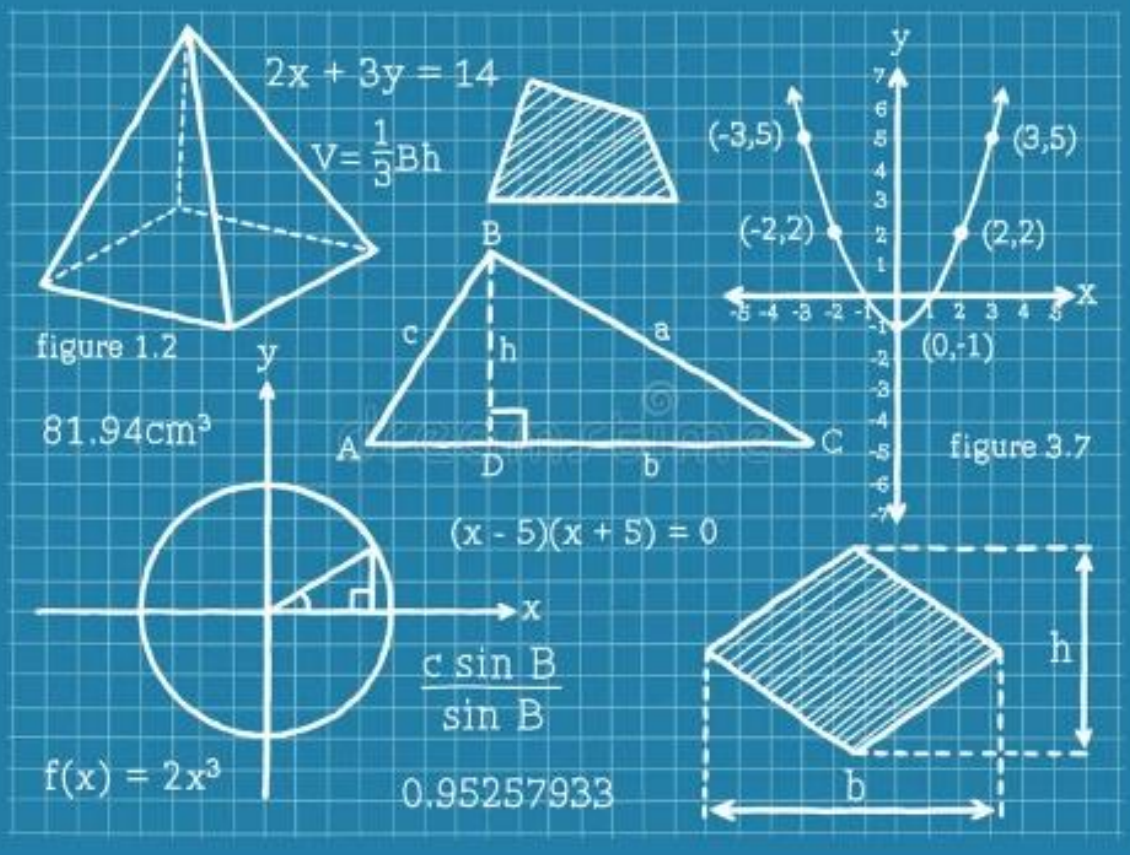
Pirnazar DAVRONOV

MATEMATIKADAN

MISOL VA MASALALAR YECHISH

1-KITOB



O‘ZBEKISTON RESPUBLIKASI XALQ TA’LIMI VAZIRLAGI

SAMARQAND VILOYATI XALQ TA’LIMI XODIMLARINI
QAYTA TAYYORLASH VA ULARNING MALAKASINI
OSHIRISH HUDUDIY MARKAZI

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Taqrizchilar:

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Mazkur metodik qo‘llanmani yozishdan maqsad, insonlarning ma’naviy ehtiyojlarini qondirishga ko‘maklashish asosida jamiyat, mamlakat taraqqiyotiga hissa qo‘shishdan iborat. Shu ma’noda maktab matematikasini o‘qib-o‘rganuvchi o‘qituvchilar, ayniqsa repetitorlik qiluvchi hamkasblar, maktabdan keyingi ta’limga tayyorgarlik ko‘ruvchi o‘quvchilar davlat test markazi tomonidan nashr etilgan axborotnomalardagi misol va masalalarni yechishda biror qiyinchlikka duch kelishsa, biz yozgan kitoblardan foydalanishlari qulay bo‘ladi.

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S O‘ Z B O S H I

Assalomu alaykum muhtaram kitobxon. Sizni muhtaram, - deb atadim. Boisi, Olloh insonni muhtaram va mukarram qilib yaratgan. Bunga barchamiz birdek musharraf bo‘lishimiz uchun shahdu shijoat ko‘rsatmog‘imiz darkor. Men, 1973 – 2018-yillar davomida oliy o‘quv yurtlarda faoliyat ko‘rsatdim va doimo talabalarimdan ma’lum qismining yaxshi o‘qimasligidan tashvishlanib yashadim. Sababi, yoshlarimizdan har biri, jonajon Vatanimizning porloq kelajagini yaratishga, o‘zining hissasini qo‘shadigan insonlar hisoblanadi.

2018-yilning sentabr oyidan boshlab “Samarqand viloyati xalq ta’limi xodimlarini qayta tayyorlash va ularning malakasini oshirish hududiy markazi”da faoliyat ko‘rsatayapman. Shu joyga ishga kelib, talabalarimning yaxshi o‘qimasligi sabablarini bildim.

Markaz rahbarining topshirig‘iga asosan, malaka oshirishga kelgan tinglovchi maktab o‘qituvchilarining o‘zi o‘qitadigan fani bo‘yicha bilimlari ikki yili davomida o‘rganildi. Afsuski, maktablarning biror o‘quv fani bo‘yicha o‘qituvchilarning o‘zlashtirishlari 50% dan oshmadi. Jahonda o‘qitilishiga eng asosiy e’tibor qaratiladigan matematika fani bo‘yicha, bizning o‘qituvchilardan o‘rtach 57 foizi qoniqarsiz natija ko‘rsatishdi. Mamlakat, bu darajadagi o‘qituvchilarning o‘quvchilaridan nimani kutishi mumkin?

Bu salbiy oqibatning bosh sababi, aksariyat o‘qituvchilarning davlatimiz tomonidan chiqarilgan ta’lim

to‘g‘risida qabul qilinayotgan qonunlar, farmonlar, qarorlar va boshqa me’yoriy hujjatlardan behabarligi, o‘qitadigan fani, uni o‘qitish metodikasi, pedagogika, psixologiya fanlari yutuqlarini o‘zlashtirib, ularni kasbiy-shaxsiy faoliyatiga qo‘llash bo‘yicha, o‘z ustida, talab darajasida ishlamasligidan iborat.

Malaka oshirishga kelgan o‘qituvchilarining e’tirof etishlaricha, 50% dan ortiq o‘quvchilar o‘zlarining o‘quv imkoniyatlaridan past darajada o‘qigan holda maktablarni bitirishmoqda.

Men, bunday ma’lumotni bergan o‘qituvchilardan biriga “Aytaylik, sinfingizda 25 nafar o‘quvchi bor, ulardan biri sizning farzandingiz. 24 nafar o‘quvchi yaxshi o‘qiyapdi, bitta sizning farzandingiz yomon o‘qishiga rozimisiz?”- degan savol bilan murojaat qilishni odat qilganman. Ular keskin ravishda “yo‘q” deb javob berishadi. Shunday ekan, 50% dan ortiq o‘quvchilarni savodsiz qoldirishni qanday baholaysizlar? O‘sha bilimi past bolaning ota-onasi qariganda, o‘zini eplay olmaydigan bu inson ularga qanday ko‘maklashadi? Bu insonning zimmasiga tushadigan mamlakat yukini kim ko‘taradi? kabi savollarimiz, o‘qituvchilarga o‘zining ta’sirini ko‘rsatmoqda, o‘ylantirib qo‘ymoqda. Ularning aksariyat qismi, o‘z ustimizda ishlab, o‘quvchilarni yaxshi o‘qitmasak bo‘lmas ekan,- degan fikrlarga kelishmoqda.

Xalqimizda “Erni er qiladigan ham, qora yer qiladigan ham …”-degan naql bor. Shunga o‘xshash, mamlakatni yuqori darajada rivojlantiradigan ham, taraqqiyotini susaytiradigan ham o‘qituvchilar hisoblanadi. Chunki, mamlakat taraqqiyoti, undagi yetuk kadrlariga bog‘liq. Bunday kadrlarni esa

o‘qituvchilar tayyorlab beradi. Demak, Ona Vatanimizning kelajakdagi taraqqiyoti, bevosita uning oqituvchilari va murabbiy mutaxassislari kasbiy-shaxsiy faoliyatlarining natijadorligiga bog‘liq.

Repetitorlik qiluvchi o‘qituvchi mustaqil izlanadi, mustaqil o‘rganadi, o‘z ustida tinimsiz ishlaydi. Barcha o‘qituvchilarning oz ustida tizimli ishlashlariga erishmasdan, Vatan taraqqiyotiga erishib bo‘lmaydi.

Hazrat Shayx Muhammad Sodiq Muhammad Yusuf o‘gitlarida aytilishicha, muallimlik eng yuksak farz amali bo‘lib, ustozlar haqqiga avvalo Olloh, farishtalar, barcha osmon va er egalari, hatto uyasidagi chumoli, suv ostidagi baliqlar ham salovat aytib turishar ekan. Har qanday kasb egasining, ayniqsa o‘qituvchining o‘z kasbiy-shaxsiy faoliyatiga mas’uliyatsizlik bilan yondashishi Olloh oldida katta gunoh, Vatanga xiyonat hisoblanar ekan. Bundan ko‘rinadiki, Ikki dunyo saodatini o‘ylaydigan har bir inson kasbiga sodiq bo‘lmog‘i darkor.

Shayx Muhammad Sodiq Muhammad Yusuf Ibn Sinoning ilm o‘rganishi tartibi misolida, qadimgi o‘qib-o‘rganish (rejasi)ning 7 bosqichini quyidagicha bayon qilgan: 1) 10 yoshgach madrasada Qur’oni karimni yod olingan; 2) qonun, ya’ni shariat ilmi; 3) hisob (matematika); 4) falsafa; 5) mantiq; 6) tib; 7) tabbiiy fanlarni o‘rganilgan. Ibn Sino matematika ilmini, ko‘mir sotib tirikchiligini o‘tkazadigan olimdan olgan.

Jahonda “Singapur mujizasi” iborasi ko‘p ishlatiladi. Singapur davlati asoschisi Li Kuan Yuga, siz “Singapur mo‘jizasi”ga qanday erishdingiz, - degan savol ko‘p berilar ekan. Li Kuan Yuning javobi: “Men Singapurda mo‘jiza

yaratmadim. Men faqat Vatanim oldidagi burchimni bajardim, xolos. Davlat byudjetini ta’limga yunaltirdim. Muallimni eng quyi tabaqadan Singapurdagi eng yuqori martabaga ko‘tardim. Davlatdagi “mo‘jiza”larni qilgan insonlar muallimlardir. Ular ilm, axloq, mehnat va haqiqatni sevadigan kamtar avlodni etishtirib chiqardilar. Buning uchun ulardan minnatdormiz”.

Respublikamiz Prezidenti Shavkat Mirziyoyev ham davlat boshiga kelgan kundan boshlab, asosiy e’tiborini ta’lim tizimini tubdan isloh qilishga qaratmoqda. Ta’lim to‘g‘risidagi chiqargan barcha farmonlari, qarorlari, Oliy Majlisga murojaatnomalari, xalq ta’limi xodimlari bilan muloqatlari mazmun mohiyati maktabgacha ta’limni, maktab ta’limini rivojlantirishga, o‘qituvchi va murabbiylarni kasbidan tashqari ishlardan, ortiqcha qog‘ozbozliklardan ozod qilishga, ularning ijtimoiy, iqtisodiy mavqe`i oshirishga qaratilgan. Jumladan, O‘zbekiston Republikasi Prezidenti Shavkat Mirziyoyev huzurida 2019-yil 23-avgust kuni “Yoshlarni vatanparvarlik ruxida tarbiyalash va jamiyatda o‘qituvchi mavqeini oshirish” masalalariga bag‘ishlab o‘tkazilgan videoselektr majlisi Bayonida “O‘zbekiston Republikasi Prezidenti Administratsiyasi, Hukumati, barcha darajadagi davlat va xo‘jalik boshqaruv organlari, mahalliy hokimliklar rahbarlarining e’tibori maktab ta’limini rivojlantirish buyuk umummilliy maqsadga, umumxalq harakatlga aylanishi, ustozlarga yuksak hurmat-ehtirom ko‘rsatish – jamiyatimizda oliy qadriyat darajasiga ko‘tarilishi zarur ekanligi ko‘rsatilsin”.

Joylarda barcha rahbarlar va mutasaddilar “Butut kuchni xalq ichidan olaylik, quchoq ochib maktablarga boraylik” shiori

ostida maktab ta’limini rivojlantirishga yunaltirilgan buyuk umummilliy maqsadga, umumxalq harakatlga ytakchilik qilishi ko‘rsatib o‘tilsin” kabi qator, juda muhim qarorlar o‘z aksini topgan.

Respublikamiz xalqaro baholash tashkilotlariga a’zo bo‘ldi. 4-sinf o‘quvchilarining matnni o‘qish va tushunsh darajasi baholash uchun PIRLIS, 4- va 8-sinf o‘quvchilarining matematika va tabiiy yunalishdagi fanlardan o‘zlashtirish darajasini baholashda TIMISS, 15 yoshli ta’lim oluvchilarning o‘qish, matematika va tabiiy yunalishdagi fanlardan savodxonlik darajasini baholashda PISA, jahon miqyosida katta e’tibor qaratilayotgan STEAM (S – scitnce (tabiiy fanlar), T – technology (texnologiya), E – engineering (muxandislik san’ati), A – art (ijod), M – mathematics (matematika)) dasturi asosida amalga oshiriladigan bo‘ldi.

Ushbu tashkilotlarning barchasida matematik ta’limga aloxida e’tibor qaratilgan. Bunga hamohang tarzda, O‘zbekiston Respublikasi Prezidentining 2020-yil 7-maydagi “Matematika sohasidagi ta’lim sifatini oshirish va ilmiy-tadqiqotlarni rivojlantirish chora-tadbirlari to‘g‘risida” gi PQ-4708-son Qarori e’lon qilindi.

Muqaddas kitobimiz Qur’oni Karim “Iqro”, ya’ni o‘qi deb boshlangan bo‘lsa, Payg‘ambarimiz (s.a.v): “Beshikdan qabrgacha ilm izlang”,- deb marhamat qilgan bo‘lsalar, Imom Buxoriy (r.a): “Dunyoda ilmdan boshqa najot yuq va bo‘lmagay”,-deb aytgan bo‘lsa, Republikamiz Prezidenti Shavkat Mirziyoyev “O‘qituvchi va murabbiylar biz uchun ibrat namunasi, barcha insoniy fazilatlar timsolidir”, - deb

bizlarni ulug‘laydi.

Biz muallim va murabbiylar kitoblarda va davlatimiz rahbari tomonidan shunchalik ulug‘lanar ekanmiz, Ona Vatanimizning porloq kelajagi va avlodlarimizning bizdan rozi bo‘lishlari, faxrlanishlari, ikki dunyomizning saodatli bo‘lishi uchun kasbimizga sodiqlik bilan mehnat qilishimiz zarur.

Men, Davlat test markazi tomonidan 1996-2003 yillarda chop etilgan 89 ta “Axborotnoma” ning 77 tasida matematika fanidan berilgan 5773 ta misol va masalalarni, 2003 yildan so‘ng “Matematika” va “Abiturient” ruknlarida e’lon qilingan misol va masalalarni yechib chiqqanman. Tabiiy-ki, malakalarini oshirishga kelgan maktablar o‘qituvchilarda “70 yoshdan oshgan bobo shuncha ish qilayotgan ekan, men nima qilayapman”,-degan fikrni uyg‘otish, ularni o‘z ustida ishlashga va repetitorlik qilishga yunaltirish maqsadida, yechilgan misol va masalalarimni matematika va fizika yunalishlari tinglovchilariga ko‘rsataman. Ishlarni ko‘rgan, mutaxassisligi qaysi fandan bo‘lishiga qaramasdan, ularni kitob qilib chiqarishimni taklif etishadi, hamma uchun foydali bo‘lishini ta’kidlashadi. Hatto ko‘pchiligi, qo‘lyozmalarimdan nushalar olishmoqdalar.

Hamkasblarimning takliflariga asosan, o‘zim yechgan misol va masalalarimni o‘quv qo‘llanma shakliga nashr etishga kirishdim. Bunda, misol va masalalarning yechimlarini berishda, kitobxonni ko‘proq mustaqil izlanishga, mustaqil fkrlashga, mustaqil ishlashga yunaltirishni maqsad qilib qo‘ydik, ya’ni o‘quvchi foydalanilgan formulalarni izlab topsin, masala yechilishining oson joylari, o‘quvchining qo‘liga

qog‘oz, ruchka olib oxiriga yetkazishi uchun qoldirilgan. Boshqacha aytganda masalalarning yechimlarini berishda “Keys stadi” talablari e’tiborga olindi.

Masalalarni yechishga bunday yondashuv, ta’lim oluvchilarni bilim, ko‘nikma va malakani shakllantirish bilan birga, ularda kompetentli-faoliyatli bo‘lishlarini kuchaytiradi, uzluksiz ta’lim olish, ehtiyojlari va qobiliyatlarini rivojlantirish layoqatini hosil qiladi.

Kitob yozishning bosh maqsadi, insonlarning ma’naviy ehtiyojlarini qondirishga ko‘maklashish asosida jamiyat, mamlakat taraqqiyotiga hissa qo‘shishdan iborat.

1996-1997-yillar axborotnomalarida berilgan misol va masalalarning yechimlarini mavzulashtirilgan tarzda, qolgan yillarnikini esa axborotnomalarda keltirilgan tartibda berdik.

Biz taklif etayotgan tizimda, o‘quvchi dastlab mavzulashtirilgan bir xil tipdagi misol va masalalarni yechishsa, keyingi axborotnoma bilan ishlash bosqichida, oldin o‘rgangan bilimlarini, o‘zgaruvchan sharoitlarda qo‘llay olish ko‘nikmalarini egallashadi.

Xulosa qilib aytganda, barchamiz birgalikda Vatanimiz, elimiz manfaati yulida umr bo‘yi o‘quvchi bo‘lib qolaylik, eng muhimi mustaqil izlanib, mustaqil o‘rganib, yangidan yangi g‘oyalarni o‘zlashtiraylik, ularni hayotga tatbiq etishda haqiqiy pragmatik bo‘lib, millatimizning koriga yaraydigan azmu shijoatli, g‘ayratu jasoratli, aqlu zakovatli, jamiyat, davlat va oila oldida o‘zining mas’uliyatini chuqur anglaydigan, erkin fikrlovchi, faol, ilmni, axloqni, mehnatni va haqiqatni sevadigan, kamtar insonlarni o‘qitib tayyorlab beraylik.

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Misollar

(1996-1-1) $26 \cdot 25 - 25 \cdot 24 + 24 \cdot 23 - 23 \cdot 22 - 12 \cdot 8$ ning qiymatini toping.

A) 106 B) 1 C) 54 D) 8 E) 0

Yechilishi: 1) matematikada birinchi o‘rinda ishoralar va belgilarga e’tiborni qaratish zarur;

2) ko‘paytiruv bor joy birhad;

3) bir hadlar ayiruv, qo‘shuv ishoralari bilan bog‘lanib ko‘p hadlar hosil bo‘ladi;

4) ko‘paytiruv, qo‘shuv (ayiruv) bor joyda bir xil ko‘paytuvchilar qavsdan tashqariga chiqariladi va o‘rnida bir qoladi.

Shunga ko‘ra:

$26 \cdot 25 - 25 \cdot 24 + 24 \cdot 23 - 23 \cdot 22 - 12 \cdot 8 =$

$= 25(26 - 24) + 23(24 - 22) - 12 \cdot 8 =$

$= 25 \cdot 2 + 23 \cdot 2 - 96 = 2 \cdot (25 + 23) - 96 =$

$= 96 - 96 = 0.$ Javobi: E.

(1996-10-1) $21 \cdot 13 + 24 \cdot 13 + 45 \cdot 12 + 25 \cdot 44 - 89 \cdot 24$ ning qiymatini toping.

A)79 B) 126 C) 89 D) 0 E) 1

Yechilishi: $21 \cdot 13 + 24 \cdot 13 + 45 \cdot 12 + 25 \cdot 44 -$

$-89 \cdot 24 =$

$= 13 \cdot (21 + 24) + 45 \cdot 12 + 25 \cdot 44 - 89 \cdot 24 =$

$= 13 \cdot 45 + 45 \cdot 12 + 25 \cdot 44 - 89 \cdot 24 =$

$= 45(13 + 12) + 25 \cdot 44 - 89 \cdot 24 =$

$= 45 \cdot 25 + 25 \cdot 44 - 89 \cdot 24 = 25(45 + 44) - 89 \cdot 24 =$
$= 25 \cdot 89 - 89 \cdot 24 = 89(25 - 24) = 89 \cdot 1 = 89.$
Javobi: C.

Xulosa: Bunday misollar bir xil ko‘paytuvchilarni qavsdan tashqariga chiqarish orqali yechiladi.

(1997-12-2) Natural sonni 18 ga bo‘lganda, bo‘linma 15 ga, qoldiq 3 ga, teng bo‘ldi. Bo‘linuvchini toping.

A) 173 B) 243 C) 253 D) 273 E) 263

Yechilishi: Bo‘linuvchini topish uchun bo‘luvchini bo‘linmaga ko‘paytirib, qoldiqni qo‘shish kerak.

n- bitta natural son;

N- barcha natural sonlar to‘plami.

$n = 18 \cdot 15 + 3 = 273.$ Javobi: D.

(1996-3-71) 8^{99} oxirgi raqamini toping.

A) 0 B) 2 C) 4 D) 6 E) 8

Yechilishi: 8^{99} ning ma’nosi: 99 ta 8 ni bir-biriga ko‘paytirish;

99 ta 8 bir-biriga ko‘paytirilsa, bitta son hosil bo‘ladi.

Uning oxirgi raqami x topiladi:

$$8^{99} = \underbrace{8 \cdot 8 \cdot 8 \cdot \ldots \cdot 8}_{99\ ta} = \cdots x$$

Bu misol 3 bosqichda yechiladi:

1) takrorlanish soni topiladi: $\underbrace{\begin{matrix}1 & 2 & 3 & 0\\ 8 & 4 & 2 & 6\end{matrix}}_{4\ ta}$

Izoh: yozuvdagi 1, 2, 3, 0 lar qoldiqlar;

Ikkinchi qatordagi 8, berilgan sonning birinchi darajasini, 4 esa 8 kvadrati 64 ning oxirgi raqami, 2 esa 8 kudi 512 ning oxirgi raqami, 6 esa 8 to‘rtinchi darajasi 4096 ning oxirgi raqamini bildiradi.

Demak, 8^{99} soni darajaga ko‘tarilganda har to‘rtta 8, 4, 2, 6 oxirgi raqamlar takrorlanadi. Bundan ko‘rinadiki 8^{99} ning takrorlanish soni 4 ga teng.

2) 8^{99} darajaning daraja ko‘rsatkichi 99, takrorlanish soni 4 ga bo‘linadi.

3) qoldiq 3, izlanayotgan oxirgi raqam x ni aniqlaydi: $x = 2$. Javobi: C.

(1996-3-66) $\left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\cdot\ldots\cdot\left(1-\frac{1}{100^2}\right)$ ni hisoblang.

A) $\frac{8751}{9900}$ B) $\frac{143}{200}$ C) $\frac{441}{600}$ D) $\frac{101}{200}$ E) $\frac{151}{300}$

Yechilishi: $\left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\cdot\ldots\cdot\left(1-\frac{1}{100^2}\right)=$

1) Birinchi qavsning minusligi, oxirgi qavsning plyusligi kvadratsiz olinib, bir-biriga ko‘paytiriladi.

$=\left(1-\frac{1}{2}\right)\cdot\left(1+\frac{1}{100}\right)=$

2) Butun sonning maxraji 1 ga teng. $=\left(\frac{1}{1}-\frac{1}{2}\right)\cdot$

$\left(\frac{1}{1}+\frac{1}{100}\right)=$

3) kasir, ayiruv (qo‘shuv) bor joyda umumiy maxraj topiladi.

4) barcha maxrajlar bo‘linadigan eng kichik songa, umumiy maxraj deyiladi.

5) 1 bilan 2 ga umumiy maxraj 2 bo‘ladi.

6) umumiy maxraj birinchi kasrning maxrajiga bo‘linib, natija suratning ustiga yoziladi, huddi shunday umumiy maxraj ikkinchi kasrning maxrajiga bo‘linib, natija suratning ustiga yoziladi.

$\left(\frac{2}{1}-\frac{1}{2}\right)\cdot\left(\frac{100}{1}+\frac{1}{100}\right)=$

7) surat ustidagi songa ko‘paytiriladi, maxraj o‘zgarmaydi. Kasrni kasrga ko‘paytirish uchun surat suratga, maxraj maxrajga ko‘paytiriladi

$= \frac{2-1}{2} \cdot \frac{100+1}{100} = \frac{1}{2} \cdot \frac{101}{100} = \frac{101}{200}$. Javobi: D.

(1996-12-64) $\left(1-\frac{1}{3^2}\right)\left(1-\frac{1}{4^2}\right) \cdot \ldots \cdot \left(1-\frac{1}{101^2}\right)$ ni hisoblang.

A) $\frac{157}{303}$ B) $\frac{142}{303}$ C) $\frac{65}{101}$ D) $\frac{64}{101}$ E) $\frac{68}{101}$

Yechilishi: $\left(1-\frac{1}{3^2}\right)\left(1-\frac{1}{4^2}\right) \cdot \ldots \cdot \left(1-\frac{1}{101^2}\right) =$

$= \left(1-\frac{1}{3}\right)\left(1+\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1+\frac{1}{4}\right) \cdot \ldots \cdot$

$\cdot \left(1-\frac{1}{101}\right)\left(1+\frac{1}{101}\right) = \left(1-\frac{1}{3}\right)\left(1+\frac{1}{101}\right) =$

$= \frac{2}{3} \cdot \frac{102}{101} = \frac{68}{101}$.

1) Kasr, ko‘paytuvchi bor joyda qisqartirishning bor yoki yuqligini o‘ylash kerak.

2) Kasr bor joyda qisqartirishning bor yoki yuqligini o‘ylash kerak.

3) 102 bilan 3, uchga qisqaradi. 102 ni 3 ga bo‘lsak 34 tadan, 3 ni 3 ga bo‘lsak bittadan (maematika o‘rganishni xohlovchi shunga o‘xshash gapirishni bilmog‘i darkor). Javobi: E.

(1997-8-1) $5{,}8 - \frac{3}{7} \cdot 2{,}2 \cdot \left(-2\frac{1}{3}\right)$ ni hisoblang.

A) 3,6 B) -8 C) 8 D) -3,6 E) 6

Yechilishi: $5{,}8 - \frac{3}{7} \cdot 2{,}2 \cdot \left(-2\frac{1}{3}\right) =$

1) verguli bor kasrni o‘nli kasr deyiladi;

2) verguldan keyin 1 ta raqam tursa son10 ga, 2 ta raqam tursa 100 ga va hokazo bo‘linadi. Natijada o‘nli kasr to‘g‘ri yoki noto‘g‘ri kasr ko‘rinishiga keladi;

3) aralash sonni noto‘g‘ri kasrga aylantirish uchun, maxraji butunga ko‘paytirilib, suratga qo‘shiladi va maxraj o‘zgarishsiz qoldiriladi;

$= \frac{58}{10} + \frac{3}{7} \cdot \frac{22}{10} \cdot \frac{7}{3} = \frac{29}{5} + \frac{11}{5} = \frac{29+11}{5} = \frac{40}{5} = 8.$ Javobi: C.

(1997-8-4) 1 soat 60 minut 2 sekund necha sekunddan iborat?

A) 106002 B) 12202 C) 14202

D) 13202 E) 12102

Yechilishi: $1\ s\ 160\ min\ 2\ sek =$

1) Orasiga qo‘shuv qo‘yib yoziladi.

$1\ s + 160\ min + 2\ sek = 60\ min + 160\ min + 2\ sek =$

$= 220\ min + 2\ sek =$

2) $220\ min\ ni\ 220 \cdot 1$ min $deb\ yoziladi.$

$= 220 \cdot 1\ min + 2\ sek = 220 \cdot 60\ sek + 2\ sek =$

$= 13200\ sek + 2\ sek = 13202\ sek.$ Javobi: D.

(1997-8-9) Quyidagilardan qaysi biri -1 ga teng?

A)$((-1)^3)^2$ B)$(-(-1)^3)^6$ C)$(-(-1)^2)^4$

D)$-((-1)^3)^4$ E) $((-1)^2)^4$

Yechilishi: 1) manfiy sonning juft darajasi musbat son bo‘ladi:

$(-1)^2 = 1;\ (-1)^4 = 1;\ (-1)^6 = 1;$

2) manfiy sonning toq darajasi manfiy son bo‘ladi:

$(-1)^3 = -1;\quad (-1)^5 = -1;\quad (-1)^7 = -1;$ Javobi: D.

(1997-7-2) $x = 10842,\ y = 5{,}49 \cdot 10^4\ va\ z = 306198$ sonlardan qaysilari 18 ga qoldiqsiz bo‘linadi?

A) $faqat\ x$ B) $faqat\ y$ C) $y\ va\ x$
D) $faqat\ z$ E) $y\ va\ z$

Yechilishi: 1) Takma-tak yoziladi.

	2	9	18
$x = 10842$	+	−	−
$y = 5{,}49 \cdot 10^4$	+	+	+
$z = 306198$	+	+	+

2) Sonning standart shakli, oddiy shaklda yoziladi. Bunda, 10^4 darajani, birdan keyin to‘rtta nol turibdi deb tushunish kifoya, ya’ni 10 000 bo‘ladi. Javobi: E.

(1997-7-6) $\frac{42}{95} \cdot 1\frac{3}{14} : \frac{3}{5} : 2 \cdot 4\frac{3}{4}$ ni hisoblang.

A) $\frac{13}{8}$ B) $1\frac{3}{8}$ C) $2\frac{1}{8}$ D) $1\frac{5}{7}$ E) $2\frac{3}{5}$

Yechilishi: $\frac{42}{95} \cdot 1\frac{3}{14} : \frac{3}{5} : 2 \cdot 4\frac{3}{4} =$ Bo‘luvni ko‘paytiruvga aylantirish uchun keyin turgan sonni teskari yozish kerak.

$= \frac{42}{95} \cdot \frac{17}{14} \cdot \frac{5}{3} \cdot \frac{1}{2} \cdot \frac{19}{4} = \frac{17}{8} = 2\frac{1}{8}$. Javobi: C.

(1997-7-14) $\sqrt{\frac{59^3 - 41^3}{100} - 59 \cdot 41}$ ifodaning qiymatini toping.

A) 24 B) 100 C) 18 D) 50 E) 36

Yechilishi:

$$\sqrt{\frac{59^3 - 41^3}{100} - 59 \cdot 41} = \sqrt{\frac{(59+41)(59^2 - 59 \cdot 41 + 41^2)}{100} - 41 \cdot 59} =$$

$$\sqrt{59^2 - 2 \cdot 59 \cdot 41 + 41^2} = \sqrt{(59 - 41)^2} = \sqrt{18^2} = 18.$$

Javobi: C.

(1997-7-9) $\left(4\frac{1}{10} - 3\frac{4}{15}\right) \cdot \frac{5}{6} + 4\frac{1}{10} : 1\frac{1}{5}$ ni hisoblang.

A) $3\frac{5}{9}$ B) $4\frac{1}{9}$ C) $5\frac{2}{3}$ D) $2\frac{3}{5}$ E) $3\frac{7}{9}$

Yechilishi: $\left(4\frac{1}{10}-3\frac{4}{15}\right)\cdot\frac{5}{6}+4\frac{1}{10}:1\frac{1}{5}=$

$=\left(\frac{41}{10}-\frac{49}{15}\right)\cdot\frac{5}{6}+\frac{41}{10}:\frac{6}{5}=\frac{41}{10}\cdot\frac{5}{6}-\frac{49}{15}\cdot\frac{5}{6}+\frac{41}{10}\cdot\frac{5}{6}=$

$=\frac{41}{12}-\frac{49}{18}+\frac{41}{12}=$

o‘zlari ham, ishoralari ham bir xil sonlar qo‘shilib, ulardan ikkita bo‘ladi

$=2\cdot\frac{41}{12}-\frac{49}{18}=\frac{41}{6}-\frac{49}{18}=\frac{123-49}{18}=\frac{74}{18}=\frac{37}{9}=4\frac{1}{9}.$

Javobi: B.

(1997-7-11) $2\cdot4^{-2}+\left(\frac{2}{3}\right)^{-3}-\left(\frac{1}{5}\right)^{0}$ ni hisoblang.

A) $3\frac{1}{2}$ B) $4\frac{2}{3}$ C) 2 D) 2,5 E) 0

Yechilishi: $2\cdot4^{-2}+\left(\frac{2}{3}\right)^{-3}-\left(\frac{1}{5}\right)^{0}=2\cdot\frac{1}{4^2}+\left(\frac{3}{2}\right)^{3}-1=$

$=\mathbf{2}\cdot\frac{1}{16}+\frac{3^3}{2^3}-1=\frac{2}{16}+\frac{27}{8}-1=\frac{1}{8}+\frac{27}{8}-1=$

$=\frac{1+27-8}{8}=\frac{20}{8}=\frac{5}{2}=2\frac{1}{2}=2{,}5.$ Javobi: D.

(1997-6-1) $\frac{0{,}15-0{,}15\cdot6{,}4}{0{,}175-\frac{3}{8}}$ ni hisoblang.

A) 4,05 B) 40,5 C) -0,405 D) 2,1 E) -0,21

Yechilishi: $\frac{0{,}15-0{,}15\cdot6{,}4}{0{,}175-\frac{3}{8}}=\frac{0{,}15(1-6{,}4)}{0{,}175-0{,}375}=$

$\frac{1}{2}=0{,}5$
$\frac{1}{4}=0{,}25$
$\frac{3}{4}=0{,}75$
$\frac{3}{8}=0{,}375$

1) Ikkita son hir xil ishorali bo‘lsa, katta sondan kichik son ayriladi va natijaga katta sonning ishorasi qo‘yiladi;

2) ko‘paytirsh yoki bo‘lish amalidan keyin kelgan minus son qavsda yoziladi;

$= \frac{0{,}15\cdot(-5{,}4)}{-0{,}200} =$ 3) o‘nli kasr oxirida kelgan nollar

$= \frac{-0{,}15\cdot 5{,}4}{-0{,}2} =$ tashlab yuboriladi;

4) kasrning surati maxrajidan vergullar bir xil suriladi;

$= \frac{0{,}15\cdot 54}{2} = 0{,}15 \cdot 27 = 4{,}05.$ Javobi: A.

(1997-6-1) $16\cdot 27 \cdot 38 \cdot 19 + 22 \cdot 43 \cdot 98$ yig‘indining oxirgi raqamini toping.

A) 8 B) 6 C) 4 D) 2 E) 0

Yechilishi: $16\cdot 27 \cdot 38 \cdot 19 + 22 \cdot 43 \cdot 98 =$

1) Oxirgi raqamlar ko‘paytirilib, qo‘shiladi.

$= \cdots 4 + \cdots 8 = \cdots 2.$ Javobi: D.

(1997-6-3) $\left(\frac{5}{9} - 1\frac{1}{6}\cdot\frac{1}{2}\right):\frac{5}{9} + \frac{1}{3}$ ni hisoblang.

A) $\frac{3}{20}$ B) $\frac{17}{60}$ C) $\frac{7}{30}$ D)$-\frac{7}{60}$ E)$-\frac{11}{30}$

Yechilishi: $\left(\frac{5}{9} - 1\frac{1}{6}\cdot\frac{1}{2}\right):\frac{5}{9} + \frac{1}{3} = \left(\frac{5}{9} - \frac{7}{6}\cdot\frac{1}{2}\right)\cdot\frac{9}{5} + \frac{1}{3} =$

$= \left(\frac{5}{9} - \frac{7}{12}\right)\cdot\frac{9}{5} + \frac{1}{3} = \frac{5}{9}\cdot\frac{9}{5} - \frac{7}{12}\cdot\frac{9}{5} + \frac{1}{3} =$

$= 1 - \frac{21}{20} + \frac{1}{3} = \frac{60-63+20}{60} = \frac{17}{60}.$ Javobi: B.

(1997-9-78) $\frac{72^6\cdot 24^4}{36^8\cdot 8^3}$ ni hisoblang.

A) 24 B) 32 C) 16 D) 36 E) 28

Yechilishi: $\frac{72^6\cdot 24^4}{36^8\cdot 8^3} =$ 1) kattasi maydasiga keltirib yechiladi;

$= \frac{(2\cdot 36)^6\cdot(3\cdot 8)^4}{36^8\cdot 8^3} =$ 2) formula: $(a\cdot b)^m = a^m\cdot b^m$

$= \frac{2^6\cdot 36^6\cdot 3^4\cdot 8}{36^8\cdot 8^3} =$

3) kasrning surati va maxrajini, suratidagi kichigi 36^6 ga qisqartirganda, suratda o‘zini-o‘ziga bo‘lsak 1 tadan, maxrajdagi 8 ta 36 dan oltitasi qisqarib ketib, ikkitasi qoladi.

$= \frac{2^6 \cdot 3^4 \cdot 8}{36^2} = \frac{2^6 \cdot 3^4 \cdot 2^3}{(4 \cdot 9)^2} = \frac{2^6 \cdot 2^3 \cdot 3^4}{(2^2 \cdot 3^2)^2} =$

4) formula $a^m \cdot a^n = a^{m+n}$ va $(a^m)^n = a^{m \cdot n}$;

$= \frac{2^{6+3} \cdot 3^4}{2^4 \cdot 3^4} = \frac{2^9}{2^4} = 2^5 = 32.$ Javobi: B.

(1997-9-62) 41582637 quyidagi sonlardan qaysi biriga qoldiqsiz bo‘linadi.

A) 4 B) 9 C) 5 D) 10 E) 6

Yechilishi: 41582637 Raqamlari yig‘indisi

$4 + 1 + 5 + 8 + 2 + 6 + 3 + 7 = 36$ soni 9 ga bo‘linadi.

Demak, berilgan son 9 ga qoldisiz bo‘linadi. Javobi: B.

(1997-9-64) n raqamining qanday qiymatlarida $\sqrt{49 + n}$ ning butun qismi 7 bo‘ladi?

A) 0; 1; 2 B) 0;1 C) 3; 4; 5

D) hech qanday qiymatida E) barcha qiymatlarida

Yechilishi: $\sqrt{49 + n}$; $\boxed{\begin{matrix}\sqrt{49}=7 \\ \sqrt{64}=8\end{matrix}}$

$n = 0 \Rightarrow \sqrt{49 + 0} = 7;$ $n = 1 \Rightarrow \sqrt{50} = 7, ...$

$n = 2 \Rightarrow \sqrt{51} = 7, ...$

... ...

$n = 9 \Rightarrow \sqrt{49 + 9} = 7, ...$ Javobi: E.

(1997-9-63) Eng katta sonni toping.

A) 3 B) $\sqrt[3]{26}$ C) $\sqrt{10}$ D) $\sqrt[4]{82}$ E) $\sqrt[5]{242}$

Yechilishi: Berilgan sonlarni o‘z aro taqqoslash uchun katta ildiz ko‘rsatkichga darajaga ko‘tariladi.

$3 > \sqrt[3]{26} \Rightarrow \begin{cases} 3^3 = 27 \\ \left(\sqrt[3]{26}\right)^3 = 26 \end{cases}$; $3 < \sqrt{10} \Rightarrow$

$\begin{cases} 3^2 = 9 \\ \left(\sqrt{10}\right)^2 = 10 \end{cases}$;

$\sqrt{10} > \sqrt[4]{82} \Rightarrow \begin{cases} \left(\sqrt{10}\right)^4 = 100 \\ \left(\sqrt[4]{82}\right)^4 = 82 \end{cases}$;

$\sqrt{10} > \sqrt[5]{242} \Rightarrow \begin{cases} \left(\sqrt{10}\right)^5 = 100\sqrt{10}; \\ \left(\sqrt[5]{242}\right)^5 = 242. \end{cases}$

2) $\sqrt{10}$ dan, 3 dan kattaroq son ildizdan chiqadi, uni 100 ga ko‘paytirilsa, 300 dan katta bo‘ladi.

Izoh: kub bilan kub ildiz qisqarib tagi chiqadi va hokazo.

Javobi: C.

(1997-7-24) $\frac{3+\sqrt{7}}{3-\sqrt{7}} - \frac{3-\sqrt{7}}{3+\sqrt{7}}$ ning qiymatini toping.

A) $4+\sqrt{7}$ B) $-3\sqrt{7}$ C) $6\sqrt{7}$ D) 3 E) 6

Yechilishi: $\frac{3+\sqrt{7}}{3-\sqrt{7}} - \frac{3-\sqrt{7}}{3+\sqrt{7}} =$ 1) umumiy maxraj ikki kasr maxrajlarining ko‘paytmasidan iborat

2) ko‘p hadlar qavsga olib ko‘paytiriladi.

$= \frac{\left(3+\sqrt{7}\right)^{1+1} - \left(3-\sqrt{7}\right)^{1+1}}{\left(3-\sqrt{7}\right)\left(3+\sqrt{7}\right)} =$

$\left(3+\sqrt{7}\right)^1 \cdot \left(3+\sqrt{7}\right)^1 = \left(3+\sqrt{7}\right)^{1+1}$;

$\frac{\left(3+\sqrt{7}\right)\left(3-\sqrt{7}\right)}{3-\sqrt{7}} = 3+\sqrt{7}; a = 3+\sqrt{7};\ b = 3-\sqrt{7}$

$= \frac{\left(3+\sqrt{7}\right)^2 - \left(3-\sqrt{7}\right)^2}{\left(3-\sqrt{7}\right)\left(3+\sqrt{7}\right)} =$

3) orada minus bo‘lsa, $a^2 - b^2$ formulani o‘ylash kerak;

4) formulaning chapi bo‘lsa, o‘ng tomoniga o‘tiladi;

5) formulaning o‘ngi bo‘lsa, chap tomoniga o‘tiladi;

6) a birinchi kvadratning tagidan;

b oxirgi kvadratning tagidan topiladi;

7) minusdan qo‘rqish kerak, shuning uchun “-,, dan keyin qavs ochiladi;

$$= \frac{[3+\sqrt{7}-(3-\sqrt{7})](3+\sqrt{7}+3-\sqrt{7})}{3^2-(\sqrt{7})^2} =$$

8) qavs oldidagi “-,, ishora, qavsning ichidagi barcha hadlarning ishoralarini o‘zgartiradi;

9) o‘zlari bir xil, ishoralari har xil sonlar ayrilib nol bo‘ladi;

$$= \frac{(3+\sqrt{7}-3+\sqrt{7})(3+\sqrt{7}+3-\sqrt{7})}{9-7} = \frac{2\cdot\sqrt{7}\cdot 2\cdot 3}{2} = \frac{\sqrt{7}\cdot 6}{1} =$$

10) son 1 ga bo‘linsa, o‘sha sonning o‘zi hosil bo‘ladi;

11) ko‘paytuvchilarning o‘rni almashgani bilan, ko‘paytma o‘zgarmaydi;

$= \sqrt{7}\cdot 6 = 6\sqrt{7}.$ Javobi: C.

(1997-9-80) $\frac{1000^3+3\cdot 1000\cdot 995+995^3}{1000^2+2\cdot 1000\cdot 995+995^2}$ ni hisoblang.

A) 1995 B) 195 C) 995 D) 2195 E) 895

Yechilishi: $\frac{1000^3+3\cdot 1000\cdot 995+995^3}{1000^2+2\cdot 1000\cdot 995+995^2} =$

1) misolda kub plus uch kelsa, kub formulaning plyusligiga qarash kerak;

2) kub formulaning o‘ng tomonida 4 ta had bor, misolda esa 3 ta had bor. Demak, misolni formulaga moslash kerak;

3) misolning maxrajida kvadrat plyus 2 bor ekan, demak bu kvadrat formulaning o‘ng tomoni bo‘lib, chap tomoniga o‘tish talab etiladi;

$= \frac{1000^3+3\cdot 1000^2\cdot 995\cdot(1000+995)+995^3}{(1000+995)^2} =$

$= \frac{1000^3+3\cdot 1000^2\cdot 995+3\cdot 1000\cdot 995^2+995^3}{1995^2} =$

$= \frac{(1000+995)^3}{995^2} = \frac{1995^3}{1995^2} = 1995.$ Javobi: A.

(1996-1-2) Bir nechta natural sonlarning yig‘indisi 75 ga teng. Agar shu sonlarning har biridan 2 ni ayirib, yig‘indi hisoblansa, u 61 ga teng bo‘ladi. Yig‘indida nechta son qatnashgan?

A) 5 B) 7 C) 14 D) 8 E) 6

Yechilishi: Katta sondan o‘rtachasi ayrilib kichigiga bo‘linadi. $(75-61):2=7.$ Javobi: B.

(1996-1-3) $\frac{6,8\cdot 0,04\cdot 1,65}{3,3\cdot 5,1\cdot 0,16}$ ning qiymatini toping.

A) 6 B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{1}{6}$ E) $\frac{5}{12}$

Yechilishi: $\frac{6,8\cdot 0,04\cdot 1,65}{3,3\cdot 5,1\cdot 0,16} =$

Kasrning surati va maxrajidan vergullar bir xil suriladi hamda qisqartirish bajariladi:

$= \frac{68\cdot 4.165}{33\cdot 510\cdot 16} = \frac{1}{6}.$ Javobi: D.

(1996-1-7) 0,6 ga teskari sonni toping.

A) -0,6 B) $1\frac{2}{3}$ C) 0,4 D) -6 E) $\frac{3}{6}$

Yechilishi: $0,6 = \frac{6}{10} \Rightarrow \frac{5}{3} = 1\frac{2}{3}.$ Javobi: B.

(1996-1-8) $\frac{9}{11}$ va 1 sonlari orasida maxraji 33 ga teng bo‘lgan nechta kasr bor?

A) 2 B) 1 C) 5 D) 6 E) 4

Yechilishi: 1) “orasida,, so‘zi e’tiborga olinadi;

2) kasrning surati va maxrajini bir xil songa ko‘paytirish mumkin;

3) qisqaradigan kasr hisobga olinmaydi;

$\frac{9}{11} = \frac{27}{33}, \underbrace{\frac{28}{33}, \frac{29}{33}, \frac{30}{33}, \frac{31}{33}, \frac{32}{33}}_{4\ ta}, \frac{33}{33} = 1.$ Javobi: E.

(1996-1-12) Quyidagi sonlardan qaysi biri 0,(2) ga teng.

A) $\frac{1}{9}$ B) $\frac{4}{18}$ C) $\frac{2}{3}$ D) 0,22 E) $\frac{2}{10}$

Yechilishi: 0,(2) davriy o‘nli kasr, davri 2 ga teng,

0,(2)=0,2222… 1) berilgan son vergulsiz, qavssiz kasrning suratiga yoziladi.

2) maxrajga qavsning ichida nechta raqam turgan bo‘lsa, shuncha 9 yoziladi.

$0,(2) = \frac{2}{9} = \frac{4}{18}$. Javobi: B.

(1996-1-13) $\frac{1^2-0,4^2}{2,8\cdot 0,4-2,8}$ ni hisoblang.

A) $\frac{1}{2}$ B) $-\frac{1}{2}$ C) -5 D) 5 E) $\frac{1}{7}$

Yechilishi: $\frac{1^2-0,4^2}{2,8\cdot 0,4-2,8} = \frac{(1-0,4)(1+0,4)}{2,8(2,8-1)} =$

1) birinchi qavs ichidagi hadlarning o‘rinlarini almashtirish uchun, qavsdan minus chiqarish kerak.

$= \frac{-(0,4-1)\cdot 1,4}{2,8\cdot(0,4-1)} = -\frac{14}{28} = -\frac{1}{2} = -0,5.$ Javobi: B.

(1996-1-24) $\frac{9^2\cdot 3^5}{81^2}$ ni hisoblang.

A) 1 B) 3 C) $\frac{1}{81}$ D) 9 E) 27

Yechilishi: $\frac{9^2\cdot 3^5}{81^2} = \frac{(3^2)^2\cdot 3^5}{(3^4)^2} = \frac{3^4\cdot 3^5}{3^8} = 3^{4+5-8} = 3.$

Javobi: B.

(1996-3-1) $12-6:3+2\cdot 4$ ning qiymatini toping.

A) 16 B) 11 C) 18 D) 48 E) $4\frac{2}{3}$

Yechilishi: $12-6:3+2\cdot 4=12-2+8=18.$

Javobi: C.

(1996-3-6) $-8+6:(-2)-2(-11)$ ni hisoblang.

A) 23 B) 11 C) -11 D) -10 E) 143

Yechilishi: $-8+6:(-2)-2(-11)=-8-3+22=11.$

Javobi: B.

(1996-3-9) $-\frac{3}{15}+\frac{1}{5}-\frac{1}{3}$ ning qiymatini toping.

A) $-\frac{19}{30}$ B) $-\frac{1}{3}$ C) $\frac{19}{30}$ D) $\frac{1}{3}$ E) $\frac{3}{13}$

Yechilishi: $-\frac{3}{15}+\frac{1}{5}-\frac{1}{3}=-\frac{1}{5}+\frac{1}{5}-\frac{1}{3}=-\frac{1}{3}.$ Javobi: B.

(1996-3-10) $\frac{1}{3}\cdot\left(-\frac{2}{7}\right):\left(-\frac{5}{42}\right)$ ni hisoblang.

A) $-\frac{4}{5}$ B) $\frac{5}{441}$ C) $\frac{10}{882}$ D) $-\frac{5}{441}$ E) $\frac{4}{5}$

Yechilishi: $\frac{1}{3}\cdot\left(-\frac{2}{7}\right):\left(-\frac{5}{42}\right)=\frac{1}{3}\cdot\frac{2}{7}\cdot\frac{42}{5}=\frac{4}{5}.$ Javobi: E.

(1996-3-12) $-\frac{1}{2}-\frac{1}{3}$ ni hisoblang.

A) $\frac{5}{6}$ B) $-\frac{2}{5}$ C) $\frac{2}{5}$ D) $-\frac{5}{6}$ E) $\frac{1}{5}$

Yechilishi: $-\frac{1}{2}-\frac{1}{3}=\frac{-3-2}{6}=\frac{-5}{6}=-\frac{5}{6}.$ Javobi: D.

(1996-3-14) $\left(-2\frac{1}{2}\right)^3$ ni hisoblang.

A) $8\frac{1}{8}$ B) $31\frac{1}{4}$ C) $2\frac{1}{8}$ D) $-8\frac{1}{8}$ E) $-15\frac{5}{8}$

Yechilishi: $\left(-2\frac{1}{2}\right)^3=\left(-\frac{5}{2}\right)^3=(-)^3\cdot\frac{5^3}{2^3}=-\frac{125}{8}=-15\frac{5}{8}.$

Javobi: E.

(1996-3-64) $2{,}701 \cdot 10^{-4} + 3{,}205 \cdot 10^{-3}$ yig‘indi quyidagi sonlardan qaysi biriga teng?

A) $5{,}906 \cdot 10^{-3}$ B) $5{,}906 \cdot 10^{-4}$ C) $3{,}4751 \cdot 10^{-3}$ D) $3{,}0215 \cdot 10^{-4}$ E) $5{,}906 \cdot 10^{-7}$

Yechilishi: $2{,}701 \cdot 10^{-4} + 3{,}205 \cdot 10^{-3} =$

$= 10^{-3}(2{,}701 \cdot 10^{-1} + 3{,}205) =$

Darajada ,,$-$'' bo‘lsa, vergul chapga suriladi.

$= 10^{-3}(0{,}2701 + 3{,}205) = 3{,}4751 \cdot 10^{-3}$. Javobi: C.

(1996-7-9) $\left(7\frac{1}{3} - 6\frac{7}{8}\right) : \frac{3}{4} + 8\frac{8}{9} \cdot 2\frac{1}{80}$ ni hisoblang.

A) $17\frac{2}{3}$ B) $18\frac{1}{2}$ C) $21\frac{1}{2}$ D) $16\frac{1}{3}$ E) $17\frac{1}{2}$

Yechilishi: $\left(7\frac{1}{3} - 6\frac{7}{8}\right) : \frac{3}{4} + 8\frac{8}{9} \cdot 2\frac{1}{80} =$

$= \left(\frac{22}{3} - \frac{55}{8}\right) \cdot \frac{4}{3} + \frac{80}{9} \cdot \frac{161}{80} = \frac{22}{3} \cdot \frac{4}{3} - \frac{55}{8} \cdot \frac{4}{3} + \frac{161}{9} =$

$= \frac{88}{9} - \frac{55}{6} + \frac{161}{9} = \frac{176-165+322}{18} = \frac{333}{18} = 18\frac{1}{2}$. Javobi: B.

(1996-9-58) $\frac{3}{4}$ va $\frac{8}{9}$ sonlari orasida maxraji 36 ga teng bo‘lgan nechta kasr son bor?

A) 1 B) 2 C) 3 D) 4 E) 5

Yechilishi: $\frac{3 \cdot 9}{4 \cdot 9} = \frac{27}{36}$, $\underbrace{\frac{28}{36}, \frac{29}{36}, \frac{30}{36}, \frac{31}{36}}_{2\ ta}, \frac{32}{36} = \frac{8}{9}$. Javobi: B.

(1996-9-63) $\frac{0{,}2^2 + 2 \cdot 0{,}2 \cdot 0{,}3 + 0{,}3^2}{0{,}5 \cdot 0{,}4 - 0{,}5 \cdot 0{,}6}$ ni hisoblang.

A) -25 B) -2,5 C) -1 D) 0,25 E) 10

Yechilishi: $\frac{0{,}2^2 + 2 \cdot 0{,}2 \cdot 0{,}3 + 0{,}3^2}{0{,}5 \cdot 0{,}4 - 0{,}5 \cdot 0{,}6} = \frac{(0{,}2+0{,}3)^2}{0{,}5(0{,}4-0{,}6)} =$

$= \frac{0{,}5^2}{0{,}5 \cdot (-0{,}2)} = \frac{0{,}5}{-0{,}2} = -\frac{5}{2} = -2{,}5.$ Javobi: B.

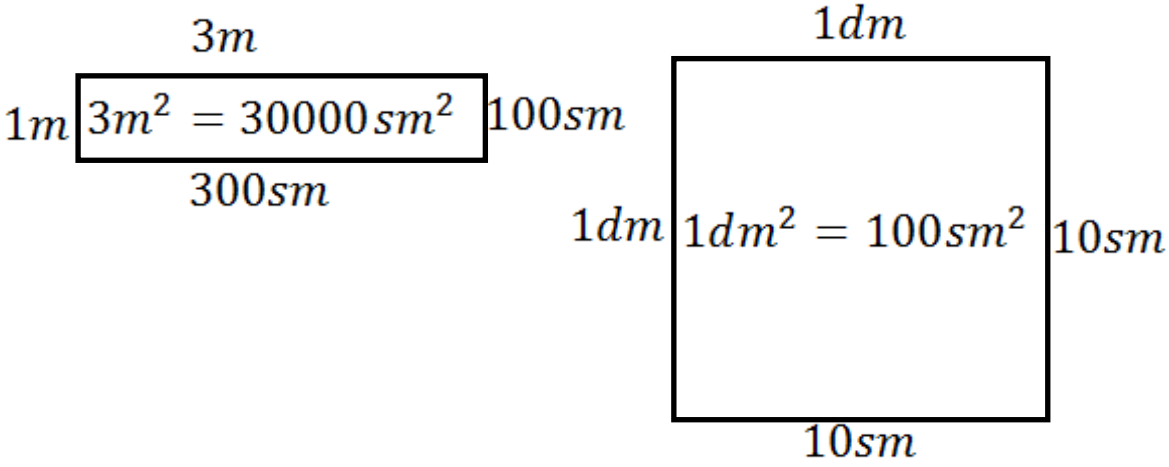
(1997-2-4) $3m^2\ 1dm^2\ 5sm^2$ necha sm^2 ga teng?

A) 3015 B) 3105 C) 30015 D) 31015 E) 30105

Yechilishi: Bunday misollarni yechishda orasiga qo‘shuv qo‘yib hisoblash qulay:

$3m^2\ 1dm^2\ 5sm^2 = 3m^2 + 1dm^2 + 5sm^2 =$

1) m –uzunlikni, m^2 –yuzni, m^3 –hajmni o‘lchaydi.



2) Misol bir xil ismli sonlarga keltiriladi:

$= 30000sm^2 + 100sm^2 + 5sm^2 = 30105sm^2$. Javobi: E.

(1997-2-17) Agar $3a \cdot b = 7,\ b \cdot c = 5\ va\ 3c \cdot a = 2$ bo‘lsa, $a + c$ ni toping.

A) 10 B)14 C) 8 D) 6 E) 7

Yechilishi: 1) Tagma-tag yoziladi.

$+\begin{matrix}3a-b=7\\ b-c=5\\ 3c-a=2\end{matrix}$ 2) $a + c$ – bu yo‘l boshlovchidagi “+” ishora, tagma-tag yozilganlarni qo‘shishni ko‘rsatmoqda.

Demak, $3a - b + b - c + 3c - a = 7 + 5 + 2 \Rightarrow$

$\Rightarrow 2a + 2c = 14 \Rightarrow 2(a + c) = 14 \Rightarrow$

3) Yo‘l boshlovchi doimo noma’lum hisoblanib, uni topish talab etiladi: $a + c = 7$. Javobi: E.

(1997-4-7) $a = 4b\ va\ c + 3b = 0\ (b \neq 0)$ bo‘lsa, $\frac{a}{c}$ ni toping.

A) $-\frac{1}{3}$ B) $1\frac{1}{3}$ C) $1\frac{2}{3}$ D) $-1\frac{1}{3}$ E) $-\frac{2}{3}$

Yechilishi: $\begin{cases} a = 4b; \\ c + 3b = 0 \Rightarrow c = -3b; \end{cases}$

1) $\frac{a}{c}$ –yo‘l boshlovchi e’tiborga olinadi.

$\frac{a}{c} = \frac{4b}{-3b} = -\frac{4}{3} = -1\frac{1}{3}$. Javobi: D.

(1997-4-18) $\frac{110^6 \cdot 77^4}{55^8 \cdot 154^2}$ ni hisoblang.

A) 30 B) $30\frac{9}{25}$ C) $31\frac{1}{25}$ D) $31\frac{9}{25}$ E) 31

Yechilishi: $\frac{110^6 \cdot 77^4}{55^8 \cdot 154^2} = \frac{(2\cdot 55)^6 \cdot 77^4}{55^8 \cdot (2\cdot 77)^2} = \frac{2^6 \cdot 55^6 \cdot 77^4}{55^8 \cdot 2^2 \cdot 77^2} = \frac{2^4 \cdot 77^2}{55^2} =$

$= \frac{16\cdot(11\cdot 7)^2}{(11\cdot 5)^2} = \frac{16\cdot 11^2 \cdot 7^2}{11^2 \cdot 5^2} = \frac{16\cdot 49}{25} = \frac{784}{25} = 31\frac{9}{25}$. Javobi: D.

(1997-4-19) $b^7x - bx^7$ ni ko‘pi bilan nechta ko‘paytuvchilarga ajratish mumkin?

A) 8 ta B) 7 ta C) 4 ta D) 9 ta E) 6 ta

Yechilishi: $b^7x - bx^7 = bx(b^6 - x^6) =$

$= b \cdot x \cdot [(b^3)^2 - (x^3)^2] = b \cdot x(b^3 - x^3)(b^3 + x^3) =$

$= b \cdot x(b - x)(b^2 + bx + x^2)(b + x)(b^2 - bx + x^2)$.

1) Bu misolni $b \cdot x[(b^2)^3 - (b^2)^3]$ deb o‘zingiz ishlab ko‘ring. Javobi: E.

(1997-4-20) $779^3 + 3 \cdot 779^2 \cdot 221 + 3 \cdot 779 \cdot 221^2 +$

$+221^3 + 10$ ni hisoblang.

A) 10000010 B) 1000010 C) 1000000010

D) 100000010 E) 100010

Yechilishi: $779^3 + 3 \cdot 779^2 \cdot 221 + 3 \cdot 779 \cdot 221^2 +$

$+221^3 + 10 =$

$= (779 + 221)^3 + 10 = 1000^3 + 10 = 1000000010.$

Javobi: C.

(1997-5-4) $3{,}4(3)$ davriy kasr qaysi oddiy kasrga teng?

A) $3\frac{13}{33}$ B) $3\frac{3}{11}$ C) $3\frac{2}{45}$ D) $3\frac{13}{33}$ E) $3\frac{13}{30}$

Yechilishi: $3{,}4(3) =$ 1) Son vergulsiz, qavssiz, kasrning suratiga yoziladi, undan qavsgacha turgan son ayriladi.

2) Maxrajga qavsning ichida qancha raqam turgan bo‘lsa, shuncha to‘qqiz, vergul bilan qavs orasida nechta raqm turgan bo‘lsa, shuncha nol yoziladi.

$= \frac{343-34}{90} = \frac{309}{90} = 3\frac{13}{30}$. Javobi: E.

(1996-11-8) Birinchi ish kuni ish normasining $\frac{1}{2}$ qismi bajarildi.Ikkinchi kuni birinchi kunda bajarilgan ishning $\frac{1}{4}$ qismicha ko‘p ish bajarildi. Shu ikki kunda qancha ish normasi bajarildi?

A) $1\frac{1}{8}$ B) $\frac{1}{4}$ C) $\frac{3}{4}$ D) $\frac{1}{8}$ E) $\frac{3}{8}$

Yechishilishi: “Qismcha,, deyilsa ko‘paytiriladi.

“Ko‘p,, deyilsa qo‘shiladi.

1) birinchi kun ------ $\frac{1}{2}$;

2) ikkinchi kun-----$\frac{1}{2} + \frac{1}{2} \cdot \frac{1}{4} = \frac{1}{2} + \frac{1}{8} = \frac{4+1}{8} = \frac{5}{8}$;

1) va 2) ni qo‘shamiz: $\frac{1}{2} + \frac{5}{8} = \frac{4+5}{8} = \frac{9}{8} = 1\frac{1}{8}$. Javobi: A.

(1996-11-20) $(b-c)(b^2+bc+c^2)$ ifodaning $b=-2$ va $c=1$ bo‘lgandagi qiymatini toping.

A) 7 B) 5 C) -9 D) -7 E) 9

Yechilishi: $(b-c)(b^2+bc+c^2) =$

1) formulaning chap tomoniga o‘tish uchun uch hadlik qavs o‘chirilib tashlanib, ikki hadlik qavsning har biri kubga ko‘tariladi:

$= b^3 - c^3 = (-2)^3 - 1^3 = -8 - 1 = -9$. Javobi: C.

(1996-11-22) $\frac{a^2-2ab}{4b^2-a^2}$ kasrni qisqartiring.

A) $\frac{a}{a+2b}$ B) $\frac{a}{a-2b}$ C) $-\frac{a}{a+2b}$ D) $-\frac{a}{a-2b}$ E) $-\frac{b}{a+2b}$

Yechilishi: $\frac{a^2-2ab}{4b^2-a^2} = \frac{a(a-2b)}{(2b)^2-a^2} =$

$= \frac{a(a-2b)}{-(a-2b)(a+2b)} = -\frac{a}{a+2b}$.

Javobi: C.

$4b^2 = (2b)^2$
$9y^2 = (3y)^2$
$64a^2 = (8a)^2$
$36x^2 = (6x)^2$

(1997-1-3) $1\frac{1}{4} + \frac{5}{12} : \left(\frac{1}{3} \cdot 2\frac{1}{2} - \frac{7}{8}\right)$ ni hisoblang.

A) $11\frac{1}{4}$ B) $-1\frac{1}{4}$ C) $9\frac{1}{4}$ D) $-8\frac{3}{4}$ E) $-9\frac{1}{4}$

Yechilishi: $1\frac{1}{4} + \frac{5}{12} : \left(\frac{1}{3} \cdot 2\frac{1}{2} - \frac{7}{8}\right) = \frac{5}{4} + \frac{5}{12} : \left(\frac{1}{3} \cdot \frac{5}{2} - \frac{7}{8}\right) =$

$= \frac{5}{4} + \frac{5}{12} : \left(\frac{5}{6} - \frac{7}{8}\right) = \frac{5}{4} + \frac{5}{12} : \frac{20-21}{24} = \frac{5}{4} + \frac{5}{12} \cdot \frac{24}{-1} =$

$= \frac{5}{4} + \frac{10}{-1} = \frac{5}{4} - 10 = \frac{5-40}{4} = \frac{-35}{4} = -8\frac{3}{4}$. Javobi: D.

(1997-1-7) $\left(\frac{1}{6} - 1\frac{1}{15} + \frac{1}{10}\right) : 0{,}6 + 0{,}4$ ni hisoblang.

A) $1\frac{11}{15}$ B) 0,88 C) $-1\frac{1}{3}$ D) $-\frac{14}{15}$ E) $-0{,}88$

Yechilishi: $\left(\frac{1}{6} - 1\frac{1}{15} + \frac{1}{10}\right) : 0{,}6 + 0{,}4 =$

$= \left(\frac{1}{6} - \frac{16}{15} + \frac{1}{10}\right) \cdot \frac{5}{3} + \frac{4}{10} = \frac{1}{6} \cdot \frac{5}{3} - \frac{16}{15} \cdot \frac{5}{3} + \frac{1}{10} \cdot \frac{5}{3} + \frac{2}{5} =$

$= \frac{5}{18} - \frac{16}{9} + \frac{1}{6} + \frac{2}{5} = \frac{5-32+3}{18} + \frac{2}{5} = \frac{-24}{18} + \frac{2}{5} =$

$= -\frac{4}{3} + \frac{2}{5} = \frac{-20+6}{15} = -\frac{14}{15}$. Javobi: D.

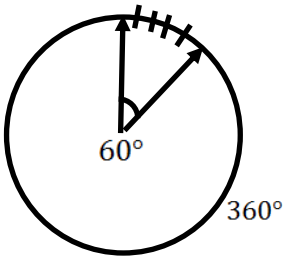
(1997-9-8) G‘ildirak 7 minutda $12\frac{3}{5}$ marta aylanadi. U 1 minutda necha marta aylanadi?

A) $1\frac{4}{5}$ B) 1 C) $1\frac{3}{5}$ D) $1\frac{2}{5}$ E) $1\frac{1}{5}$

Yechilishi: 1) bunday masalalarda, doimo son vaqtga bo‘linadi.

$1' = 12\frac{3}{5} : 7 = \frac{63}{5} \cdot \frac{1}{7} = \frac{9}{5} = 1\frac{4}{5} = 1{,}8.$ Javobi: A.

(1997-9-3) Soatning minut mili 6 minutda necha gradusga buriladi?



A) 20 B) 24 C) 36

D) 40 E) 60

Yechilishi: $1' = \frac{360°}{60} = 6°.$

Javobi: C.

(1997-11-13) $1 - (8a - 3)^2$ ni ko‘paytuvchilarga ajrating.

A) $8(4a + 1)(1 - 2a)$ B) $(16a - 1)(4a - 3)$

C) $4(2a + 1)(4a - 1)$ D) $4(a - 2)(a + 3)$

E) $8(1 - 2a)(4a - 1)$

Yechilishi: $1 - (8a - 3)^2 = 1^2 - (8a - 3)^2 =$

$= [1 - (8a - 3)] \cdot (1 + 8a - 3) =$

$= (1 - 8a + 3) \cdot (8a - 2) =$

$= (4 - 8a)(8a - 2) = 4(1 - 2a) \cdot 2 \cdot (4a - 1) =$

$= 8(1 - 2a)(4a - 1).$ Javobi: E.

$$\boxed{\begin{aligned} a &= 1 \\ b &= 8a - 3 \end{aligned}}$$

(1997-10-18) $(x^2 + 9)^2 - 36x^2$ ni ko‘paytuvchilarga ajrating.

A) $(x^2 - 5)(x^2 + 4)$ B)$(x - 3)^2(x + 3)^2$

C) $(x - 6)^2(x + 6)^2$ D) $x^2(x^2 - 6)$

E) $(x^2 - 3)(x + 3)^2$

Yechilishi: $(x^2 + 9)^2 - 36x^2 = (x^2 + 9)^2 - (6x)^2 =$

$= (x^2 + 9 - 6x)(x^2 + 9 + 6x) =$

hadlar o‘rinlari almashtirilib formulaga moslanadi

$= (x^2 - 6x + 3^2)(x^2 + 6x + 3^2) = (x-3)^2(x+3)^2.$

Javobi: B.

(1997-9-20) Binoning 8-qavatigacha bo‘lgan zinaning uzunligi 2-qavatgacha bo‘lgan zina uzunligidan necha marta uzun? (Qavatlar orasidagi zinalar soni bir xil deb hisoblansin).

A) 4 B) 5 C) 4,5 D) 3,5 E) 7

Yechilishi: Oraliqlar soni qavatlar sonidan bitta kam bo‘ladi va aksincha.

Jumladan, bitta qo‘lning barmoqlari soni 5 ta, ularning orasi esa 4 ta, ya’ni bitta kam. Javobi: E.

(1997-12-5) $\frac{16n^2-128}{n^2}$ ifoda natural son bo‘ladigan n ning barcha natural qiymatlari nechta?

A) 5 B) 3 C) 2 D) 6 E) 7

Yechilishi: $\frac{16n^2-128}{n^2} = \frac{16n^2}{n^2} - \frac{128}{n^2} = 16 - \frac{128}{n^2};$

$n = 1, 2, 3, 4, 5, 6, 7, 8, 9 \Rightarrow n = 4; 8.$ Javobi: C.

(1997-12-49) $\frac{19}{\sqrt{20}+1} + 6 - 2\sqrt{5}$ ni soddalshtiring.

A) 6 B) 5 C) $4\sqrt{5} - 7$ D) $4\sqrt{5} - 6$ E) $2\sqrt{5} - 5$

Yechilishi: $\frac{19}{\sqrt{20}+1} + 6 - 2\sqrt{5} = \frac{19}{\sqrt{20}+1} + 6 - \sqrt{20} =$

$= \frac{19+6\sqrt{20}+6-20-\sqrt{20}}{\sqrt{20}+1} = \frac{5+5\sqrt{20}}{\sqrt{20}+1} = \frac{5(1+\sqrt{20})}{1+\sqrt{20}} = 5.$ Javobi: B.

(1997-4-12) n raqamning qanday qiymatlarida $6134n$ soni 3 ga qoldiqsiz bo‘linadi?

A) 1 B) 4 C) 2 D) 4; 2 E) 1; 4; 7

Yechilishi: $6134n = \underbrace{6+1+3+4}_{14} + n \Rightarrow 1; 4; 7.$

Javobi: E.

(1997-5-17) $a = \sqrt{1995} + \sqrt{1997}$ va $b = 2\sqrt{1996}$ ni taqqoslang.

A) $a < b$ B) $a = 0$ C) $a > b$

D) $a = b + 1$ E) $a = b - 1$

Yechilishi: Kvadrat katta butun sonning o‘zi ham katta bo‘ladi. $a = \sqrt{1995} + \sqrt{1997} \Rightarrow$

$\Rightarrow \quad a^2 = \left(\sqrt{1996 - 1} + \sqrt{1996 + 1}\right)^2 =$

$= 1996 - 1 + 1996 + 1 + 2\sqrt{(1996 - 1)(1996 + 1)} =$

$= 2 \cdot 1996 + 2\sqrt{1996^2 - 1};$

$b^2 = 4 \cdot 1996.$ $b^2 > a^2 \Rightarrow b > a.$ Javobi: A.

(1997-5-19) $a = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot 29$ va $b = 15^{29}$ ni taqqoslang.

A) $a = b$ B) $a > 0$ C) $a < b$

D) $a = b + 1$ E) $a = b - 1$

Yechilishi: $a = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot 29 = 29!;$ $b = 15^{29};$

$29! < \left(\frac{29+1}{2}\right)^{29} \Rightarrow 29! < 15^{29} \Rightarrow a < b.$ Javobi: C.

(1997-4-1) n raqamining qanday qiymatlarida $10 + n$ va 10 sonlarning eng kichik umumiy karralisi 60 bo‘ladi?

A) 2 B) 0 C) 5; 2 D) 2; 0 E) 5

Yechilishi: $n = 2 \Rightarrow 12 \; va \; 10.$ Javobi: A.

(1997-5-14) 1601 sonini tub son ekanligini aniqlash uchun unu ketma-ket 2,3, 5 va hakozo tub sonlarga bo‘lib boriladi.Qanday tub songa yetganda bo‘lishni to‘xtatish mumkin?

A) 29 B) 31 C) 37 D) 41 E) 43

Yechilishi: 1601 ning qanday sonning kvadratidan kattaligi aniqlanadi va bo‘lish undan oldin turgan tub sonda to‘xtatiladi.

$40^2 < 1601 < 41^2 \Rightarrow 37,\ \underbrace{38,39,40}_{murakkab\ sonlar}$. Javobi: C.

(1997-5-10) Qaysi juftlik o‘zaro tub sonlardan iborat?

A) $(8;14)$ B) $(11;22)$ C) $(12;35)$

D) $(12;34)$ E) $(10;26)$

Yechilishi: faqat 1 ga bo‘linadigan ikkita son o‘zaro tub, shuningdek, barcha tub sonlar ham o‘zaro tub bo‘ladi. Javobi: C.

Soddalashtirishlar

(1996-1-17) $(2a-b)^2-(2a+b)^2$ ni soddalashtiring.

A) 0 B) $-2b^2$ C) $-8ab$ D) $-4ab+2b^2$ E) $2b^2$

Yechilishi: $(2a-b)^2-(2a+b)^2=$

$\boxed{a=2a-b;\qquad b=2a+b}$

$=[2a-b-(2a+b)]\cdot(2a-b+2a+b)=$

$=(2a-b-2a-b)\cdot 4a=-2b\cdot 4a=-8ab$. Javobi: C.

(1996-1-23) $\left(x-\frac{1+x^2}{x-1}\right):\frac{x^2+2x+1}{x-1}$ ni soddalashtiring.

A) -1 B)$\frac{1}{x+1}$ C)$\frac{x-2}{(x+1)^2}$ D)$-\frac{1}{x+1}$ E)0

Yechilishi: $\left(x-\frac{1+x^2}{x-1}\right):\frac{x^2+2x+1}{x-1}=$ 1)kasrning oldida turgan “-“ ishora, kasrning suratidagi barcha hadlarning ishoralarini qarama-qarshisiga o‘zgartiradi

$=\frac{x^2-x-1-x^2}{x-1}\cdot\frac{x-1}{x^2+2x+1}=$ 2) bir xil “-,, ishora qavsdan chiqariladi

$=\frac{-(x+1)}{(x+1)^2}=-\frac{1}{x+1}$. Javobi: D.

(1996-1-25) $2x(x-1)-(2x-1)(x+1)$ ifodani, ko‘phadning standart shakliga keltiring.

A) $4x^2-1$ B)$2x^2-3x$ C) $3x+1$

D) $4x^2-5x+1$ E)$-3x+1$

Yechilishi: $2x(x-1)-(2x-1)(x+1)=$

$=2x^2-2x-(2x^2+2x-x-1)=$

$=2x^2-2x-2x^2-2x+x+1=-3x+1$. Javobi: E.

(1996-3-74) $\frac{x^3+2x^2+x}{(x+1)^2}$ ni soddalashtiring.

A) $2x$ B) $x+1$ C) $x+2$ D) x E) $x-1$

Yechilishi: $\frac{x^3+2x^2+x}{(x+1)^2}=\frac{x(x^2+2x+1)}{(x+1)^2}=\frac{x(x+1)^2}{(x+1)^2}=x$. Javobi:D.

(1996-7-18) $(a^2+16)^2-64a^2$ ni ko‘paytuvchilarga ajrating.

A) $(a^2-8)(a^2+4)$ B) $(a-2)^2\cdot(a+2)^2$

C) $(a-4)^2\cdot(a+4)^2$ D) $a^2\cdot(a^2-60)$

E) $(a-8)^2\cdot(a+8)^2$

Yechilishi: $(a^2+16)^2-64a^2=(a^2+16)^2-(8a)^2=$

$=(a^2+16-8a)(a^2+8a+16)=$

$\boxed{a=a^2+16;\ \ b=8a}$

Hadlarning o‘rinlari formulaga moslab yoziladi.

$=(a^2-8a+4^2)(a^2+8a+4^2)=(a-4)^2(a+4)^2$.

Javobi: C.

(1996-9-15) $\frac{1-x^{-1}+x^{-2}}{1-x+x^2}$ ni soddalashtiring.

A) 1 B) x^2 C) $\frac{1}{x^2}$ D) $1-\frac{1}{x}$ E) $1+\frac{1}{x}$

Yechilishi: $\frac{1-x^{-1}+x^{-2}}{1-x+x^2}=\frac{1-\frac{1}{x}+\frac{1}{x^2}}{x^2-x+1}=\frac{\frac{x^2-x+1}{x^2}}{x^2-x+1}=$

$= \frac{x^2-x+1}{x^2} : (x^2 - x + 1) = \frac{(x^2-x+1)}{x^2} \cdot \frac{1}{(x^2-x+1)} = \frac{1}{x^2}.$

Javobi: C.

(1996-10-18) $(1 - 2a)^2 + (1 + 2a)(2a - 1)$ ni soddalashtiring.

A) $8a^2 - 4a$ B) $2a$ C)$-2a + 2$

D) $4a^2 - 2a$ E)$8a^2$

Yechilishi: $(1 - 2a)^2 + (1 + 2a)(2a - 1) =$

Ikkinchi had formulaga moslanadi:

$= 1^2 - 2 \cdot 1 \cdot 2a + (2a)^2 + (2a - 1)(2a + 1) =$

$= 1 - 4a + 4a^2 + (2a)^2 - 1^2 =$

$1 - 4a + 4a^2 + 4a^2 - 1 = 8a^2 - 4a = 4a(2a - 1).$

Javobi: A.

(1996-72-12) $\frac{x^3+x^2+x+1}{x^2+1}$ ni soddalashtiring.

A) $x - 1$ B) x C) $2x$ D) $x + 1$ E) $x + 2$

Yechilishi: $\frac{x^3+x^2+x+1}{x^2+1} = \frac{x^2(x+1)+(x+1)}{x^2+1} =$

Kasrning suratida qavsdan qavs chiqadi $=$

$\frac{(x+1)(x^2+1)}{x^2+1} = = x + 1.$ Javobi: D.

(1996-13-15) $(x^{-1} + y^{-1}) \cdot \frac{xy}{(x+y)^2}$ ni soddalashtiring.

A) 1 B)$\frac{x^2y^2}{(x+y)^3}$ C) x^2y^2 D) $\frac{1}{x+y}$ E) $\frac{1}{(x+y)^2}$

Yechilishi: Daraja ko‘rsatkich oldida “-“ ishora bo‘lsa, uni “+” ishoraga aylantirish uchun son teskari yoziladi va aksincha. $(x^{-1} + y^{-1}) \cdot \frac{xy}{(x+y)^2} = \left(\frac{1}{x} + \frac{1}{y}\right) \cdot \frac{xy}{(x+y)^2} =$

$= \frac{y+x}{xy} \cdot \frac{xy}{(x+y)^2} = \frac{1}{x+y}.$ Javobi: D.

(1997-1-57) $\frac{(x+\sqrt{y})\left(\sqrt{y-2\sqrt{y}x+x^2}\right)}{y-x^2}$ ifodani $x=2\sqrt{6}$ va $y=23$ bo‘lganda hisoblang.

A) 1 B) -1 C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) to‘g‘ri javob yo‘q

Yechilishi: $\frac{(x+\sqrt{y})\left(\sqrt{y-2\sqrt{y}x+x^2}\right)}{y-x^2}=$

$\frac{(x+\sqrt{y})\left(\sqrt{(\sqrt{y})^2-2\sqrt{y}x+x^2}\right)}{(\sqrt{y})^2-x^2}=$

$=\frac{(x+\sqrt{y})\sqrt{(\sqrt{y}-x)^2}}{(\sqrt{y}-x)(\sqrt{y}+x)}=\frac{|\sqrt{y}-x|}{\sqrt{y}-x}=\frac{|\sqrt{23}-\sqrt{24}|}{\sqrt{23}-\sqrt{24}}=\frac{-(\sqrt{23}-\sqrt{24})}{\sqrt{23}-\sqrt{24}}=-1.$

Javobi: B.

(1997-1-18) $\left(\frac{x^{\frac{1}{2}}-y^{\frac{1}{2}}}{x-y}-\frac{1}{x^{\frac{1}{2}}-y^{\frac{1}{2}}}\right)\cdot\frac{x+2x^{\frac{1}{2}}y^{\frac{1}{2}}+y}{4y^{\frac{1}{2}}}$ ni soddalashtiring.

A) $\sqrt{x}+\sqrt{y}$ B) $\frac{1}{\sqrt{x}+\sqrt{y}}$ C) 1 D) $-\frac{1}{2}$ E) $\frac{\sqrt{x}+\sqrt{y}}{2(\sqrt{y}-\sqrt{x})}$

Yechilishi: $\left(\frac{x^{\frac{1}{2}}-y^{\frac{1}{2}}}{x-y}-\frac{1}{x^{\frac{1}{2}}-y^{\frac{1}{2}}}\right)\cdot\frac{x+2x^{\frac{1}{2}}y^{\frac{1}{2}}+y}{4y^{\frac{1}{2}}}=$

$x^{\frac{1}{2}}=x^{0,5}=\sqrt{x}$	$x=\left(\sqrt{x}\right)^2$

$=\left(\frac{\sqrt{x}-\sqrt{y}}{\left(\sqrt{x}\right)^2-(\sqrt{y})^2}-\frac{1}{\sqrt{x}-\sqrt{y}}\right)\cdot\frac{\left(\sqrt{x}\right)^2+2\sqrt{x}\sqrt{y}+(\sqrt{y})^2}{4\sqrt{y}}=$

$=\frac{\sqrt{x}-\sqrt{y}-\sqrt{x}-\sqrt{y}}{(\sqrt{x}-\sqrt{y})(\sqrt{x}+\sqrt{y})}\cdot\frac{\left(\sqrt{x}+\sqrt{y}\right)^2}{4\sqrt{y}}=\frac{-2\sqrt{y}}{\sqrt{x}-\sqrt{y}}\cdot\frac{\sqrt{x}+\sqrt{y}}{4\sqrt{y}}=$

$=\frac{-1}{\sqrt{x}-\sqrt{y}}\cdot\frac{\sqrt{x}+\sqrt{y}}{2}=-\frac{\sqrt{x}+\sqrt{y}}{2(\sqrt{x}-\sqrt{y})}=\frac{\sqrt{x}+\sqrt{y}}{2(\sqrt{y}-\sqrt{x})}.$ Javobi: E.

(1997-4-14) Agar $x=4{,}5$ va $y=3{,}5$ bo‘lsa, $x^3-x^2y-xy^2+y^3$ ni hisoblang.

A) 10 B) 9,5 C) 8 D) 7,2 E) 11

Yechilishi: $x-y=4{,}5-3{,}5=1$ ekanligi e'tiborga olinadi.

$$x^3-x^2y-xy^2+y^3=x^2(x-y)-y^2(x-y)=$$
$$=x^2-y^2=(x-y)(x+y)=x+y=4{,}5+3{,}5=8.$$

Javobi: C.

(1997-5-16) x^4+x^2+1 ni ko'paytuvchilarga ajrating.

A)$(x^2+x+1)(x^2+x-1)$

B)$(x^2+x+1)(x^2-x+1)$

C)$(x^2+x+1)(x^2-x-1)$

D)$(x^2+x+1)(-x^2+x-1)$

E) ko'paytuvchilarga ajratib bo'lmaydi

Yechilishi: $x^4+x^2+1=$

Berilgan ifodaga x^2 ham qo'shiladi, ham ayriladi.

$$=(x^2)^2+x^2+1+x^2-x^2=(x^2)^2+2x^2+1-x^2=$$
$$=(x^2+1)^2-x^2=(x^2+1-x)(x^2+1+x)=$$
$$=(x^2-x+1)(x^2+x+1).$$

Javobi: B.

(1997-9-14) Agar $x=71{,}8$ va $y=70{,}8$ bo'lsa, $x^3-y^3-2y^2-3y-1+x^2-2xy$ ni hisoblang.

A) 1 B) 21 C) 79 D) 87,5 E) 92,1

Yechilishi: $x-y=1$ ekanligi e'tiborga olinadi

$x^3-y^3-2y^2-3y-1+x^2-2xy=(x-y)(x^2+$
$xy+y^2)-2y^2-3y-1+x^2-2xy=$ Tarqatib yoziladi:

$$=x^2+xy+y^2-y^2-y^2-3y-1+x^2-xy-xy=$$
$$=(x-y)(x+y)-3y-1+x(x-y)=$$
$$=x+y-3y-1+x=2x-2y-1=2(x-y)-1=$$
$$=2-1=1.$$

Javobi: A.

(1997-7-5) $\frac{3}{7}\cdot\left(1\frac{2}{5}a+2{,}1\right)+\frac{3}{5}\cdot\left(\frac{2}{3}a-\frac{5}{6}\right)$ ni soddalashtiring.

A) $a+\frac{2}{5}$ B) $a+1{,}3$ C) $1\frac{2}{3}a-\frac{2}{5}$

D) $0{,}6+a$ E) $2\frac{1}{3}a+1\frac{1}{6}$

Yechilishi: $\frac{3}{7}\cdot\left(1\frac{2}{5}a+2{,}1\right)+\frac{3}{5}\cdot\left(\frac{2}{3}a-\frac{5}{6}\right)=$

$=\frac{3}{7}\cdot\left(\frac{7}{5}a+\frac{21}{10}\right)+\frac{3}{5}\cdot\left(\frac{2}{3}a-\frac{5}{6}\right)=$

1) kasrning oldida yoki orqasida unga ko‘paytirilib turgan son kasrning suratiga ko‘paytirilib yoziladi

$=\frac{3}{7}\cdot\left(\frac{7a}{5}+\frac{21}{10}\right)+\frac{3}{5}\cdot\left(\frac{2a}{3}-\frac{5}{6}\right)=$

2) qavsning oldida yoki orqasida unga ko‘paytirilib turgan son qavsning ichidagi har biri hadga alohida –alohida ko‘paytirib yoziladi

$=\frac{3}{7}\cdot\frac{7a}{5}+\frac{3}{7}\cdot\frac{21}{10}+\frac{3}{5}\cdot\frac{2a}{3}-\frac{3}{5}\cdot\frac{5}{6}=\frac{3a}{5}+\frac{9}{10}+\frac{2a}{5}-\frac{1}{2}=$

$=\frac{6a+9+4a-5}{10}=\frac{10a+4}{10}=$

3) kasrning suratida nechta had bo‘lsa, uni shuncha kasr qilib yozish mumkin.

$=\frac{10\cdot a}{10}+\frac{4}{10}=a+\frac{2}{5}$. Javobi: A.

(1997-9-81) $\frac{\sqrt[3]{x^2}+2\sqrt[3]{x}+1}{x+3\sqrt[3]{x^2}+3\sqrt[3]{x}+1}-\frac{1}{\sqrt[3]{x}+1}$ ni soddalashtiring.

A) 1 B) $\frac{1}{\sqrt[3]{x}+1}$ C) $\sqrt[3]{x}$ D) 0 E) $\sqrt[3]{x}+1$

Yechilishi: $\frac{\sqrt[3]{x^2}+2\sqrt[3]{x}+1}{x+3\sqrt[3]{x^2}+3\sqrt[3]{x}+1}-\frac{1}{\sqrt[3]{x}+1}=$

1) suratda $\sqrt[3]{x^2}=\left(\sqrt[3]{x}\right)^2$ almashtirish olinadi.

2) maxrajda $x=\left(\sqrt[3]{x}\right)^3$ almashtirish olinadi.

3) 1 larga ham suratda kvadrat va maxrajda kub qo‘yilib, formulalarga moslanadi.

$$= \frac{\left(\sqrt[3]{x}\right)^2+2\sqrt[3]{x}+1^2}{\left(\sqrt[3]{x}\right)^3+3\left(\sqrt[3]{x}\right)^2+3\sqrt[3]{x}+1^3} - \frac{1}{\sqrt[3]{x}+1} = \frac{\left(\sqrt[3]{x}+1\right)^2}{\left(\sqrt[3]{x}+1\right)^3} - \frac{1}{\sqrt[3]{x}+1} =$$

$$= \frac{1}{\sqrt[3]{x}+1} - \frac{1}{\sqrt[3]{x}+1} = 0.$$ Javobi: D.

(1997-4-21) $\frac{a^{-3}+b^{-3}}{a^2-ab+b^2} \cdot a^3b^3$ ni soddalashtiring.

A $(a+b)^2$ B) 1 C) ab D) $c-b$ E) $a+b$

Yechilishi: $\frac{a^{-3}+b^{-3}}{a^2-ab+b^2} \cdot a^3b^3 = \frac{\frac{1}{a^3}+\frac{1}{b^3}}{a^2-ab+b^2} \cdot a^3b^3 =$

$$= \frac{\frac{a^3+b^3}{a^3b^3} \cdot a^3b^3}{a^2-ab+a^2} = a+b = \frac{a^3+b^3}{a^2-ab+b^2} = \frac{(a+b)\left(a^2-ab+b^2\right)}{a^2-ab+b^2} =$$

$= a+b.$ Javobi: E.

(1997-5-6) $-6-2(2-y)-2y+2$ ni soddalashtiring.

A) 8 B) $-8-4y$ C) $8-4y$ D) -8 E) $-8-4y$

Yechilishi: $-6-2(2-y)-2y+2 =$

$= -6-4+2y-2y+2 = -10+2 = -8.$ Javobi: D.

(1997-1-8) $4\sqrt{3\frac{1}{2}} - 0{,}5\sqrt{56} - 3\sqrt{1\frac{5}{9}}$ ni soddalashtiring.

A) $2\sqrt{14}$ B) $2\sqrt{7}$ C) 0 D) 2 E) $\sqrt{7}$

Yechilishi: $4\sqrt{3\frac{1}{2}} - 0{,}5\sqrt{56} - 3\sqrt{1\frac{5}{9}} =$

$$= 4\sqrt{\frac{7}{2}} - \frac{1}{2}\sqrt{56} - 3\sqrt{\frac{14}{9}} = \sqrt{4^2 \cdot \frac{7}{2}} - \sqrt{\left(\frac{1}{2}\right)^2 \cdot 56} -$$

$$- \sqrt{3^2 \cdot \frac{14}{9}} = \sqrt{16 \cdot \frac{7}{2}} - \sqrt{\frac{1}{4} \cdot 56} - \sqrt{9 \cdot \frac{14}{9}} = \sqrt{4 \cdot 14} -$$

$-\sqrt{14} - \sqrt{14} = 2\sqrt{14} - 2\sqrt{14} = 0.$ Javobi: C.

(1997-10-19) $\left(\frac{3a}{a+6}-\frac{2a}{a^2+12a+36}\right):\frac{3a+16}{a^2-36}+\frac{6(a-6)}{a+6}$ ni soddalashtiring.

A) 6 B) $\frac{6}{a+6}$ C) $\frac{1}{a-6}$ D) $a+6$ E) $a-6$

Yechilishi: $\left(\frac{3a}{a+6}-\frac{2a}{a^2+12a+36}\right):\frac{3a+16}{a^2-36}+\frac{6(a-6)}{a+6}=$

$=\left(\frac{3a}{a+6}-\frac{2a}{(a+6)^2}\right)\cdot\frac{a^2-6^2}{3a+16}+\frac{6(a-6)}{a+6}=$

$=\frac{3a^2+18a-2a}{(a+6)^2}\cdot\frac{(a-6)(a+6)}{3a+16}+\frac{6(a-6)}{a+6}=$

$=\frac{a(3a+16)}{a+6}\cdot\frac{a-6}{3a+16}+\frac{6(a-6)}{a+6}=\frac{a^2-6a}{a+6}+\frac{6a-36}{a+b}=$

$=\frac{a^2-6a+6a-36}{a+6}=\frac{a^2-6^2}{a+6}=\frac{(a+6)(a-6)}{a+6}=a-6.$

Parametr qatnashgan soddalashtirishga doir test misollarining to‘g‘ri javobini topishda, matematik ofarizm usulidan foydalanish qulay. Buning uchun misol va test javobidagi parametr o‘rniga bir xil son qo‘yib hisoblash kifoya. Masalan, $a=0$ ni misolning berilishi va javoblarga qo‘yib tekshiriladi. Ikkala holda ham olingan bir xil natija -6 to‘g‘ri javob E) ni topish imkonini beradi. Javobi: E.

(1997-12-9) $(y^3-1)^2+(y^2+1)(y^4-y^2+1)$ ni soddalashtirgandan keyin nechta haddan iborat bo‘ladi?

A) 4 B) 5 C) 6 D) 3 E) 2

Yechilishi: $(y^3-1)^2+(y^2+1)(y^4-y^2+1)=$

$=(y^3)^2-2y^3\cdot 1+1^2+(y^2)^3+1^3=$

$=y^6-2y^3+1+y^6+1=2y^6-2y^3+2.$ Demak, 3 ta haddan iborat. Javobi: D.

Pirnazar DAVRONOV

Ekuk va ekub

(1996-3-64) Quyidagi oddiy kasr ko‘rinishida berilgan sonlardan qaysilarini chekli o‘nli kasr ko‘rinishiga keltirib bo‘lmaydi:

1) $\frac{7}{40}$ 2) $\frac{3}{28}$ 3) $\frac{13}{35}$ 4) $\frac{18}{250}$

A) 1; 2 B) 2; 3 C) 3; 4 D) 4; 1 E) 2; 4

Yechilishi: Berilgan kasrlarning maxrajlarini tub ko‘paytuvchilarga ajratilganda, 2 va 5 ning darajalari qatnashmasa, bunday kasrlarni chekli o‘nli kasr ko‘rinishiga keltirib bo‘lmaydi.

40	2
20	2
10	2
5	5
1	

40 ni tub ko‘paytuvchilarga ajratganimizda 2 va 5 qatnashayabdi. Demak, $\frac{7}{40}$ chekli o‘nli kasrga keltirib, bo‘ladi.

28	2
14	2
7	7
1	

2) 28 ni tub kopaytuvchilarga ajratganimizda 2 qatnashyapti, lekin 5 qatnashmayabdi. Shuning uchun, bu kasrni chekli o‘nli kasr ko‘rinishiga keltirib bo‘lmaydi.

35	5
7	7
1	

3) 35 ni tub ko‘paytuvchilarga ajratganimizda 5 qatnashyabdi, lekin 2 qatnashmayabdi. Shuning uchun, bu kasrni ham chekli o‘nli kasr ko‘rinishiga keltirib bo‘lmaydi.

Bulardan ma’lumki 2) va 3) ni chekli o‘nli kasr ko‘rinishiga keltirib bo‘lmaydi.

Umuman olganda, mahraji ham 2 ga, ham 5 ga bo‘linmaydigan oddiy kasrlarni chekli o‘nli kasr ko‘rinishiga keltirib bo‘lmaydi.

Javobi: B.

(1996-3-2) 8 va 6 sonlarining eng kichik umumiy karralasini toping.

A) 16 B) 24 C) 12 D) 8 E) 48

Yechilishi: 1) ikkita songa bo‘linadigan bitta eng kichik songa, ikkita sonning eng kichik umumiy karralisi (bo‘linuvchisi) deyiladi;

2) karrali sonni topish uchun ikki son tub ko‘paytuvchilarga ajraladi.

3) birinchi tub son 2 ga teng.

4) 1 ga va o‘ziga bo‘linadigan sonlarga tub sonlar deyiladi.

8	2
4	2
2	2
1	

6	2
3	3
1	

$8 = 2 \cdot 2 \cdot 2 = 2^3$; $6 = 2 \cdot 3$.

5) karrali sonni topish uchun katta imkoniyat olinadi.

$K(8; 6) = 2^3 \cdot 3 = 24$. Javobi: B.

(1996-3-61) 630 va 198 ning umumiy bo‘luvchilari nechta?

A) 5 B) 6 C) 4 D) 7 E) 8

Yechilishi: 1) Ikkita son bo‘linadigan bitta eng katta sonni ikkita sonning eng katta umumiy bo‘luvchisi deyiladi.

630	2
315	3
105	3
35	5
7	7
1	

198	2
99	3
33	3
11	11
1	

$630 = 2 \cdot 3^2 \cdot 5 \cdot 7;$ $198 = 2 \cdot 3^2 \cdot 11;$

2) umimiy sonlar olinadi: $D(630; 198) = 2 \cdot 3^2;$

3) bo‘luvchilar sonini topish uchun daraja ko‘rsatkichlarga 1 qo‘shilib, bir-biriga ko‘paytiriladi.

$(1+1)(2+1) = 6$ ta. Ular $\underbrace{1; 2; 3; 6; 9; 18}_{6\ ta}$. Javobi: B.

(1997-5-7) Bolalar archa bayramida bir xil sog‘a olishdi. Hamma sovg‘alarda jami 123 ta olma va 82 ta nok bo‘lgan. Archa bayramida nechta bola qatnashgan va har bil bola nechta olma va nechta nok olgan?

A) 41;3;2 B) 82;1;1 C) 20; 61;41 D) 41;2;3 E) 61;2;1

Yechilishi:

123	3
41	41
1	

82	2
41	41
1	

$\Rightarrow 41; 3; 2.$

Javobi: C.

Murakkab radikal

(1996-3-73) $\sqrt{9 - 2\sqrt{20}} - \sqrt{9 + 2\sqrt{20}}$ ayirmaning qiymatini toping.

A) -3 B) -6 C) -4 D) -5 E) 4

Yechilishi: $\sqrt{9 - 2\sqrt{20}} - \sqrt{9 + 2\sqrt{20}};$

$$\sqrt{9-2\sqrt{20}}=\sqrt{9-\sqrt{80}}=\sqrt{\frac{9+\sqrt{9^2-80}}{2}}-\sqrt{\frac{9-\sqrt{9^2-80}}{2}}=$$

$$=\sqrt{5}-2;$$

$$\sqrt{9+2\sqrt{20}}=\sqrt{9+\sqrt{80}}=\sqrt{\frac{9+\sqrt{9^2-80}}{2}}+\sqrt{\frac{9-\sqrt{9^2-80}}{2}}=$$

$$=\sqrt{5}+2;$$

$$\sqrt{9-2\sqrt{20}}-\sqrt{9+2\sqrt{20}}=\sqrt{5}-2-\left(\sqrt{5}+2\right)=-4.$$

Javobi: C.

(1997-11-25) $\sqrt{15-4\sqrt{7+4\sqrt{3}}}$ ni isoblang.

A)$\sqrt{3}-1$ B)$4-\sqrt{3}$ C)$3\sqrt{3}$ D)$3-2\sqrt{3}$ E)$2-\sqrt{3}$

Yechilishi: $\sqrt{15-4\sqrt{7+4\sqrt{3}}}$;

1) $\sqrt{7+\sqrt{48}}=\sqrt{\frac{7+\sqrt{7^2-48}}{2}}+\sqrt{\frac{7-\sqrt{7^2-48}}{2}}=2+\sqrt{3}$;

2) $\sqrt{15-4\left(2+\sqrt{3}\right)}=\sqrt{15-8-4\sqrt{3}}=7-4\sqrt{3}=$

$=\sqrt{7-\sqrt{48}}=2-\sqrt{3}$. Javobi: E.

Foizga doir masalalar

(1996-1-4) Do‘konga 96 t karam keltirildi. Agar karamning 80% i sotilgan bo‘lsa, do‘konda qancha karam qolgan?

A) 16 B) 19,2 C) 24 D) 20,2 E) 18,4

Yechilishi: 1)berilgan foiz doimo 100 ga bo‘linib, songa ko‘paytiriladi; 2) ma’lum miqdordagi foiz kamaysa, o‘sha foiz 100 dan ayrilib, 100 ga bo‘linadi va songa

ko‘paytiriladi; 3) ma’lum miqdordagi foiz ortsa, o‘sha foiz 100 qo‘shiladi va natija 100 ga bo‘linib, songa ko‘paytiriladi.

$\frac{100-80}{100} \cdot 96 = 19{,}2\ t.$ Javobi: B.

(1996-3-65) Go‘sht qaynatilganda o‘z vaznining 40% ini yo‘qotadi. 6 kg qaynatilgan go‘sht hosil qilish uchun qozonga necha kg go‘sht solish kerak?

A) 8 B) 9 C) 10 D) 11 E) 12

Yechilishi: $\begin{matrix} x------100\% \\ 6------60\% \end{matrix} \Rightarrow 60x = 6 \cdot 100 \Rightarrow x = 10kg.$

Javobi: C.

(1996-6-3) Magazinga keltirilgan tarvuzlarning 56% i birinchi kuni , qolgan 132 tasiikkinchi kuni sotildi. Birinchi kuni qancha tarvuz sotilgan?

A) 168 B) 148 C) 178 D) 138 E) 158

Yechilishi: $\begin{matrix} x-----56\% \\ 132-----44\% \end{matrix} \Rightarrow x = 168.$ Javobi: A.

(1996-7-4) Ishchining ish normasini bajarishiga ketadigan vaqti 20 % ga qisqardi. Uning mexnat unumdorligi necha foiz ortgan?

A) 20 B) 15 C) 5 D) 25 E) 1

Yechilishi: $M = \frac{100 \cdot t}{100-t} = \frac{100 \cdot 20}{100-20} = \frac{100 \cdot 20}{80} = 25\%.$

Javobi: D.

(1996-9-5) 40 dan 32 necha protsent kam?

A) 18 B) 20 C) 22 D) 25 E) 24

Yechilishi: So‘ralayotgan son 100 ga ko‘paytirilib, ikkinchisiga bo‘linadi.

$\frac{32 \cdot 100}{40} = 80 \Rightarrow 100 - 80 = 20\%$ kam. Javobi: B.

(1997-2-3) Qotishma mis va qo‘rg‘oshindan iborat. Qotishmaning 60% mis bo‘lib, mis qo‘rg‘oshindan 2 kg ko‘p. Qotishmada qancha mis bor?

A) 5 B) 7 C) 6 D) 5,5 E) 6,2

Yechilishi: $Q = M - 2;\ M = Q +$

2. $\begin{cases} M - - - 60\% \\ Q - - - 40\% \end{cases} \Rightarrow \Rightarrow$

$\begin{cases} M - - - 60\% \\ M - 2 - - - 40\% \end{cases} \Rightarrow \quad M = 6.$ Javobi: C.

(1997-9-12) Qo‘rg‘oshin va misdan quyilgan ikkita quyma bor. Birinchi quymada 2 kg qo‘rg‘oshin va 6 kg mis bor. Ikkinchi quymada 12 kg qo‘rg‘oshin va 3 kg mis bor. Qaysi quymada qo‘rg‘oshinning foiz miqdori ko‘p va u necha foiz ko‘p?

A) $2 - quymada$ 55% B) $1 - quymada$ 25%

C) $2 - quymada$ 80% D) $2 - quymada$ 45%

E) $1 - quymada$ 55%

Yechilishi: $1 - quymada$: $\underset{2kg}{Q}$; $\underset{6kg}{M} \Rightarrow$

$\begin{matrix} 8 - - - 100\% \\ 2 - - - x\% \end{matrix} \Rightarrow x = 25\%.$

$2 - quymada$: $\underset{3kg}{M}$; $\underset{12kg}{Q} \Rightarrow$ $\begin{matrix} 15 - - - 100\% \\ 12 - - - x\% \end{matrix} \Rightarrow$

$x = 80\%.$

$80\% - 25\% = 55\%.$ Javobi: A.

(1997-1-77) Doiraning radiusi 40% ga oshsa, uning yuzi necha foizga oshadi?

A) 140 B) 196 C) 96

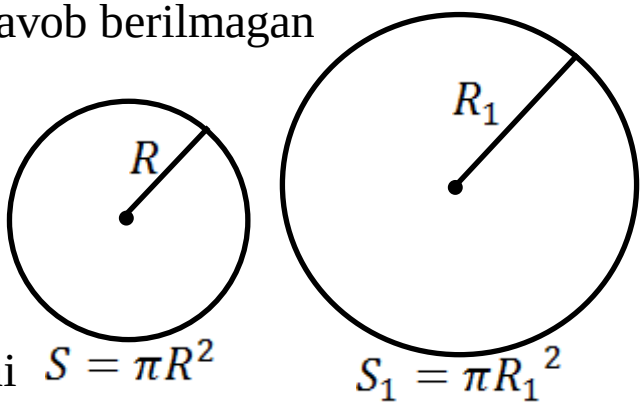
D) 4 E) to‘g‘ri javob berilmagan

Yechilishi:

$R_1 = \frac{100+40}{100} \cdot R = 1{,}4R;$

$S_1 = \pi(1{,}4R)^2 =$

$= 1{,}96\pi R^2 = 1{,}96 \cdot S;$



1) Verguldan oldingi 1 soni dastladki asli 100% ni, verguldan keyingi 96 esa ortgan foizni bildiradi. Javobi: C.

(1997-6-65) Doiraning yuzi 96 % ga ortishi uchun uning radiusini necha foizga oshirish kerak?

A) 40 B) 62 C) 4 D) 196 E) 140

Yechilishi: $\sqrt{1{,}96} = 1{,}4 \Rightarrow 40\%$. Javobi: A.

(1997-4-5) 30 ta talabadan 25 tasi qishqi sinovlarning hammasini topshirdi. Bazi sinovlarni topshira olmagan talabalar barcha sinovlarni topshirgan talabalarning necha foizini tashkil qiladi?

A) 10% B) 15% C) 20% D) 25% E) 30%

Yechilishi: $30 - 25 = 5;$ $\begin{cases} 25 - - - 100\% \\ 5 - - - x\% \end{cases} \Rightarrow$

$\Rightarrow 25x = 100 \cdot 5 \Rightarrow x = 20\%.$ Javobi: C.

(1997-5-5) Qutiga 25 kg massali yuk joylandi. Agar qutining massasi yuk massasining 12% ni tashkil etsa, qutining massasini toping.

A) 3kg B) 3,5kg C) 4kg D) 4,5kg E) 5kg

Yechilishi: $\frac{12}{100} \cdot 25 = 3kg.$ Javobi: A.

(1997-9-65) Brigada ekin maydonining 180 gektariga paxta, 60 gektariga sholi ekdi. Sholi maydoni paxta maydoniningnecha foizini tashkil qiladi?

A) $33\frac{1}{3}$ B) 33 C) $33\frac{2}{3}$ D) 34 E) $32\frac{1}{3}$

Yechilishi: $\begin{cases} 180 - - - 100\% \\ 60 - - - x\% \end{cases} \Rightarrow 180x = 60 \cdot 100 \Rightarrow$

$\Rightarrow x = 33\frac{1}{3}$. Javobi: A.

Harakatga doir masalalar

(1996-3-3) Passajir va yuk poezdi bir-biriga tomon harakatlanmoqda. Ular orasidagi masofa 275 km. Yuk poezdining tezligi 50 km/soat. Passajir poezdning tezligi yuk poezdining tezligidan 20% ortiq. Ular necha soatdan keyin uchrashadi?

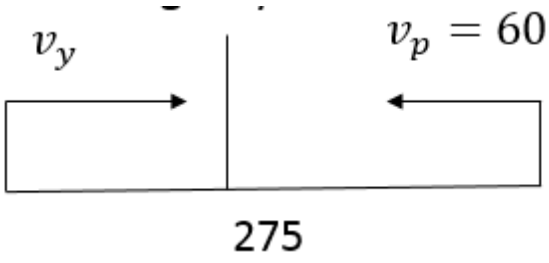
A) 3 B) 2 C) 2,5 D) 4 E) 3,5

Yechilishi: Bunday masalalar $v \cdot t$ ga tenglab yechiladi.

$50 \cdot t + 1{,}2 \cdot 50 \cdot t = 275;$

$110 \cdot t = 275 \Rightarrow t = 2{,}5.$

Javobi: C.

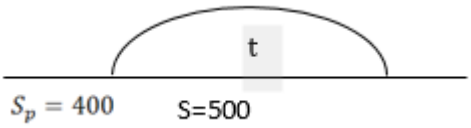


(1996-3-69) Uzunligi 400m bo‘lgan poezd uzunligi 500 m bo‘lgan tuneldan 30 s da o‘tib ketdi. Poyezdning tezligini toping.

A) $35\frac{m}{s}$ B) $30\frac{m}{s}$ C) $40\frac{m}{s}$ D) $45\frac{m}{s}$ E) $25\frac{m}{s}$

Yechilishi $S = v \cdot t \Rightarrow S_p = 400$

$\Rightarrow v = \frac{S}{t} = \frac{900}{30} = 30\frac{m}{s}$. Javobi: B.



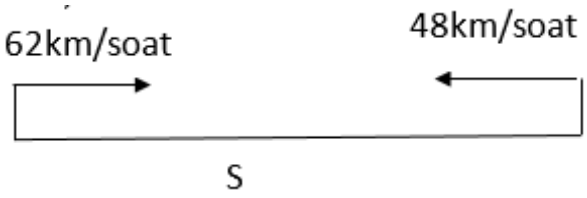
(1996-6-7) Ikki shahardan bir-biriga qarama-qarshi ikki turist yo‘lga chiqdi. Birinchisi avtomashinada, tezligi 62 km/soat;

ikkinchisi avtobusda, tezligi 48 km/soat. Agar ular 0,6 soatdan keyin uchrashgan bo‘lsa, shaharlar orasidagi masofani toping.

A) 70km B) 64km C) 62km D) 66km E) 72km

Yechilishi: $62 \cdot 0{,}6 + 48 \cdot 0{,}6 = S$

$S = 66\ km.$



Javobi: D.

(1996-7-10) Turist butun yo‘lning 0,35 qismini o‘tganda, unga yo‘lning yarmigacha 18,3 km qolgani ma’lum bo‘ldi. Butun yo‘lning uzunligini toping.

A) 110 km B) 102 km C) 122 km

D) 98 km E) 78,2 km

Yechilishi: $0{,}35 \cdot x + 18{,}3 = \frac{1}{2} \cdot x \Rightarrow x = 122\ km.$

Javobi: C.

(1996-9-9) Poezdning uzunligi 800 m. Poezdning ustun yonidan 40 s da o‘tib ketgani ma’lum bo‘lsa, tezligini toping.

A) $30\frac{m}{s}$ B) $15\frac{m}{s}$ C) $25\frac{m}{s}$ D) $20\frac{m}{s}$ E) $22\frac{m}{s}$

Yechilishi: $v = \frac{S}{t} = \frac{800}{40} = 20\frac{m}{s}$.

Javobi: D.

(1997-5-11) Avtomashina bakiga 60 l benzin quyildi. Toshkent dengiziga borish uchun bakdagi benzinning $\frac{3}{5}$ qismi, Chirchiqqa borish uchun $\frac{1}{12}$ qismi sarflandi. Bakda necha litr benzin qolgan.

A) 30 B) 31 C) 25 D) 26 E) 27

Yechilishi: $\frac{2}{5} \cdot 60 + \frac{1}{12} \cdot 60 = 24 + 5 = 29 \Rightarrow$

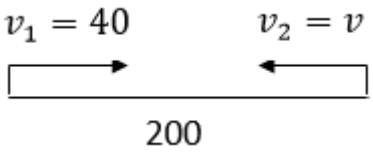
$\Rightarrow 60 - 29 = 31.$

Javobi: B.

(1997-8-7) Oralaridagi masofa 200 km bo‘lgan A va B punktlardan bir vaqtning o‘zida ikki turist bir-biriga qarama- qarshi yo‘lga chiqdi. Birinchisi avtobusda tezligi 40 km/soat, ikkinchisi avtomobilda. Agar ular ikki soatdan keyin uchrashishgan bo‘lishsa, avtomobilning tezligini toping.

A) 58 km/soat B) 55 km/soat C) 65 km/soat

D) 60 km/soat E) 50 km/soat



Yechilishi: $2 \cdot 40 + 2v = 200 \Rightarrow$

$\Rightarrow v = 60.$ Javobi: D.

(1997-7-10) Velosipedchi butun yo‘lning 0,6 qismini o‘tgach, qolgan yo‘l, u bosib o‘tgan yo‘ldan 4 km kamligi ma’lm bo‘ldi. Butun yo‘lning uzunligini toping.

A) 40 km B) 24 km C) 20 km

D) 36,6 km E) 42,2 km

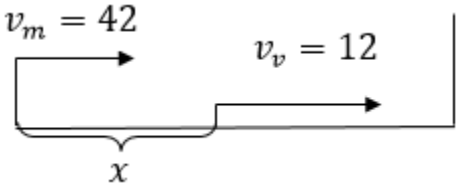
Yechilishi: $0{,}6x + 0{,}6x - 4 = x \Rightarrow x = 20.$

Javobi: C.

(1997-2-7) Harakat boshlangandan 0,8 soat o‘tgach, mototsiklchi velosipedchini quvib yetdi. Mototsiklchining tezligi 42 km/soat, velosipedchiniki 12 km/soat bo‘lsa, harakat boshlanishidan oldin ular orasidagi masofa qancha bo‘lgan?

A) 24 km B) 22 km C) 26 km

D) 20 km E) 28 km



Yechilishi:

$x = 42 \cdot 0{,}8 - 12 \cdot 0{,}8 == 30 \cdot 0{,}8 = 24.$ Javobi: A.

(1997-10-10) Turist butun yo‘lning 0,85 qismini o‘tganda, ko‘zlangan manzilgacha 6,6 km qolgani ma’lum bo‘ldi. Butun yo‘lning uzunligi necha km?

A) 52 km B) 44 km C) 36,6 km

D) 64,4 km E) 40,4 km

Yechilishi: $0{,}85x + 6{,}6 = x \Rightarrow x = 44.$ Javobi: B.

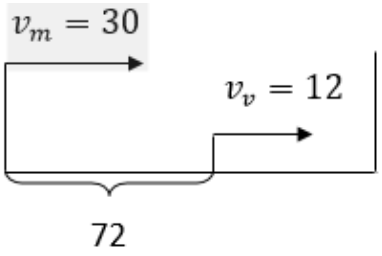
(1997-12-6) Mototsiklchi va velosipedchi bir tomonga qarab harakat qilishmoqda. Velosipedchining tezligi 12 km/soat, mototsiklchiniki 30 km/soat va ular orasidagi masofa 72 km bo‘lsa, necha soatdan keyin velosipedchini mototsiklchi quvib yetadi?

A) 3 B) 4 C) 3,5 D) 2,5 E) 3,8

Yechilishi: $30t - 12t = 72;$

$18t = 72 \Rightarrow t = 4.$

Javobi: B.



Tenglamalar

(1997-7-7) $\left(x + 3\frac{2}{9}\right) : 4\frac{1}{6} = 6$ tenglamani yeching.

A) $22\frac{2}{9}$ B) $21\frac{7}{9}$ C) $22\frac{1}{3}$ D) $20\frac{4}{9}$ E) $21\frac{5}{6}$

Yechilishi: $\left(x + 3\frac{2}{9}\right) : 4\frac{1}{6} = 6$ 1) Tenglamani yechish uchun o‘zgaruvchlar tenglikning bir tomoiga, ma’lumlar ikkinchi tomoniga o‘tkaziladi.

2) Bo‘luv tenglikdan ko‘paytiruv, qo‘shuv tenglikdan ayiruv bo‘lib o‘tadi.

$x+\frac{29}{9}=6\cdot\frac{25}{6}\Rightarrow x=25-\frac{29}{9}=\frac{225-29}{9}=\frac{196}{9}=21\frac{7}{9}\Rightarrow$

$\Rightarrow x=21\frac{7}{9}$. Javobi: B.

(1996-7-5) $2\frac{1}{2}\cdot\left(\frac{4}{5}x+2\right)-2\frac{1}{3}\cdot\left(\frac{3}{7}x-6\right)$ ni soddalashtiring.

A) 19 B) $x-9$ C) $x+19$ D) $20+x$ E) $1\frac{2}{7}x+9$

Yechilishi: $2\frac{1}{2}\cdot\left(\frac{4}{5}x+2\right)-2\frac{1}{3}\cdot\left(\frac{3}{7}x-6\right)=$

$=\frac{5}{2}\cdot\frac{4x}{5}+\frac{5}{2}\cdot 2-\frac{7}{3}\cdot\frac{3x}{7}+\frac{7}{3}\cdot 6=$

$=2x+5-x+14=x+19.$

Javobi: C.

(1997-2-27) $\frac{x^2-16}{x^2-5x+4}$ ni qisqartiring.

A) $\frac{4+x}{1-x}$ B) $\frac{4-x}{x+1}$ C) $\frac{4+x}{1+x}$ D) $\frac{x-4}{x+1}$ E) $\frac{x+4}{x-1}$

Yechilishi: $\frac{x^2-16}{x^2-5x+4}=\frac{x^2-4^2}{x^2-5x+4}=\frac{(x-4)(x+4)}{x^2-5x+4}=$

$\frac{(x-4)(x+4)}{(x-1)(x-4)}=$

$=\frac{x+4}{x-1}$. 1) kasrning maxraji keltirilgan kvadrat tenglama ko‘rinishida yozilib, so‘ngra yechiladi:

$x^2-5x+4=0\Rightarrow\begin{cases}p=-5;\\ q=4.\end{cases}x_{1,2}=-\frac{p}{2}\pm\sqrt{\left(\frac{p}{2}\right)^2-q}=$

$=-\frac{-5}{2}\pm\sqrt{\left(\frac{-5}{2}\right)^2-4}=\frac{5}{2}\pm\sqrt{\frac{25}{4}-4}=\frac{5}{2}\pm\sqrt{\frac{25-16}{4}}=$

$= \frac{5}{2} \pm \sqrt{\frac{9}{4}} = \frac{5}{2} \pm \frac{3}{2} \Rightarrow \begin{cases} x_1 = \frac{5}{2} - \frac{3}{2} = \frac{5-3}{2} = \frac{2}{2} = 1 \\ x_2 = \frac{5}{2} + \frac{3}{2} = \frac{5+3}{2} = \frac{8}{2} = 4 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x_1 = 1; \\ x_2 = 4. \end{cases}$ 2)topilgan x_1 va x_2 larni kvadrat tenglamaning ildizlari deyiladi;

3) $x_1 = 1$ va $x_2 = 4$ lardan foydalanib, $x^2 - 5x + 4$ kvadrat uchhad, chiziqli ko‘paytuvchilarga ajratiladi.

$x^2 - 5x + 4 = (x-1)(x-4) -$ olingan natija misolning berilishiga qo‘yiladi. Javobi: E.

(1996-11-23) Otasi 40, o‘g‘li 16 yoshda. Necha yildan keyin otasi o‘g‘lidan 2 marta katta bo‘ladi?

A) 5 yil B) 7 yil C) 6 yil D) 4 yil E) 8 yil

Yechilishi: 1) “Keyin,, deyilsa yoshga-yosh qo‘shiladi. “Oldin,, deyilsa yoshdan-yosh ayriladi.

$40 + x = 2(16 + x) \Rightarrow \ 40 + x = 32 + 2x \Rightarrow$

$\Rightarrow \ x - 2x = 32 - 40 \Rightarrow \ -x = -8 \Rightarrow \ x = 8.$ Javobi: E.

(1997-10-3) $0{,}2 \cdot (5y - 2) = 0{,}3 \cdot (2y - 1) - 0{,}9$ ni soddalashtiring.

A) 2 B) 0,2 C) -2 D) $-1{,}2$ E) $2\frac{1}{2}$

Yechilishi: $0{,}2 \cdot (5y - 2) = 0{,}3 \cdot (2y - 1) - 0{,}9 \Rightarrow$

$\Rightarrow y - 0{,}4 = 0{,}6y - 0{,}3 - 0{,}9 \Rightarrow y - 0{,}6y =$

$= -1{,}2 + 0{,}4 \Rightarrow 0{,}4y = -0{,}8 \Rightarrow y = \frac{-0{,}8}{0{,}4} = -\frac{8}{4} = -2 \Rightarrow$

$\Rightarrow y = -2.$ Javobi: C.

(1996-1-10) $x; -2{,}1; \ va$ 3,3 sonlarining o‘rta arifmetigi 0,2 ga teng. y ni toping.

A) 0,6 B) -0,6 C) 0,8 D) 2 E) -0,8

Yechilishi: $\frac{x+(-2,1)+3,3}{3} = 0,2;$

Tenglamada kasr qatnashsa, umumiy maxraj beriladi, so‘ngra maxraj tashlab yuboriladi:

$x - 2,1 + 3,3 = 0,6 \Rightarrow x = 0,6 + 2,1 - 3,3 = -0,6.$

Javobi: B.

(1996-1-6) $2\frac{4}{5} : x = 1\frac{2}{3} : 2\frac{6}{7}$ proporsiyaning nomalum hadini toping.

A) $\frac{1}{2}$ B) $\frac{2}{3}$ C) $4\frac{4}{5}$ D) $\frac{3}{5}$ E) $2\frac{1}{5}$

Yechilishi: $2\frac{4}{5} : x = 1\frac{2}{3} : 2\frac{6}{7}$ – Proporsiya;

1) Proporsiyada o‘rta hadlar ko‘paytmasi chetki hadlar ko‘paytmasiga teng bo‘ladi.

$1\frac{2}{3} \cdot x = 2\frac{4}{5} \cdot 2\frac{6}{7} \Rightarrow \frac{5}{3} \cdot x = \frac{14}{5} \cdot \frac{20}{7} = \frac{5x}{3} = 8 \Rightarrow$

$\Rightarrow$ 2) Tenglamada kasr qatnashsa umumiy maxraj beriladi, so‘ngra maxraj tashlab yoziladi $\Rightarrow$

$\Rightarrow 5x = 24 \Rightarrow x = \frac{24}{5} = 4\frac{4}{5} = 4,8 \Rightarrow x = 4,8.$

Javobi: C.

(1996-1-18) $3 - x = -\frac{4}{x}$ tenglamaning nechta ildizi bor?

A) 1 B) 2 C) 3 D) ildizi yo‘q E) cheksiz ko‘p

Yechilishi: $3 - x = -\frac{4}{x} \Rightarrow 3x - x^2 = -4 \Rightarrow$

$\Rightarrow x^2 - 3x - 4 = 0 \Rightarrow \begin{cases} a = 1; \\ b = -3; \\ c = -4. \end{cases}$

1) Kvadrat tenglama ildizlarining bor yoki yo‘qligi, agar bor bo‘lsa, nechtaligi diskreminant yordamida aniqlanadi.

$D = b^2 - 4ac = (-3)^2 - 4 \cdot 1 \cdot (-4) = 9 + 16 = 25 > 0.$

Demak, yechim ikkita. Javobi: B.

(1996-9-71) a ning qanday qiymatlarida $ax = 2x + 3$ tenglama yechimga ega bo‘lmaydi?

A) $a \neq 1$ B) $a = 2$ C) $a \neq 2$ D) $a \neq -2$ E) $a = 0$

Yechilishi: $ax = 2x + 3$;

1) Masala shartida yechim, ildiz va nollari so‘zlari kelsa, x o‘zgaruchi topiladi.

$ax - 2x = 3 \Rightarrow x(a-2) = 3 \Rightarrow x = \frac{3}{a-2}$.

2) Kasrning maxraji nolga teng bo‘lsa, yechim bo‘lmaydi.

Demak, $a - 2 = 0 \Rightarrow a = 2$. Javobi: B.

(1996-9-85) $4^4 \cdot 4^8 \cdot 4^{12} \cdot \ldots \cdot 4^{4x} = 0{,}25^{-144}$ tenglamani yeching.

A) 14 B) 9 C) -4 va 3 D) 6 E) 8

Yechilishi: $4^4 \cdot 4^8 \cdot 4^{12} \cdot \ldots \cdot 4^{4x} = 0{,}25^{-144}$;

1) darajada asoslari bir xil bo‘lsa, ulardan bittasi olinib, daraja ko‘rsatkichlari qo‘shiladi

$4^{4+8+12+\cdots+4x} = \left(\frac{1}{4}\right)^{-144}$

2) tenglikning ikkala tomonidagi asoslar teng bo‘lsa, darajalar ham teng bo‘ladi

$4 = 4 \Rightarrow 4 + 8 + 12 + \cdots + 4x = 144 \Rightarrow$

$\Rightarrow 4(1 + 2 + 3 + \cdots + x) = 144 \Rightarrow 1 + 2 + 3 + \cdots + x = 36.$

4) arifmetik progressiyaning birinchi hadi $a_1 = 1$, oxirgi had $a_n = x$, hadlar soni $n = x$, hadlar yug‘indisi $S_n = 36$ ekanligi e’tiborga olinadi.

U holda, $S_n = \frac{a_1 + a_n}{2} \cdot n$ formulaga asosan,

$36 = \frac{1+x}{2} \cdot x \Rightarrow 36 = \frac{x^2+x}{2} \Rightarrow x^2 + x = 72 \Rightarrow$

$\Rightarrow x^2 + x - 72 = 0 \Rightarrow \begin{cases} p = 1; \\ q = -72. \end{cases}$

$x_{1,2} = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q} = -\frac{1}{2} \pm \sqrt{\left(\frac{1}{2}\right)^2 - (-72)} =$

$= -\frac{1}{2} \pm \sqrt{\frac{1}{4} + 72} = -\frac{1}{2} \pm \sqrt{\frac{1+288}{9}} = -\frac{1}{2} \pm \sqrt{\frac{289}{4}} =$

$= -\frac{1}{2} \pm \frac{17}{2} \Rightarrow \begin{cases} x_1 = -\frac{1}{2} - \frac{17}{2} = \frac{-1-17}{2} = -9 \\ x_2 = -\frac{1}{2} + \frac{17}{2} = \frac{-1+17}{2} = 8 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x_1 = -9 - chet\ ildiz; \\ x_2 = 8 - ildiz. \end{cases}$ Javobi: E.

(1996-3-5) Ikki sonning yig‘indisi 6,5 ga teng. Ulardan biri ikkinchisidan 4 marta kichik. Shu sonlarning kattasini toping.

A) 6 B) 5 C) 4 D) 5,3 E) 5,2

Yechilishi: 1) sonning o‘zi aytilmasdan, ikki son deyilsa, ular x va y ko‘rinishda olinadi.

$x + y = 6{,}5 \Rightarrow$

2) birinchi son ikkinchisidan 4 marta kichik bo‘lsa, ikkinchi son birinchisidan 4 marta katta bo‘ladi.

$\Rightarrow x + 4x = 6{,}5 \Rightarrow 5x = 6{,}5 \Rightarrow x = \frac{6{,}5}{5} \Rightarrow x = 1{,}3 \Rightarrow$

$\Rightarrow y = 4x = 4 \cdot 1{,}3 = 5{,}2.$ Javobi: E.

(1996-3-22) Onasi 50, qizi 28 yoshda. Necha yil oldin qizi onasidan 2 marta yosh bo‘lgan?

A) 5 yil B) 6 yil C) 8 yil D) 4 yil E) 7 yil

Yechilishi: 1) “Oldin” deyilganligi uchun yoshdan yosh ayriladi.

$50 - x = 2(28 - x) \Rightarrow 50 - x = 56 - 2x \Rightarrow$

$\Rightarrow -x + 2x = 56 - 50 \Rightarrow x = 6.$ Javobi: B.

(1996-3-67) Qadimiy masala. meshdagi suv Anvarning o‘ziga 20 kunga, ukasiga esa 60 kunga yetadi. Meshdagi suv ikkalasiga necha kunga yetadi?

A) 15 B) 12 C) 14 D) 16 E) 13

Yechilishi: 1) Anvar bir kunda meshdagi suvning $\frac{1}{20}$ qismini ichadi;

2) ukasi bir kunda meshdagi suvning $\frac{1}{60}$ qismini ichadi;

3) aka-uka bir kunda meshdagi suvning $\frac{1}{20} + \frac{1}{60}$ qismini ichadi;

4) Ikkalasi birgalikda bir mesh suvni x kunda ichib tugatadi.

5) bir mesh suv, bir mesh suvga teng g‘oyasiga asoslanib, tenglama quyidagi ko‘rinishda tuziladi va yechiladi

$\left(\frac{1}{20} + \frac{1}{60}\right) \cdot x = 1 \Rightarrow \frac{3+1}{60} \cdot x = 1 \Rightarrow \frac{4}{60} \cdot x = 1 \Rightarrow$

$\Rightarrow \frac{x}{15} = 1 \Rightarrow x = 15.$ Javobi: A.

(1996-6-51) $\left(\frac{4}{3}\right)^x \cdot \left(\frac{3}{8}\right)^x = 2$ tenglamaning ildizi x_0 bo‘lsa quyidagi munosabatlardan qaysi biri o‘rinli?

A) $x_0 > -1$ B) $x_0 < -1$ C) $x_0 = -1$

D) $\frac{x_0}{2} = -1$ D) To‘g‘ri javob keltirilmagan

Yechilishi: $\left(\frac{4}{3}\right)^x \cdot \left(\frac{3}{8}\right)^x = 2;$

$\left(\frac{4}{3}\right)^x \cdot \left(\frac{3}{2 \cdot 4}\right)^x = 2 \Rightarrow \frac{4^x}{3^x} \cdot \frac{3^x}{4^x \cdot 2^x} = 2 \Rightarrow$

$\Rightarrow \frac{1}{2^x} = 2 \Rightarrow 2^{-x} = 2^1 \Rightarrow -x = 1 \Rightarrow x = -1.$ Javobi: C.

(1997-6-69) $\sqrt[3]{25^{x-1}} = \frac{5}{\sqrt[5]{5}}$ tenglamani yeching.

A) 1 B) 5 C) $\frac{1}{4}$ D) 2,2 E) 0

Yechilishi: $\sqrt[3]{25^{x-1}} = \frac{5}{\sqrt[5]{5}}$;

Bunday misollar bir xil asosga keltirib yechiladi

$\sqrt[3]{5^{2(x-1)}} = \frac{\sqrt[5]{5^5}}{\sqrt[5]{5}} \Rightarrow \sqrt[3]{5^{2x-2}} = \sqrt[5]{\frac{5^5}{5}} \Rightarrow 5^{\frac{2x-2}{3}} = 5^{\frac{4}{5}} \Rightarrow$

$\Rightarrow \frac{5x-2}{3} = \frac{4}{5} \Rightarrow 10x - 10 = 12 \Rightarrow 10x = 12 + 10 \Rightarrow$

$\Rightarrow 10x = 22 \Rightarrow x = 2{,}2.$ Javobi: D.

(1997-6-57) $(0{,}8)^{3-2x} = (1{,}25)^3$ temglamani yeching.

A) 0 B) 1 C) 2 D) 3 E) 4

Yechilishi: $(0{,}8)^{3-2x} = (1{,}25)^3 \Rightarrow \left(\frac{8}{10}\right)^{3-2x} = \left(\frac{125}{100}\right)^3 \Rightarrow$

$\Rightarrow \left(\frac{4}{5}\right)^{3-2x} = \left(\frac{4}{5}\right)^{-3} \Rightarrow 3 - 2x = -3 \Rightarrow 3 + 3 = 2x \Rightarrow$

$\Rightarrow 2x = 6 \Rightarrow x = 3.$ Javobi: D.

(1997-6-26) $2^{3x+7} + 5^{3x+5} + 2^{3x+5} - 5^{3x+5} = 0$ tenglamani yeching.

A) 1 B) 0 C) -1 D) 2 E) $\frac{1}{3}$

Yechilishi: $2^{3x+7} + 5^{3x+5} + 2^{3x+5} - 5^{3x+5} = 0 \Rightarrow$

$\Rightarrow 2^{3x+7} + 2^{3x+5} = 5^{3x+5} - 5^{3x-4} \Rightarrow$

$\Rightarrow 2^{3x} \cdot 2^7 + 2^{3x} \cdot 2^5 = 5^{3x} \cdot 5^5 - 5^{3x} \cdot 5^{-3} \Rightarrow$

$\Rightarrow 2^{3x} \cdot 2^5(2^2 + 1) = 5^{3x} \cdot 5^4(5 - 1) \Rightarrow$

$\Rightarrow 2^{3x} \cdot 2^5 \cdot 5 = 5^{3x} \cdot 5^4 \cdot 4 \Rightarrow$

$\Rightarrow 2^{3x} \cdot 32 \cdot 5 = 5^{3x} \cdot 625 \cdot 4 \Rightarrow 2^{3x} \cdot 2^3 = 5^{3x} \cdot 5^3 \Rightarrow$

$\Rightarrow 2^{3x+3} = 5^{3x+3}$;

Tenglikning ikkala tomoni, o‘zlaridan ixtiyoriy bittasiga bo‘linadi.

$\frac{2^{3x+3}}{5^{3x+3}} = \frac{5^{3x+3}}{5^{3x+3}} \Rightarrow \left(\frac{2}{5}\right)^{3x+3} = 1 \Rightarrow \left(\frac{2}{5}\right)^{3x+3} = \left(\frac{2}{5}\right)^{0} \Rightarrow$

$\Rightarrow 3x + 3 = 0 \Rightarrow 3x = -3 \Rightarrow x = -1.$ Javobi: B.

(1997-6-16) a ning qanday qiymatlarida $ax - 2a = 2$ tenglama birdan kichik ildizga ega bo‘ladi?

A) $a \in (-2; 0)$ B) $a \in (-\infty; 0)$ C) $a \in (0; 1)$

D) $a \in [1; 2)$ E) $a \in R$

Yechilishi: $ax - 2a = 2$; 1) Ildiz so‘zi bor, demak, x o‘zgaruvchi topiladi.

$ax = 2a + 2 \Rightarrow x = \frac{2a+2}{a} \Rightarrow x = 2 + \frac{2}{a};$

2) Ildizlari 1 dan kichik deganligi uchun:

$x < 1 \Rightarrow 2 + \frac{2}{a} < 1 \Rightarrow \frac{2}{a} < 1 - 2 \Rightarrow \frac{2}{a} < -1;$

3) a ning qiymatini baholash orqali topiladi.

Baholash: 1) $a \neq 0$

2) $a > 0 \Rightarrow$

4) Maxraj a noldan katta ekan, umumiy maxraj berilsa (tengsizlikning ikkala tomon a ga ko‘paytirilsa), tengsizlik belgisi o‘zgarmaydi.

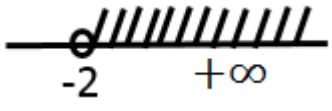
$\Rightarrow \frac{2}{a} < -1 \Rightarrow 2 < -a \Rightarrow a < -2 \Rightarrow (-\infty; -2).$

$\Rightarrow (-\infty; -2) \Rightarrow$

3) $a < 0;$

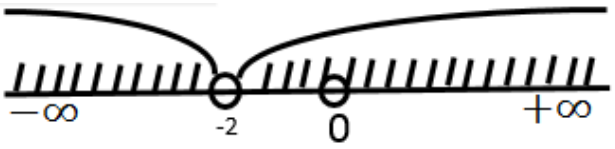
Maxraj a noldan kichik bo‘lganda umumiy maxraj berilsa, tengsizlik belgisi o‘zgaradi.

$\Rightarrow \frac{2}{a} < -1 \Rightarrow 2 > -a \Rightarrow a > -2 \Rightarrow$



$\Rightarrow (-2; +\infty);$

4) 1), 2) va 3) lardan



1) $a \in (-\infty;-2) \Rightarrow a =$

$= -3 \Rightarrow x = 2 + \frac{2}{a} \Rightarrow x = 2 + \frac{2}{-3} = \frac{4}{3} > 1;$

2) $a \in (-2;0) \Rightarrow a = -1 \Rightarrow x = 2 + \frac{2}{-1} = 0 < 1;$

3) $a \in (0;+\infty) = a = 1 \Rightarrow x = 2 + \frac{2}{1} = 4 > 1;$

Demak, $a \in (-2;0)$ ekan. Javobi: A.

(1997-6-4) Zavodning uchta sexida 1872 ishchi ishlaydi. Birinchi sexda ikkinchi sexdagidan 5 marta ko‘p, uchinchi sexda birinchi va ikkinchi sexdagi ishchilarning soniga teng ishchi ishlaydi. Birinchi sexda qancha ishchi ishlaydi?

A) 760 B) 730 C) 780 D) 820 E) 800

Yechilishi: kam sonlisi x bilan belgilanadi:

$\begin{matrix} I---5x \\ II----x \\ III-----6x \end{matrix} \Rightarrow 12x = 1872 \Rightarrow x = 156 \Rightarrow$

$\Rightarrow 5x = 5 \cdot 156 = 780.$ Javobi: C.

(1997-6-12) $x^3 - 3x^2 - 4x + 12 = 0$ tenglamaning ildizlari ko‘paytmasini toping.

A) 6 B) -4 C) 12 D) -12 E) 24

Yechilishi: $x^3 - 3x^2 - 4x + 12 = 0 \Rightarrow$

$\Rightarrow x^2(x-3) - 4(x-3) = 0 \Rightarrow$ qavsdan qavs chiqadi$\Rightarrow$

$\Rightarrow (x-3)(x^2-4) = 0 \Rightarrow$

$$\Rightarrow \begin{cases} x-3=0 \\ x^2-4=0 \end{cases} \Rightarrow \begin{cases} x=3 \\ x^2=4 \end{cases} \Rightarrow \begin{cases} x=3 \\ x=2 \\ x=-2 \end{cases} \Rightarrow \begin{cases} x_1=-2 \\ x_2=2 \\ x_3=3 \end{cases} \Rightarrow$$

$\Rightarrow x_1 \cdot x_2 \cdot x_3 = (-2) \cdot 2 \cdot 3 = -12.$ Javobi: D.

(1997-9-15) $x+\frac{1}{y+\frac{1}{z}}=\frac{17}{15}$ tenglamaning natural sonlardagi yechimida y nimaga teng?

A) 4 B) 3 C) 2 D) 7 E) 6

Yechilishi: $x+\frac{1}{y+\frac{1}{z}}=\frac{17}{15}\Rightarrow x+\frac{1}{\frac{yz+1}{z}}=1\frac{2}{15}\Rightarrow$

$\Rightarrow x+1:\frac{yz+1}{z}=1+\frac{2}{15}\Rightarrow x+1\cdot\frac{z}{yz+1}=1+\frac{2}{15}\Rightarrow$

$\Rightarrow x+\frac{z}{yz+1}=1+\frac{2}{15}\Rightarrow\begin{cases}x=1;\\ z=2;\\ yz+1=15\Rightarrow\end{cases}$

$\Rightarrow y\cdot 2=15-1\Rightarrow 2y=14\Rightarrow y=7.$ Javobi: D.

(1997-11-6) $\frac{x-3}{6}+x=\frac{2x-1}{3}-\frac{4-x}{2}$ tenglamani yeching.

A) 3 B) 2 C) -2 D) -4 E) $\emptyset$

Yechilishi: $\frac{x-3}{6}+x=\frac{2x-1}{3}-\frac{4-x}{2}\Rightarrow$

$\Rightarrow x-3+6x=4x-2-12+3x\Rightarrow$

$\Rightarrow 7x-3\neq 7x-4\Rightarrow 7x-7x\neq 3-14\Rightarrow 0\neq -11\Rightarrow$

$\Rightarrow\emptyset.$ Javobi: E.

(1997-9-95) $1-3x+9x^2-\cdots-3^9x^9=0$ tenglamani yeching.

A) $\pm\frac{1}{3}$ B) $\frac{1}{3}$ C) $-\frac{1}{3}$ D) $\frac{1}{5}$ E) $\frac{3}{4}$

Yechilishi: $1-3x+9x^2-\cdots-3^9x^9=0$ yoyib yoziladi:

$1-3\cdot x+3^2\cdot x^2-3^3\cdot x^3+\cdots+3^8\cdot x^8-3^9\cdot x^9=0;$

Minuslik hadlar tenglikdan o‘rtkaziladi.

$1+3^2\cdot x^2+\cdots+3^8\cdot x^8=3\cdot x+3^3\cdot x^3+3^9\cdot x^9\Rightarrow$

$\Rightarrow 1+3^2\cdot x^2+\cdots+3^8\cdot x^8=$

$=3x(1+3^2\cdot x^2+\cdots+3^8\cdot x^8)\Rightarrow 3x=1\Rightarrow x=\frac{1}{3}.$

Javobi: B.

(1997-1-72) $\sqrt{x+2}+x=0$ tenglamani yeching.

A) -1 B) -2 C) 2 D) 0 E) to‘g‘ri javob berilmagan

Yechilishi: $\sqrt{x+2}+x=0;$

1) ildiz qatmashgan tenglamaga, irrtsional tenglama deyiladi;

2) uni yechish uchun ildiz tenglikning bir tomonida qoldirilib, qolgan hadlar boshqa tomoniga o‘tkaziladi va tenglikning ikkala tomoni kvadratga ko‘tariladi

$\sqrt{x+2}=-x \Rightarrow \left(\sqrt{x+2}\right)^2=(-x)^2 \Rightarrow$

tenglamada o‘zgaruvchining kvadrati qatnashsa, barcha hadlar tenglikning bir tomonida, ikkinchi tomonida nol turadi:

$\Rightarrow x^2-x-2=0 \Rightarrow \begin{cases} x=-1; \\ x=2. \end{cases}$

4) topilgan yechimlar berilishiga qo‘yib, tekshiriladi.

a) $\sqrt{-1+2}+(-1)=0 \Rightarrow \sqrt{1}-1=0 \Rightarrow 0=0;$

Tenglik bajarildi, demak $x=-1$ tenglamaning ildizi;

b) $\sqrt{2+2}+2=0=\sqrt{4}+2=0 \Rightarrow 2+2=0 \Rightarrow 4\neq 0;$

Tenglik bajarilmadi, demak $x=2$ chet ildiz. Javobi: A.

(1997-2-51) $(3^{-x}-9)(x^2-36)=0$ tenglamaning ildizlari ko‘paytmasini toping.

A) 72 B) -6 C) 36 D) -18 E) 18

Yechilishi: $(3^{-x}-9)(x^2-36)=0 \Rightarrow$

$\Rightarrow \begin{cases} 3^{-x}-9=0 \\ x^2-36=0 \end{cases} \Rightarrow \begin{cases} 3^{-x}=3^2 \\ x^2=36 \end{cases} \Rightarrow \begin{cases} -x=2 \\ x=\pm 6 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x_1=-2 \\ x_2=-6 \\ x_3=6 \end{cases} \Rightarrow x_1\cdot x_2\cdot x_3=-2\cdot(-6)\cdot 6=72.$

Javobi: A.

(1997-2-55) $4^{\log_4(x-5)} = 19$ tenglamaning ildizi 20 dan qancha katta?

A) 6 B) 2 C) 4 D) 3 E) 5

Yechilishi: $4^{\log_4(x-5)} = 19$;

1) logarifmning aniqlanish sohasi tekshiriladi

$4 > 0;\ 4 \neq 1;\ x - 5 > 0 \Rightarrow x > 5;$

2) so‘ngra, logarifmik tenglamaning o‘zi yechiladi

$x - 5 = 19 \Rightarrow x = 19 + 5 \Rightarrow x = 24;\ 24 - 20 = 4.$

Javobi: C.

(1996-6-24) a ning qanday qiymatlarida $a^2x^2 - 2x + 1 = 0$ tenglama bitta ildizga ega bo‘ladi?

A) $a = 1$ B) $a = -1$ C) $a = \pm 1$

D) $a = 0$ va $a = 1$ E) $a = \pm 1$ va $a = 0$

Yechilishi: $a^2x^2 - 2x + 1 = 0;\ D = b^2 - 4ac \Rightarrow$

$\Rightarrow D = 0 \Rightarrow b^2 - 4ac = 0 \Rightarrow (-2)^2 - 4a^2 \cdot 1 = 0 \Rightarrow$

$\Rightarrow 4 - 4a^2 = 0 \Rightarrow 4a^2 = 4 \Rightarrow a^2 = 1 \Rightarrow a = \pm 1;$

$a = 0 \Rightarrow 0^2x^2 - 2x + 1 = 0 \Rightarrow 0 - 2x + 1 = 0 \Rightarrow$

$\Rightarrow 2x = 1 \Rightarrow x = \frac{1}{2};\quad a = \pm 1\ va\ a = 0.$ Javobi: E.

(1996-6-25) $x^2 - px + 8 = 0$ tenglamaning ildizlaridan biri 4 ga teng. Bu tenglamaning barcha koeffitsientlari yig‘indisini toping.

A) 3 B) 2 C) 15 D) 14 E) 4

Yechilishi: $x^2 - px + 8 = 0 \Rightarrow \begin{cases} p = -p; \\ q = 8; \\ x_1 = 4. \end{cases}$

$\begin{cases} x_1 + x_2 = -p \\ x_1 \cdot x_2 = q \end{cases} \Rightarrow \begin{cases} 4 + x_2 = -(-p) \\ 4 \cdot x_2 = 8 \end{cases} \Rightarrow \begin{cases} p = 6 \\ x_2 = 2 \end{cases} \Rightarrow$

$\Rightarrow x^2 - 6x + 8 = 0 \Rightarrow 1 + (-6) + 8 = 3.$ Javobi: A.

(1996-7-15) $x^4 - 13x^2 + 36 = 0$ tenglamaning ildizlari yig‘indisini toping.

A) 13 B) 5 C) 0 D) 36 E) 1

Yechilishi: Bikvadrat tenglamaning ildizlari yig‘indisi doimo nolga teng bo‘ladi.

(1996-9-18) x_1 va x_2 $x^2 + x + a = 0$ tenglamaning ildizlari bo‘lib, $\frac{1}{x_1} + \frac{1}{x_2} = \frac{1}{2}$ tenglikni qanoatlantiradi. a ni toping.

A) -1 B) -2 C) -3 D) 2 E) 1

Yechikishi: $x^2 + x + a = 0 \Rightarrow \begin{cases} p = 1; \\ q = a. \end{cases}$

$\begin{cases} x_1 + x_2 = -p \\ x_1 \cdot x_2 = q \end{cases} \Rightarrow \begin{cases} x_1 + x_2 = -1; \\ x_1 \cdot x_2 = a. \end{cases}$

1) $\frac{1}{x_1} + \frac{1}{x_2} = \frac{1}{2}$ – munosabatdan foydalaniladi. Bunda $2 \cdot x_1 \cdot x_2$ –umumiy maxraj. U holda $\frac{1}{x_1} + \frac{1}{x_2} = \frac{1}{2} \Rightarrow$

$\Rightarrow 2x_1 + 2x_2 = x_1 \cdot x_2 \Rightarrow x_1 \cdot x_2 = 2(x_1 + x_2) \Rightarrow$

$\Rightarrow a = 2 \cdot (-1) = a = -2.$ Javobi: B.

(1997-2-24) $y = x^2 - 9x + (m^2 - 4)(m^2 - 9) = 0$ tenglamaning ildizlaridan biri nolga teng bo‘ladigan m ning barcha qiymatlari ko‘paytmasini toping.

A) 36 B) $4\sqrt{3}$ C) -6 D) 6 E) $6\sqrt{3}$

Yechilishi: $y = x^2 - 9x + (m^2 - 4)(m^2 - 9) = 0 \Rightarrow$

$\Rightarrow \begin{cases} p = -9 \\ q = (m^2 - 4)(m^2 - 9) \Rightarrow (m^2 - 4)(m^2 - 9) = 0 \Rightarrow \\ x_1 = 0 \end{cases}$

$$\Rightarrow \begin{cases} m^2 = 4 \\ m^2 = 9 \end{cases} \Rightarrow \begin{cases} m_{1,2} = \pm 2 \\ m_{3,4} = \pm 3 \end{cases} \Rightarrow \begin{cases} m_1 = -2 \\ m_2 = 2 \\ m_3 = -3 \\ m_4 = 3 \end{cases} \Rightarrow$$

$\Rightarrow m_1 \cdot m_2 \cdot m_3 \cdot m_4 = 36.$ Javobi: A.

(1997-4-24) a va b sonlari $3x^2 - 2x - 6 = 0$ tenglamaning ildizlari bo‘lsa, $a^2 + b^2$ ni hisoblang.

A) 6 B) 8 C) $4\frac{4}{9}$ D) $4\frac{2}{9}$ E) $3\frac{5}{9}$

Yechilishi: $3x^2 - 2x - 6 = 0 \Rightarrow \begin{cases} a = 3 \\ b = -2 \\ c = -6 \end{cases} \Rightarrow$

$$\Rightarrow x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-2) \pm \sqrt{(-2)^2 - 4 \cdot 3 \cdot (-6)}}{2 \cdot 3} =$$

$$= \frac{2 \pm \sqrt{4 + 72}}{6} = \frac{2 \pm \sqrt{76}}{6} \Rightarrow \begin{cases} x_1 = a = \frac{2 - \sqrt{76}}{6} \\ x_2 = b = \frac{2 + \sqrt{76}}{6} \end{cases} \Rightarrow$$

$$\Rightarrow a^2 + b^2 = \left(\frac{2 - \sqrt{76}}{6}\right)^2 + \left(\frac{2 + \sqrt{76}}{6}\right)^2 =$$

$$= \frac{4 - 4\sqrt{76} + 76 + 4 + 4\sqrt{76} + 76}{36} = \frac{160}{36} = 4\frac{4}{9}.$$ Javobi: C.

(1997-7-15) $x^4 - 10x^2 + 9 = 0$ tenglamaning eng katta va eng kichik ildizlari ayirmasini toping.

A) 1 B) 8 C) 2 D) 4 E) 6

Yechilishi: $x^4 - 10x^2 + 9 = 0;$

1) $x^2 = y$ almashtirish olinadi.

$$y^2 - 10y + 9 = 0 \Rightarrow \begin{cases} y_1 = 1 \\ y_2 = 9 \end{cases} \Rightarrow \begin{cases} x^2 = 1 \\ x^2 = 9 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x_{1,2} = \pm 1 \\ x_{3,4} = \pm 3 \end{cases} \Rightarrow \begin{cases} x_1 = -1 \\ x_2 = 1 \\ x_3 = -3 \\ x_4 = 3 \end{cases} \Rightarrow x_4 - x_3 = 3 - (-3) = 6.$$

Javobi: E.

(1996 −9-12) $(\alpha x + 2y)(3x + \beta x) = \gamma x^2 + 7xy + y^2$ ayniyatdagi noma'lum koeffitsiyentlardan biri α ni toping.

A) 3 B) 2 C) 4 D) $\frac{3}{2}$ E) $\frac{5}{2}$

Yechilishi: $(\alpha x + 2y)(3x + \beta x) = \gamma x^2 + 7xy + y^2$;

$3\alpha x^2 + \alpha\beta xy + 6xy + 2\beta y^2 = \alpha x^2 + 7xy + y^2$;

$3\alpha x^2 + (\alpha\beta + 6) \cdot xy + 2\beta y^2 = \gamma x^2 + 7xy + y^2$;

Ikkala tomoni bir xil bo'lgan algebraik tenglikka ayniyat deyiladi. U holda

$$\begin{cases} 3\alpha = \gamma \\ \alpha\beta + 6 = 7 \\ 2\beta = 1 \end{cases} \Rightarrow \begin{cases} \gamma = 3\alpha \\ \alpha \cdot \frac{1}{2} = 7 - 6 \\ \beta = \frac{1}{2} \end{cases} \Rightarrow \begin{cases} \gamma = 3\alpha \\ \frac{\alpha}{2} = 1 \\ \beta = \frac{1}{2} \end{cases} \Rightarrow$$

$$\begin{cases} \gamma = 3 \cdot 2 = 6 \\ \alpha = 2 \\ \beta = \frac{1}{2} \end{cases}$$

Javobi: B.

(1996-7-13) $(3x - 1)(x - 2) = 0$ bo'lsa, $3x - 1$ qanday qiymatlarni qabul qilishi mumkin?

A) $faqat\ \frac{1}{3}$ B) $faqat\ 0$ C) $\frac{1}{3}\ yoki\ 0$

D) $\frac{1}{3}\ yoki\ 0$ E) $0\ yoki\ 5$

Yechilishi: $(3x - 1)(x - 2) = 0$; $3x - 1 = ?$

1) bu tenglamada x emas, balki $3x - 1$ ifodani topish talab etilgan.

2) o'zgaruvchi qatnashgan ko'paytma qachon nolga teng?

Javobi: har bir ko‘paytuvchi alohida-alohida nolga teng bo‘lsa,

$\begin{cases} 3x-1=0; \\ x-2=0. \end{cases}$

3) ikkinchi tenglamadan x topilib, $3x-1$ ga qo‘yiladi.

$x-2=0 \Rightarrow x=2 \Rightarrow 3x-1=3\cdot 2-1=5;$

Demak, berilgan ifoda qiymati 0 yoki 5 ekan. Javobi: E.

(1996-7-22) a ning qanday qiymatlarida $ax-a=x-1$ tenglama cheksiz ko‘p yechimga ega?

A) $a=1$ B) $a=2$ C) $a=-1$ D) $a\epsilon R$ E) $a\in\emptyset$

Yechilishi: $ax-a=x-1.$

Ayniyatning yechimi cheksiz ko‘p bo‘ladi bundan $a=1$ ga ega bo‘lamiz.

Haqiqatan, $a=1$ da $x-1=x-1$ ayniyat hosil bo‘ladi.

Javobi: A.

(1996-13-7) Qadimiy masala. Meshdagi suv Anvarning o‘ziga 35 kunga, akasi ikkalasiga esa 10 kunga yetadi. Meshdagi suv Anvarning akasiga necha kunga yetadi?

A) 20 B) 14 C) 16 D) 15 E) 18

Yechilishi: $\left(\frac{1}{35}+\frac{1}{x}\right)\cdot 10=1 \Rightarrow \frac{10}{35}+\frac{10}{x}=1 \Rightarrow$

$\Rightarrow \frac{2}{7}+\frac{10}{x}=1 \Rightarrow 2x+70=7x \Rightarrow 7x-2x=70 \Rightarrow$

$\Rightarrow 5x=70 \Rightarrow x=14.$ Javobi: B.

(1996-3-77) x_1 va x_2 $x^2+|a|x+6=0$ tenglamaning ildizlari bo‘lib, ${x_1}^2+{x_2}^2=13$ tenglikni qanoatlantirsa, x_1+x_2 nechaga teng?

A) 5 B) -6 C) 6 D) -7 E) -5

Yechilishi: 1) masala shartida x_1, x_2 yoki ildizlardan biri iboralari kelsa, Viyet teoremasidan foydalaniladi.

$x^2 + |a|x + 6 = 0 \Rightarrow \begin{cases} p = |a|; \\ q = 6. \end{cases}$

$\begin{cases} x_1 + x_2 = -p \\ x_1 \cdot x_2 = q \end{cases} \Rightarrow \begin{cases} x_1 + x_2 = -|a| \\ x_1 \cdot x_2 = 6 \end{cases} \Rightarrow$

2) ${x_1}^2 + {x_2}^2 = 13$ tenglik munosabat e'tiborga olinib, sistemaning birinchi tenglamasi kvadratga ko'tariladi

$(x_1 + x_2)^2 = (-|a|)^2 \Rightarrow {x_1}^2 + {x_2}^2 + 2 \cdot x_1 x_2 = a^2 \Rightarrow$

$\Rightarrow a^2 = 25 \Rightarrow |a| = 5 \Rightarrow x_1 + x_2 = -5.$ Javobi: E.

Tenglamalar sistemasi

(1996-9-59) Ikki son yig'indisi 24 ga teng. Agar shu sonlardan birining 85% i ikkinchisining $\frac{7}{20}$ qismiga teng bo'lsa, shu sonlarni toping.

A) 18 va 6 B) 20 va 4 C) 7 va 17

D) 8 va 16 E) 15 va 9

Yechilishi: $\begin{cases} x + y = 24 \\ \frac{85}{100} \cdot x = \frac{7}{24} \cdot y \end{cases} \Rightarrow$

1) foiz 100 ga bo'linib, songa ko'paytiriladi;

2) "qismi" deyilsa ko'paytiriladi;

$\Rightarrow \begin{cases} x = 24 - y \\ 0{,}85 \cdot x = \frac{7}{20} \cdot y \end{cases} \Rightarrow \begin{cases} x = 24 - y \\ 17 \cdot (24 - y) = 7y \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = 24 - y \\ 17 \cdot 24 - 17 \cdot y = 7y \end{cases} \Rightarrow \begin{cases} x = 24 - y \\ 24y = 17 \cdot 24 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = 24 - 17 \\ y = 17 \end{cases} \Rightarrow \begin{cases} x = 7; \\ y = 17. \end{cases}$ Javobi: C.

(1997-3-17) Agar $3^{x-1}=9^{y}$ va $2x-y=5$ bo‘lsa, $x-y$ ni toping.

A) 2 B) 3 C) -1 D) -0,5 E) -3

Yechilishi: $\begin{cases}3^{x-1}=9^{y}\\2x-y=5\end{cases}\Rightarrow\begin{cases}3^{x-1}=3^{2y}\\y=2x-5\end{cases}\Rightarrow\begin{cases}x-1=2y\\y=2x-5\end{cases}\Rightarrow$

$\Rightarrow\begin{cases}x-1=2(2x-5)\\y=2x-5\end{cases}\Rightarrow\begin{cases}x-1=4x-10\\y=2x-5\end{cases}\Rightarrow$

$\Rightarrow\begin{cases}x-4x=-10+1\\y=2x-5\end{cases}\Rightarrow\begin{cases}-3x=-9\\y=2x-5\end{cases}\Rightarrow\begin{cases}x=3\\y=1\end{cases}\Rightarrow$

$\Rightarrow x-y=3-1=2.$ Javobi: A.

(1997-12-19) $\begin{cases}x^2-y^2+2x+4=0\\x-y=0\end{cases}$ tenglamalar sistemasini yeching.

A)$(2;2)$ B)$(-2;-2)$ C)$(-1;-1)$ D)$(2;2)$ E)$(-2;2)$

Yechilishi: $\begin{cases}x^2-y^2+2x+4=0\\x-y=0\end{cases}\Rightarrow$

$\Rightarrow\begin{cases}(x-y)(x+y)+2x+4=0\\x-y=0\end{cases}\begin{cases}0\cdot(x+y)+2x+4=0\\x-y=0\end{cases}\Rightarrow$

$\Rightarrow\begin{cases}2x=-4\\x=y\end{cases}\Rightarrow\begin{cases}x=-2\\y=-2\end{cases}\Rightarrow(-2;-2).$ Javobi: E.

(1996-1-19) $\begin{cases}x^2+y^2-2xy=1\\x+y=3\end{cases}$ sistemaning yechimini toping.

A) (2; 1) B) (1; 2) C) (1,5; 1,5)

D) (2; 1) va (1; 2) E) (4; -1)

Yechilishi: $\begin{cases}x^2+y^2-2xy=1\\x+y=3\end{cases}\Rightarrow\begin{cases}(x-y)^2=1\\x+y=3\end{cases}\Rightarrow$

$\Rightarrow\begin{cases}x-y=\pm1\\x+y=3\end{cases}\Rightarrow$

1) $\begin{cases} x-y=-1 \\ x+y=3 \end{cases} \Rightarrow 2x=2 \Rightarrow x=1;\ y=2 \Rightarrow A)\ (1;2)$

2) $\begin{cases} x-y=1 \\ x+y=3 \end{cases} \Rightarrow 2x=4 \Rightarrow x=2; y=1 \Rightarrow B(2;1).$

Javobi: D.

(1996-1-21) $(;y)$ sonlar jufti $\begin{cases} 2x-y=5 \\ 3x+2y=4 \end{cases}$ sistemaning yechimi bo‘lsa, $x-y$ ni toping.

A) 1 B) -1 C) 3 D) 0 E) 5

Yechilishi: $\begin{cases} 2x-y=5 \\ 3x+2y=4 \end{cases} \Rightarrow$ Birinchi tenglamani 2 ga hadlab ko‘paytiriladi, so‘ngra sistema tenglamalari bir-biriga hadlab qo‘shiladi $+\begin{cases} 4x-2y=10 \\ 3x+2y=4 \end{cases} \Rightarrow 7x=14 \Rightarrow$

$\Rightarrow \begin{cases} x=2; \\ y=-1. \end{cases} x-y=2-(-1)=3.$ Javobi: C.

(1996-3-75) $\begin{cases} x+y=3 \\ x^2-y^2=6, \end{cases}$ $x-?$

A) 1 B) 2 C) 3 D) -2 E) -1

Yechilishi: $\begin{cases} x+y=3 \\ x^2-y^2=6 \end{cases} \Rightarrow \begin{cases} x+y=3 \\ (x+y)(x-y)=6 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x+y=3 \\ (x-y)\cdot 3=6 \end{cases} \Rightarrow +\begin{cases} x+y=3 \\ x-y=2 \end{cases} \Rightarrow 2x=5 \Rightarrow x=2{,}5.$

Javobi: B.

(1996-7-23) $\begin{cases} x^2+y^2=9 \\ y-x=-3 \end{cases}$ tenglamalar sistemasi nechta yechimga ega?

A) 1 B) 2 C) 4 D) 3 E) 5

Yechilishi: $\begin{cases} x^2+y^2=9 \\ y-x=-3 \end{cases} \Rightarrow \begin{cases} x^2+y^2=9 \\ y=x-3 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} x^2+(x-3)^2=9 \\ y=x-3 \end{cases} \Rightarrow \begin{cases} 2x^2-6x=0 \\ y=x-3 \end{cases} =$$

$$= \begin{cases} x(2x-6)=0 \\ y=x-3 \end{cases} \Rightarrow \begin{cases} \begin{cases} x=0 \\ 2x-6=0 \end{cases} \Rightarrow \begin{cases} \begin{cases} x=0 \\ x=3 \end{cases} \Rightarrow \\ y=x-3 \end{cases} \\ y=x-3 \end{cases}$$

$$\Rightarrow \begin{cases} \begin{cases} x=0 \\ y=x-3 \end{cases} \Rightarrow \begin{cases} x=0 \\ y=-3 \end{cases} \Rightarrow A(0;-3); \\ \begin{cases} x=3 \\ y=x-3 \end{cases} \Rightarrow \begin{cases} x=3 \\ y=0 \end{cases} \Rightarrow B(3;0). \end{cases}$$

Javobi: B.

(1996-9-16) $\begin{cases} x^2+y^2=10 \\ x+y=4 \end{cases}$ $x \cdot y-?$

A) 4 B) 5 C) 6 D) 7 E) 3

Yechilishi: $\begin{cases} x^2+y^2=10 \\ x+y=4 \end{cases}$ 1) $x \cdot y$ ko‘paytmani topish talab etilsa, birinchi darajali tenglama kvadratga ko‘tarilib, ikkinchisidan hadlab atriladi.

$$-\begin{cases} x^2+y^2=10 \\ x^2+y^2+2xy=16 \end{cases} \Rightarrow 2xy=6 \Rightarrow x \cdot y=3.$$

Javobi: E.

(1997-2-20) $\begin{cases} x+2=0 \\ xy^2=-8 \end{cases}$ tenglamalar sistemasini yeching.

A) $(-2;-2)$ B)$(-2;2)$ C)$(-2;2),(-2;-2)$

D)$(2;2)$ E)$(2;2),\ (-2;-2)$

Yechilishi: $\begin{cases} x+2=0 \\ xy^2=-8 \end{cases} \Rightarrow \begin{cases} x=-2 \\ -2y^2=-8 \end{cases} \Rightarrow \begin{cases} x=-2 \\ y^2=4 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x=-2; \\ y_{1,2}=\pm 2. \end{cases}$ 1) $\begin{cases} x_1=-2 \\ y_1=-1 \end{cases}$ $A(-2;-2);$

2) $\begin{cases} x_2=-2 \\ y_2=2 \end{cases}$ $B(-2;2).$ Javobi: C.

(1997-4-23) Agar $\begin{cases} x+2y=2 \\ 2x+y=k \end{cases}$ bo‘lsa, k ning qanday qiymatida $x+y=2$ tenglik o‘rinli bo‘ladi?

A) 2 B) 4 C) 1 D) 5 E) 3

Yechilishi: $\begin{cases} x+2y=2 \\ 2x+y=k \end{cases}$ bunday holda, berilgan sistemani buzilib, o‘rniga yangi sistema tuziladi.

$-\begin{cases} x+2y=2 \\ x+y=2 \end{cases} \Rightarrow y=0 \Rightarrow x=2.$

Olingan ushbu natijalar k parametrli tenglamaga qo‘yiladi.

$2x+y=k \Rightarrow 2\cdot 2+0=k \Rightarrow k=4.$ Javobi: B.

(1997-4-25) Agar $\begin{cases} x^3-y^3=3x^2y+5 \\ xy^2=1 \end{cases}$ bo‘lsa, $\frac{x-y}{2}$ ni hisoblang.

A) 2 B) 1 C) 3 D) 4,5 E) 1,5

Yechilishi: $\begin{cases} x^3-y^3=3x^2y+5 \\ xy^2=1 \end{cases} \Rightarrow$ sistemaning ikkinchi tenglamasi 3 ga ko‘paytirilib birinchi tenglamaga qo‘shiladi.

$\Rightarrow +\begin{cases} x^3-3x^2y-y^3=5 \\ 3xy^2=3 \end{cases} \Rightarrow x^3-3x^2y+3xy^2-y^3=8 \Rightarrow$

$\Rightarrow (x-y)^3=2^3 \Rightarrow \sqrt[3]{(x-y)^3}=\sqrt[3]{2^3} \Rightarrow x-y=2 \Rightarrow$

$\Rightarrow \frac{x-y}{2}=1.$ Javobi: B.

(1997-5-26) Agar $\begin{cases} \sqrt{x}+\sqrt{y}=3 \\ \sqrt{xy}=2 \end{cases}$ bo‘lsa, $x+y$ ni toping.

A) 2 B) 3 C) 4 D) 5 E) 6

Yechilishi: $\begin{cases}\sqrt{x}+\sqrt{y}=3\\ \sqrt{xy}=2\end{cases}\Rightarrow$

1) $x+y$ yig‘indi e’tiborga olingan holda, $\sqrt{x}+\sqrt{y}=3$ tenglama kvadratga ko‘tariladi.

$$\begin{cases}\left(\sqrt{x}+\sqrt{y}\right)^2=3^2\\ \sqrt{x}\cdot\sqrt{y}=2\end{cases}\Rightarrow\begin{cases}x+y+2\sqrt{x}\sqrt{y}=9\\ \sqrt{x}\cdot\sqrt{y}=2\end{cases}\Rightarrow x+y=5.$$

Javobi: D.

(1997-5-39) $\begin{cases}\sqrt{(x+2)^2}=x+2\\ \sqrt{(x-2)^2}=2-x\end{cases}$ tenglamalar sistemasini yeching.

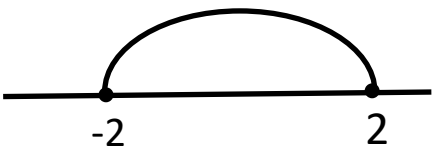
A) $x\geq -2$ B) $x<2$ C) $x\leq 2$

D) $-2\leq x\leq 2$ E) $-2<x<2$

Yechilishi: $\begin{cases}\sqrt{(x+2)^2}=x+2\\ \sqrt{(x-2)^2}=2-x\end{cases}\Rightarrow\begin{cases}|x+2|=x+2\\ |x-2|=2-x\end{cases}\Rightarrow$

$$\Rightarrow\begin{cases}\pm(x+2)=x+2\\ \pm(x-2)=2-x\end{cases}\Rightarrow\begin{cases}-x-2=x+2\\ x+2=x+2\\ -x+2=2-x\\ x-2=2-x\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases}x=-2\\ ayniyat\\ ayniyat\\ x=2\end{cases}\Rightarrow$$



$[-2;2]\Rightarrow -2\leq x\leq 2$. Javobi: D.

Tengsizliklar

(1996-1-30) $f(x) = x^3 - 3x - 4$ bo‘lsa, $\frac{f'(x)}{x-5} \geq 0$ tengsizlikning eng kichik butun yechimini toping.

A) 1 B) -1 C) -5 D) 0 E) -2

Yechilishi: $f(x) = x^3 - 3x - 4$;

1) $\frac{f'(x)}{x-5} \geq 0$ –yo‘l boshlovchi e’tiborga olgan holda, $f(x)$ funksiyadan hosila olinadi.

$f'(x) = (x^3 - 3x - 4)' = 3x^2 - 3 \cdot 1 - 0 = 3x^2 - 3 =$

$= 3(x^2 - 1) = 3(x - 1)(x + 1);$

$\frac{3(x-1)(x+1)}{x-5} \geq 0 \Rightarrow$

2) tengsizlikning ikkala tomoni musbat 3 ga bo‘linsa, tengsizlik belgisi o‘zgarmaydi, lekin misol soddalashadi;

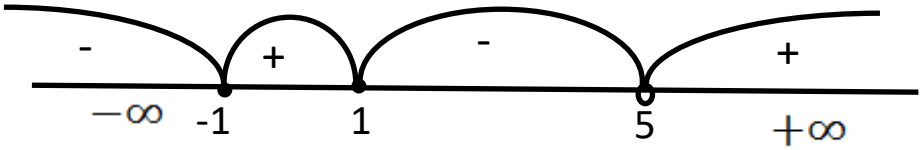
$\Rightarrow \frac{(x-1)(x+1)}{x-5} \geq 0 \Rightarrow$

3) kasr qatnashgan tengsizlik,

$\Rightarrow \begin{cases} (x-1)(x+1) = 0 \\ x - 5 \neq 0 \end{cases} \Rightarrow$ surat nolga teng, maxraj noldan farqli deb yechiladi;

$\Rightarrow \begin{cases} x = 1; \\ x = -1; \\ x \neq 5 \end{cases} \Rightarrow$

4) olingan natijalardan foydalanib intervallar yasaladi. Agar tengsizlikda tenglik belgisi ham qatnashsa, kasrning suratidan olingan natijalarning ichi bo‘yaladi.



5) tengsizlikning har bir oraliqdagi ishorasi aniqlanadi

$[-1;1] \Rightarrow x=0 \Rightarrow \frac{(x-1)(x+1)}{x-5}=\frac{(0-1)(0+1)}{0-5}=\frac{-}{-}=+$

6) qaralayotgan tengsizlik noldan kichik bo‘lsa, intervalning “$-$„ joylari, noldan katta bo‘lsa, ″$+$„ joylari olinadi

$[-1;1]\cup(5;\infty) \Rightarrow x=-1$. Javobi: B.

(1996-3-25) $(x-2)(x+3)>0$ tengsizlikni yeching.

A) $(-\infty;2)\cup(3;\infty)$ B)$(-\infty;-3)\cup(2;\infty)$

C)$(-\infty;-2)\cup(3;\infty)$ D)$(-\infty;\infty)$ E)$(0;\infty)$

Yechilishi: $(x-2)(x+3)>0$. Bundan $x=2$ va $x=-3$.

Kvadrat tengsizlik noldan katta bo‘lsa, uning yechimlari to‘plami kichik ildizdan kichik, katta ildizdan katta tomonda bo‘ladi: $(-\infty;-3)\cup(2;\infty)$. Javobi: B.

(1996-6-11) 1) $a^2>0$, 2) $a^2-10<0$, 3) $(a-5)^2\geq 0$, 4) $\frac{1}{a^2}+a^2>2$ tengsizliklarning qaysilari a ning barcha qiymatlarida o‘rinli?

A) 1 B) 2 C) 1, 3 va 4 D) 3 E) 2

Yechilishi: Ham tenglik, ham tengsizlik bori doim to‘g‘ri bo‘ladi. Javobi:D.

(1996-6-23) $(y+6)(y+2)<0$ tengsizlikning barcha butun yechimlari yig‘indisini toping.

A) 12 B) 20 C) -12 D) -20 E) -9

Yechilishi: $(y+6)(y+2)<0 \Rightarrow y=-6;\ y=-2$.

1) Kvadrat tengsizlik noldan kichik bo‘lsa, uning yechimlari to‘plami ildizlarning orasida bo‘ladi: $(-6;-2)$.

$-5+(-4)+(-3)=-12$. Javobi: C.

(1996-6-54) $0{,}25^{x} \geq 0{,}5^{4x-8}$ tengsizlikni yeching.

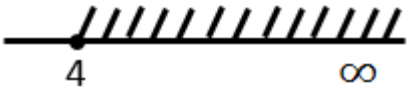
A) $(-\infty; 4)$ B) $(-\infty; 2]$ C) $[2; \infty)$

D) $[4; \infty)$ E) $(-\infty; 4]$

Yechilishi: $0{,}25^{x} \geq 0{,}5^{4x-8}$ 1) bir xil asosga keltiriladi $0{,}5^{2x} \geq 0{,}5^{4x-8}$; 2) asos 0 bilan 1 ning orasida bo‘lsa, asos tashlansa tengsizlik belgisi o‘zgaradi

$0 < 0{,}5 < 1 \Rightarrow 2x \leq 4x - 8 \Rightarrow 8 \leq 4x - 2x \Rightarrow$

$\Rightarrow 8 \leq 2x \Rightarrow x \geq 4.$



Javobi: D.

(1996-7-34) $(x+3)\sqrt{x^2 - x - 2} \geq 0$ tengsizlikning yechimini ko‘rsating.

A) $[-3; \infty)$ B)$[-1; 2]$ C) $[-3; -1] \cup [2; \infty)$

D) $[2; \infty)$ E)$(-\infty; -2] \cup [1; \infty)$

Yechilishi: $(x+3)\sqrt{x^2 - x - 2} \geq 0;$

1) kvadrat ildiz qatnashgan tengsizlik, yarim yechilgan tengsizlik hisoblanadi;

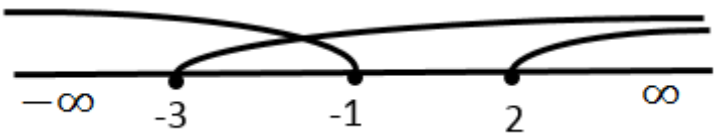
Sababi: Ildizning tagi doimo noldan katta yoki nolga teng bo‘ladi;

2) matematikada ko‘pincha, Ikkitasini bilgan holda uchinchisi topiladi g‘oyasiga rioya qilinadi

$$\begin{cases} x^2 - x - 2 \geq 0 \\ (x+3)(\sqrt{x^2 - x - 2} \geq 0 \end{cases} \Rightarrow x + 3 \geq 0 \Rightarrow \begin{cases} x_1 = -1 \\ x_2 = 2 \\ x \geq -3 \end{cases} \Rightarrow$$

$$\begin{cases} (-\infty; -1] \cup [2; \infty); \\ [-3; \infty). \end{cases} \Rightarrow [-3; -1] \cup [2; +\infty).$$

Javobi: C.



(1997-2-23) $\frac{(x-5)(x+3)}{(x+1)^2} \leq 0$ tengsizlikning manfiy butun yechimlari yig‘indisini toping.

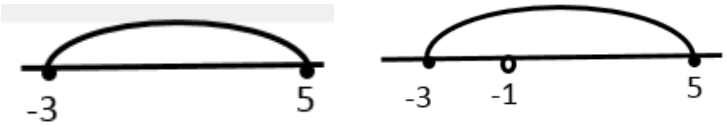
A) -9 B) -12 C) -5 D) -6 E) -4

Yechilishi: $\frac{(x-5)(x+3)}{(x+1)^2} \leq 0;$

1) $(x+1)^2 \geq 0,$ biroq maxrajda turganligi uchun $(x+1)^2 \neq 0 \Rightarrow x \neq -1;$

2) Ikkitasini bilgan holda uchinchisi topiladi:

$\begin{cases} \frac{(x-5)(x+3)}{(x+1)^2} \leq 0 \\ (x+1)^2 > 0 \end{cases} \Rightarrow (x-5)(x+3) \leq 0 \Rightarrow [-3;5] \Rightarrow$



$\Rightarrow$ 1) va 2) dan

$-3+(-2)=-5.$ Javobi: C.

(1997-2-54) $0{,}2^{x^2+1} + 0{,}2^{x^2-1} < 1{,}04$ tengsizlikni yeching.

A) $(-\infty;-1)$ B) $(1;\infty)$ C) $(-\infty;1] \cup [1;\infty)$

D) $(-\infty;-1) \cup (1;\infty)$ E)$[-1;1]$

Yechilishi: $0{,}2^{x^2+1} + 0{,}2^{x^2-1} < 1{,}04;$

$0{,}2^{x^2} \cdot 0{,}2 + 0{,}2^{x^2} \cdot 0{,}2^{-1} < 1{,}04;$

$0{,}2^{x^2}\left(0{,}2 + \frac{1}{0{,}2}\right) < 1{,}04 \Rightarrow 0{,}2^{x^2}\,\frac{0{,}04+1}{0{,}2} < 1{,}04;$

$\frac{0{,}2^{x^2}\cdot 1{,}04}{0{,}2} < 1{,}04 \Rightarrow 0{,}2^{x^2-1} < 1 \Rightarrow$

$\Rightarrow 0{,}2^{x^2-1} < 0{,}2^0 \Rightarrow 0 < 0{,}2 < 1 \Rightarrow x^2 > 1 \Rightarrow |x| > 1 \Rightarrow$

$\Rightarrow (-\infty;-1) \cup (1;\infty).$ Javobi: D.

(1997-4-8) $a > b > c > 0$ bo‘lsa, $\frac{1}{a}, \frac{1}{a+b}$ va $\frac{1}{a+c}$ larni taqqoslang.

A) $\frac{1}{a} < \frac{1}{a+c} < \frac{1}{a+b}$ B) $\frac{1}{a} < \frac{1}{a+b} < \frac{1}{a+c}$ C) $\frac{1}{a+b} < \frac{1}{a+c} < \frac{1}{a}$

D) $\frac{1}{a+b} < \frac{1}{a} < \frac{1}{a+c}$ E) $\frac{1}{a+c} < \frac{1}{a+b} < \frac{1}{a}$

Yechilishi: Suratlari teng, maxraji katta kasr, kichik bo‘ladi. $a > b > c > 0$; Soddalik uchun $3 > 2 > 1 > 0$ deb olamiz. U holda

$\frac{1}{a} = \frac{1}{3}$; $\frac{1}{a+b} = \frac{1}{3+2}$; $\frac{1}{a+c} = \frac{1}{3+1} \Rightarrow \frac{1}{a+b} < \frac{1}{a+c} < \frac{1}{a}$. Javobi: C.

(1997-8-54) $\sqrt{0{,}2^{x(x+1)}} > 1$ tengsizlikning eng katta butun manfiy yechimini toping.

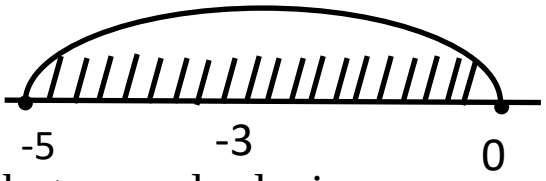
A) -5 B) -4 C) -3 D) -1 E) -2

Yechilishi: $\sqrt{0{,}2^{x(x+5)}} > 1$; 1) birdan katta son kvadratga ko‘tarilsa, tengsizlik belgisi o‘zgarmaydi.

$0{,}2^{x(x+5)} > 1 \Rightarrow 0{,}2^{x(x+5)} > 0{,}2^0 \Rightarrow 0 < 0{,}2 < 1 \Rightarrow$

$\Rightarrow x(x+5) < 0 \Rightarrow \begin{cases} x = 0 \\ x = -5 \end{cases} \Rightarrow$

$\Rightarrow x = -1$. Javobi: D.



(1997-1-58) $x^4 < 9x$ tengsizlikning butun sonlardagi yechimini toping.

A) 1 B) 2 C) 3 D) 4 E) cheksiz ko‘p

Yechilishi: $x^4 < 9x$; ikkitasini bilgan holda uchinchisi topiladi.

$\begin{cases} x^4 > 0 \\ x \neq 0 \\ 9 > 0 \end{cases} \Rightarrow x > 0 \Rightarrow x^3 < 9 \Rightarrow x = 1; 2$. Javobi: B.

(1997-6-55) $2^{\sqrt{x}-1} \cdot (4x^2 - 4x + 1) > 0$ tengsizlikni yeching.

A) $(1; \infty)$ B) $[1; \infty)$ C) $\left[\frac{1}{2}; \infty\right)$

D) $(-\infty; \infty)$ E) $\left[0; \frac{1}{2}\right) \cup (\frac{1}{2}; \infty)$

Yechilishi: $2^{\sqrt{x}-1} \cdot (4x^2 - 4x + 1) > 0;$

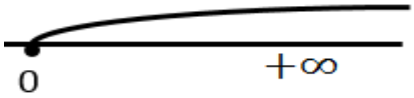
1) $2^{\sqrt{x}-1}$ –ko‘rsatkichli funksiya qatnashgan tengsizlik yarim yechilgan tengsizlik hisoblanadi.

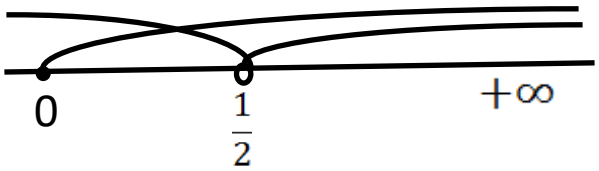
Sababi: Ko‘rsatkichli funksiya doimo noldan katta bo‘ladi.

$$\begin{cases} 2^{\sqrt{x}-1} > 0 \\ 2^{\sqrt{x}-1} \cdot (4x^2 - 4x + 1) > 0 \end{cases} \Rightarrow \begin{cases} x \geq 0; \\ 4x^2 - 4x + 1 > 0. \end{cases}$$

1) $x \geq 0 \Rightarrow$

2) $4x^2 - 4x + 1 = 0 \;\Rightarrow\; x_1 = x_2 = \frac{1}{2};$





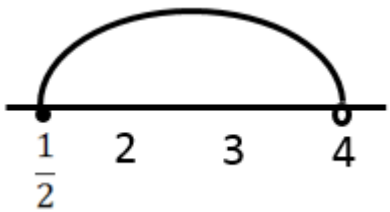
$\left[0; \frac{1}{2}\right) \left(\frac{1}{2}; +\infty\right).$ Javobi: E.

Tengsizkliklar sistemasi

(1996-1-22) $\begin{cases} 3 + 4x \geq 5 \\ 2x - 3(x - 1) > -1 \end{cases}$ tengsizliklar sistemasi nechta butun yechimga ega?

A) 5 B) 3 C) 4 D) 2 E) 6

Yechilishi: $\begin{cases} 3 + 4x \geq 5 \\ 2x - 3(x - 1) > -1 \end{cases} \Rightarrow$



$\begin{cases} 4x \geq 5 - 3 \\ 2x - 3x + 3 > -1 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x \geq \frac{2}{4} \\ -x > -4 \end{cases} \Rightarrow \begin{cases} x \geq \frac{1}{2}; \\ x < 4. \end{cases}$ Javobi: B.

(1996-9-19) $\begin{cases} ax \geq 7a-3 \\ ax < 3a+3 \end{cases}$ tengsizliklar sistemasi a ning qanday qiymatlarida yechimga ega bo‘lmaydi?

A) $(1{,}5;\infty)$ B) $[1{,}9;\infty)$ C) $(-\infty;0)\cup(1{,}5;\infty)$

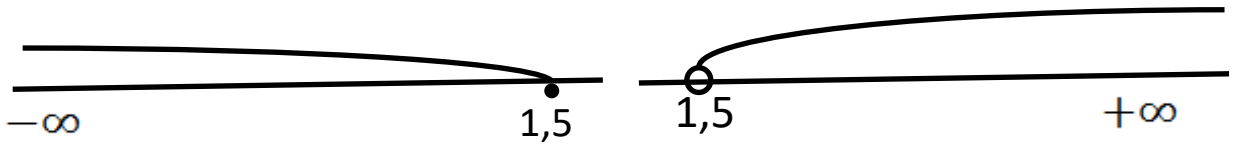
D) $(-\infty;0)$ E) $(-\infty;0)\cup[1{,}5;\infty)$

Yechilishi: $\begin{cases} ax \geq 7a-3 \\ ax < 3a+3 \end{cases} \Rightarrow + \begin{cases} ax \geq 7a-3 \\ -ax > -3a-3 \end{cases} \Rightarrow$

$\Rightarrow 0 \geq 4a-6 \Rightarrow 4a \leq 6 \Rightarrow a \leq \frac{6}{4} \Rightarrow a \leq 1{,}5 \Rightarrow$

$\Rightarrow (1{,}5;\infty)$. Bunda yechim bor.

Demak,



Javobi: A.

(1996-76-12) $\begin{cases} bx \geq 6b-2 \\ bx \leq 4b+2 \end{cases}$ tengsizliklar sistemasi b ning qanday qiymatlarida yechimga ega bo‘lmaydi?

A) $(-\infty;0)\cup[2;\infty)$ B) $\{2\}$ C) $(0;2)$

D) $(2;\infty)$ E) $(-\infty;0)$

Yechilishi: $\begin{cases} bx \geq 6b-2 \\ bx \leq 4b+2 \end{cases} \Rightarrow + \begin{cases} bx \geq 6\mathrm{b}-2 \\ -\mathrm{b}x \geq -4b-2 \end{cases} \Rightarrow$

$\Rightarrow 0 \geq 2\mathrm{b}-4 \Rightarrow \mathrm{b} \leq 2.$ Javobi: $(2;\infty)$ D.

Pirnazar DAVRONOV

Modul

(1996-3-26) $|x-1| \geq 2$ tengsizlikni yeching.

A) $(-\infty;-1]$ B) $[-1;3]$ C) $(-\infty;-1] \cup [3;\infty)$

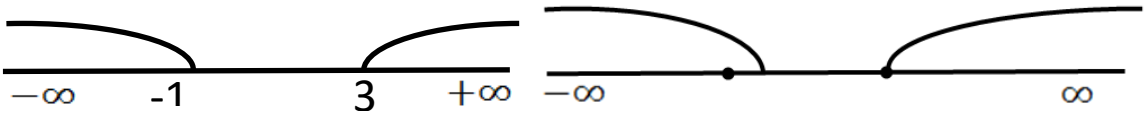
D) $[1;3]$ E) $[-1;-3]$

Yechilishi: $|x-1| \geq 2 \Rightarrow$

1) Modul sondan katta bo‘lsa, sistemaga keltirib yechiladi. Bunda modulining ichi sonning plyusligidan katta minusligidan kichik bo‘ladi.

$$\Rightarrow \begin{cases} x-1 \geq 2 \\ x-1 \leq -2 \end{cases} \Rightarrow \begin{cases} x \geq 2+1 \\ x \leq -2+1 \end{cases} \Rightarrow \begin{cases} x \geq 3; \\ x \leq -1. \end{cases}$$

2)Buni, modul qatnashgan tengsizlikning, tengsizlik ko‘rinishidagi yechimi deyiladi;



3) Buni modul qatnashgan tengsizlikning grafik ko‘rinishdagi yechimi deyiladi.

4) $(-\infty;-1] \cup [3;\infty)$ buni modul qatnashgan tengsizlikning oraliq ko‘rinishidagi yechimi deyiladi.

Javobi: C.

(1997-3-8) $|3-x| < 4$ tengsizlik nechta butun yechimga ega?

A) 4 B) 5 C) 6 D) 7 E) 9

Yechilishi: $|3-x| < 4 \Rightarrow$

1) Modul sondan kichik bo‘lsa, qo‘sh tengsizlikka keltirib yechiladi. Bunda modulning ichi sonning minusligidan katta, plyusligidan kichik bo‘ladi:

$\Rightarrow -4 < 3-x < 4 \Rightarrow -4-3 < -x < 4-3 \Rightarrow$

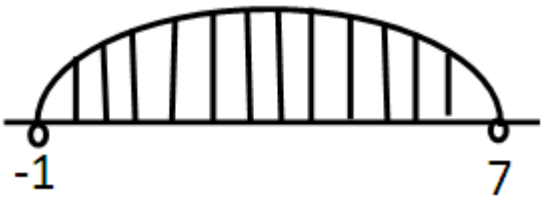
$\Rightarrow -7 < -x < 1 \Rightarrow$

2) Noma'lumning oldi minus bo'lishi mumkin emas, shuning uchun tengsizlik -1 ga hadlab ko'paytiriladi. Bunda tengsizlik belgilari o'zgaradi

$\Rightarrow 7 > x > -1 \Rightarrow$

3) Odatdagidek minus son chapda, plyus son o'ngda turishi e'tiborga olinsa,

$\Rightarrow -1 < x < 7 \Rightarrow (-1; 7)$.



Topilgan oraliqda butun yechimlari soni 7 ta.

Javobi: D.

(1996-6-14) Agar $a > b > c$ bo'lsa,

$|a-b| + |c-a| - |b-c|$ ni soddalashtiring.

A) $a-2b$ B) $2c$ C) $2a$ D) $2a-2b$ E) $b-2c$

Yechilishi: Modulning ichidagi ifodaning qiymati nol yoki musbat son bo'lsa, modul belgisi shunday tashlanadi. Modulning ichidagi ifodaning qiymati manfiy son bo'lsa, modul belgisi oldiga "-" ishora qo'yib, so'ngra modul belgisi tashlanadi.

Tengsizlikni yechishda $a > b > c$ munosabat e'tiborga olinadi.

$|a-b| + |c-a| - |b-c| = a - b - (c-a) - (b-c) =$

$= a - b - c + a - b + c = 2a - 2b$. Javobi: D.

(1996-9-61) $-4{,}8 : |a| = -0{,}5$ tenglamani qanoatlantiruvchi a ning barcha qiymatlarini toping.

A) 2,4 B) 2,4 va -2,4 C) 9,6 va -9,6 D) 9,6 E) $\emptyset$

Yechilishi: $-4{,}8 : |a| = -0{,}5 \Rightarrow 4{,}8 = -0{,}5 \cdot |a| \Rightarrow$

$\Rightarrow |a| = \frac{-4{,}8}{-0{,}5} = \frac{48}{5} = 9{,}6 \Rightarrow a = \pm 9{,}6$. Javobi: C.

(1997-4-9) $m = |4{,}8|;\ n = |-4,(8)|;\ p = \left|4\frac{3}{5}\right|$ va $q = |-3{,}2|$ sonlarini kamayish tartibida yozing.

A) $n > m > p > q$ B) $m > n > p > q$

C) $m > p > q > n$ D) $p > m > q > n$

E) $m > p > n > q$

Yechlishi: 1) Moduldan musbat sondan ham, manfiy sondan ham, musbat son chiqishi e'tiborga olinadi.

$$\begin{cases} m = |4{,}8| = 4{,}8 \\ n = |-4,(8)| = 4{,}888\ldots \\ p = \left|4\frac{3}{5}\right| = 4{,}6 \\ q = |-3{,}2| = 3{,}2 \end{cases} \Rightarrow n > m > p > q.$$ Javobi: A.

(1997-4-13) a ning qanday qiymatlarida $a^2 \pm 1 = 2|a|$ tenglik o'rinli bo'ladi?

A) $a \geq 0$ B) $a \leq 0$ C) $a \in (-\infty; \infty)$

D) $a = \pm 1$ E) $a = 1$

Yechilishi: 1) Tenglamada kvadrat qatnashsa, barcha hadlar tenglikning bir tomonida , ikkinchi tomonda nol turadi.

$$\Rightarrow a^2 \pm 2a + 1 = 0 \Rightarrow \begin{cases} a^2 - 2a + 1 = 0 \\ a^2 + 2a + 1 = 0 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} (a-1)^2 = 0 \\ (a+1)^2 = 0 \end{cases} \Rightarrow \begin{cases} a = 1 \\ a = -1 \end{cases} \Rightarrow a = \pm 1.$$ Javobi: D.

(1997-9-73) a ning qanday qiymatlarida $a^2|a| - a^2 + 2|a| - 1 = 2a^2 - |a|$ tenglik o'rinli bo'ladi?

A) 1 B) -1 C) 3 D) -1; 3 E) -1; 1

Yechilishi: 1) $a \geq 0 \Rightarrow a^3 - a^2 + 2a - 1 = 2a^2 - a \Rightarrow\ a = 1;$

2) $a < 0 \Rightarrow -a^3 - a^2 - 2a - 1 = 2a^2 + a \Rightarrow\ a = -1.$

Javobi: E.

(1997-12-10) Agar $(a-|b|)^2+(a-2)^2=0$ bo‘lsa, $2a-3b$ ning qiymatini toping.

A) -2 B) 10 C) 2 va 10 D) -2 va 10 E) -10

Yechilishi: $(a-|b|)^2+(a-2)^2=0 \Rightarrow$

kvadratning tagida turgan ifoda musbat yoki nol bo‘ladi;

2)ikkita musbat sonning yig‘indisi nolga teng emas;

shuning uchun qo‘shiluvchilardan har biri alohida-alohida nolga tenglanadi

$\Rightarrow \begin{cases}(a-|b|)^2=0\\(a-2)^2=0\end{cases}$ ⇒ kvadratdan qutilish uchun tenglikning ikkala tomonidan, kvadrat iklizlar olinadi

$\Rightarrow \begin{cases}\sqrt{(a-|b|)^2}=\sqrt{0}\\\sqrt{(0-2)^2}=\sqrt{0}\end{cases}$ ⇒ kvadrat ildiz tagidagi harfli ifadadan uning moduli, sondan esa son chiqadi.

$\Rightarrow \begin{cases}|a-|b||=0\\|a-2|=0\end{cases}$ ⇒ tenglik bor joyda, modul belgisi oldiga " $\pm$ " ishora qo‘yilib, so‘ngra modul belgisi tashlanadi;

$\Rightarrow \begin{cases}\pm(a-|b|)=0\\\pm(a-2)=0\end{cases}$ ⇒tenglikning chap tomonidagi " $\pm$ " ishora, o‘ng tomonidagi solga olib beriladi.

$\Rightarrow \begin{cases}a-|b|=\pm0\\a-2=\pm0\end{cases}$ ⇒ nol soni manfiy bo‘lmaganligi uchun ishoralar tashlab yuboriladi.

$\Rightarrow \begin{cases}a-|b|=0\\a-2=0\end{cases} \Rightarrow \begin{cases}|b|=a\\a=2\end{cases} \Rightarrow \begin{cases}\pm b=2\\a=2\end{cases} \Rightarrow \Rightarrow \begin{cases}b=\pm2\\a=2\end{cases} \Rightarrow$ har bir ishora bilan alohida-alohida masalalar tuziladi.

$\Rightarrow \begin{cases} 1) \begin{cases} a = 2 \\ b = -2 \end{cases} \Rightarrow \\ 2) \begin{cases} a = 2 \\ b = 2 \end{cases} \Rightarrow \end{cases}$ aniqlangan qiymatlar, masala shartida so‘ralgan ifodaga qo‘yiladi.

$\Rightarrow \begin{cases} 2a - 3b = \\ 2a - 3b = \end{cases} \begin{cases} 2 \cdot 2 - 3 \cdot (-2) = 10; \\ 2 \cdot 2 - 3 \cdot 2 = -2. \end{cases}$ Javobi: D.

(1996-12-77) $|x + 4| + |x - 2| + |x - 3| = 7$ tenglikning ildizlari yig‘indisini toping.

A) 2 B) ildizi yo‘q C) 0 D) -2 E) 1

Yechilishi: 1) modulning ichida o‘zgaruvchi qatnashsa, modul belgisini tashlash uchun modulning asosiy formulasidan foydalaniladi;

2) modulning ichidagi ifoda noldan katta yoki teng deb, modul belgisi shunday tashlanadi.

3) modulning ichidagi ifodani noldan kichik deb, oldiga minus qo‘yilib modul belgisi tashlanadi.

$\Rightarrow \begin{cases} x + 4 \geq 0 \\ x + 4 < 0 \end{cases} \Rightarrow \begin{cases} x + 4 + |x - 2| + |x - 3| = 7 \\ -x - 4 + |x - 2| + |x - 3| = 7 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x - 2 \geq 0 \Rightarrow \begin{cases} x + 4 + x - 2 + |x - 3| = 7 \\ -x - 4 + x - 2 + |x - 3| = 7 \end{cases} \\ x - 2 < 0 \Rightarrow \begin{cases} x + 4 - x + 2 + |x - 3| = 7 \\ -x - 4 - x + 2 + |x - 3| = 7 \end{cases} \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x - 3 \geq 0 \Rightarrow \begin{cases} x + 4 + x - 2 + x - 3 = 7 \\ -x - 4 + x - 2 + x - 3 = 7 \\ x + 4 - x + 2 + x - 3 = 7 \\ -x - 4 - x + 2 + x - 3 = 7 \end{cases} \\ x - 3 < 0 \Rightarrow \begin{cases} x + 4 + x - 2 - x + 3 = 7 \\ -x - 4 + x - 2 - x + 3 = 7 \\ x + 4 - x + 2 - x + 3 = 7 \\ -x - 4 - x + 2 - x + 3 = 7 \end{cases} \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} x = \frac{8}{3} — \\ x = 16 — \\ x = 4 — \\ x = -12 — \\ x = 2 + \\ x = -10 — \\ x = 2 + \\ x = -2 - \end{cases}$$ olingan sakkizta natijalar, masala shartiga qo‘yilib tekshiriladi. Demak, ildiz bitta $x = 2$, ildizlar yig‘indisi ham 2 ga teng. Javobi: A.

(1997-1-75) $|x + 1| = |2x - 1|$ tengsizlikni nechta ildizi bor?

A) 4 B) 3 C) 2 D) 1 E) $\emptyset$

Yechilishi: $|x + 1| = |2x - 1|$;

$$\begin{cases} x + 1 \geq 0 \Rightarrow \begin{cases} x + 1 = |2x - 1| \\ -x - 1 = |2x - 1| \end{cases} \Rightarrow \\ x + 1 < 0 \Rightarrow \end{cases}$$

$$\Rightarrow \begin{cases} 2x - 1 \geq 0 \Rightarrow \begin{cases} \begin{cases} x + 1 = 2x - 1 \\ -x - 1 = 2x - 1 \end{cases} \\ \begin{cases} x + 1 = -2x + 1 \\ -x - 1 = -2x + 1 \end{cases} \end{cases} \Rightarrow \\ 2x - 1 < 0 \Rightarrow \end{cases}$$

$$\Rightarrow \begin{cases} x = 2 \\ x = 0 \\ x = 0 \\ x = 2 \end{cases} \Rightarrow \begin{cases} x = 0; \\ x = 2. \end{cases}$$

Tekshirish: Olingan natijalar masalaning berilishiga qo‘yib tekshiriladi.

$x = 0 \Rightarrow |0 + 1| = |2 \cdot 0 - 1| \Rightarrow 1 = 1;$

$x = 2 \Rightarrow |2 + 1| = |2 \cdot 2 - 1| \Rightarrow 3 = 3.$

Javobi: C.

(1997-4-22) $ax^2 = |a|$ tenglama yagona yechimga ega bo‘ladigan a ning barcha qiymatlarini toping.

A) $a < 0$ B) $a > 0$ C) $a = 0$ D) $a \geq 0$ E)$\emptyset$

Yechilishi: $ax^2 = |a|$ bunday tenglamalarni to‘rt bosqichda baholash orqali yechish qulay:

$a = 0$ bunday holda, tenglama mohiyatini yuqotadi.

Demak, 2) $a \neq 0$;

U holda

3) $a > 0 \Rightarrow ax^2 = a \Rightarrow x^2 = \frac{a}{a} \Rightarrow x^2 = 1 \Rightarrow x = \pm 1$;

4) $a < 0 \Rightarrow ax^2 = -a \Rightarrow x^2 \neq -1$ $\emptyset$. Javobi: E.

(1997-4-26) a ning qanday qiymatlarida $ax \leq |a|$ tengsizlikning yechimlari to‘plami $[-1;\ \infty)$ oraliqdan iborat bo‘ladi?

A) $a < 0$ B)$a > 0$ C)$a\epsilon(-\infty; \infty)$ D)$a = 0$ E)$a \leq 0$

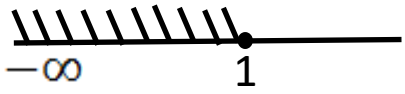
Yechilishi: $ax \leq |a|$;

1) $a \neq 0$;

2)$a > 0 \Rightarrow ax \leq a \Rightarrow$

Tengsizlikning ikkala tomoni musbat a songa bo‘linsa, tengsizlik belgisi o‘zgarmaydi

3) $a < 0 \Rightarrow ax \leq -a \Rightarrow$.

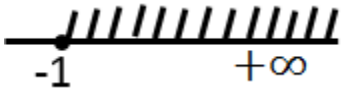


$\Rightarrow x \leq 1 \Rightarrow (-\infty; 1]$;

Tengsizlikning ikkala tomoni manfiy a songa bo‘linsa, tengsizlik belgisi o‘zgarmaydi.

$\Rightarrow x \geq -1 \Rightarrow$

$\Rightarrow [-1;\ +\infty)$.



Javobi: A.

(1997-9-86) a ning qanday qiymatlarida $a^6x \geq |a|^3$ tengsizlikning yechimlari $x \geq \frac{1}{8}$ bo‘ladi?

A) $a > 0$ B)$a < 0$ C)$a \neq 0$ D)$-2; 2$ E)± 4

Yechilishi: $a^6 x \geq |a|^3 \Rightarrow a \neq 0$;

1) Juft darajali sonni uning shu darajali moduli bilan almashtirish mumkin.

$\Rightarrow a^6 x \geq |a|^3 \Rightarrow x \geq \frac{|a|^3}{|a|^6} \Rightarrow x \geq \frac{1}{|a|^3} \Rightarrow a = \pm 2$. Javobi: D.

(1997-9-82) $-ax = |a|$ tenglama yagona musbat yechimga ega bo‘ladigan a ning barcha qiymatlarini toping.

A) $a \neq 0$ B) $a > 0$ C) $a \leq 0$ D) $a \geq 0$ E) $a < 0$

Yechilishi: $-ax = |a|$;

1) $a \neq 0$;

2) $a > 0 \Rightarrow -ax = a \Rightarrow x = -1$;

3) $a < 0 \Rightarrow -ax = -a \Rightarrow x = 1$. Javobi: E.

(1997-4-6) Quyidagi munosabatlardan qaysi biri noto‘g‘ri?

A) $|a^2 + b^2| = a^2 + b^2$

B) $a > 0$ bo′lsa, $|a^4 + b^4| \geq a^4 + b^4$

C) $a < 0$ bo′lsa, $|a^3 + b^2| \geq a^3 + b^2$

D) $a < 0, b < 0$ bo′lsa, $|a^3 + b^3| = -a^3 - b^3$

E) $a < 0, b > 0$ bo′lsa, $|a^2 + b^2| = b - a^2$

Yechilishi: $|a^2 + b^2| \geq 0$ Biroq $b - a^2 < 0$ bo‘lishi mumkin. Haqiqatdan, $a = -1 < 0;\ b = 1 > 0$, $|a^2 + b^2| = b - a^2$.

Javobi:E.

(1996-12-66) $a = 0{,}6(4), b = \frac{59}{90}$ va $c = 1 - 0{,}36(9)$.

a, b va c sonlar uchun quyidagi munosabatlardan qaysi biri o′rinli?

Yechilishi: $\begin{cases} a = 0{,}644\ldots \\ b = \frac{59}{90} = 0{,}6555\ldots \\ c = 1 - 0{,}36(9) = 1 - \frac{369-36}{900} = 0{,}63 \end{cases} \Rightarrow$

$\Rightarrow c < a < b$. Javobi:E.

(1997-9-68) Agar $a < 0 < b$ va $|a| > |b|$bo‘lsa, $\frac{1}{a^3+b^3}, \frac{1}{a^4+b^3}$ va $\frac{1}{a^3}$ larni hisoblang.

A) $\frac{1}{a^3} > \frac{1}{a^3+b^3} > \frac{1}{a^4+b^3}$ B) $\frac{1}{a^4+b^3} > \frac{1}{a^3} > \frac{1}{a^3+b^3}$

C) $\frac{1}{a^4+b^3} > \frac{1}{a^3+b^3} > \frac{1}{a^3}$ D) $\frac{1}{a^3+b^3} > \frac{1}{a^3} > \frac{1}{a^4+b^3}$

E) $\frac{1}{a^3+b^3} > \frac{1}{a^4+b^3} > \frac{1}{a^3}$

Suratlari teng, maxraji katta kasr son, kichik bo‘ladi. Buni misolda ko‘rsatish qulay. Masalan, $a = -2;\ b = 1$ bo‘lsin. Javobi: B.

Progressiyalar

(1996-3-62) 1 dan 100 gacha bo‘lgan sonlar orasida 2 ham, 3 ga ham bo‘linmaydiganlari nechta?

A) 33 B) 30 C) 32 D) 21 E) 19

Yechilishi: $1,2,3,\ldots,100$ 1) 2 va 3 bo‘linadigan sonlar topiladi.

$a_n = a_1 + d(n-1)$ dan foydalaniladi.

2: $2,4,6,\ldots,100$;

$100 = 2 + 2(n-1) \Rightarrow 100 = 2 + 2n - 2 \Rightarrow n = 50$;

3: $3,9,15,\ldots,99 \Rightarrow 99 = 3 + 6(n-1) \Rightarrow$

$\Rightarrow 99 = 3 + 6n - 6 \Rightarrow 6n = 102 \Rightarrow n = 17$;

Demak, $100-(50+17)=33$ ta son 2 va 3 ga bo‘linmaydi.

Javobi: A.

(1997-3-27) 150 dan katta bo‘lmagan 7 ga karrali barcha natural sonlarning yig‘indisini toping.

A) 1450 B) 1617 C) 1803 D) 1517 E) 1950

Yechilishi: $1,2,3,\dots,150 \Rightarrow 7:\ 7,14,\dots,147,$

$a_n = a_1 + d(n-1) \Rightarrow 147 = 7 + 7(n-1) \Rightarrow n = 21.$

$S_{21} = \frac{a_1+a_{21}}{2} \cdot 21 = \frac{7+147}{2} \cdot 21 = \frac{154}{2} \cdot 21 = 1617.$

Javobi: B.

(1996-1-27) Arifmetik progressiyada $a_2 = 12$ va $a_5 = 3$. Shu progressiyaning o‘ninchi hadini toping.

A) -6 B) 0 C) -12 D) -30 E) -15

Yechilishi: $a_2 = 12;\ a_5 = 3;\ a_{10} = ?$

1) $a_n = a_1 + d(n-1)$ formuladan foydalaniladi.

$$\begin{cases} a_2 = a_1 + d(2-1) \\ a_5 = a_1 + d(5-1) \\ a_{10} = a_1 + d(10-1) \end{cases} \Rightarrow \begin{cases} a_1 + d = 12 \\ a_1 + 4d = 3 \\ a_{10} = a_1 + 9d = ? \end{cases}$$

$$-\begin{cases} a_1 + d = 12 \\ a_1 + 4d = 3 \end{cases} \Rightarrow -3d = 9 \Rightarrow d = -3 \Rightarrow a_1 = 15 \Rightarrow$$

$\Rightarrow a_{10} = 15 + 9 \cdot (-3) = -12.$ Javobi: C.

(1996-3-27) Arifmetik progressiya uchinchi va to‘qqizinchi hadlarning yig‘indisi 8 ga teng. Shu progressiyaning dastlabki 11 ta hadlari yig‘indisini toping.

A) 22 B) 33 C) 44 D) 55 E) 60

Yechilishi: $a_3 + a_9 = a_1 + a_{11} = 8;$

$S_{11} = \frac{a_1+a_{11}}{2} \cdot 11 = \frac{8}{2} \cdot 11 = 44.$ Javobi: C.

(1996-3-80) Ushbu 31323334...7980 sonning raqamlar yig‘indisini toping.

A) 473 B) 480 C) 460 D) 490 E) 453

Yechilishi: 31323334...7980;

1) $n(5n+41)\ formulada\ \ n=8 \Rightarrow 8(5\cdot 8+41)=648$;

2) 123....282930 da $n=3 \Rightarrow 3(5\cdot 3+41)=168$;

1) va 2) $\Rightarrow 648-168=480$. Javobi: B.

(1996-9-78) Arifmetik progressiya $a_4-a_2=4$ va $a_7=14$. Shu progressiyaning beshinchi hadini toping.

A) 12 B) 8 C) 7 D) 10 E) 6

Yechilishi: $\begin{cases} a_4-a_2=4 \\ a_7=14 \end{cases} \Rightarrow \begin{cases} a_1+3d-(a_1+d)=4 \\ a_1+6d=14 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} d=2 \\ a_1=2 \end{cases} \Rightarrow a_5=a_1+4d=2+4\cdot 2=10.$ Javobi: D.

(1997-1-17) Hadlari $x_n=4n+5$ formula bilan berilgan ketma-ketlikning dastlabki 30 ta hadi yig‘indisini toping.

A) 2010 B) 1900 C) 2100 D) 1940 E) 2210

Yechilishi: $x_n=4n+5 \Rightarrow \begin{cases} x_1=4\cdot 1+5=9 \\ x_{30}=4\cdot 30+5=125 \end{cases} \Rightarrow$

$\Rightarrow S_{30}=\frac{x_1+x_{30}}{2}\cdot 30=(9+125)\cdot 15=2010.$ Javobi: A.

(1997-2-36) (x_n) arifmetik progressiyaning dastlabki n ta hadining yig‘indisi 120 ga teng. Agar $x_3+x_{n-2}=30$ bo‘lsa, yig‘indida nechta had qatnashgan.

A) 6 B) 10 C) 8 D) 12 E) 11

Yechilishi: $x_1+x_n=x_3+x_{n-2}=30$;

$S_n=\frac{x_1+x_n}{2}\cdot n \Rightarrow 120=\frac{30}{2}\cdot n \Rightarrow n=\frac{120}{15}=8.$ Javobi: C.

(1997-2-37) Maxraji 2 ga teng bo‘lgan geometrik progressiyaning dastlabki oltita hadi yig‘indisi 126 ga, dastlabki beshta hadi yig‘indisi 62 ga teng. Progressiyaning birinchi hadini toping.

A) 6 B) 5 C) 4 D) 2 E) 3

Yechilishi: $q = 2,\ b_6 = S_6 - S_5 = 126 - 62 = 64;$

$b_n = b_1 \cdot q^{n-1} \Rightarrow b_6 = b_1 \cdot q^5 \Rightarrow 64 = b_1 \cdot 2^5 = b_1 = 2.$

Javobi: D.

(1997-8-35) Dastlabki yettita hadining yig‘indisi -266 ga, dastlabki sakkizta hadining yig‘indisi -312 ga va hadlarning ayirmasi -2 ga teng bo‘lgan arifmetik progressiyaning birinchi hadini toping.

A) -32 B) -42 C) -34 D)-36 E) -35

Yechilishi: $d = -2;\ a_8 = S_8 - S_7 = -312 — 266 =$

$= -46;\quad a_n = a_1 + d(n-1) \Rightarrow a_8 = a_1 + 7d \Rightarrow$

$\Rightarrow -46 = a_1 + 7(-2) \Rightarrow a_1 = -32.$ Javobi: A.

(1997-4-27) Arifmetik progressiyaning dastlabki 6 ta hadlari $7, a_2, a_3, a_4, a_5, 22$ bo‘lsa, $a_2 + a_3 + a_4 + a_5$ ni hisoblang.

A) 1250 B) 1300 C) 1120 D) 1000 E) 1296

Yechilishi: $7, a_2, a_3, a_4, a_5, 22;\ S_6 = \frac{7+22}{2} \cdot 6 = 87;$

$a_2 + a_3 + a_4 + a_5 = 87 - (7 + 22) = 58.$ Javobi: B.

(1997-9-87) Geometrik progressiyaning dastlabki oltita hadi $2, b_2,\ b_3, b_4,\ b_5$ va 486 bo‘lsa, $b_2 + b_3 + b_4 + b_5$ ni hisoblang.

A) 200 B) 260 C) 230 D) 250 E) 240

Yechilishi: $2, b_2,\ b_3, b_4,\ b_5$ va 486;

$b_n = b_1 \cdot q^{n-1} \Rightarrow b_6 = b_1 \cdot q^{6-1} \Rightarrow 486 = 2 \cdot q^5 \Rightarrow$

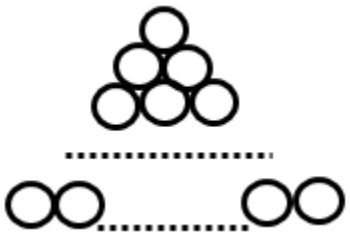
$\Rightarrow q^5 = 243 \Rightarrow q^5 = 3^5 \Rightarrow q = 3;$

$S_6 = \frac{b_1(q^6-1)}{q-1} = \frac{2(3^6-1)}{3-1} = 728;$

$b_2 + b_3 + b_4 + b_5 = 728 - (2 + 486) = 240.$

Javobi: E.

(1997-9-27) Quvurlar rasmdagidek ustma-usttaxlangan. Agar taxlamning asosida 11 ta quvur bo‘lsa, taxlamdanechta qovur bor?



A) 66 B) 67 C) 68 D) 65 E) 64

Yechilishi: $1, 2, \dots, 11 \Rightarrow S_{11} = \frac{1+11}{2} \cdot 11 = 66.$ Javobi: A.

(1996-6-37) Geometrik progressiyada $b_2 b_3 b_4 = 216$ bo‘lsa, uning uchinchi hadini toping.

A) 12 B) 8 C) 4 D) 10 E) 6

Yechilishi: $b_2 b_3 b_4 = 216;\ \ b_2 = \frac{b_3}{q};\ \ b_4 = b_3 \cdot q;$

$\frac{b_3}{q} \cdot b_3 \cdot b_3 \cdot q = 216 \Rightarrow {b_3}^3 = 6^3 \Rightarrow b_3 = 6.$ Javobi: E.

Logarifmlar

(1996-1-35) $\lg^2 x - lgx - 2 = 0$ tenglamaning ildizlari ko‘paytmasini toping.

A) 1 B) -2 C) 10 D) 100 E) 1,2

Yechilishi: $\lg^2 x - lgx - 2 = 0;$

Logarifmning aniqlanish sohasi topiladi.

$10 > 0, \quad 10 \neq 0, \ \ x > 0.$

Berilgan tenglamada $lgx = y$ belgilash olinadi.

$y^2 - y - 2 = 0 \Rightarrow \begin{cases} y_1 = -1 \\ y_2 = 2 \end{cases} \Rightarrow \begin{cases} \lg x_1 = y_1 \\ \lg x_2 = y_2 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} \lg x_1 = -1 \\ \lg x_2 = 2 \end{cases} \Rightarrow \begin{cases} x_1 = 10^{-1} \\ x_2 = 10^2 \end{cases} \Rightarrow \begin{cases} x_1 = \frac{1}{10} \\ x_2 = 100 \end{cases} \Rightarrow$$

$\Rightarrow \frac{1}{10} \cdot 100 = 10 \ yoki \ x_1 \cdot x_2 = 10^{-1} \cdot 10^2 = 10^{-1+2} = 10.$

Javobi: C.

(1996-1-33) Agar $2^n = 5$ bo‘lsa, $\lg 2$ ni n orqali ifodalang.

A) $\frac{1}{n}$ B) $n+1$ C) n D) $\frac{n+1}{2}$ E) $\frac{1}{n+1}$

Yechilishi: $2^n = 5$; $\lg 2$ –yo‘l boshlovchi e’tiborga olingan holda, berilgan tenglama o‘nli logarifmlanib, argument 2 ga keltiriladi.

$\Rightarrow \lg 2^n = \lg 5 \Rightarrow n \lg 2 = \lg \frac{10}{2} = n \lg 2 = \lg 10 - \lg 2 \Rightarrow$

$\Rightarrow n \lg 2 = 1 - \lg 2 \Rightarrow n \lg 2 + \lg 2 = 1 \Rightarrow$

$\Rightarrow \lg 2(n+1) = 1 \Rightarrow \lg 2 = \frac{1}{n+1}.$ Javobi: E.

(1996-3-86) $a = \log_{98} 56$ bo‘lsa, $\log_7 2$ ni a orqali ifodalang.

A) $\frac{3-a}{2a-1}$ B) $\frac{2a-1}{3-a}$ C) $\frac{a-3}{2a-1}$ D) $\frac{1-2a}{3-a}$ E) $\frac{a-2}{3-a}$

Yechilishi: $\log_7 2$ – yo‘l boshlovchi e’tiborga olingan holda, berilgan misol 7 asos, 2 argumentga keltirildi.

$$a = \log_{98} 56 = \frac{\log_7 56}{\log_7 98} = \frac{\log_7 7 \cdot 8}{\log_7 49 \cdot 2} = \frac{\log_7 7 + \log_7 2^3}{\log_7 7^2 + \log_7 2} =$$

$$= \frac{1 + 3\log_7 2}{2\log_7 7 + \log_7 2} = \frac{1 + 3\log_7 2}{2 + \log_7 2} \Rightarrow a = \frac{1 + 3\log_7 2}{2 + \log_7 2} \Rightarrow$$

$\Rightarrow 2a + a \cdot \log_7 2 = 1 + 3\log_7 2 \Rightarrow a \cdot \log_7 2 - 3\log_7 2 =$

$= 1 - 2a \Rightarrow \log_7 2(a-3) = 1 - 2a \Rightarrow \log_2 7 = \frac{1-2a}{a-3} \Rightarrow$

$\Rightarrow \log_7 2 = \frac{2a-1}{3-a}.$ Javobi: B.

(1996-10-35) Agar $\log_4 125 = a$ bo‘lsa, $\lg 64$ ni a orqali ifodalang.

A) $\frac{3}{2}a+4$ B) $\frac{2}{3}a+6$ C) $\frac{18}{2a+3}$

D) $\frac{6}{3a+2}$ E) $3a+2$

Yechilishi: $\lg 64 = \lg 2^6 = 6\cdot\lg 2 -$ yo‘l boshlovchini e’tiborga olgan holda, berilgan misolni 10 asos, 2 argumentga keltiriladi.

$a = \log_4 125 = \frac{\lg 125}{\lg 4} = \frac{\lg 5^3}{\lg 2^2} = \frac{3\lg\frac{10}{2}}{2\lg 2} = \frac{3(\lg 10-\lg 2)}{2\lg 2} =$

$= \frac{3-3\lg 2}{2\lg 2} \Rightarrow a = \frac{3-3\lg 2}{2\lg 2} \Rightarrow 2a\lg 2 = 3-3\lg 2 \Rightarrow$

$\Rightarrow 2a\lg 2 + 3\lg 2 = 3 \Rightarrow \lg 2(2a+3) = 3 \Rightarrow$

$\Rightarrow \lg 2 = \frac{3}{2a+3};\ \lg 64 = 6\cdot\frac{3}{2a+3} = \frac{18}{2a+3};$ Javobi: C.

(1996-12-89) $\left[2^{\frac{1}{\log_3 16}}\right]^4$ ni hisoblang.

A) $\sqrt{3}$ B) 4 C) 2 D) $3^{\frac{1}{4}}$ E) 3

Yechilishi: Bunday misollar javobi logarifmning asosiga teng bo‘ladi. $\left[2^{\frac{1}{\log_3 16}}\right]^4 = 2^{4\cdot\log_{16} 3} = 16^{\log_{16} 3} = 3.$

Javobi: E.

(1996-12-89) $\left(\sqrt{3}\right)^{\frac{2}{\log_4 3}}$ ni hisoblang.

A) 2 B) 3 C) 4 D) 6 E) 7

Yechilishi: $\left(\sqrt{3}\right)^{\frac{2}{\log_4 3}} = 4.$ Javobi: C.

(1996-3-90) $a = \log_{\frac{1}{2}} 5,\ b = \log_{\frac{1}{4}} 3,\ va\ c = \log_{\frac{1}{2}} 3$ bo‘lsa, $a, b\ va\ c$ sonlar uchun quyidagi munosabatlarning qaysi biri o‘rinli?

A) $a<b<c$ B) $c<a<b$ C) $b<c<a$

D) $b<a<c$ E) $a<c<b$

Yechilishi: Taqqoslash uchun jogarifm bir xil asosga keltiriladi: $\begin{cases} a = \log_{\frac{1}{2}} 5 \\ b = \log_{\frac{1}{4}} 3 \\ \log_{\frac{1}{2}} 3 \end{cases} \Rightarrow \begin{cases} a = \log_{2^{-1}} 5 \\ b = \log_{2^{-2}} 3 \Rightarrow \\ c = \log_{2^{-1}} 3 \end{cases}$

$$\Rightarrow \begin{cases} a = \frac{1}{-1}\log_2 5 \\ b = \frac{1}{-2}\log_2 3 \Rightarrow \\ c = \frac{1}{-1}\log_2 3 \end{cases} \begin{cases} a = -\log_2 5 \\ b = -\frac{1}{2}\log_2 3 \Rightarrow b > c > a. \\ c = -\log_2 3 \end{cases}$$

Javobi: C.

(1996-6-55) $3^{2\log_3 x} = 16$ tenglamaning ildizlarini toping.

A) 3 B) -4 C) 4 D) ± 4 E) ± 3

Yechilishi: $3^{2\log_3 x} = 16$; Tenglamada o‘zgarish qilmasdan, logarifmning aniqlanish sohasi topiladi:

$3 > 0, \quad 3 \neq 0, \quad x > 0.$

$3^{2\log_3 x} = 16 \Rightarrow x^2 = 16 \Rightarrow x = \pm 4 \Rightarrow x = 4.$

Javobi: C.

(1996-3-87) $y = \log_2 \log_3 \sqrt{4x - x^2 - 2}$ funksiyaning aniqlanish sohasini toping.

A) $\emptyset$ B) $(1; 3)$ C) $\{2\}$

D) $(-\infty; 1) \cup (3; \infty)$ E) $(1{,}5; 2{,}5)$

Yechilishi: $y = \log_2 \log_3 \sqrt{4x - x^2 - 2}$ - funksiyaning aniqlanish sohasi topiladi: $2 > 0, 2 \neq 1,$

$\log_3 \sqrt{4x - x^2 - 2} > 0$; Logarifmning xossasidan foydalaniladi. Bunda ham, ikkitasini bilgan holda

uchinchisa topiladi. $\begin{cases} 3>1 \\ \log>0 \end{cases} \Rightarrow \sqrt{4x-x^2-2}>1 \Rightarrow$

$4x-x^2-2>1 \Rightarrow x^2-4x+3<0 \Rightarrow$

$\Rightarrow \ (1;3); \quad D(y)=(1;3).$

Javobi: B.

(1996-12-87) $y=\log_2 \log_{\frac{1}{2}} \sqrt{4x-x^2}$

funksiyaning aniqlanish sohasini toping.

A) $\left\{\frac{1}{2}\right\}$ B) $\left(0;\frac{1}{2}\right)$ C) $\left(\frac{1}{2};1\right)$

D) $(-\infty;0)\cup(1;\infty)$ E) $\left(0;\frac{1}{2}\right)\cup\left(\frac{1}{2};1\right)$

Yechilishi: Oldingi misoldagi singari: 1)$y=$

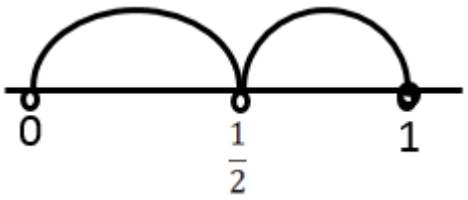
$=\log_2 \log_{\frac{1}{2}} \sqrt{4x-x^2}$; $2>1; 2\neq 1; \log_{\frac{1}{2}} \sqrt{4x-x^2}>0;$

2) $\begin{cases} 0<\frac{1}{2}<1 \\ \log>0 \end{cases} \Rightarrow 0<\sqrt{4x-x^2}<1 \Rightarrow$

$\Rightarrow \begin{cases} \sqrt{4x-4x^2}>0 \\ \sqrt{4x-4x^2}<1 \end{cases} \Rightarrow \begin{cases} 4x-4x^2>0 \\ 4x-4x^2<1 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 4x^2-4x<0 \\ 4x^2-4x+1>0 \end{cases} \Rightarrow$

$\Rightarrow \left(0;\frac{1}{2}\right)\cup\left(\frac{1}{2};1\right).$ Javobi: E.



(1996-3-59) $3^{\frac{1}{2}+\log_3 cosx}+6^{\frac{1}{2}}=9^{\frac{1}{2}+\log_9 sinx}$ tenglamaning yechimini toping.

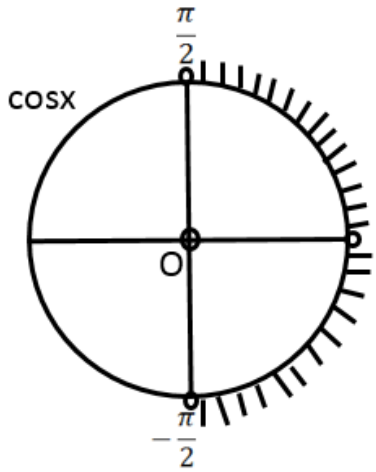
A) $\frac{11\pi}{12}+2\pi n, n\epsilon Z$ B) $\frac{7\pi}{12}+2\pi n, n\epsilon Z$ C) $\frac{5\pi}{12}+2\pi n, n\epsilon Z$

D) $\frac{\pi}{4}+2\pi n, n\epsilon Z$ E) $\frac{3\pi}{4}+2\pi n, n\epsilon Z$

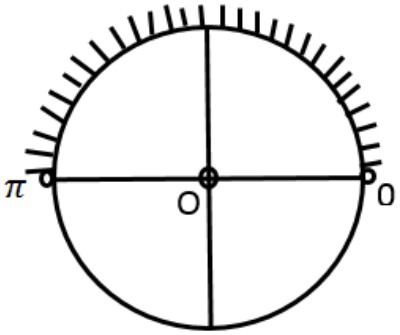
Yechilishi: $3^{\frac{1}{2}+\log_3 cosx} + 6^{\frac{1}{2}} = 9^{\frac{1}{2}+\log_9 sinx}$;

Logarifmning aniqlanish sohasi topiladi:

$$\begin{cases} cosx > 0 \\ sinx > 0 \end{cases} \Rightarrow \begin{cases} -\frac{\pi}{2} < x < \frac{\pi}{2}; \\ 0 < x < \pi. \end{cases}$$

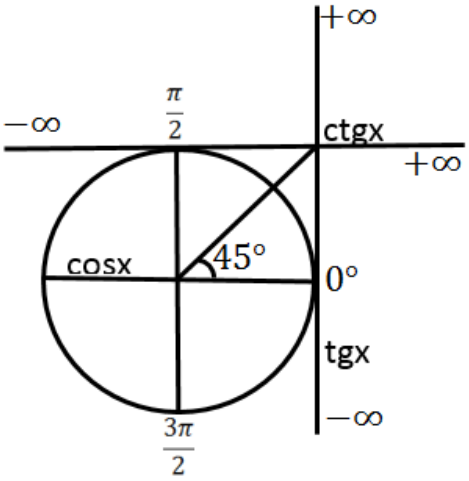


$cosx$ funksiya nolga teng bo‘lsa, uning argumenti x ni topish uchun , kosinus chiziqning nol nuqtasiga perpendikulyar to‘g‘ri chiziq o‘tqaziladi. Bu to‘g‘ri chiziq birlik doirani 2 nuqtada kesib o‘tadi.



1) $cosx$ absissada joylashib, qiymati -1 va +1 orasida bo‘ladi: $-1 \leq cosx \leq 1$;

2) $cosx$ ning x argumenti birlik doiraning ustida joylashgan.



3)$sinx$ ordinatada joylashgan, qiymati -1 va +1 orasida bo‘ladi: $-1 \leq sinx \leq 1$;

$sinx$ ning x argumenti birlik doiraning ustida joylashgan.

Tenglama yechiladi:

$3^{\frac{1}{2}} \cdot 3^{\log_3 cosx} + (2 \cdot 3)^{\frac{1}{2}} = 9^{\frac{1}{2}} \cdot 9^{\log_9 sinx}$;

$\sqrt{3} \cdot cosx + \sqrt{2} \cdot \sqrt{3} = 3sinx$;

5) $\sqrt{3} = ctg30° = \frac{cos30°}{sin30°}$ bilan almashtiriladi.

$cosx+\sqrt{2}=\frac{cos30^\circ}{sin30^\circ}\cdot sinx \Rightarrow$

$\Rightarrow cosx\cdot sin30^\circ+\sqrt{2}sin30^\circ=sinxcos30^\circ \Rightarrow$

$\Rightarrow sinxcos30^\circ-cosxsin30^\circ=\sqrt{2}\cdot\frac{1}{2}\Rightarrow$

$\Rightarrow \sin(x-30^\circ)=\frac{\sqrt{2}}{2}\Rightarrow$

$\Rightarrow x-\frac{\pi}{6}=arcsin\frac{\sqrt{2}}{2}+2\pi k,\ k\epsilon Z.$

6) $arcsin\frac{\sqrt{2}}{2}$ - ma'nosi: sinus necha gradusda $\frac{\sqrt{2}}{2}$ ga teng?

$x-\frac{\pi}{6}=\frac{\pi}{4}+2\pi k\Rightarrow x=\frac{\pi}{4}+\frac{\pi}{6}+2\pi k\Rightarrow$

$\Rightarrow x=\frac{5\pi}{2}+2\pi k,\ k\in Z;\qquad \frac{\pi}{12}=15^\circ;$

7) Olingan yechimning logarifmning aniqlanish sohasini qanoatlantirishi tekshirib ko'riladi. Buning uchun:

$k=0\ deb, x=\frac{5\pi}{12}=75^\circ$ ekanligi aniqlanadi.

U holda: $\begin{cases}-90^\circ<75^\circ<90^\circ\\ 0<75<180^\circ\end{cases}$ munosabat shartni qanoatlantiradi. Demak, $x=\frac{5\pi}{12}+2\pi k, k\in Z,$ masalaning yechimi ekan. Javobi: B.

(1996-3-88) $y=(x+2)^{\log_2(x^2+1)}<(x+2)^{\log_2(2x+9)}$ tengsizlik x ning qanday qiymatlarida o'rinli?

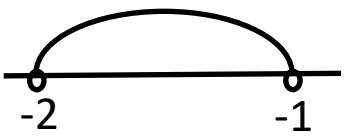
A) $(-4{,}5;\infty)$ B)$(-2;4)$ C)$(4;\infty)$

D)$(-1;4)$ E)$(-2;-1)$

Yechilishi: $y=(x+2)^{\log_2(x^2+1)}<(x+2)^{\log_2(2x+9)};$

1) $x+2$ umumiy asos baholanadi va logarifmning aniqlanish sohasi topiladi:

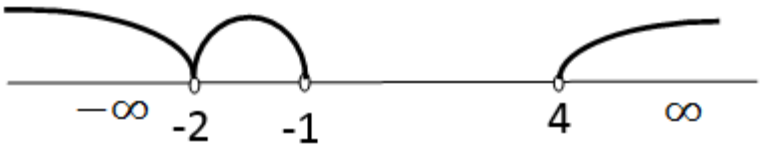
1) $0<x+2<1\Rightarrow -2<x<-1;$



2) $x^2+1>0 \Rightarrow x^2>-1;$

3) $2x+9>0 \Rightarrow x>4{,}5;$

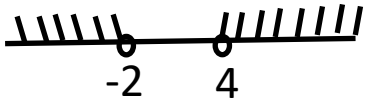
$x+2$ umumiy asos e'tiborga olingan holda, berilgan



tengsizlik yechiladi. Bunda $0<x+2<1$ bo'lganligi uchun asos tashlanganda tengsizlik belgisi o'zgaradi.

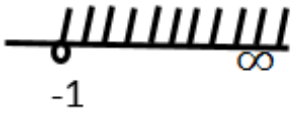
$\log_2(x^2+1)>\log_2(2x+9) \Rightarrow asos\ 2>1 \Rightarrow$bo'lganligi uchun logarifm potenserlanganda tengsizlik belgisi o'zgarmayadi $\Rightarrow x^2+1>2x+9 \Rightarrow x^2-2x-8>0 \Rightarrow$

$\Rightarrow \begin{cases} x=-2; \\ x\le 4. \end{cases}$



va 2) dan yechimning yo'qligi kelib chiqadi.

1) Endi umumiy asos $x+2>1 \Rightarrow x>-1$ ko'rinishda olinib, berilgan tengsizlik yechiladi. Bunda tengsizlik belgisi o'zgarmaydi.



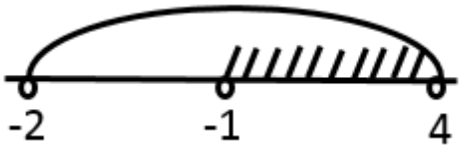
2) $\log_2(x^2+1)<\log_2(2x+9) \Rightarrow$

$asos\ 2>1 \Rightarrow$

$\Rightarrow x^2+1<2x+9 \Rightarrow x^2-2x-8<0 \Rightarrow$

1) $va\ 2\ dan\ \Rightarrow (-1;4).$

Javobi: D.



(1996-12-91) $y=\sqrt{1-\log_{\frac{1}{2}} cosx}$ funksiya x $(x\epsilon[0;2\pi])$ ning qanday qiymatlarida aniqlangan?

A) $[\frac{\pi}{3};\frac{\pi}{2})$ B) $(\frac{3\pi}{2};\frac{5\pi}{3}]$ C) $\left[0;\frac{\pi}{3}\right]$

D) $[\frac{\pi}{3};\frac{\pi}{2}) \cup (\frac{3\pi}{2};\frac{5\pi}{3}]$ E) $\left[\frac{5\pi}{3};2\pi\right] \cup \left[0;\frac{\pi}{3}\right]$

Yechilishi: $y = \sqrt{1 - \log_{\frac{1}{2}} cosx}$;

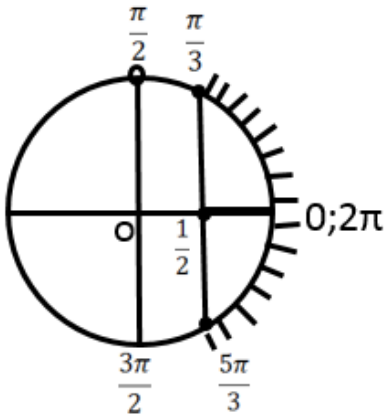
logarifmning aniqlanish sohasi topiladi:

$cosx > 0 \Rightarrow -\frac{\pi}{2} < x < \frac{\pi}{2}$;

kvadrat ildiz ostidagi ifodaning noldan katta yoki tengligi e'tiborga olinadi: $1 - \log_{\frac{1}{2}} cosx \geq 0 \Rightarrow \log_{\frac{1}{2}} cosx \leq 1 \Rightarrow$

$\Rightarrow \log_{\frac{1}{2}} cosx \leq \log_{\frac{1}{2}} \frac{1}{2} \Rightarrow 0 < \frac{1}{2} < 1 \Rightarrow cosx \geq \frac{1}{2} \Rightarrow$

$\Rightarrow \left[0; \frac{\pi}{3}\right] \cup \left[\frac{5\pi}{3}; 2\pi\right]$;



To‘rtinchi chorakdagi $\frac{5\pi}{3}$ nuqtani topish uchun $\frac{3\pi}{2}$ ga $\frac{\pi}{6}$ qo‘shiladi yoki 2π dan $\frac{\pi}{3}$ ayriladi:

$2\pi - \frac{\pi}{3} = \frac{5\pi}{3}$; $\frac{3\pi}{2} + \frac{\pi}{6} = \frac{5\pi}{3}$. Javobi: E.

(1996-9-45) $\log_{cosx} sin2x - 3 + 2\log_{sin2x} cosx = 0$ tenglamani yeching.

A) $(-1)^k \cdot \frac{\pi}{6} + k\pi$; $arcctg2 + 2k\pi$, $k \in Z$.

B) $(-1)^k \cdot \frac{\pi}{3} + k\pi$; $arcctg2 + k\pi$, $k \in Z$.

C) $(-1)^{k+1} \cdot \frac{\pi}{6} + k\pi$; $arcctg2 + 2k\pi$, $k \in Z$.

D) $(-1)^k \cdot \frac{\pi}{3} + k\pi$; $arcctg2 + 2k\pi$, $k \in Z$.

E) $(-1)^k \cdot \frac{\pi}{6} + 2k\pi$; $arcctg2 + 2k\pi$, $k \in Z$.

Yechilishi: $\log_{cosx} sin2x - 3 + 2\log_{sin2x} cosx = 0$;

1) Logarifmning aniqlanish sohasi topiladi:

$$\begin{cases} cosx > 0 \\ cosx \neq 1 \\ sin2x > 0 \\ sin2x \neq 1 \end{cases} \Rightarrow \begin{cases} -\frac{\pi}{2} < x < \frac{\pi}{2} \\ x \neq 2\pi k \\ 0 < 2x < \pi \\ 2x \neq \frac{\pi}{2} + 2\pi k \end{cases} \Rightarrow \begin{cases} -\frac{\pi}{2} < x < \frac{\pi}{2} \\ x \neq 2\pi k \\ 0 < x < \frac{\pi}{2} \\ x \neq \frac{\pi}{4} + \pi k \end{cases}$$

2) logarifmlar bir xil asosga keltiriladi

$$\text{Log}_{cosx}\, sin2x - 3 + 2 \cdot \frac{1}{\log_{cosx} sin2x} = 0;$$

$$\text{Log}^2{}_{cosx}\, sin2x - 3\log_{cosx} sin2x + 2 = 0;$$

$$\log_{cosx} sin2\text{x} = y;\ \ y^2 - 3y + 2 = 0 \Rightarrow \begin{cases} y_1 = 1; \\ y_2 = 2. \end{cases}$$

$$\begin{cases} \log_{cosx} sin2x = 1 \\ \log_{cosx} sin2x = 2 \end{cases} \Rightarrow \begin{cases} sin2x = cosx \\ sin2x = cos^2 x \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} 2sinxcosx = cosx \\ 2sinxcosx = cos^2 x \end{cases} \Rightarrow \begin{cases} 2sinxcosx - cosx = 0 \\ 2sinxcosx - cos^2 x = 0 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} cosx(2sinx - 1) = 0 \\ cosx(2sinx - cosx) = 0 \end{cases} \Rightarrow \begin{cases} cosx = 0 \\ 2sinx - 1 = 0 \\ 2sinx - cosx = 0 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x = \frac{\pi}{2} + \pi k \\ sinx = \frac{1}{2} \\ 2sinx = cosx \end{cases} \Rightarrow \begin{cases} x = \frac{\pi}{2} + \pi k \\ x = \frac{\pi}{6} + 2\pi k \Rightarrow ctgx = 2 \Rightarrow \\ \frac{cosx}{sinx} = 2 \end{cases}$$

$$\Rightarrow\ arcctg2 + 2\pi k.$$

3) $x = \frac{\pi}{2} + \pi k, k \epsilon Z$ yechim logarifmning aniqlanish sohasiga kirmaydi. Shuning uchun yechim

$$\Rightarrow \begin{cases} x = \frac{\pi}{6} + 2\pi k, \ \ k \epsilon Z; \\ x = arcctg2 + 2\pi k, \ \ k \epsilon Z. \end{cases}$$

Javobi: E.

(1996-6-53) $M = \log_5 100 - \log_5 4\,, N = 4\log_2 3 - \log_2 9,$

$P = \log_6 72 - \log_6 2$ va $Q = \log_4 16 + \log_4 \frac{1}{8}$ sonlardan qaysi biri 2 dan kichik?

A) N B) P C) M D) Q E) hech qaysisi

Yechilishi: $M = \log_5 100 - \log_5 4 = \log_5 \frac{100}{4} = \log_5 5^2 = 2;$

$Q = \log_4 16 + \log_4 \frac{1}{8} = \log_4 16 \cdot \frac{1}{8} = \log_{2^2} 2 = \frac{1}{2}\log_2 2 =$

$= \frac{1}{2} < 2.$ Javobi: D.

(1996-9-84) $\log_3 4 \cdot \log_4 5 \cdot \log_5 6 \cdot \log_6 7 \cdot \log_7 8 \cdot \log_8 9$ ni hisoblang.

A) 1 B) 3 C) 6 D) 2 E) 9

Yechilishi: $\log_3 4 \cdot \log_4 5 \cdot \log_5 6 \cdot \log_6 7 \cdot \log_7 8 \cdot \log_8 9 =$

1) oxirida turgan logarifm o‘zidan oldingi logarifmning asosiga o‘tkazib boriladi

$= \log_3 4 \ldots \log_7 8 \cdot \frac{\log_7 9}{\log_7 8} = \cdots = \log_3 4 \cdot \frac{\log_3 9}{\log_3 4} = 2.$

Javobi: D.

(1996-13-29) $(x-2)^{\log_2(x^2-5x+5)} < (x-2)^{\log_2(x-3)}$ tengsizlik x ning qanday qiymatlarida o‘rinli?

A) $(-\infty; 2) \cup (4; \infty)$ B) $(2; 4)$ C) $\left(\frac{5+\sqrt{5}}{2}; 4\right)$

D)$(4; \infty)$ E) $\left(-\infty; \frac{5-\sqrt{5}}{2}\right) \cup \left(\frac{5+\sqrt{5}}{2}; \infty\right)$

Yechilishi: $(x-2)^{\log_2(x^2-5x+5)} < (x-2)^{\log_2(x-3)};$

$I.\ sh.\ x - 3 > 0 \Rightarrow x > 3$ –shu ma’lumotning o‘zi $x-2$ asosning 1 dan katta ekanligini aniqlab beradi.

Javobi: C.

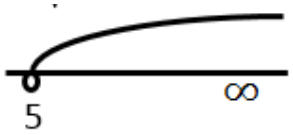
(1997-1-24) $\log_{\frac{1}{\sqrt{3}}}(x-5)+2\log_{\sqrt{3}}(x-5)<4$ tengsizlikni yeching.

A) $(6;15)$ B)$(5;14)$ C)$(5;81)$

D)$(10;20)$ E) $(6{,}5;10)$

Yechilishi: $\log_{\frac{1}{\sqrt{3}}}(x-5)+2\log_{\sqrt{3}}(x-5)<4$;

1) $x-5>0 \Rightarrow x>5$;



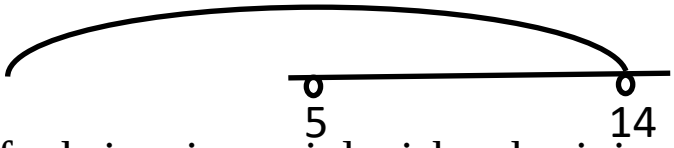
2) $\log_{\sqrt{3}^{-1}}(x-5)+2\log_{\sqrt{3}}(x-5)<4 \Rightarrow$

$\Rightarrow -\log_{\sqrt{3}}(x-5)+2\log_{\sqrt{3}}(x-5)<4 \Rightarrow$

$\Rightarrow \log_{\sqrt{3}}(x-5)<4 \Rightarrow x-5<(\sqrt{3})^4 \Rightarrow x<14;$

1) $va\ 2)dan \Rightarrow (5;14).$

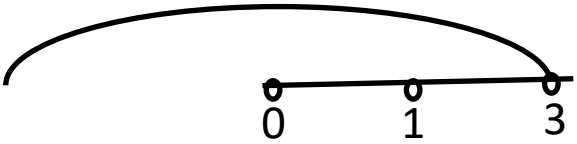
Javobi: B.



(1997-1-63) $y=\log_x(3-x)$funksiyaning aniqlanish sohasini toping.

A) $(-\infty;3)$ B)$(0;\infty)$ C)$(0;1)\cup(1;3)$

D)$(0;3)$ E)$(3;\infty)$



Yechilishi: $y=\log_x(3-x)$;

$x>0;\ x\neq 1;\ 3-x>0 \Rightarrow$

$\Rightarrow x<3 \Rightarrow\ D(y)=(0;1)\cup(1;3).$ Javobi: C.

(1997-3-58) $2^{1-\log_2 sinx}=4$ tenglamani yeching.

A) $\frac{\pi}{6}+2\pi n,\ n\epsilon Z$ B)$(-1)^n\cdot\frac{\pi}{6}+\pi n,\ n\epsilon Z$

C)$(-1)^n\cdot\frac{\pi}{3}+\pi n,\ n\epsilon Z$ D)$\frac{\pi}{4}+2\pi n,\ n\epsilon Z$

E)$(-1)^n\cdot\frac{\pi}{6}+2\pi n,\ n\epsilon Z$

Yechilishi: 1) $2^{1-\log_2 sinx}=2^2 \Rightarrow 1-\log_2 sinx=2 \Rightarrow$

$\Rightarrow \log_2 sinx = -1 \Rightarrow sinx > 0 \Rightarrow 0 < x < \pi.$

2) $sinx = 2^{-1} \Rightarrow sinx = \frac{1}{2} \Rightarrow$

$\Rightarrow x = arcsin\frac{1}{2} + 2\pi k \Rightarrow x = \frac{\pi}{6} + 2\pi k, k\epsilon Z.$ Javobi: A.

(1997-4-16) x ning qanday qiymatlarida $y = 2 - \lg x$ funksiya manfiy qiymatlar qabul qiladi?

A) $x > 100$ B) $x > 10$ C) $x \leq 100$

D) $x < 10$ E) $x \geq 100$

Yechilishi: $y = 2 - \lg x$;

1)$10 > 0, 10 \neq 1, x > 0;$

2) $y < 0; 2 - \lg x < 0 \Rightarrow \lg x > 2 \Rightarrow x > 10^2 \Rightarrow$

$\Rightarrow x > 100.$ Javobi: A.

(1997-4-33) Agar $\lg 2 = a$ va $\lg 7 = b$ bo‘lsa, $\log_{70} 5$ ni a va b orqali ifodalang.

A) $\frac{1+a}{1+b}$ B)$\frac{1-a}{1+b}$ C)$\frac{a+b}{b-1}$ D)$\frac{a-1}{a+b}$ E)$\frac{1-a}{1-b}$

Yechilishi: $\lg 2 = a$ va $\lg 7 = b$ yo‘l boshlovchilar e’tiborga olingan holda, $\log_{70} 5$ logarifm 10 asos, 2 va 7 argumentlarga o‘tkaziladi.

$\log_{70} 5 = \frac{\lg 5}{\lg 10\cdot 7} = \frac{\lg 10 - \lg 2}{\lg 10 + \lg 7} = \frac{1-a}{1+b}$. Javobi: B.

(1997-4-36) $\left[\frac{\log_\pi 2\pi}{tg^2\frac{\pi}{12}+1}\right]^{sin^2\frac{\pi}{5}+cos^2\frac{\pi}{5}-1}$ ni hisoblang.

A) 0 B) 2 C) 3 D) 1 E) 1,5

Yechilishi: $\left[\frac{\log_\pi 2\pi}{tg^2\frac{\pi}{12}+1}\right]^{sin^2\frac{\pi}{5}+cos^2\frac{\pi}{5}-1} = \left[\frac{\log_\pi 2\pi}{tg^2\frac{\pi}{12}+1}\right]^{1-1} =$

$= \left[\frac{\log_\pi 2\pi}{tg^2\frac{\pi}{12}+1}\right]^{0} = 1.$

Javobi: D.

(1997-4-37) Ma’noga ega ifodalarni ko‘rsating:

1) $arcsin(\log_2 5)$ 2)$arccos\frac{\pi}{\sqrt{17}}$

3) $arccos\frac{a^2+b^2}{a^2+b^2+c^2}$ 4) $arcsin\frac{a^2+b^2+\sqrt{2}}{a^2+b^2+1}$

A) 1; 2 B) 1; 2; 3 C) 2; 3 D) 1; 2; 3; 4 E) 3; 4

Yechilishi: cosx va sinx ning -1 va +1 orasida joylashishi e’tiborga olinadi.

1) $\log_2 5 > 1$; 2) $\frac{\pi}{\sqrt{17}} = \frac{3{,}14}{4{,}\ldots} < 1$; 3) $\frac{a^2+b^2}{a^2+b^2+c^2} < 1$;

4) $\frac{a^2+b^2+\sqrt{2}}{a^2+b^2+1} > 1 \Rightarrow 2; 3$ to‘g‘ri.

Javobi: C.

(1997-1-59) $x^{\lg 25} + 25^{\lg x} = 10$ tenglamani yeching.

A) 10 B) 1 C) $\sqrt{10}$ D) 5 E) 100

Yechilishi: $x^{\lg 25} + 25^{\lg x} = 10 \Rightarrow x \neq 1, x > 0$;

$x^{\lg 25} = 25^{\lg x} \Rightarrow$

$\Rightarrow 25^{\lg x} + 25^{\lg x} = 10 \Rightarrow 2 \cdot 25^{\lg x} = 10 \Rightarrow 5^{2\lg x} = 5$;

$\Rightarrow 2\lg x = 1 \Rightarrow \lg x = \frac{1}{2} = x = 10^{\frac{1}{2}} \Rightarrow x = \sqrt{10}$.

Javobi: C.

(1997-5-37) $\log_2 \lg 100$ ni hisoblang.

A) 1 B) 4 C) 3 D) 2 E) 10

Yechilishi: $\log_2 \lg 100 = \log_2 \lg 10^2 = \log_2 2\lg 10 = 1$.

Javobi: A.

(1997-5-38) $y = \log_2 sinx$ funksiyaning aniqlanish sohasini toping.

A) $(\pi n;\ \pi + 2\pi n),\ n\epsilon Z$ B)$\left(\frac{\pi}{2}n;\ \pi + 2\pi n\right),\ n\epsilon Z$

C)$\left(\frac{\pi}{3}n;\ \frac{3}{2}\pi + 2\pi n\right),\ n\epsilon Z$ D)$(2\pi n;\ \pi + 2\pi n),\ n\epsilon Z$

E)$(\pi n; \pi + 2\pi n),\ n\epsilon Z$

Yechilishi: $y = \log_2 sinx \Rightarrow 2 > 0,\ 2 \neq 1,\ sinx > 0 \Rightarrow$

$\Rightarrow 0 < x < \pi;$

Trigonometrik tengsizlikning xususiy yechimi topilgach, unga funksiyaning davri qo‘shilib umumiy yechim hosil qilinadi.

$2\pi n < x < \pi + 2\pi n, n\epsilon Z\ \ yoki\ (2\pi n;\ \pi + 2\pi n), n\epsilon Z.$

Javobi: D.

(1997-7-35) $\lg(x + 1) = x - 1$ tenglama nechta ildizga ega?

A) 1 B) 2 C) 3

D) ildizi yo‘q E) aniqlab bo‘lmaydi

Yechilishi: $\lg(x + 1) = x - 1 \Rightarrow \begin{cases} y = \lg(x + 1); \\ y = x - 1. \end{cases}$

$y = \lg(x + 1) \Rightarrow \begin{cases} 10 \neq 1 \\ 10 > 1; \\ x > -1. \end{cases}$

Ushbu ma’lumotlar asosida logarifmning grafigi chiziladi.

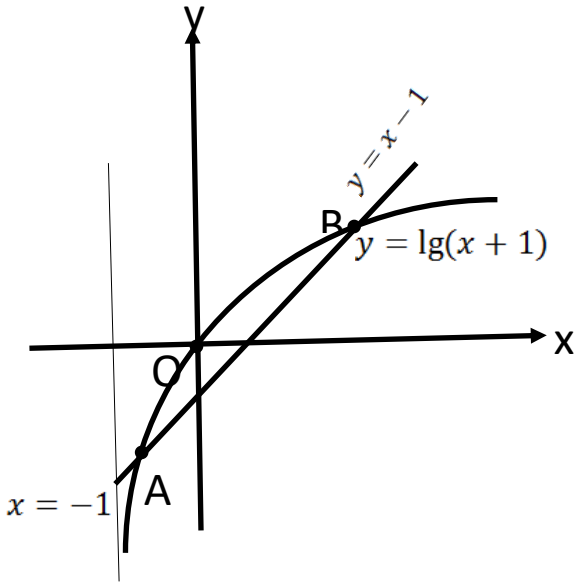
Bunda:

$x = 0 \Rightarrow y = \lg(0 + 1) =$

$= \lg 1 = 0$ bo‘lishi e’tiborga olinadi.

Demak, asos $10 > 1$ bo‘lganligi uchun logarifmik funksiya o‘suvchi va

$x = 0$ va $y = 0$ dan grafikni koordinata boshidan o‘tishi ma’lum.



Natijada, $y = \lg(x+1)$ logarifmik funksiya grafigi bilan $y = x - 1$ to′g′richiziqning ikkita nuqtada kesishganligidan, yechimning ikkitaekanligi kelib chiqadi.

Javobi: B.

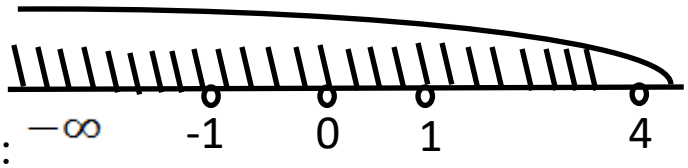
(1997-2-52) $y = \log_{x^2}(4-x)$ funksiyaning aniqlanish sohasini toping.

A) $(-\infty; 4)$ B)$(-\infty; -1) \cup (-1; 0) \cup (0; 4) \cup (1; 4)$

C) $(-\infty; -1) \cup [-1; 1] \cup (1; 4)$ D)$(-\infty; 1) \cup (4; \infty)$

E)$(4; \infty)$

Yechilishi: $y = \log_{x^2}(4-x)$. Logarifmning asosi va argumentiga qo‘yiladigan talablar e’tiborga olinadi:



$x^2 \Rightarrow x \neq -1;\quad x \neq 0;\ \ x \neq 1;\ 4 - x > 0 \Rightarrow x < 4.$

Bundan $D(y) = (-\infty; -1) \cup (-1; 0) \cup (0; 1) \cup (1; 4)$.

Javobi: B.

(1997-9-75) n ning qanday butun qiymatlarida $y = \lg(nx^2 - 5x + 1)$ funksiyaning aniqlanish sohasi $\left(-\infty; \frac{1}{4}\right] \cup [1; \infty)$ bo‘ladi?

A) 1 B) 4 C) 3

D) hech qanday butun qiymatida E) 5

Yechilishi: $y = \lg(nx^2 - 5x + 1)$. Logarifmning argumenti $nx^2 - 5x + 1 > 0$ bo‘lganligi, ya’ni tenglik belgisi qatnashmaganligi uchun

$\left(-\infty; \frac{1}{4}\right] [1; \infty)$ bo‘lishi mumkin emas.

$\left(-\infty; \frac{1}{4}\right) \cup (1; \infty)$ bo‘lsa, $n = 4$ bo‘lar edi. Javobi: D.

Pirnazar DAVRONOV

(1997-10-35) $\ln(x-1)=x-3$ tenglamaning nechta ildizi bor?

A) 1 B) 2 C) 3 D) ildizi yo‘q

E) aniqlab bo‘lmaydi

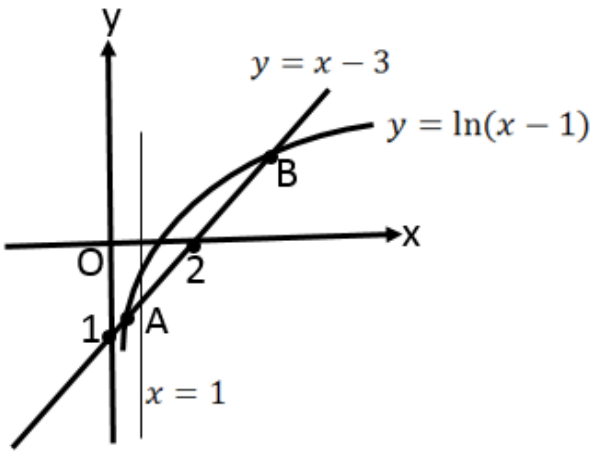
Yechilishi: $\ln(x-1)=x-3 \Rightarrow \begin{cases} y=\ln(x-1) \Rightarrow \\ y=x-3 \end{cases}$

$\Rightarrow \begin{cases} e>1; \\ x>1. \end{cases} x=2 \Rightarrow$

$\Rightarrow y=\ln(2-1)=$

$=\ln 1=0.$

To‘g‘ri chiziq bilan egri chiziq 2 ta nuqtada kesishadi.



Javobi: B.

(1997-3-33) $\log_{\sqrt{3}}\frac{3x}{3x-1,5}>0$ tengsizlikni yeching.

A)$(0,5;\infty)$ B)$(0;0,5)$ C)$(-\infty;0)$

D)$(0;\infty)$ E)$(2;\infty)$

Yechilishi: $\log_{\sqrt{3}}\frac{3x}{3x-1,5}>0;$

1) logarifmning birinchi hossasidan foydalaniladi;

2) ikkitasini bilgan holda uchinchisi topiladi;

$\begin{cases} \sqrt{3}>1 \\ log>0 \end{cases} \Rightarrow \frac{3x}{3x-1,5}>1 \Rightarrow \frac{3x}{3x-1,5}-1>0 \Rightarrow$

$\Rightarrow \frac{3x-3x+1,5}{3x-1,5}>0 \Rightarrow \frac{1,5}{3x-1,5}>0;$

3) ikkitasini bilgan holda uchinchisi topiladi

$\begin{cases} 1,5>0 \\ \frac{1,5}{3x-1,5}>0 \end{cases} \Rightarrow \{3x-1,5>0 \Rightarrow \{3x>1,5 \Rightarrow x>0,5 \Rightarrow$

$\Rightarrow (0,5;\infty).$ Javobi: A.

Vektorlar

(1996-1-42) $\vec{b} = \{0; -2\}$ va $\vec{c} = \{-3; 4\}$ vektorlar berilgan. $\vec{a} = 3\vec{b} - 2\vec{c}$ vektorning koordinatalarini toping.

A) (0;8) B) (3;-6) C) (6;-8) D) (6;-14) E) (-6;-8)

Yechilishi: $\vec{a} = 3\vec{b} - 2\vec{c} = 3 \cdot \{0; -2\} - 2 \cdot \{-3; 4\} =$

$= \{3 \cdot 0; 3 \cdot (-2)\} - \{2 \cdot (-3); 2 \cdot 4\} = \{0; -6\} - \{-6; 8\}$

$= \{0 - (-6);\ -6 - 8\} = \{6; -14\}.$ Javobi: D.

(1996-1-50) $\vec{m}$ =$\{-1; 5; 3\}$ va $\vec{n} = \{2; -2; 4\}$ vektorlar skalyar ko‘paytmasini hisoblang.

A) -24 B) 2 C) 0 D) -10 E) 12

Yechilishi: $\vec{m} = \{-1; 5; 3\};\ \vec{n} = \{2; -2; 4\};$

$\vec{m} \cdot \vec{n} = \{-1; 5; 3\} \cdot \{2;\ -2; 4\} =$

$= -1 \cdot 2 + 5 \cdot (-2) + 3 \cdot 4 = -2 - 10 + 12 = 0 \Rightarrow$

$\Rightarrow \vec{m} \perp \vec{n}\ \ yoki\ \ \vec{m}\hat{}\vec{n} = 90°.$ Javobi: C.

(1996-3-40) $\vec{a} = \left\{1; \frac{3}{4}\right\}$ vektor berilgan. $3 \cdot \vec{a}$ vektorning modulini toping.

A) 4,5 B) 3,5 C) 5 D) 5,5 E) 2,5

Yechilishi: $\vec{a} = \left\{1; \frac{3}{4}\right\} \Rightarrow 3\vec{a} = 3 \cdot \left\{1; \frac{4}{3}\right\} = \{3; 4\} \Rightarrow$

$\Rightarrow |3\vec{a}| = \sqrt{3^2 + 4^2} = 5.$ Javobi: C.

(1996-3-44) Uchlari $A\ (1; 1),\ B\ (-2; 3)$ va $C\ (-1; -2)$ nuqtalarda bo‘lgan uchburchakning A va B burchaklarini toping.

A)$60°; 30°$ B) $90°; 45°$ C) $30°; 90°$
D) $45°; 90°$ E) $45°; 45°$

Yechilishi: 1) $\overrightarrow{AB} = \{-2-1; 3-1\} = \{-3; 2\}$;
$\left|\overrightarrow{AB}\right| = \sqrt{(-3)^2 + 2^2} = \sqrt{13}$;
2) $\overrightarrow{AC} = \{-1-1; -2-1\} = \{-2; -3\}$;
$\left|\overrightarrow{AC}\right| = \sqrt{(-2)^2 + (-3)^2} = \sqrt{13}$;
3) $cos\left(\overrightarrow{AB}, \overrightarrow{AC}\right) = \frac{\overrightarrow{AB} \cdot \overrightarrow{AC}}{\left|\overrightarrow{AB}\right| \cdot \left|\overrightarrow{AC}\right|} = \frac{\{-3;2\} \cdot \{-2;-3\}}{\sqrt{13} \cdot \sqrt{13}} = \frac{6+(-6)}{13} = 0 \Rightarrow$
$\Rightarrow \angle A = 90° \Rightarrow \angle B = \angle C = 45°$. Javobi: B.

(1996-3-43) $\vec{a}$ va $\vec{b}$ nokollianar vektorlar berilgan.
$|\vec{a}| = \left|\vec{b}\right| = 3$ bo‘lsa, $\left(\vec{a} + \vec{b}\right)$ bilan $\left(\vec{a} - \vec{b}\right)$ qanday burchak tashkil qiladi?

A) $30°$ B) $45°$ C) $90°$ D) $60°$ E) $75°$

Yechilishi: $|\vec{a}| = \left|\vec{b}\right| = 3$; $\left(\vec{a} + \vec{b}\right) \cdot \left(\vec{a} - \vec{b}\right) = ?$
$\left(\vec{a} + \vec{b}\right) \cdot \left(\vec{a} - \vec{b}\right) = \vec{a}^2 - \vec{b}^2 = |\vec{a}|^2 - \left|\vec{b}\right|^2 =$
$= 3^2 - 3^2 = 0$. Javobi: C.

(1996-3-50) $B(4; 2; 0)$ nuqta $\vec{a}\{-2; 3; -1\}$ vektorning oxiri bo‘lsa, bu vektor boshining koordinatalarini toping.

A) $(-6; 1; 1)$ B)$(6; 1; 1)$ C)$(6; -1; 1)$
D)$(6; -1; -1)$ E)$(-6; -1; 1)$

Yechilishi: $\overrightarrow{AB} = \{4-x; 2-y; -z\}$; $\overrightarrow{AB} = \vec{a}$;
$\{4-x; 2-y; -z\} = \{-2; 3; -1\}$;

$A(x; y; z)$ $\vec{a}\{-2; 3; -1\}$ $B(4; 2; 0)$

$\begin{cases} 4-x = -2 \\ 2-y = 3 \\ -z = -1 \end{cases} \Rightarrow \begin{cases} x = 6 \\ y = -1 \\ z = 1 \end{cases} \Rightarrow A(6; -1; 1)$. Javobi: C.

(1996-3-99) $|\vec{a}| = 3,\ |\vec{b}| = 4,\ \vec{a}\hat{}\vec{b} = 60°$. γ ning qanday qiymatida $(\vec{a} - \gamma\vec{b}) \perp \vec{a}$ bo‘ladi.

A) 1 B) 2 C) 3 D) 1,5 E) 2,5

Yechilishi: Ikkita vektor perpendikulyar bo‘lsa, ular ko‘paytirilib nolga tenglanadi.

$|\vec{a}| = 3, \quad |\vec{b}| = 4, \quad (\vec{a}\hat{}\vec{b}) = 60°;\ (\vec{a} - \gamma\vec{b}) \perp \vec{a} \Rightarrow$

$\Rightarrow (\vec{a} - \gamma\vec{b}) \cdot \vec{a} = 0 \Rightarrow \vec{a}^2 - \gamma\vec{a} \cdot \vec{b} = 0 \Rightarrow$

$\Rightarrow |\vec{a}|^2 - \gamma \cdot |\vec{a}| \cdot |\vec{b}| \cdot cos(\vec{a}\hat{}\vec{b}) = 0 \Rightarrow$

$\Rightarrow 3^2 - \gamma \cdot 3 \cdot 4 \cdot cos60° = 0 \Rightarrow 9 - \gamma \cdot 12 \cdot \frac{1}{2} = 0 \Rightarrow$

$\Rightarrow 6\gamma = 9 \Rightarrow \gamma = \frac{9}{6} = 1{,}5.$ Javobi: D.

(1996-3-107) $A(x; 0; 0)$ nuqta $B(1; 2; 3)$ va $C(-1; 3; 4)$ nuqtalardan teng uzoqlikdaligi ma’lum bo‘lsa, x ni toping.

Yechilishi: $\overrightarrow{AB} = \{1 - x; 2; 3\};$

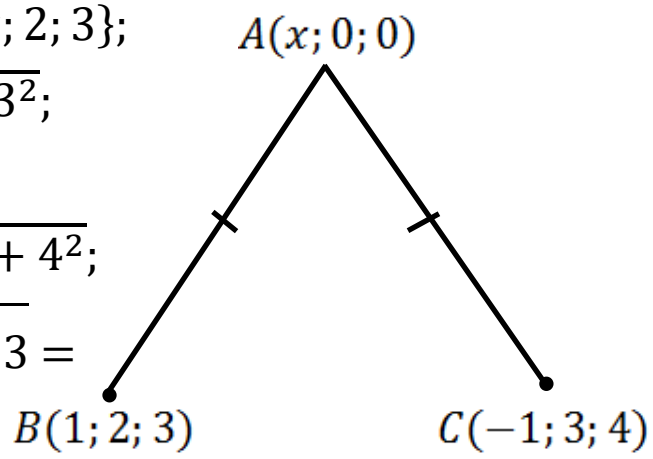
$|\overrightarrow{AB}| = \sqrt{(1-x)^2 + 2^2 + 3^2};$

$\overrightarrow{AC} = \{-1 - x; 3; 4\};$

$|\overrightarrow{AB}| = \sqrt{[-(1-x)]^2 + 3^2 + 4^2};$

$|\overrightarrow{AB}| = |\overrightarrow{AC}| \Rightarrow \sqrt{(1-x)^2 + 13} =$

$= \sqrt{(1+x)^2 + 25} \Rightarrow$



$\Rightarrow (1-x)^2 + 13 = (1+x)^2 + 25 \Rightarrow$

$\Rightarrow 1 - 2x + x^2 + 13 = 1 + 2x + x^2 + 25 \Rightarrow$

$\Rightarrow 4x = -12 \Rightarrow x = -3.$ Javobi: C.

(1997-1-37) Agar $\vec{m}$ va $\vec{n}$ o‘zaro perpendikulyar birlik vektorlar bo‘lsa, $\vec{a} = 2\vec{m} + \vec{n}$ vektorning uzunligini toping.

A) 2 B) 3 C) $\sqrt{5}$ D) $\sqrt{3}$ E) $2\sqrt{2}$

Yechilishi: Vektorlarga doir masalalari yechishning yana bir usuli tenglikning ikkala tomonini kvadratga ko‘tarishdan iborat.

$|\vec{m}| = |\vec{n}| = 1; \quad \vec{m} \cdot \vec{n} = 0;$

$(\vec{a})^2 = (2\vec{m} + \vec{n})^2 = 4|\vec{m}|^2 + 4\vec{m} \cdot \vec{n} + |\vec{n}|^2 =$

$= 4 \cdot 1^2 + 4 \cdot 0 + 1^2 \Rightarrow |\vec{a}| = \sqrt{5}.$ Javobi: C.

(1997-11-37) Agar $\vec{m}$ va $\vec{n}120°$ li burchak tashkil etuvchi birlik vektorlar bo‘lsa, $2\vec{m} + 4\vec{n}$ va $\vec{m} - \vec{n}$ vektorlar orasidagi burchakni toping.

A) $120°$ B) $90°$ C) $135°$ D) $150°$ E) $60°$

Yechilishi: $\vec{m} = \vec{n} = 1; \ \vec{m}\hat{}\vec{n} = 120°;$

$\alpha = (2\vec{m} + 4\vec{n})\hat{}(\vec{m} - \vec{n}) = ?$

1) ikki vektor skalyar ko‘paytiriladi:

$(2\vec{m} + 4\vec{n})\hat{}(\vec{m} - \vec{n}) = 2\vec{m}^2 - 2\vec{m} \cdot \vec{n} + 4\vec{m}\vec{n} - 4|\vec{n}|^2 =$

$= 2|\vec{m}| \cdot |\vec{n}| \cdot cos(\vec{m}\hat{}\vec{n}) - 2 = 2 \cdot 1 \cdot 1 \cdot cos120° - 2 =$

$= 2 \cdot \left(-\frac{1}{2}\right) - 2 = -3;$

2) har bir vektorni kvadratga ko‘tarish orqali ularning uzunliklari topiladi:

$(2\vec{m} + 4\vec{n})^2 = 4\vec{m}^2 + 16\vec{m} \cdot \vec{n} + 16\vec{n}^2 \Rightarrow$

$\Rightarrow \ (2\vec{m} + 4\vec{n})^2 = 4|\vec{m}|^2 + 16\left(-\frac{1}{2}\right) + 16|\vec{n}|^2 \Rightarrow$

$\Rightarrow 4 \cdot 1 - 8 + 16 \cdot 1 = 12 \Rightarrow |2\vec{m} + 4\vec{n}| = 2\sqrt{3};$

$(\vec{m} - \vec{n})^2 = 1^2 - 2 \cdot \left(-\frac{1}{2}\right) + 1^2 = 1 + 1 + 1 = 3 \Rightarrow$

$\Rightarrow |\vec{m} - \vec{n}| = \sqrt{3}.$ U holda

$cos\alpha = \frac{-3}{2\sqrt{3} \cdot \sqrt{3}} = -\frac{1}{2} \Rightarrow \alpha = 120°;$ Javobi: A.

(1997-4-50) $\vec{a} = \{0; 1\}$ va $\vec{b} = \{2; 1\}$ vektorlar berilgan. x ning qanday qiymatlarida $\vec{b} + x\vec{a}$ vektor $\vec{b}$ vektorga perpendikulyar bo‘ladi.

A) -4 B) -6 C) -7 D) -3 E) -5

Yechilishi: $(\vec{b} + x\vec{a}) \cdot \vec{b} = 0 \Rightarrow |\vec{b}|^2 + x\vec{a} \cdot \vec{b} = 0;$

$|\vec{b}| = \sqrt{2^2 + 1^2} = \sqrt{5};\ \ \vec{a} \cdot \vec{b} = \{0; 1\} \cdot \{2; 1\} = 0 + 1 = 1;$

$(\sqrt{5})^2 + x \cdot 1 = 0 \Rightarrow x = -\sqrt{5}.$ Javobi: E.

(1997-4-56) x ning qanday qiymatlarida $\vec{a} = \{2; x; x\}$ va $\vec{b} = \{2; 5; x\}$ vektorlar o‘zaro perpendikulyar bo‘ladi?

A) -4; 1 B) -1; 4 C) -4; -1 D) -1; 3 E) 1; 3

Yechilishi: $\overrightarrow{a =} \{2; x; x\};\ \ \vec{b} = \{2; 5; x\};\ \ \vec{a} \cdot \vec{b} = 0 \Rightarrow$

$\Rightarrow 4 + 5x + x^2 \Rightarrow \begin{cases} x_1 = -1; \\ x_2 = -4. \end{cases}$ Javobi: C.

(1997-5-29) $\vec{a}\{5; 1\}$ va $\vec{b}\{-2; 3\}$ vektorlar berilgan $|\vec{a} + \vec{b}|$ ni hisoblang.

A) 5 B) 3 C) 4 D) 2 E) 1

Yechilishi; $\vec{a} = \{5; 1\};\ \ \vec{b} = \{-2; 3\};$

$\vec{a} + \vec{b} = \{5; 1\} + \{-2; 3\} = \{3; 4\};$

$|\vec{a} + \vec{b}| = \sqrt{3^2 + 4^2} = \sqrt{25} = 5.$ Javobi: A.

Trigonometriya

(1996-3-57) $sin20° \cdot sin40° \cdot sin80°$ ni hisoblang.

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{\sqrt{3}}{8}$ E) $5\sqrt{3}$

Yechilishi: 1) ko‘paytmadan ayirmaga o‘tiladi

$\frac{1}{2}[cos(20° - 40°) - cos(20° + 40°)] \cdot sin80° =$

$= \frac{1}{2}\left[cos(-20°) - \frac{1}{2}\right] \cdot sin80° =$

2) kosinus juft funksiya bo‘lganligi uchun argumentdagi $''-''$ ni $''+''$ ga aylantiradi

$= \frac{1}{2} sin80° \left(cos20° - \frac{1}{2}\right) =$

$= \frac{1}{2} \cdot sin80° \cdot cos20° - \frac{1}{4} sin80° =$

3) ko‘paytmadan yig‘indiga o‘tiladi

$= \frac{1}{2} \cdot \frac{1}{2}[sin(80° + 20°) + sin(80° - 20°)] - \frac{1}{4} sin80° =$

$= \frac{1}{4}\left(sin100° + \frac{\sqrt{3}}{2}\right) - \frac{1}{4} sin80° =$

$= \frac{1}{4} sin100° + \frac{\sqrt{3}}{8} - \frac{1}{4} sin80° =$

$= \frac{1}{4}(sin100° - sin80°) + \frac{\sqrt{3}}{8} =$

4) ayirmadan ko‘paytmaga o‘tiladi

$= \frac{1}{4} \cdot 2cos\frac{100°+80°}{2} \cdot sin\frac{100°-80°}{2} + \frac{\sqrt{3}}{8} = \frac{\sqrt{3}}{8}$. Javobi: D.

(1996-3-112) $\frac{sin3\alpha}{sin\alpha} - \frac{cos3\alpha}{cos\alpha}$ ni soddalashtiring.

A) $2cos\alpha$ B) 2 C) $2sin\alpha$ D) 1 E) 0,5

Yechilishi: $\frac{sin3\alpha}{sin\alpha} - \frac{cos3\alpha}{cos\alpha} = \frac{sin3\alpha \cdot cos\alpha - cos3\alpha \cdot sin\alpha}{\sin\alpha \cdot cos\alpha} =$

$= \frac{sin(3\alpha-\alpha)}{sin\alpha \cdot cos\alpha} = \frac{sin2\alpha}{sin\alpha \cdot cos\alpha} = \frac{2sin\alpha \cdot cos\alpha}{sin\alpha \cdot cos\alpha} = 2.$

Javobi: B.

(1996-6-31) $240°$ ning radian o‘lchovini toping.

A) $\frac{5\pi}{4}$ B) $\frac{2\pi}{3}$ C) $\frac{4\pi}{3}$ D) $\frac{6\pi}{3}$ E) $\frac{3\pi}{4}$

Yechilishi: $240° = 240 \cdot 1° = 240° \cdot \frac{\pi}{180°} = \frac{4\pi}{3}$. Javobi: C.

(1996-6-32) $2sin^2x + cos^2x$ ning eng katta qiymatini toping.

A) 1 B) 1,5 C) 2,6 D) 2 E) 2,5

Yechilishi: $2sin^2x + cos^2x =$ Tarqatib yoziladi:

$sin^2x + sin^2x + cos^2x = sin^2x + 1 =$

2) sin^2x bilan cos^2x ning eng kichik qiymati nolga, eng katta qiymati 1 ga teng.

$-1 \le sinx \le 1;$ $-1 \le cosx \le 1;$

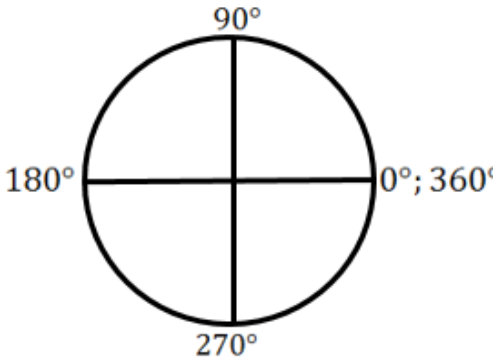
$0 \le sin^2x \le 1;$ $0 \le cos^2x \le 1.$

Javobi: D.

(1996-6-33) $M = \frac{cos320°}{sin217°}$; $N = \frac{ctg187°}{tg340°}$; $P = \frac{tg185°}{sin140°}$ va $Q = \frac{sin135°}{ctg140°}$ sonli ifodalarning qaysi biri musbat?

A) M B) N C) P

D) Q E) hech qaysisi



Yechilishi: $M = \frac{cos320°}{sin217°} = \frac{+}{-} =$

$-$;

$P = \frac{tg185°}{sin140°} = \frac{+}{+} = +;$

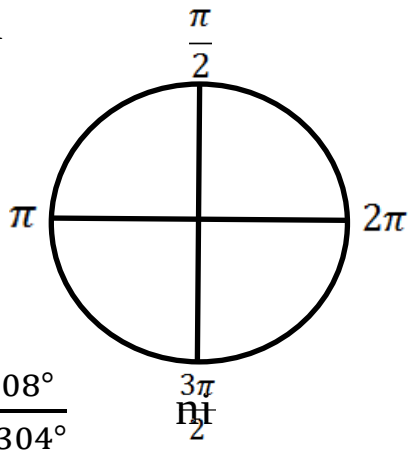
Javobi: C.

(1996-6-34) $\frac{\sin(2\pi-\alpha)}{ctg\left(\frac{3\pi}{2}-\beta\right)}$ ni soddalashtiring.

A) $\frac{sin\alpha}{tg\beta}$ B)$-\frac{sin\alpha}{ctg\beta}$ C)$-\frac{sin\alpha}{tg\beta}$ D)$-\frac{cos\alpha}{tg\beta}$ E)$-\frac{cos\alpha}{ctg\beta}$

Yechilishi: Keltirish formulalariga asosan

$\frac{\sin(2\pi-\alpha)}{ctg\left(\frac{3\pi}{2}-\beta\right)}=\frac{-sin\alpha}{tg\beta}=-\frac{sin\alpha}{tg\beta}$.



Javobi: C.

(1996-7-54) $\frac{cos18°\cdot cos28°+cos108°\cdot sin208°}{sin34°\cdot sin146°+sin236°\cdot sin304°}$ ni soddalashtiring.

A) 1 B) $sin10°$ C) $sin46°$ D)$-sin10°$ E) 2

Yechilishi: $\frac{cos18°\cdot cos28°+cos108°\cdot sin208°}{sin34°\cdot sin146°+sin236°\cdot sin304°}=$

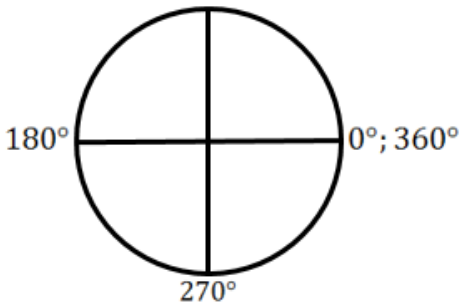
1) Birinchi chorakda joylashgan

18°; 28°; 34° –burchaklarga teginilmaydi.

2) birinchidan boshqa chorakda bo‘lgan 108°, 208°, 146°, 236°, 304° burchaklar keltirish formulalaridan foydalanib birinchi chorakka tushiriladi

$=\frac{cos18°\cdot cos28°+cos(90°+18°)sin(180°+28°)}{sin34°\cdot sin(90°+56°)+sin(180°+56°)sin(270°+34°)}=$

$=\frac{cos18°\cdot cos28°+(-sin18°)(-sin28°)}{sin34°\cdot cos(56°)+(-sin56°)(-cos34°)}=$



$=\frac{cos28°\cdot cos18°+sin18°\cdot sin28°}{sin34°\cdot cos56°+sin56°\cdot cos34°}=$

$=\frac{cos(28°-18°)}{sin(56°+34°)}=\frac{cos10°}{sin90°}=$

$=\frac{cos10°}{1}=cos10°$. Javobi: B.

(1996-6-35) $\frac{cos\alpha-cos3\alpha}{sin\alpha}$ ni soddalashtiring.

A) $-2cos2\alpha$ B) $2cos2\alpha$ C) $sin2\alpha$

D)$-2sin2\alpha$ E) $2sin2\alpha$

Yechilishi: $\frac{cos\alpha-cos3\alpha}{sin\alpha}=\frac{-2sin\frac{\alpha+3\alpha}{2}\cdot sin\frac{\alpha-3\alpha}{2}}{sin\alpha}=$

$=\frac{-2sin2\alpha\cdot \sin(-\alpha)}{sin\alpha}=\frac{2sin2a\cdot sin\alpha}{sin\alpha}=2sin2\alpha.$ Javobi: E.

(1997-7-56) $\frac{sin2\alpha+cos(\pi-\alpha)sin\alpha}{sin\left(\frac{\pi}{2}-\alpha\right)}$ ni soddalashtiring.

A) $cos\alpha$ B) $sin\alpha$ C)$-2sin\alpha$ D)$-cos\alpha$ E)$3cos\alpha$

Yechilishi: $\frac{sin2\alpha+cos(\pi-\alpha)\cdot sin\alpha}{sin\left(\frac{\pi}{2}-\alpha\right)}=$

$=\frac{2sin\alpha\cdot cos\alpha+(-cos\alpha)\cdot sin\alpha}{cos\alpha}=\frac{2sin\alpha\cdot cos\alpha-sin\alpha\cdot cos\alpha}{cos\alpha}=$

$=\frac{sin\alpha\cdot cos\alpha}{cos\alpha}=sin\alpha.$ Javobi: B.

(1997-7-60) $sin\left(2arcsin\frac{1}{3}\right)$ ni hisoblang.

A) $\frac{2}{3}$ B) $\frac{2\sqrt{2}}{3}$ C) $\frac{4\sqrt{2}}{9}$ D) $\frac{2\sqrt{2}}{9}$ E) $\frac{2}{9}$

Yechilishi: $sin\left(2arcsin\frac{1}{3}\right)=2\sin arcsin\frac{1}{3}\cdot cosarcsin\frac{1}{3}=$

$=2\cdot\frac{1}{3}\cdot\sqrt{1-\left(\frac{1}{3}\right)^2}=\frac{2}{3}\sqrt{1-\frac{1}{9}}=\frac{2}{3}\cdot\sqrt{\frac{8}{9}}=\frac{4\sqrt{2}}{9}.$ Javobi: C.

(1996-6-47) $\frac{1+sin2\alpha}{sin\alpha+cos\alpha}-sin\alpha$ ni soddalashtiring.

A) $cs\alpha$ B) $sin\alpha$ C)$-cos\alpha$

D)$-2sin\alpha$ E) $cos\alpha-2sin\alpha$

Yechilishi: $\frac{1+sin2\alpha}{sin\alpha+cos\alpha}-\frac{sin\alpha}{1}=$

$=\frac{sin^2\alpha+cos^2\alpha+2sin\alpha cos\alpha-sin^2\alpha-sin\alpha cos\alpha}{sin\alpha+cos\alpha}=$

$=\frac{cos^2\alpha+sin\alpha cos\alpha}{sin\alpha+cos\alpha}=\frac{cos\alpha(cos\alpha+sin\alpha)}{cos\alpha+sin\alpha}=cos\alpha.$ Javobi: A.

(1997-1-44) $sin1050°-cos(-90°)+ctg660°$ ni hisoblang.

A) $\sqrt{3}-1$ B) $-\frac{3\sqrt{3}}{2}$ C) $-\frac{3+2\sqrt{3}}{6}$

D) $0{,}5+\sqrt{3}$ E) $2\sqrt{3}$

Yechilishi: $sin1050°-cos(-90°)+ctg660°=$

Katta burchakni $180°$ ga bo‘lib keltirish formulalariga tushiriladi

$=\sin(6\pi-30°)-cos90°+ctg(4\pi-60°)=$

$=-sin30°-0-ctg60°=-\frac{1}{2}-\frac{\sqrt{3}}{3}=\frac{-3-2\sqrt{3}}{6}=-\frac{3+2\sqrt{3}}{6}.$

Javobi: C.

(1997-1-45) Agar $cos\alpha=-\frac{1}{2}$ va $\pi<\alpha<\frac{3\pi}{2}$ bo‘lsa,

$sin\left(\frac{\pi}{2}+\frac{\alpha}{2}\right)$ ni toping.

A) $\frac{1}{2}$ B)$-\frac{\sqrt{3}}{2}$ C)$\frac{\sqrt{3}}{2}$ D)$-\frac{1}{2}$ E)$-\frac{1}{4}$

Yechilishi: $cos\alpha=-\frac{1}{2};\ \pi<\alpha<\frac{3\pi}{2}-uchinchi\ chorak.$

$sin\left(\frac{\pi}{2}+\frac{\alpha}{2}\right)=sin\left(90+\frac{240}{2}\right)^{\circ}=sin210°=$

$=\sin(180°+30°)=-sn30°=-\frac{1}{2}.$ Javobi: D.

(1997-1-47) $(ctg\alpha-cos\alpha)\cdot\left(\frac{sin^2\alpha}{cos\alpha}+tg\alpha\right)$ ni soddalashtiring.

A) $cos^2\alpha$ B) $tg\alpha$ C) $\frac{1}{cos\alpha}$ D)$ctg^2\alpha$ E)$sin^2\alpha$

Yechilishi: $(ctg\alpha-cos\alpha)\cdot\left(\frac{sin^2\alpha}{cos\alpha}+tg\alpha\right)=$

$=\left(\frac{cos\alpha}{sin\alpha}-cos\alpha\right)\left(\frac{sin^2\alpha}{cos\alpha}+\frac{sin\alpha}{cos\alpha}\right)=$

$=\frac{cos\alpha-sin\alpha\cdot cos\alpha}{sin\alpha}\cdot\frac{sin^2\alpha+sin\alpha}{cos\alpha}=\frac{cos\alpha(1-sin\alpha)}{sin\alpha}\cdot\frac{sin\alpha(sin\alpha+1)}{cos\alpha}=$

$=1-sin^2\alpha=cos^2\alpha.$ Javobi: A.

(1997-1-52) $sin\frac{\pi}{16}cos^2\frac{\pi}{16}-sin^3\frac{\pi}{16}\cdot cos\frac{\pi}{16}$ ni hisoblang.

A) $\frac{\sqrt{2}}{2}$ B)$\frac{\sqrt{2}}{3}$ C)$\frac{\sqrt{2}}{4}$ D)$\frac{\sqrt{2}}{8}$ E)$\frac{1}{2}$

Yechilishi: $sin\frac{\pi}{16}cos^2\frac{\pi}{16}-sin^3\frac{\pi}{16}\cdot cos\frac{\pi}{16}=$

$=sin\frac{\pi}{16}\cdot cos\frac{\pi}{16}\left(cos^2\frac{\pi}{16}-sin^2\frac{\pi}{16}\right)=$

$\frac{1}{2}\cdot 2$ ga ko‘paytiriladi.

$=\frac{1}{2}\cdot 2\cdot sin\frac{\pi}{16}\cdot cos\frac{\pi}{16}\cdot cos2\cdot\frac{\pi}{16}=$

$=\frac{1}{2}\sin\left(2\cdot\frac{\pi}{16}\right)\cdot cos\frac{\pi}{8}=\frac{1}{2}\cdot sin\frac{\pi}{8}\cdot cos\frac{\pi}{8}=$

$=\frac{1}{2}\cdot\frac{1}{2}\cdot 2\cdot sin\frac{\pi}{8}cos\frac{\pi}{8}=\frac{1}{4}sin2\cdot\frac{\pi}{8}=\frac{1}{4}sin\frac{\pi}{4}=\frac{1}{4}\cdot\frac{\sqrt{2}}{2}=\frac{\sqrt{2}}{8}.$

Javobi: D.

(1997-3-56) $\frac{cos2\alpha+cos\left(\frac{\pi}{2}-\alpha\right)sin\alpha}{sin\left(\frac{\pi}{2}+\alpha\right)}$ ni soddalashtiring.

A) $cos\alpha$ B) $2cos\alpha$ C)$-cos\alpha$ D) $tg\alpha$ E)$-sin\alpha$

Yechilishi: $\frac{cos2\alpha+cos\left(\frac{\pi}{2}-\alpha\right)sin\alpha}{sin\left(\frac{\pi}{2}+\alpha\right)}=$

$=\frac{cos^2\alpha-sin^2\alpha+sin\alpha sin\alpha}{cos\alpha}=cos\alpha.$ Javobi: A.

(1997-3-55) $cos\frac{\pi}{12}$ ni hisoblang.

A) $\frac{\sqrt{2+\sqrt{3}}}{3}$ B)$\sqrt{2-\sqrt{2}}$ C)$\frac{\sqrt{\sqrt{3}-1}}{2}$

D)$\frac{\sqrt{2-\sqrt{3}}}{2}$ E)$\frac{\sqrt{2+\sqrt{3}}}{2}$

Yechilishi: $cos\frac{\pi}{12}=cos15°=$

Yarim burchakdan to‘la burchakka o‘tiladi:

$\sqrt{\frac{1}{2}(1+cos30°)}=\sqrt{\frac{1}{2}\left(1+\frac{\sqrt{3}}{2}\right)}=\sqrt{\frac{1}{2}\cdot\frac{2+\sqrt{3}}{2}}=$

$= \sqrt{\frac{2+\sqrt{3}}{4}} = \frac{\sqrt{2+\sqrt{3}}}{2}$. Javobi: E.

(1997-5-28) $8cos30° + tg^2 15°$ ni hisoblang.

A) 5 B) 6 C) 7 D) 8 E) 9

Yechilishi: $8cos30° + tg^2 15° = 8 \cdot \frac{\sqrt{3}}{2} + (tg15°)^2 =$

$= 4\sqrt{3} + \left(\sqrt{\frac{1-cos30°}{1+cos30°}}\right)^2 = 4\sqrt{3} + \frac{1-\frac{\sqrt{3}}{2}}{1+\frac{\sqrt{3}}{2}} =$

$= 4\sqrt{3} + \frac{\frac{2-\sqrt{3}}{2}}{\frac{2+\sqrt{3}}{2}} = 4\sqrt{3} + \frac{2-\sqrt{3}}{2} : \frac{2+\sqrt{3}}{2} = 4\sqrt{3} + \frac{2-\sqrt{3}}{2+\sqrt{3}} =$

Kasrning surati va maxraji $2 + \sqrt{3}$ ning qo‘shmasi $2 - \sqrt{3}$ ga ko‘paytiriladi.

$= 4\sqrt{3} + \frac{(2-\sqrt{3})(2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})} = 4\sqrt{3} + \frac{(2-\sqrt{3})^2}{4-3} =$

$= 4\sqrt{3} + 4 - 4\sqrt{3} + 3 = 7.$ Javobi: C.

(1997-9-96) $A = \frac{97,6^2 - 2 \cdot 97,6 \cdot 96,6 + 96,6^2 + 5}{sin^2 5 + cos^2 5 + 5}$ bo‘lsa,

$(arccosA)^{sin^2 5 + cos^2 6 + 2sin5cos6}$ ni hisoblang.

A) 1 B) 2 C) 0 D) 3 E) 5

Yechilishi: $A = \frac{97,6^2 - 2 \cdot 97,6 \cdot 96,6 + 96,6^2 + 5}{sin^2 5 + cos^2 5 + 5} = \frac{1+5}{1+5} = 1;$

$(arccosA)^{sin^2 5 + cos^2 6 + 2sin5cos6} = 0.$ Javobi: C.

(1997-7-57) $x = tg\frac{5\pi}{6}$, $y = cos\frac{2\pi}{5}$ va $x = tg\left(-\frac{\pi}{8}\right)$ sonlarni kamayish tartibida yozing.

A) $x < y < z$ B) $y < x < z$ C) $x < z < y$

D) $y < z < x$ E) $z < y < x$

Yechilishi:

$x = tg\frac{5\pi}{6} = tg150° = tg(180° - 30°) = -tg30°;$

$y = cos\frac{2\pi}{5} = cos72°;\quad z = tg\left(-\frac{\pi}{8}\right) = tg22{,}5°.$

Burchak kattaligi oshgan sari $sinx$ va tgx funksiyalar qiymati oshib boradi, $cosx$ va $ctgx$ funksiyalarning qiymati kamayib boradi. Shunga asosan:

$y < z < x.$ Javobi: D.

(1997-5-30) $\arcsin(sin10)$ ni hisoblang.

A) $\pi - 10$ B) $2\pi - 10$ C) $3\pi - 10$

D) $\frac{3\pi}{2} - 10$ E) $\frac{2\pi}{3} - 10$

Yechilishi: $\arcsin(sin10) =$

$\arcsin(\sin(3\pi - 10)) = 3\pi - 10.$

Javobi: C.

(1997-9-30) $arcctg(ctg(-3))$ ni hisoblang.

A) $\pi + 3$ B) $2\pi - 3$ C) $\frac{2\pi}{3} - 3$

D) $\frac{2\pi}{2} - 3$ E) $\pi - 3$

Yechilishi: $arcctg\big(ctg(-3)\big) = \pi - arcctg(ctg3) =$

$= \pi - 3.$ Javobi: E.

(1997-6-46) $\frac{1-sin^4\alpha-cos^4\alpha}{cos^4\alpha}$ ni soddalashtiring.

A) $2tg^2\alpha$ B) $\frac{1}{cos^2\alpha}$ C)2 D)$sin^2\alpha$ E)$ctg^2\alpha$

Yechilishi: $\frac{1-sin^4\alpha-cos^4\alpha}{cos^4\alpha} = \frac{sin^2\alpha-sin^4\alpha+cos^2\alpha-cos^4\alpha}{cos^4\alpha} =$

$= \frac{sin^2\alpha(1-sin^2\alpha)+cos^2\alpha(1-cos^2\alpha)}{cos^4\alpha} =$

$= \frac{sin^2\alpha\cdot cos^2\alpha+cos^2\alpha\cdot sin^2\alpha}{cos^4\alpha} = \frac{2cos^2\alpha\cdot sin^2\alpha}{cos^4\alpha} =$

$= 2\cdot\left(\frac{sin\alpha}{cos\alpha}\right)^2 = 2tg^2\alpha.$ Javobi: A.

(1997-11-46) $\frac{sin^2\alpha-cos^2\alpha+cos^4\alpha}{cos^2\alpha-sin^2\alpha+in^4\alpha}$ ni soddalashtiring.

A) $tg^4\alpha$ B)$tg^2\alpha$ C)$ctg^4\alpha$ D)$\frac{1}{2}tg^2\alpha$ E)$2ctg^2\alpha$

Yechilishi: $\frac{sin^2\alpha-cos^2\alpha+cos^4\alpha}{cos^2\alpha-sin^2\alpha+sin^4\alpha}=\frac{sin^2\alpha-cos^2\alpha(1-cos^2\alpha)}{cos^2\alpha-sin^2\alpha(1-sin^2\alpha)}=$

$=\frac{sin^2\alpha-cos^2\alpha\cdot sin^2\alpha}{cos^2\alpha-sin^2\alpha\cdot cos^2\alpha}=\frac{sin^2\alpha(1-cos^2\alpha)}{cos^2\alpha(1-sin^2\alpha)}=\frac{sin^2\alpha\cdot sin^2\alpha}{cos^2\alpha\cdot cos^2\alpha}=$

$=\frac{sin^4\alpha}{sin^4\alpha}=\left(\frac{sin\alpha}{cos\alpha}\right)^4=tg^4\alpha.$ Javobi: A.

(1997-10-56) $\frac{\sin(2\alpha-\pi)}{1-sin\left(\frac{3\pi}{2}+2\alpha\right)}$ ni soddalashtiring.

A) $tg\alpha$ B)$-tg\alpha$ C)$-2ctg\alpha$ D)$-2cos\alpha$ E) $sin\alpha$

Yechilishi: $\frac{\sin(2\alpha-\pi)}{1-sin\left(\frac{3\pi}{2}+2\alpha\right)}=\frac{-\sin(\pi-2\alpha)}{1-(-cos2\alpha)}=\frac{-sin2\alpha}{1+cos2\alpha}=$

$=-\frac{2sin\alpha\cdot cos\alpha}{sin^2\alpha+cos^2\alpha+cos^2\alpha-sin^2\alpha}=-\frac{2sin\alpha\cdot cos\alpha}{2cos^2\alpha}=$

$=-\frac{sin\alpha}{cos\alpha}=-tg\alpha.$ Javobi: B.

(1996-1-55) Agar $cos2\alpha=\frac{1}{2}$ bo‘lsa, $cos^2\alpha$ ni hisoblang.

A) $\frac{1}{4}$ B) $\frac{\sqrt{3}}{2}$ C)$\frac{3}{4}$ D)$\frac{3}{8}$ E)$\frac{1}{8}$

Yechilishi: $cos2\alpha=cos^2\alpha-sin^2\alpha=$

$=cos^2\alpha-(1-cos^2\alpha)=cos^2\alpha-1+cos^2\alpha=$

$=2cos^2\alpha-1\Rightarrow cos2\alpha=2cos^2\alpha-1\Rightarrow$

$\Rightarrow 2cos^2\alpha=\frac{1}{2}+1=\frac{3}{2}\Rightarrow cos^2\alpha=\frac{3}{4}.$ Javobi: C.

(1996-10-35) Agar $cos\alpha=\frac{1}{5}$ bo‘lsa, $\frac{2sin\alpha+sin2\alpha}{2sin\alpha-sin2\alpha}$ ni hisoblang.

A) 0,5 B) 1,5 C) 3 D) $\frac{2}{3}$ E) -0,5

Yechilishi: $cos\alpha=\frac{1}{5}$; $\frac{2sin\alpha+sin2\alpha}{2sin\alpha-sin2\alpha}=\frac{2sin\alpha+2sin\alpha\cdot cos\alpha}{2sin\alpha-2sin\alpha\cdot cos\alpha}=$

$= \frac{2sin\alpha(1+cos\alpha)}{2sin\alpha(1-cos\alpha)} = \frac{1+\frac{1}{5}}{1-\frac{1}{5}} = \frac{\frac{6}{5}}{\frac{4}{5}} = \frac{6}{5}:\frac{4}{5} = \frac{6}{5}\cdot\frac{5}{4} = \frac{3}{2} = 1{,}5.$

Javobi: B.

(1996-12-84) $tg\left(\frac{\pi}{4}+\alpha\right) = 2$ bo‘lsa, $tg\alpha$ ning qiymatini toping.

A) $-\frac{1}{3}$ B)$\frac{1}{2}$ C)$\frac{1}{3}$ D)$-\frac{1}{2}$ E)$\frac{1}{4}$

Yechilishi: $tg\left(\frac{\pi}{4}+\alpha\right) = \frac{tg\frac{\pi}{4}+tg\alpha}{1-tg\frac{\pi}{4}tg\alpha} = 2 \Rightarrow \frac{1+tg\alpha}{1-tg\alpha} = 2 \Rightarrow$

$\Rightarrow 1+ tg\alpha = 2 - 2tg\alpha \Rightarrow 3tg\alpha = 1 \Rightarrow tg\alpha = \frac{1}{3}$. Javobi: C.

(1996-13-38) $\frac{2}{ctg\alpha-tg\alpha}$ ni soddalashtiring.

A) $ctg2\alpha$ B)$sin2\alpha$ C) $tg2\alpha$ D)$cos2\alpha$ E)$\frac{2}{sin\alpha cos\alpha}$

Yechilishi: $\frac{2}{ctg\alpha-tg\alpha} = \frac{2}{\frac{1}{tg\alpha}-tg\alpha} = \frac{2}{\frac{1-tg^2\alpha}{tg\alpha}} = \frac{2tg\alpha}{1-tg^2\alpha} = tg2\alpha.$

Javobi: C.

(1997-1-66) $tg\alpha = \frac{5+\sqrt{x}}{2},\ tg\beta = \frac{5-\sqrt{x}}{2};\ \alpha+\beta = 45°. x =?$

A) 41 B) 40 C) 5 D) 42

E) to‘g‘ri javob berilmagan

Yechilishi: $tg\alpha = \frac{5+\sqrt{x}}{2},\ tg\beta = \frac{5-\sqrt{x}}{2};\ \alpha+\beta = 45°;$

Yo‘l boshlovchi $\alpha+\beta = 45°$ tenglik tangenslanadi

$tg(\alpha+\beta) = tg45° \Rightarrow \frac{tg\alpha+tg\beta}{1-tg\alpha tg\beta} = 1 \Rightarrow tg\alpha + tg\beta =$

$= 1 - tg\alpha tg\beta \Rightarrow \frac{5+\sqrt{x}}{2} + \frac{5-\sqrt{x}}{2} =$

$= 1 - \frac{5+\sqrt{x}}{2}\cdot\frac{5-\sqrt{x}}{2} \Rightarrow \frac{5+\sqrt{x}+5-\sqrt{x}}{2} = \frac{4-\left(5^2-\left(\sqrt{x}\right)^2\right)}{4} \Rightarrow$

$\Rightarrow 5 = \frac{4-25+x}{4} \Rightarrow x = 41.$ Javobi: A.

(1997-6-60) $tg(\alpha+\beta) = 5;\ \ tg(\alpha-\beta) = 3$ bo‘lsa, $tg2\beta$ ni hisoblang.

A) 15 B) 8 C) $\frac{1}{8}$ D) 1 E) 2

Yechilishi: $\begin{cases} tg(\alpha+\beta) = 5 \\ tg(\alpha-\beta) = 3 \end{cases} \Rightarrow \begin{cases} \alpha+\beta = arctg5 \\ \alpha-\beta = arctg3 \end{cases} \Rightarrow$

$\Rightarrow 2\beta = arctg5 - arctg3;$

Hosil qilingan tenglik tangenslanadi:

$tg2\beta = tg(arctg5 - arctg3) = \frac{tgarctg5 - tgarctg3}{1+tgarctg5\cdot tgarctg3} =$

$= \frac{5-3}{1+5\cdot 3} = \frac{2}{16} = \frac{1}{8}.$ Javobi: C.

(1996-1-58) $cos3xcosx + 0{,}5 = sin3xsinx$ tenglamaning ildizlarini ko‘rsating.

A) $\frac{\pi}{4} + 2\pi k, k\epsilon Z$ B) $\frac{\pi}{6} + \pi k, k\epsilon Z$ C) $\frac{\pi}{6} + 2\pi k, k\epsilon Z$

D) $\pm\ \frac{\pi}{4} + \frac{\pi}{2}k, k\epsilon Z$ E) $-\frac{\pi}{6} + \pi k, k\epsilon Z$

Yechilishi: $cos3xcosx + 0{,}5 = sin3xsinx;$

$cos3xcosx - \ sin3xsinx = -\frac{1}{2};$

$\cos(3x+x) = -\frac{1}{2};\quad cos4x = -\frac{1}{2};$

$4x = \pm\left(\pi - arccos\frac{1}{2}\right) + 2\pi k,\ \ k\epsilon Z;$

$4x = \pm\left(\pi - \frac{\pi}{3}\right) + 2\pi k, \text{k}\epsilon Z;\ 4x = \pm\frac{2\pi}{3} + 2\pi k,\ \ k\epsilon Z;$

$x = \pm\frac{2\pi}{3\cdot 4} + \frac{\pi k}{2}, k\epsilon Z;\quad x = \pm\frac{\pi}{6} + \frac{\pi k}{2},\ k\epsilon Z.$ Javobi: D.

(1996-1-60) Agar $90° < x < 180°$ bo‘lsa, $cos2xsinx = cos2x$ tenglamaning ildizlarini toping.

A) 120° B) 170° C) 110° D) 135° E) 165°

Yechilishi: misolning $90° < x < 180° -$ yo‘l boshlovchisi oraliq ko‘rinishida berilgan. Demak, umumiy yechim topilgach k ga qiymat berilib, ko‘rsatilgan oraliqqa tegishli xususiy yechimlar tanlanadi.

$cos2xsinx = cos2x \Rightarrow cos2xsinx - cos2x = 0 \Rightarrow$

$\Rightarrow cos2x(sinx - 1) = 0 \Rightarrow \begin{cases} cos2x = 0 \\ sinx = 1 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 2x = \frac{\pi}{2} + \pi k \\ x = \frac{\pi}{2} + 2\pi k \end{cases} \Rightarrow \begin{cases} x = \frac{\pi}{4} + \pi k \\ x = \frac{\pi}{2} + 2\pi k \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = \frac{\pi}{4} + \frac{\pi k}{2},\ k \epsilon Z; \\ x = \frac{\pi}{2} + 2\pi k,\ \ k \epsilon Z \end{cases}$

$k = -1 \Rightarrow \begin{cases} x = \frac{\pi}{4} + \frac{\pi(-1)}{2} = -45°; - \\ x = \frac{\pi}{2} + 2\pi(-1) = -270°; - \end{cases}$

$k = 0 \Rightarrow \begin{cases} x = 45° + \frac{\pi \cdot 0}{2} = 45°; - \\ x = 90° + 2\pi \cdot 0 = 90°; - \end{cases}$

$k = 1 \Rightarrow \begin{cases} x = 45° + \frac{\pi \cdot 1}{2} \Rightarrow 135°\ yechim \\ x = 90° + 2\pi \cdot 1 \Rightarrow 450°. - \end{cases}$ Javobi: D.

(1996-3-58) $sin\left(2x - \frac{\pi}{2}\right) = 0$ tenglamaning yechimini toping.

A) $\frac{\pi}{4}$ B) $\frac{\pi}{2}n, n \epsilon Z$ C) $\frac{\pi}{4} + \frac{\pi}{2}n,\ n \epsilon Z$

D) $\pi n, n \epsilon Z$ E) $\frac{\pi}{2} + \pi n,\ n \epsilon Z$

Yechilishi: $sin\left(2x - \frac{\pi}{2}\right) = 0 \Rightarrow -sin\left(\frac{\pi}{2} - 2x\right) = 0 \Rightarrow$

$\Rightarrow cos2x = 0 \Rightarrow 2x = \frac{\pi}{2} + \pi n \Rightarrow x = \frac{\pi}{4} + \frac{\pi n}{2},\ n \epsilon Z.$

Javobi: C.

(1996-3-60) $sinx \cdot cos2x + cosx \cdot sin2x = 0$ tenglamaning yechimini toping.

A) $\frac{\pi n}{4}, n\epsilon Z$ B)$\frac{\pi n}{3}, n\epsilon Z$ C)$\frac{\pi n}{2}, n\epsilon Z$

D)$\frac{\pi n}{5}, n\epsilon Z$ E)$\frac{\pi n}{8}, n\epsilon Z$

Yechilishi: $sinx \cdot cos2x + cosx \cdot sin2x = 0;$

$\sin(x + 2x) = 0 \Rightarrow sin3x = 0 \Rightarrow 3x = \pi n \Rightarrow x = \frac{\pi n}{3}, n\epsilon Z.$

Javobi: B.

(1996-7-58) $5^{1+\log_5 cosx} = 2{,}5$ tenglamani yeching.

A) $\frac{\pi}{3} + 2\pi n, n\epsilon Z$ B)$\pm\frac{\pi}{6} + 2\pi n, n\epsilon Z$ C)$\pm\frac{\pi}{3} + 2\pi n, n\epsilon Z$

D)$\frac{\pi}{4} + 2\pi n, n\epsilon Z$ E)$\pm\frac{\pi}{4} + 2\pi n, n\epsilon Z$

Yechilishi: $5^{1+\log_5 cosx} = 2{,}5 \Rightarrow 5 \cdot 5^{\log_5 cosx} = 2{,}5 \Rightarrow$

$\Rightarrow 5^{\log_5 cosx} = \frac{2{,}5}{5} \Rightarrow 5^{\log_5 cosx} = \frac{1}{2}.$

Logarifmni e′tiborgaolsak 1)$cosx > 0 \Rightarrow -\frac{\pi}{2} < x < \frac{\pi}{2};$

$2)\ cosx = \frac{1}{2} \Rightarrow x = \pm arccos\frac{1}{2} + 2\pi n \Rightarrow$

$\Rightarrow x = \pm\frac{\pi}{3} + 2\pi n,\ n\epsilon Z.$ Javobi: C.

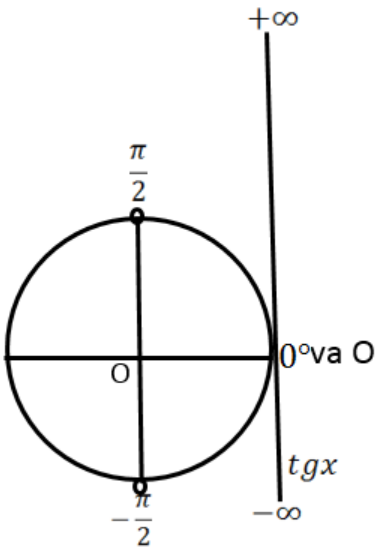
(1996-7-59) $\frac{tgx}{1-cosx} = 0$ tenglama $[-\pi; 3\pi]$ oraliqda nechta ildizga ega?

A) 7 B) 2 C) 3 D) 5 E) 4

Yechilishi: $\frac{tgx}{1-cosx} = 0 \Rightarrow [-\pi; 3\pi] = [-180°; 540°];$

$tgx\ da\ argument\ -\frac{\pi}{2} < x < \frac{\pi}{2}$ bo‘ladi.

$$\begin{cases} tgx = 0 \\ 1 - cosx \neq 0 \end{cases} \Rightarrow \begin{cases} x = arctg0 + \pi n \\ cosx \neq 1 \end{cases} \Rightarrow \begin{cases} x = \pi n; \\ x \neq 2\pi n. \end{cases}$$



$k=-1 \Rightarrow \begin{cases} x=-180°; \\ x \neq -360°; \end{cases}$

$k=0 \Rightarrow \begin{cases} x=0; \\ x \neq 0; \end{cases}$ $k=1 \Rightarrow \begin{cases} x=\pi; \\ x \neq 2\pi; \end{cases}$ $k=2 \Rightarrow \begin{cases} x=2\pi; \\ x \neq 4\pi; \end{cases}$

$k=3 \Rightarrow \begin{cases} x=3\pi; \\ x \neq 6\pi. \end{cases}$

Javobi: C.

(1996-9-50) $4sin\frac{x}{2}-cosx+1=0$ tenglamaning $[0;2\pi]$ kesmada nechta ildizi bor?

A) 0 B) 2 C) 3 D) 1 E) 4

Yechilishi: $4sin\frac{x}{2}-cosx+1=0;[0;2\pi]$

1) to‘la burchakdan yarim burchakka o‘tiladi:

$4sin\frac{x}{2}-cos2\cdot\frac{x}{2}+1=0;$

$4sin\frac{x}{2}-\left(cos^2\frac{x}{2}-sin^2\frac{x}{2}\right)+1=0;$

$4sin\frac{x}{2}-cos^2\frac{x}{2}+sin^2\frac{x}{2}+1=0;$

$4sin\frac{x}{2}-\left(1-sin^2\frac{x}{2}\right)+sin^2\frac{x}{2}+1=0;$

2) bir xil funksiyaga keltiriladi:

$4sin\frac{x}{2}-1+sin^2\frac{x}{2}+sin^2\frac{x}{2}+1=0;$

$2sin^2\frac{x}{2}+4sin\frac{x}{2}=0;\ \ sin\frac{x}{2}\left(2sin\frac{x}{2}+4\right)=0 \Rightarrow$

$\Rightarrow \begin{cases} sin\frac{x}{2} = 0 \\ sin\frac{x}{2} \neq -2 \end{cases} \Rightarrow sin\frac{x}{2} = 0 \Rightarrow \frac{x}{2} = \pi k, k\epsilon Z;$

3) k ga qiymat beriladi: $\begin{cases} k = 0 \Rightarrow x = 0 \\ k = 1 \Rightarrow x = 2\pi \end{cases}$ 2 ta. Javobi: B.

(1996-9-104) $sin\left(\frac{\pi}{6} + x\right) + sin\left(\frac{\pi}{6} - x\right) = 0{,}5$ tenglamaning ildizlarini ko‘rsating.

A) $\frac{\pi k}{2},\ k\epsilon Z$ B) $\frac{\pi}{6} + 2\pi k,\ k\epsilon Z$ C) $\pm\frac{\pi}{3} + 2\pi k,\ k\epsilon Z$

D) $\frac{\pi}{3} + 2\pi k,\ k\epsilon Z$ E) $\frac{\pi}{12} + \pi k,\ k\epsilon Z$

Yechilishi: $sin\left(\frac{\pi}{6} + x\right) + sin\left(\frac{\pi}{6} - x\right) = 0{,}5;$

1) yig‘indidan ko‘paytmaga o‘tiladi:

$2sin\frac{\frac{\pi}{6}+x+\frac{\pi}{6}-x}{2} cos\frac{\frac{\pi}{6}+x-\frac{\pi}{6}+x}{2} = \frac{1}{2};\quad 2sin30°cosx = \frac{1}{2};$

$2 \cdot \frac{1}{2} \cdot cosx = \frac{1}{2} \Rightarrow cosx = \frac{1}{2} \Rightarrow$

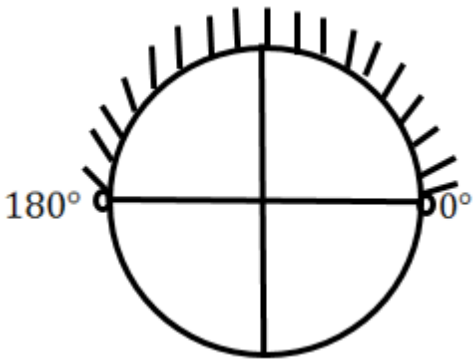
$\Rightarrow x = \pm arccos\frac{1}{2} + 2\pi k, k\epsilon Z \Rightarrow x = \pm\frac{\pi}{3} + 2\pi k, k\epsilon Z.$

Javobi: C.

(1996-10-54) Agar $0° < x < 180°$ bo‘lsa, $sin^4x + cos^4x = sinx \cdot cosx$ tenglamaning $(0°; 180°)$ oraliqqa tegishli ildizlarini ko‘rsating.

A) $60°\ va\ 75°$ B) $120°$ C) $90°$ D) $45°$ E) $45°\ va\ 135°$

Yechilishi: $0° < x < 180°;$



$sin^4x + cos^4x = sinx \cdot cosx;$

$1 - \frac{1}{2}sin^2 2x = sinx \cdot cosx;$

$2 - sin^2 2x = 2sinx \cdot cosx;$

$sin^2 2x + sin2x - 2 = 0;$

$sin2x = y;\ \ y^2 + y - 2 = 0 \Rightarrow$

$\Rightarrow \begin{cases} y=1 \\ y=-2 \end{cases} \Rightarrow \begin{cases} sin2x=1 \\ sin2x \neq -2 \end{cases} \Rightarrow 2x=\frac{\pi}{2}+2\pi k, \ \ k\epsilon Z;$

$x=\frac{\pi}{4}+\pi k, \ k\epsilon Z \quad 1)k=0 \Rightarrow x=\frac{\pi}{4}; \ \ 2)k=1 \Rightarrow$

$\Rightarrow x=\frac{\pi}{4}+\pi \cdot 1=\frac{5\pi}{4}=225°.$ Javobi: D.

(1997-1-53) Quyidagi sonlardan qaysi biri $sin\frac{\pi x}{2}=1$ tenglamaning ildizi emas?

A) 5 B) 1996 C) 1 D) 9 E) 65

Yechilishi: $sin\frac{\pi x}{2}=1;$ Jufti 1996. Javobi: B.

(1997-1-46) $2cos^2(x-\pi)+3\sin(\pi+x)=0$ tenglmani yeching.

A) $\frac{\pi}{2}+\pi n, n\epsilon Z$ B) $(-1)^n\frac{\pi}{6}+\pi n, n\epsilon Z$

C) $\pm\frac{\pi}{3}+2\pi n, n\epsilon Z$ D) $\pm\frac{\pi}{6}+2\pi n, \ n\epsilon Z$ E) $\pi n, n\epsilon Z$

Yechilishi: $2cos^2(x-\pi)+3\sin(\pi+x)=0;$

$2\left[\cos\left(-(\pi-x)\right)\right]^2-3sinx=0;$

$2[\cos(\pi-x)]^2-3sinx=0; \quad 2[-cosx]^2-3sinx=0;$

$2cos^2x-3sinx=0; \quad 2(1-sin^2x)-3sinx=0;$

$2-2sin^2x-3sinx=0; \quad 2sin^2x+3sinx-2=0;$

$sinx=y; \quad y^2+3y-2=0 \Rightarrow \begin{cases} y_1=-2 \\ y_2=\frac{1}{2} \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} sinx \neq -2; \\ sinx=\frac{1}{2} \Rightarrow x=(-1)^k\frac{\pi}{6}+\pi k, \ k\epsilon Z. \end{cases}$ Javobi: B.

(1997-1-51) $(3cos\pi x-\pi)\cdot\left(2sin\pi x-\sqrt{3}\right)=0$ tenglamaning eng kichik musbat ildizini toping.

A) $\frac{\pi}{6}$ B)$\frac{1}{4}$ C)$\frac{1}{3}$ D)$\frac{1}{2}$ E) to‘g‘ri javob berilmagan

Yechilishi: $(3cos\pi x-\pi)\cdot\left(2sin\pi x-\sqrt{3}\right)=0 \Rightarrow$

$$\Rightarrow \begin{cases} 3cos\pi x - \pi = 0 \\ 2sin\pi x - \sqrt{3} = 0 \end{cases} \Rightarrow \begin{cases} 3cos\pi x = \pi \\ 2sin\pi x = \sqrt{3} \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} cos\pi x \neq \frac{\pi}{3} = \frac{3{,}14}{3} > 1 \\ sin\pi x = \frac{\sqrt{3}}{2} \Rightarrow \end{cases} \Rightarrow \pi x = (-1)^k arcsin\frac{\sqrt{3}}{2} + \pi k \Rightarrow$$

$$\Rightarrow \pi x = (-1)^k \frac{\pi}{3} + \pi k \Rightarrow x = (-1)^k \cdot \frac{1}{3} + k;$$

$\Rightarrow k = 0 \Rightarrow x = (-1)^0 \cdot \frac{1}{3} + 0 = \frac{1}{3}$. Javobi: C.

(1997-1-54) $\sqrt{sinx} \cdot cosx = 0$ tenglamani yeching.

A) $\pi k, k\epsilon Z$ B) $\frac{\pi}{2} + \pi k,\ k\epsilon Z$ C) $\frac{\pi}{2} + 2\pi k,\ k\epsilon Z$

D) $2\pi k,\ k\epsilon Z$ E) to‘g‘ri javob berilmagan

Yechilishi: $\sqrt{sinx} \cdot cosx = 0 \Rightarrow \begin{cases} sinx \geq 0; \\ cosx = 0. \end{cases} \Rightarrow$

$0; \frac{\pi}{2}; \pi; 2\pi$ larni qamrab olgan javob to‘g‘ri bo‘ladi.

Demak, $x = \pi k$ va $x = \frac{\pi}{2} + 2\pi k$ to‘g‘ri javob. Bunday javob yuq. Javobi: E.

(1997-1-61) $sinx + cosx = 1$ tenglamaning $[-\pi; 2\pi]$ oraliqda nechta ildizi bor?

A) 0 B) 1 C) 2 D) 3 E) 4

Yechilishi: $sinx + cosx = 1;\ [-\pi; 2\pi];$

$\sqrt{2}cos(\alpha - 45°) = 1;\ cos(\alpha - 45°) = \frac{1}{\sqrt{2}};$

$cos(\alpha - 45°) = \frac{\sqrt{2}}{2};$

$\alpha - \frac{\pi}{4} = \pm arccos\frac{\sqrt{2}}{2} + 2\pi k,\ k\epsilon Z;$

$\alpha - \frac{\pi}{4} = \pm\frac{\pi}{4} + 2\pi k,\quad kZ \Rightarrow$

$$\Rightarrow \begin{cases} \alpha - \frac{\pi}{4} = -\frac{\pi}{4} + 2\pi k \\ \alpha - \frac{\pi}{4} = \frac{\pi}{4} + 2\pi k \end{cases} \Rightarrow \begin{cases} \alpha = 2\pi k; \\ \alpha = \frac{\pi}{2} + \pi k. \end{cases} \text{K=-2} \Rightarrow \begin{cases} \alpha = -4\pi; \\ \alpha = -\frac{3\pi}{2}; \end{cases}$$

$k=-1 \Rightarrow \begin{cases}\alpha=-2\pi;\\ \alpha=-\frac{\pi}{2};\end{cases}\ k=0 \Rightarrow \begin{cases}\alpha=0;\\ \alpha=\frac{\pi}{2};\end{cases}$

$k=1 \Rightarrow \begin{cases}\alpha=2\pi;\\ \alpha=\frac{3\pi}{2}.\end{cases}$

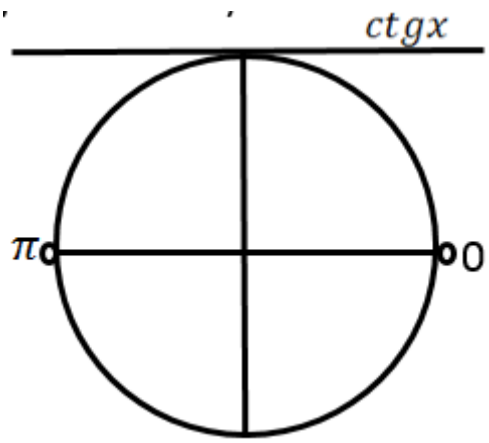
$[-\pi;2\pi]$ oraliqda 3 ta $0, \frac{\pi}{2}, 2\pi$ yechimlar bor. Javobi: E.

(1997-3-59) $\frac{ctgx}{1+sinx}=0$ tenglama $[0;5\pi]$ oraliqda nechta ildizga ega?

A) 5 B) 4 C) 3 D) 2 E) 6

Yechilishi: $\frac{ctgx}{1+sinx}=0;\quad [0;5\pi];$

$0<x<\pi;\ \begin{cases}ctgx=0\\ 1+sinx\neq 0\end{cases}\Rightarrow$



$\Rightarrow \begin{cases}x=\frac{\pi}{2}+\pi k,\ k\epsilon Z;\\ x\neq -\frac{\pi}{2}+2\pi k,\ k\epsilon Z;\end{cases}$

$k=0 \Rightarrow \begin{cases}x=\frac{\pi}{2};\\ x\neq -\frac{\pi}{2};\end{cases}$

$k=1 \Rightarrow \begin{cases}x=\frac{\pi}{2}+\pi=\frac{3\pi}{2};\\ x\neq -\frac{\pi}{2}+2\pi\neq\frac{3\pi}{2};\end{cases}\ k=2 \Rightarrow$

$\begin{cases}x=\frac{\pi}{2}+2\pi=\frac{5\pi}{2};\\ x\neq -\frac{\pi}{2}+4\pi\neq\frac{7\pi}{2};\end{cases}\quad k=3 \Rightarrow \begin{cases}x=\frac{7\pi}{2};\\ x\neq\frac{11\pi}{2};\end{cases}$

$k=4 \Rightarrow x=\frac{9\pi}{2};\quad k=5 \Rightarrow x=\frac{11\pi}{2}.$

$[0;5\pi]$ oraliqqa tegishli yechimlar 3 ta $\frac{\pi}{2}, \frac{5\pi}{2}, \frac{9\pi}{2}$.

Javobi: C.

(1997-5-32) $sin^{1995}x+cos^{1995}x=1$ tenglamani yeching.

A) $2\pi n;\ \frac{\pi}{2}+2\pi n, n\epsilon Z$ B) $\pi n;\ \frac{\pi}{3}+2\pi n, n\epsilon Z$

C) $2\pi n, n\epsilon Z$ D) $\frac{\pi}{2}+2\pi n, n\epsilon Z$ E) $\pi n, n\epsilon Z$

Yechilishi: $sin^{1995}x+cos^{1995}x=1\Rightarrow$

$\Rightarrow sin^2x-sin^{1995}x+cos^2x-cos^{1995}x=0\Rightarrow$

$\Rightarrow sin^2x(1-sin^{1993}x)+cos^2x(1-cos^{1993}x)=0\Rightarrow$

1)qo‘shiluvchilardan har biri musbat. Ikkita musbat sonning yig‘indisi nolga teng bo‘lmaganligi uchun har bir had alohida-alohida nolga teng bo‘ladi.

$$\begin{cases} sin^2x(1-sin^{1993}x)=0 \\ cos^2x(1-cos^{1993}x)=0 \end{cases}\Rightarrow\begin{cases} sin^2x=0 \\ sin^{1993}x=1 \\ cos^2x=0 \\ cos^{1993}x=1 \end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases} sinx=0 \\ sinx=1 \\ cosx=0 \\ cosx=1 \end{cases}\Rightarrow\begin{cases} x=\pi n \\ x=\frac{\pi}{2}+2\pi n \\ x=\frac{\pi}{2}+\pi n \\ x=2\pi n \end{cases} n\epsilon Z.$$

2) Ildizni topish uchun n ni 0 va 1 ga tenglab yechiladi.

$$n=0\Rightarrow\begin{cases} x=0 \\ x=\frac{\pi}{2} \\ x=\frac{\pi}{2} \\ x=0 \end{cases}\Rightarrow\begin{cases} x=0; \\ x=\frac{\pi}{2}; \end{cases} n=1\Rightarrow\begin{cases} x=\pi; \\ x=\frac{5\pi}{2}; \\ x=\frac{3\pi}{2}; \\ x=2\pi; \end{cases}$$

va 2) dan, $x=\frac{\pi}{2}+2\pi n, n\epsilon Z;\ x=2\pi n, n\epsilon Z.$ Javobi:A.

(1997-6-52) Quyidagi sonlardan qaysi biri $cos\frac{\pi x}{2}=1$ tenglamaning ildizi emas?

A) 1996 B) 3 C) 4 D) 40 E) 100

Yechilishi: $cos\frac{\pi x}{2}=1;$ 1) Toq son ildizi emas. Javobi: B.

(1997-6-54) $\sqrt{cosx} \cdot sinx = 0$ tenglamani yeching.

A) $\frac{\pi}{2} + \pi k, k \epsilon Z$ B) $\pi k, k \epsilon Z$ C)$2\pi k;\ \frac{\pi}{2} + \pi k, k \epsilon Z$

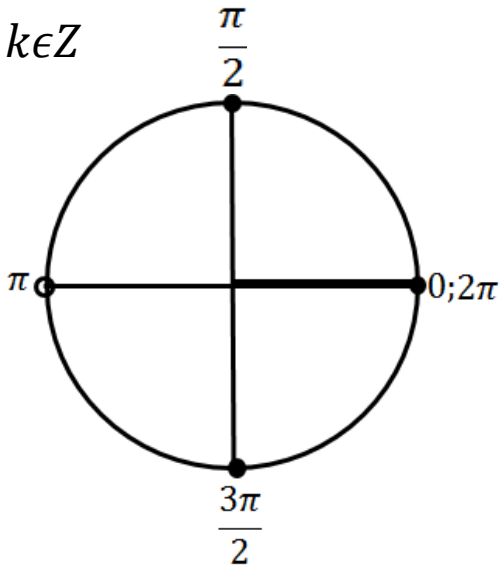
D)$\frac{\pi}{2} + 2\pi k, k \epsilon Z$ E) $\pi + 2\pi k, k \epsilon Z$

Yechilishi: $\sqrt{cosx} \cdot sinx = 0;$

$\begin{cases} cosx \geq 0; \\ sinx = 0; \end{cases}$ Yechim

$0;\ \frac{\pi}{2};\ \frac{3\pi}{2}\ va\ 2\pi$ nuqtalarni qamrab oladi.

Javobi: C.



(1996-1-59) $tg\left(x + \frac{\pi}{4}\right) \geq 1$ tengsizlikni yeching.

A) $\left[-\frac{\pi}{4} + \pi; \frac{\pi}{2} + \pi n\right], n \epsilon Z$ B)$[\pi n; \infty], n \epsilon Z$

C)$\left[-\frac{\pi}{4} + 2\pi n; \frac{\pi}{2} + 2\pi n\right], n \epsilon Z$ D) $[\pi n; \frac{\pi}{4} + \pi n), n \epsilon Z$

E)$\left[\frac{\pi}{4} + \pi n; \frac{\pi}{2} + \pi n\right], n \epsilon Z$

Yechilishi: $tg\left(x + \frac{\pi}{4}\right) \geq 1;$

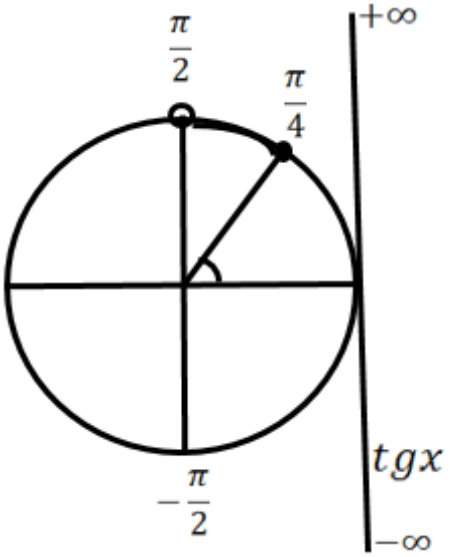
$-\frac{\pi}{2} < x < \frac{\pi}{2},\ \ \frac{\pi}{4} \leq x + \frac{\pi}{4} < \frac{\pi}{2};$

Tengsizlikda funksiyadan argumenti ajratib olingach, birdaniga davr qo‘shiladi.

$\pi n + \frac{\pi}{4} \leq x + \frac{\pi}{4} < \frac{\pi}{2} + \pi n;\ \ \pi n \leq$

$\leq x < \frac{\pi}{4} + \pi n; \Rightarrow$

$\Rightarrow\ \left[\pi n; \frac{\pi}{4} + \pi n\right), n \epsilon Z.$ Javobi: D.



(1996-3-54) Agar $sin\alpha \cdot cos\alpha > 0$ bo‘lsa, α burchak qaysi chorakka tegishli?

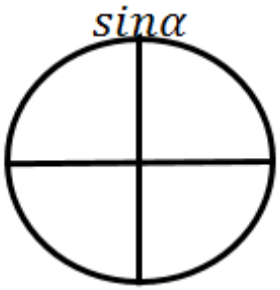
A) $I\ yoki\ II$ B) $I\ yoki\ III$ C) $I\ yoki\ IV$

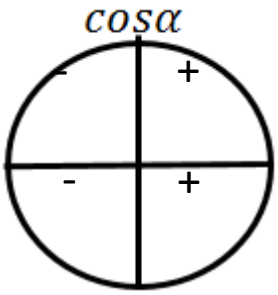
D) $II\ yoki\ III$ E) $III\ yoki\ IV$

Yechilishi:

$I\ yoki\ III$.

Javobi: B.





(1996-7-57) $x = cos\frac{11\pi}{12}, y = cos\left(-\frac{\pi}{3}\right)$ va $z = sin\frac{11\pi}{12}$ sonlar uchun quyidagi munosabatlarning qaysi biri o‘rinli?

A) $x < y < z$ B) $x < z < y$ C) $y < z < x$

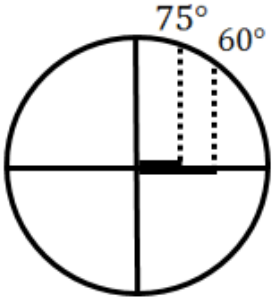
D) $z < y < x$ E) $y < x < z$

Yechilishi: $x = cos\frac{11\pi}{12} = cos165° = cos(\pi - 15°) =$

$= -cos15°; y = cos\left(-\frac{\pi}{3}\right) = cos60°;$

$z = sin\frac{11\pi}{12} = sin165° =$

$= sin\left(\frac{\pi}{2} + 75°\right) = cos75°.$



Burchak kattaligi oshgan sari kosinusning qiymati kamayib borishi e’tiborga olinadi: $x < z < y$. Javobi: B.

(1996-9-51) $sin^2x - \frac{5}{2}sinx + 1 > 0$ tengsizlik $x(x\epsilon[0; 2\pi])$ ning qanday qiymatlarida o‘rinli?

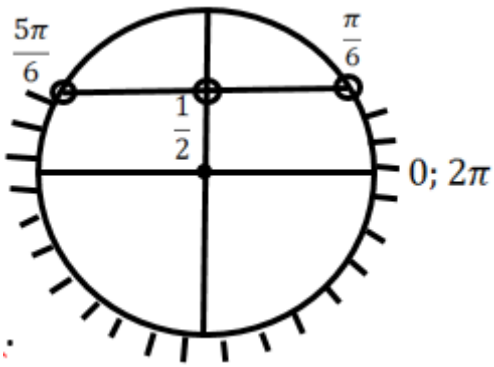
A) $[0;\frac{\pi}{6}) \cup (\frac{5\pi}{6}; 2\pi]$ B) $\left(\frac{\pi}{6}; \frac{5\pi}{6}\right)$

C)$[0;\frac{\pi}{3}) \cup (\frac{2\pi}{3}; 2\pi]$ D)$[0;\frac{\pi}{3}] \cup [\frac{2\pi}{3}; 2\pi]$ E) $\emptyset$

Yechilishi: $sin^2x - \frac{5}{2}sinx + 1 > 0$; $sinx = y;$

$y^2 - \frac{2}{5}y + 1 > 0 \Rightarrow 2y^2 - 5y$

$\Rightarrow \begin{cases} y_1 = \frac{1}{2} \\ y_2 = 2 \end{cases} \Rightarrow \begin{cases} sinx = \frac{1}{2} \\ sinx \neq 2 \end{cases} \Rightarrow$



Kvadrat tengsizlikning noldan kattaligi e'tiborga olinadi.

$\Rightarrow [0;\frac{\pi}{6}) \cup \left(\frac{5\pi}{6}; 2\pi\right]$.

Javobi: A.

(1996-9-105) $2sin2x \geq ctg\frac{\pi}{4}$ tengsizlini yeching.

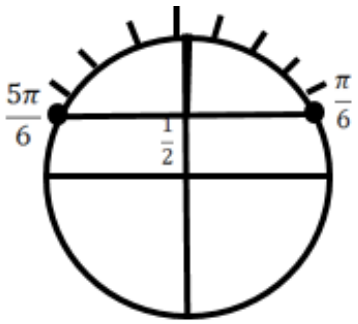
A)$\left[\frac{\pi}{6} + 2\pi n; \frac{5\pi}{6} + 2\pi n\right], n\epsilon Z$ B)$\left[\frac{\pi}{12} + \pi n; \frac{5\pi}{12} + \pi n\right], n\epsilon Z$

C)$\left[\frac{\pi}{12} + 2\pi n; \frac{5\pi}{12} + 2\pi n\right], n\epsilon Z$ D$\left[\frac{\pi}{12} + 2\pi n; \frac{5\pi}{6} + 2\pi n\right], n\epsilon Z$

E)$\left[-\frac{\pi}{3} + 2\pi n; \frac{\pi}{3} + 2\pi n\right],\ n\epsilon Z$

Yechilishi: $2sin2x \geq ctg\frac{\pi}{4} \Rightarrow 2 \cdot sin2x \geq 1 \Rightarrow$

$\Rightarrow sin2x \geq \frac{1}{2} \Rightarrow$



$\Rightarrow 2\pi k + \frac{\pi}{6} \leq 2x \leq \frac{5\pi}{6} + 2\pi k;$

$\Rightarrow 2\pi k + \frac{\pi}{6} \leq 2x \leq \frac{5\pi}{6} + 2\pi k;$

$\Rightarrow \pi k + \frac{\pi}{12} \leq x \leq \frac{5\pi}{12} + \pi k;$

Javobi: B.

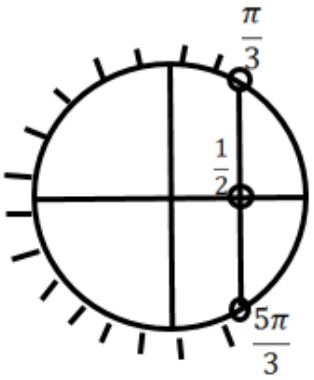
(1996-12-111) $cos^2x - \frac{5}{2}cosx + 1 > 0$ tengsizlik $x(x\epsilon[0; 2\pi])$ ning qanday qiymatlarida o'rinli?

A) $[0;\frac{\pi}{3}) \cup (\frac{5\pi}{3}; 2\pi]$ B) $(\frac{\pi}{3}; \frac{\pi}{2}] \cup [\frac{3\pi}{2}; \frac{5\pi}{3})$

C)$(\frac{\pi}{3};\frac{5\pi}{3})$ D)$(\frac{\pi}{3};\frac{5\pi}{3})$ E) $[\frac{3\pi}{2};\frac{5\pi}{3})$

Yechilishi: $cos^2x-\frac{5}{2}cosx+1>0 \Rightarrow \begin{cases} cosx \neq 2 \\ cosx=\frac{1}{2} \end{cases} \Rightarrow$

$cosx$ ning juft funksiya ekanligi e'tiborga olinadi.



$\left(\frac{\pi}{3};\frac{5\pi}{3}\right)$. Javobi: C.

(1997-4-41) $cos^2x<\frac{\sqrt{2}}{2}+sin^2x$ tengsizlikni yeching.

A)$\frac{\pi}{8}+2\pi n<x<\frac{7\pi}{8}+2\pi n,\ n\epsilon Z$

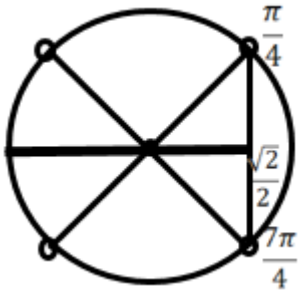
B)$\frac{\pi}{8}+\pi n<x<\frac{7\pi}{8}+\pi n,\ n\epsilon Z$

C)$-\frac{\pi}{8}+2\pi n<x<\frac{\pi}{8}+2\pi n,\ n\epsilon Z$

D)$\frac{\pi}{4}+2\pi n<x<\frac{7\pi}{4}+2\pi n,\ n\epsilon Z$

E)$-\frac{\pi}{8}+\pi n<x<\frac{\pi}{8}+\pi n,\ n\epsilon Z$

Yechilishi: $cos^2x<\frac{\sqrt{2}}{2}+sin^2x \Rightarrow$



$\Rightarrow cos^2x-sin^2<\frac{\sqrt{2}}{2}\Rightarrow$

$\Rightarrow cos2x<\frac{\sqrt{2}}{2}\Rightarrow$

$\Rightarrow 2\pi k+\frac{\pi}{4}<2x<\frac{7\pi}{4}+2\pi k \Rightarrow$

$\Rightarrow \pi k+\frac{\pi}{8}<x<\frac{7\pi}{8}+\pi k, k\epsilon Z$. Javobi: B.

(1997-9-101) $sinx\cdot cosx>\frac{\sqrt{2}}{4}$ tengsizlikni yeching.

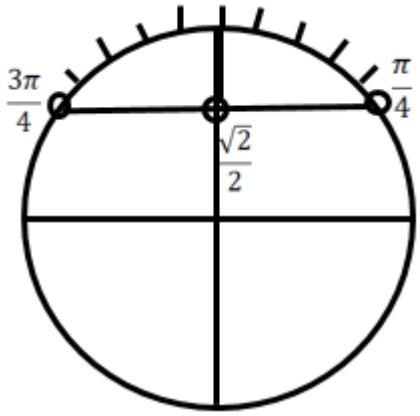
A) $\frac{\pi}{8}+2\pi n<x<\frac{3\pi}{8}+2\pi n,\ n\epsilon Z$

B) $\frac{\pi}{4}+\pi n<x<\frac{3\pi}{4}+\pi n,\ n\epsilon Z$

C) $\frac{\pi}{8}+\pi n<x<\frac{3\pi}{8}+\pi n,\ n\epsilon Z$

D) $\frac{\pi}{8}+\pi n\leq x\leq\frac{3\pi}{8}+\pi n,\ n\epsilon Z$

E) $\frac{\pi}{6}+\pi n<x<\frac{5\pi}{6}+\pi n,\ n\epsilon Z$



Yechilishi: $sinx\cdot cosx>\frac{\sqrt{2}}{4}\Rightarrow$

$\Rightarrow 2sinx\cdot cosx>\frac{\sqrt{2}}{2}\Rightarrow$

$\Rightarrow sin2x>\frac{\sqrt{2}}{2};$

$2\pi k+\frac{\pi}{4}<2x<\frac{3\pi}{4}+2\pi k, k\epsilon Z;$

$\pi k+\frac{\pi}{8}<x<\frac{3\pi}{8}+\pi k,\ k\epsilon Z.$ Javobi: C.

(1997-3-57) $x=tg\frac{5\pi}{7}, y=sin\frac{\pi}{6}$ va $z=tg\frac{3\pi}{7}$ sonlar uchun quyidagi munosabatlardan qaysi biri o‘rinli?

A) $z>y>x$ B) $x>z>y$ C) $y>x>z$

D) $x>y>z$ E) $y>z>x$

Yechilishi: $x=tg\frac{5\pi}{7}=tg128°<0;$

$y=sin\frac{\pi}{6}=sin30°=\frac{1}{2}\Rightarrow x<y<z$

$z=tg\frac{3\pi}{7}=tg77°>1;$ Javobi: A.

Pirnazar DAVRONOV

Funksiya

(1996-8-28) $x \to 3$ da $f(x) = \frac{x^2-9}{x+3}$ funksiya qanday songa intiladi?

A) 0 B) 3 C) 6 D) -6 E) -3

Yechilishi: $f(x) = \frac{x^2-9}{x+3} = \frac{x^2-3^2}{x+3}$;

1) funksiya soddalashtiriladi;

$f(x) = \frac{(x-3)(x+3)}{x+3} = x - 3;$

2) $x \to 3$ bo‘lganligi uchun x ning o‘rniga 3 qo‘yiladi;

$f(3) = 3 - 3 = 0.$ Demak,$x \to 3$ da $f(x) \to 0$. Javobi: A.

(1996-1-16) Agar $f(x) = \left(1 + \frac{1}{x}\right)(7 + 4x)$ bo‘lsa, $f\left(-\frac{1}{2}\right)$ ni toping.

A) 9 B) -3 C) 15 D) -5 E) 1

Yechilishi: $f(x) = \left(1 + \frac{1}{x}\right)(7 + 4x) =$

x ning o‘rniga $-\frac{1}{2}$ qo‘yib yechiladi.

$f\left(-\frac{1}{2}\right) = \left(1 + \frac{1}{-\frac{1}{2}}\right)\left(7 + 4 \cdot \left(-\frac{1}{2}\right)\right) =$

$\left(1 - 1:\frac{1}{2}\right)\left(7 - \frac{4}{2}\right) = \left(1 - 1 \cdot \frac{2}{1}\right)(7 - 2) = -1 \cdot 5 = -5.$

Javobi: D.

(1996-7-35) $e^{-x} = x - 2$ tenglamaning nechta ildizi bor?

A) 1 B) 2 C) 3 D) ildizi yo‘q E) aniqlab bo‘lmaydi

Yechilishi: $e^{-x} = x - 2;$

1) bu tenglama grafik usulda yechiladi;

Buning uchun berilgan tenglama, 2 ta funksiya ko‘rinishida quyidagicha yozib olinadi:

$$\begin{cases} y = e^x \\ y = x - 2 \end{cases}$$

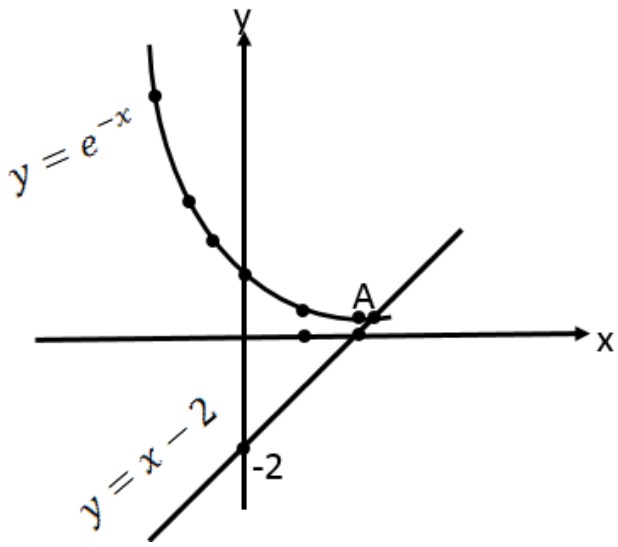
2) tenglamani yechishni soddalashtirish uchun $e = 2$ yoki 3 deb olish xato bo‘lmaydi.

$y = e^{-x} \Rightarrow y = 2^{-x} \Rightarrow y = \frac{1}{2^x}$;

3) $y = x - 2$ chiziqli funksiya bo‘lganligi uchun, uning grafigi to‘g‘ri chiziq bo‘ladi;

4) egri chiziqni chizish uchun bir nechta nuqta kerak;

5) to‘g‘ri chiziq chizish uchun ikkita nuqta topish kifoya;



6) $y = \frac{1}{2^x}$ va $y = x - 2$ funksiyalar jadvallarini tuzib,

x	-3	-2	-1	0	1	2
$y = \frac{1}{2^x}$	8	4	2	1	0,5	0,25

grafiklarini chiziladi.

$y = \frac{1}{2^{-3}} = 2^3 = 8$;

$y = \frac{1}{2^0} = 2^0 = 1$;

x	0	2
$y = x - 2$	-2	0

D(y)-funksiyaning aniqlanish sohasi, E(y)-funksiyaning qiymatlar sohasi, (Ox)-abssissa o‘qi, (Oy)-ordinata o‘qi, O nuqta-koordinatalar boshi.

Funksiyadagi x argument qabul qilishi mumkin bo‘lgan qiymatlar to‘plamiga, funksiyaning aniqlanish sohasi deyiladi.

Funksiya argumenti x ga mos ravishda, y o‘zgaruvchi qabul qilgan qiymatlarni, funksiyaning qiymatlar sohasi deyiladi.

Musbat yunalishi aniqlangan to‘g‘ri chiziqqa o‘q deyiladi.

7) $y = e^{-x}$ egri chiziq bilan $y = x - 2$ to‘g‘ri chiziq bitta A nuqtada kesishadi. Demak yechim bitta. Javobi: A.

(1996-6-21) $y = x^2 - 4x + 3$ parabolaning uchi koordinata tekisligining qayerida joylashgan?

A) to‘rtinchi choragida B) OX o‘qida

C) uchinchi choragida D) ikkinchi choragida

E) birinchi choragida

Yechilishi: $ax^2 + bx + c$ - kvadrat uchhad;

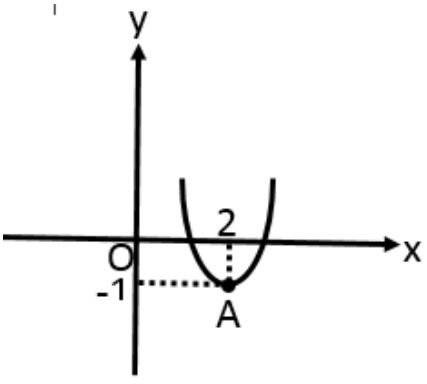
$ax^2 + bx + c = 0 -$ to‘la kavadrat

$y = ax^2 + bx + c -$ parabola;

$$y = x^2 - 4x + 3 \Rightarrow \begin{cases} a = 1 > 0; \\ b = -4; \\ c = 3. \end{cases}$$

$$x = -\frac{b}{2a} = -\frac{-4}{2\cdot 1} = 2;$$

$$y = -\frac{b^2-4ac}{4a} = -\frac{(-4)^2-4\cdot 1\cdot 3}{4\cdot 1} = -1.$$



$A(x; y) = A(2; -1).$ Javobi: A.

Funksiyaning aniqlanish va qiymatlar sohalari

(1996-3-16) $f(x)=\frac{x-2}{x^2-1}$ funksiyaning aniqlanish sohasini toping.

A) $(-\infty;-1)\cup(1;\infty)$ B) $(0;\infty)$ C) $(-\infty;\infty)$
D) $(-\infty;-1)\cup(-1;1)\cup(1;\infty)$ E) $(-\infty;0)$

Yechilishi: $f(x)=\frac{x-2}{x^2-1}$; Kasrning aniqlanish sohasini topish uchun maxrajni noldan farqli deb yechish kifoya:

$x^2-1\neq 0\Rightarrow x^2\neq 1\Rightarrow x\neq\pm 1\Rightarrow$

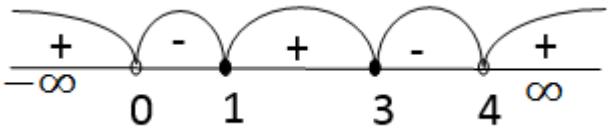
$\Rightarrow D(f)=(-\infty;-1)\cup(-1;1)\cup(1;\infty)$. Javobi: D.

(1996-3-70) $y=\sqrt{\frac{(x-1)(3-x)}{x(4-x)}}$ funksiyaning aniqlanish sohasini toping.

A) $[0;1)\cup[3;4)$ B) $(0;1]\cup[3;4)$
C) $[0;1]\cup[3;4)$ D) $(-\infty;0)\cup(1;3]\cup(4;\infty)$
E) $(-\infty;0)\cup[1;3]\cup(4;\infty)$

Yechilishi: $y=\sqrt{\frac{(x-1)(3-x)}{x(4-x)}}$; 1) Ildiz qatnashgan funksiyaning aniqlanish sohasini topish uchun, ildizning tagini noldan katta yoki teng deb yechish kerak (bu misol oldin yechilgan).

$\frac{(x-1)(3-x)}{x(4-x)}\geq 0\Rightarrow$



Demak, $(-\infty;0)\cup[1;3]\cup(4;\infty)$. Javobi: E.

(1996-9-49) $y=\sqrt{1+\log_{\frac{1}{2}} cosx}$ funksiya x ($x\in[0;2\pi]$) ning qanday qiymatlarida aniqlangan?

A) $[0;\pi]$ B) $\left[0;\frac{\pi}{4}\right]\cup[\frac{7\pi}{4};2\pi]$ C) $\left[0;\frac{\pi}{2}\right)\cup(\frac{3\pi}{2};2\pi]$

D) $\left[0;\frac{\pi}{2}\right]\cup[\frac{3\pi}{2};2\pi]$ E) $\left[0;\frac{\pi}{3}\right]\cup[\frac{5\pi}{3};2\pi]$

Yechilishi: $y=\sqrt{1+\log_{\frac{1}{2}} cosx}$; $1+\log_{\frac{1}{2}} cosx\geq 0$;

Logarifmning aniqlanish sohasi topiladi:

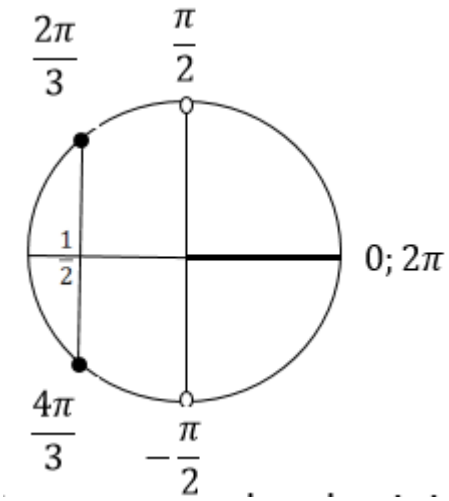
1) $cosx>0\Rightarrow -\frac{\pi}{2}<x<\frac{\pi}{2}$;

2)$\log_{\frac{1}{2}} cosx\geq -\log_{\frac{1}{2}}\frac{1}{2}\Rightarrow$

$\Rightarrow 0<\frac{1}{2}<1\Rightarrow cosx\leq -\frac{1}{2}$;

$D(y)=\left[0;\frac{\pi}{2}\right)\cup\left(\frac{3\pi}{2};2\pi\right]$.

Javobi: C.



(1997-1-48) $y=\sqrt{ctgx-1}$ funksiyaning aniqlanish sohasini toping.

A) $[\pi n;\ \frac{\pi}{4}+\pi n], n\in Z$ B) $[\ \frac{\pi}{4}+\pi n;\ \pi+\pi n], n\in Z$

C) $(\pi n;\ \frac{\pi}{4}+\pi n], n\in Z$ D) $(\frac{\pi}{4}+\pi n;\ \frac{\pi}{2}+\pi n), n\in Z$

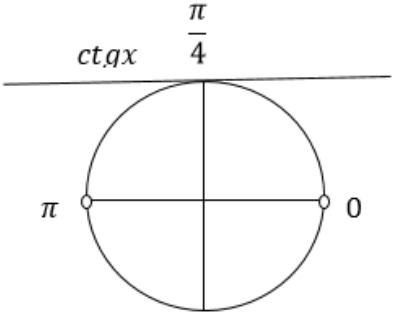
E) $(-\frac{\pi}{2}+\pi n;\ \frac{\pi}{4}+\pi n), n\in Z$

Yechilishi: $y=\sqrt{ctgx-1}$;

$ctgx-1\geq 0;\ \ ctgx\geq 1;$

$0<x<\pi;\ \ 0<x\leq\frac{\pi}{4}$

$\pi n<x\leq\frac{\pi}{4}+\pi;\ \ n\in Z.$



Javobi: C.

(1997-8-52) $y = \log_{x-1}\left(x - \frac{1}{4}\right)$ funksiyaning aniqlanish sohasini toping.

A) $\left(\frac{1}{4}; \infty\right)$ B)$(1; 2) \cup (2; \infty)$ C) $(-0{,}25; 2) \cup (2; \infty)$

D) $[-0{,}25; 2) \cup [2; \infty)$ E) $[-0{,}25; 2) \cup (2; 4]$

Yechilishi: Logarifmning aniqlanish sohasii topiladi:

$$y = \log_{x-1}\left(x - \frac{1}{4}\right) \Rightarrow \begin{cases} x - 1 > 0 \\ x - 1 \neq 1 \\ x - \frac{1}{4} > 0 \end{cases} \Rightarrow \begin{cases} x > 1 \\ x \neq 2 \\ x > \frac{1}{4} \end{cases} \Rightarrow$$

$\Rightarrow (1; 2) \cup (2; \infty)$. Javobi: B.

(1997-1-15) $y = \frac{3+4x-x^2}{2}$ funksiyaning qiymatlar sohasini toping.

A) $(0; \infty)$ B) $(-\infty; 1{,}5]$ C) $[-\frac{1}{2}; \infty)$

D) $(-\infty; 3{,}5]$ E) $(-\infty; \infty)$

Yechilishi: $y = \frac{3+4x-x^2}{2}$;

1)Bu funksiyaning qiymatlar sohasi ordiata o‘qida bo‘ladi:

$y = -\frac{1}{2}x^2 + 2x + 1{,}5;$

2) Parabola pastga qaragan, uning uchi ordinatasini topish kerak:

$a = -\frac{1}{2}; \quad b = 2; \quad c = 1{,}5;$

$$y = -\frac{b^2-4ac}{4a} = -\frac{2^2-4\cdot\left(-\frac{1}{2}\right)\cdot 1{,}5}{4\cdot\left(-\frac{1}{2}\right)} = -\frac{4+3}{-2} = 3{,}5;$$

Demak, $(-\infty; 3{,}5]$. Javobi: D.

(1997-6-15) Quyidagilardan qaysi biri $y = \sqrt{x^2 - 6x + 11}$ funksiyaning qiymatlar sohasi?

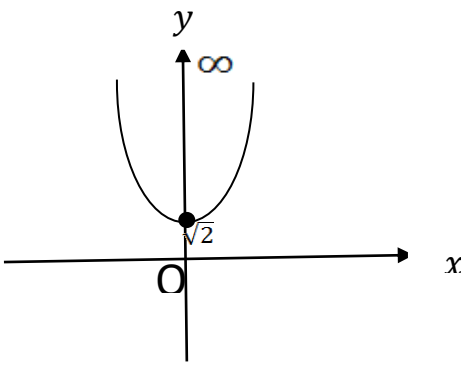
A) $[0; \infty)$ B) $[0; 11]$ C) $[\sqrt{2}; \infty)$

D) $(2;\infty)$ E) $(-\infty;\infty)$

Yechilishi: $y=\sqrt{x^2-6x+11}$;

$y=-\frac{-(-6)^2-4\cdot1\cdot11}{4\cdot1}=2\Rightarrow$

$\Rightarrow E(y)=\left[\sqrt{2};+\infty\right)$.



Javobi: C.

(1997-11-15) $y=x^2-8x+7$ funksiyaning qiymatlar sohasini toping.

A) $(2;\infty)$ B) $[-9;\infty)$ C) $[9;\infty)$

D) $[-4;\infty)$ E) $(-\infty;\infty)$

Yechilishi: $y=x^2-8x+7$;

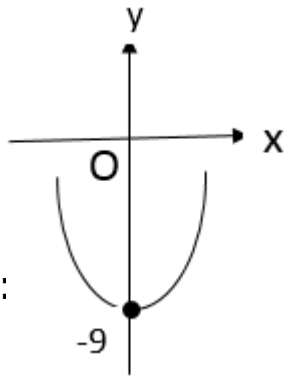
$y=\frac{(-8)^2-4\cdot1\cdot7}{4\cdot1}=-\frac{64-28}{4}=-9$;

$E(y)=[-9;\infty)$;

Hosila yordamida ham topish mumkin:

$y'=2x-8\Rightarrow 2x-8=0\Rightarrow x=4$;

$y(4)=4^2-8\cdot4+7=-9$.



Javobi: B.

(1996-1-15) Rasmda quyidagi funksiyalardan qaysi birining grafigi keltirilgan?

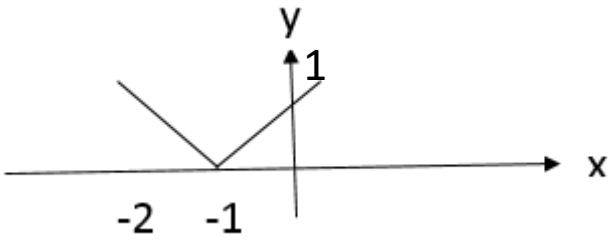
A) $y=|x-1|$

B) $y=|x+1|$

C) $y=|x|-1$

D) $y=\frac{1}{|x|-1}$

E) $y=\frac{1}{|x|+1}$



Yechilishi: 1) Shaklda ko‘rsatilgan nuqtalar koordinatalari bilan yoziladi:

$A(0;1);\ B(-1;0);\ C(-2;1);$

2) Bu nuqtalarning koordinatalari

javobdagi funksiyalarga qo‘yiladi:

$y = |x - 1|$;

$A(0;1) \Rightarrow 1 = |0 - 1| \Rightarrow 1 = 1$;

$B(-1;0) \Rightarrow 0 = |-1;-1| \Rightarrow 0 \neq 2$;

Demak, nuqtalar $y = |x - 1|$ funksiyaga tegishli emas;

$y = |x + 1|$;

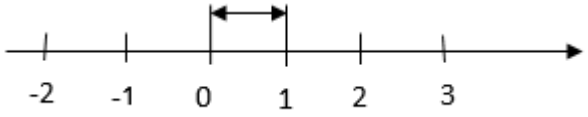
$A(0;1)$: $1 = |0 + 1| \Rightarrow 1 = 1$;

$B(-1;0)$: $0 = |-1 + 1| \Rightarrow 0 = 0$;

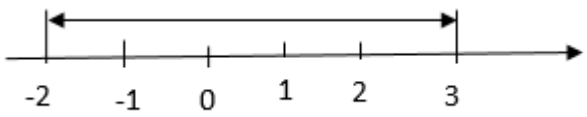
$C(-2;1)$: $1 = |-2 + 1| \Rightarrow 1 = 1$. Javobi: B.

(1996-3-7) Agar $a = -2$ va $b = 3$ bo‘lsa, rasmda $|a - b|$ ga mos to‘g‘ri javobni ko‘rsating.

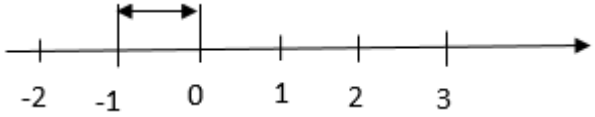
A)



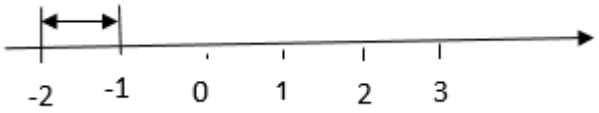
B)



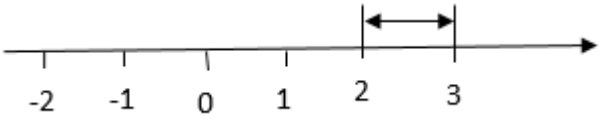
C)



D)



E)



Yechilishi: $a = -2;\ \ b = 3;\ \ |a - b| = |-2 - 3| = 5$.

Javobi: B.

(1996-3-15) Quyidagi nuqtalarning qaysi biri $f(x) = -3x + 4$ funksiyaning grafigiga tegishli?

A) $(3;-5)$ B) $(-3;5)$ C) $(5;-3)$

D) $(2;4)$ E) $(4;2)$

Yechilishi: 1) Nuqtalarning koordinatalari $f(x) = -3x + 4$ ga qo‘yiladi. Tenglik to‘g‘ri buzilmagani to‘g‘ri bo‘ladi:

A) $(3; -5) \Rightarrow -5 = -3 \cdot 3 + 4 \Rightarrow -5 = -5$. Javobi: A.

(1997-6-9) Quyidagilardan qaysi biri $y = \frac{2}{x-1} - 1$ funksiyaga teskari funksiya?

A) $y = 1 - \frac{2}{x+1}$ B) $y = 2 - \frac{3}{x}$ C) $y = -\frac{2}{x+1}$

D) $y = \frac{3}{x-2}$ E) $y = \frac{2}{x+1} + 1$

Yechilishi: $y = \frac{2}{x-1} - 1$; 1) $x -$ topiladi:

$\frac{2}{x-1} = y + 1 \Rightarrow 2 = (y+1)(x-1) \Rightarrow x - 1 = \frac{2}{y+1} \Rightarrow$

$\Rightarrow x = \frac{2}{y+1} + 1;$

2) x va y lar o′rinlari almashtiriladi: $y = \frac{2}{x+1} + 1$.

Javobi: E.

Funksiyaning toq yoki juftligi va eng kichik davri

(1996-6-41) Quyidagi funksiyalardan qaysi biri toq?

A) $f(x) = cosx + x^2$ B) $f(x) = sinx \cdot tgx$

C) $f(x) = ctgx + \frac{1}{x^2}$ D) $f(x) = sinx + \frac{x^3+1}{x^3-1}$

E) $f(x) = cosx + x^2$

Yechilishi: x ning o‘rniga $-x$ qo‘yib ishlanganda, masalaning berilishi qaytib kelsa, funksiy juft, minus bilan qaytib kelsa, funksiya toq, $''+„$ bilan ham $''-„$ bilan ham qaytarib bo‘lmasa, juft ham emas, toq ham emas bo‘ladi.

B) $f(x) = sinx \cdot tgx \Rightarrow f(-x) = \sin(-x) \cdot tg(-x) =$
$= -sinx \cdot (-tgx) = sinx \cdot tgx --$ juft funksiya;

E) $f(x) = x^3 - \frac{2}{x^3} \Rightarrow f(-x) = (-x)^3 - \frac{2}{(-x)^3} =$
$= -x^3 + \frac{2}{x^3} = -\left(x^3 - \frac{2}{x^3}\right) -$ toq funksiya. Javobi: E.

(1997-12-41) Quyidagi funksiyalardan qaysi birining eng kichik davri 2π ga teng?

A) $f(x) = cos^2x - sin^2x$ B) $f(x) = ctg\frac{x}{2}sin\frac{x}{2}$

C) $f(x) = 2sin\frac{x}{2}cos\frac{x}{2}$ D) $f(x) = cos^2x + 3sin^2x$

E) $f(x) = tg2x - cos2x$

Yechilishi: Berilgan funksiya bitta funksiyaga keltiriladi:
$f(x) = cos^2x - sin^2x = cos2x$.

$eng\ kichik = \frac{T}{|k|} = \frac{2\pi}{2} = \pi$. T-funksiyaning eng kichik davri, k - x ning koeffitsiyenti. Javobi: C

(1996-9-48) $y = tg\frac{x}{4} - 2sin\frac{x}{2} + 3cos\frac{2}{3}x$ funksiyaning eng kichik davrini toping.

A) 4π B) 6π C) 3π D) 12π E) 15π

Yechilishi: Bu funksiyani bitta funksiyaga keltirib bo‘lmaganligi uchun har bir funksiyaning eng kichik davri aloxida-aloxida topilib, so‘ngra ularning umumiy karralisi eng kichik davr sifatida qabul qilinadi.

$y = tg\frac{x}{4} - 2sin\frac{x}{2} + 3cos\frac{2}{3}x;$

o‘zgaruvchilar sondan ajratib yoziladi:

$y = tg\frac{1}{4} \cdot x - 2sin\frac{1}{2} \cdot x + 3cos\frac{2}{3}x;$

1)har bir funksiyaning eng kichik davri topiladi :

$\frac{\pi}{\frac{1}{4}} = 4\pi;\ \frac{2\pi}{\frac{1}{2}} = 4\pi;\ \frac{2\pi}{\frac{2}{3}} = 3\pi;$

2) Karralisi olinadi: 12π. Javobi: D.

Hosila

(1997-4-28) $y = \log_2 4x + cos(x^2 + 3x)$ funksiyaning hosilsini toping.

A) $\frac{\ln 2}{x} - sin(x^2 + 3x)(2x + 3)$

B) $\frac{1}{4x} - sin(x^2 + 3x)(2x + 3)$

C) $\frac{1}{4x\ln 2} + sin(x^2 + 3x)(2x + 3)$

D) $\frac{1}{x\ln 2} - (2x + 3)sin(x^2 + 3x)$

Yechilishi: $y = \log_2 4x + cos(x^2 + 3x)$;

1)oldin funksiyadan, so‘ngra uning argumentdan hosila olinadi.

$y' = \left(\log_2 4x + cos(x^2 + 3x)\right)' = (\log_2 4x)' +$

$+\left(cos(x^2 + 3x)\right)' = \frac{1}{4x\ln 2} \cdot (4x)' +$

$+\left(-sin(x^2 + 3x)\right)(x^2 + 3x)' =$

$= \frac{1}{4x\ln 2} \cdot 4 \cdot 1 - sin(x^2 + 3x)(2x + 3 \cdot 1) =$

$= \frac{1}{x\ln 2} - (2x + 3) \cdot sin(x^2 + 3x).$ Javobi: E.

(1997-8-57) Agar $f(x) = (x^2 + 1)^2$ bo‘lsa, $f'\left(\frac{1}{2}\right)$ ni toping.

A) 2,5 B) $-1\frac{2}{5}$ C) $1\frac{4}{5}$ D) $\frac{2}{5}$ E) $1\frac{4}{5}$

Yechilishi: $f(x) = (x^2 + 1)^2$; $f'\left(\frac{1}{2}\right)$;

$f(x) = x^4 + 2x^2 + 1 \Rightarrow$

$\Rightarrow f'(x) = (x^4 + 2x^2 + 1)' = (x^4)' + (x^2)' + 1' =$

$= 4x^3 + 4x \Rightarrow f'(x) = 4x^3 + 4x.$

Hosiladagi x ning o‘rniga, unga teng $\frac{1}{2}$ qo‘yiladi.

$f'\left(\frac{1}{2}\right) = 4 \cdot \left(\frac{1}{2}\right)^3 + 4 \cdot \frac{1}{2} = 4 \cdot \frac{1}{8} + 2 = \frac{1}{2} + 2 = \frac{5}{2} = 2{,}5.$

Javobi: A.

(1997-6-62) Agar $f(x) = \ln sinx$ bo‘lsa, $f'\left(\frac{\pi}{4}\right)$ ni hisoblang.

A) -1 B) 3 C) $-\sqrt{3}$ D) 1 E) $\frac{\sqrt{2}}{2}$

Yechilishi: $f(x) = \ln sinx$, $f'\left(\frac{\pi}{4}\right) = ?$

$f'(x) = \frac{1}{sinx} \cdot (sinx)' = \frac{1}{sinx} \cdot cosx = \frac{cosx}{sinx} = ctgx;$

$f'\left(\frac{\pi}{4}\right) = ctg\frac{\pi}{4} = 1.$ Javobi: D.

(1997-6-19) Agar $g(x) = ctgx + \frac{12x^3}{\pi^2} + \pi$ bo‘lsa, $g'\left(\frac{\pi}{6}\right)$ ni hisoblang.

A) -1 B) -3 C) 5 D) 3 E) 1,5

Yechilishi: $g(x) = ctgx + \frac{12x^3}{\pi^2} + \pi$, $g'\left(\frac{\pi}{6}\right)$.

Qulaylik uchun o‘zgarmas son bilan o‘zgaruvchi alohida-alohida yoziladi: $g(x) = ctgx + \frac{12}{\pi^2} \cdot x^3 + \pi;$

$g'(x) = -\frac{1}{sin^2x} + \frac{12}{\pi^2} \cdot 3x^2 + 0 = -\frac{1}{sin^2x} + \frac{36}{\pi^2} \cdot x^2 \Rightarrow$

$\Rightarrow g'\left(\frac{\pi}{6}\right) = -\frac{1}{sin(\frac{\pi}{6})^2} + \frac{36}{\pi^2} \cdot (\frac{\pi}{6})^2 = -3.$ Javobi: B.

(1997-9-33) $y = e^{ctgx}$ funksiyaning hosilasini toping.

A) $\frac{e^{ctgx}}{cos^2x}$ B) $ctgx \cdot e^{ctgx-1}$ C)$-\frac{e^{ctgx}}{sin^2x}$

D) $e^{ctgx}\ln x$ E) $tgx \cdot e^{ctgx}$

Yechilishi: $y = e^{ctgx} \Rightarrow y' = e^{ctgx}(ctgx)' =$

$= -\frac{1}{sin^2x} \cdot e^{ctgx}$. Javobi: C.

(1997-9-34) $y = \frac{1}{3} \cdot 6^x - 6$ funksiyaning $x = 1$ nuqtadagi hosilasini toping.

A) $\ln 12$ B)$\ln 36$ C)$\ln 6$ D)$\ln \frac{6}{e}$ E) 6

Yechilishi: $y = \frac{1}{3} \cdot 6^x - 6;$ $x = 1;$

$y' = \frac{1}{3} \cdot 6^x \cdot \ln 6 - 0 \Rightarrow y'(1) = \frac{1}{3} \cdot 6^1 \cdot \ln 6 =$

$=2\ln 6 = \ln 36.$ Javobi: B.

(1997-11-19) $f(x) = 2cosx - \frac{(\sqrt{\pi})^3}{\sqrt{x}} + \frac{\pi}{2}.f'(\pi)$ ni hisoblang.

A) $\frac{\sqrt{\pi}}{2}$ B) -1,5 C) 0,5 D) 2,5 E) $\frac{\sqrt{\pi}}{3}$

Yechilishi: $f(x) = 2cosx - \frac{(\sqrt{\pi})^3}{\sqrt{x}} + \frac{\pi}{2}.f'(\pi) =?$

$f(x) = 2cosx - \frac{1}{x^{\frac{1}{2}}} \cdot \sqrt{\pi^3} + \frac{\pi}{2};$

$f'(x) = -2sinx + \frac{1}{2} \cdot x^{-\frac{1}{2}-1} \cdot \sqrt{\pi^3} + 0 =$

$= -2sinx + \frac{1}{2} \cdot x^{-\frac{3}{2}}\sqrt{\pi^3} = -2sinx + \frac{1}{2} \cdot \frac{1}{x^{\frac{3}{2}}} \cdot \sqrt{\pi^3} =$

$= -2sinx + \frac{1}{2\sqrt{x^3}} \cdot \sqrt{\pi^3};$

$f'(\pi) = -2sin\pi + \frac{\sqrt{\pi^3}}{2 \cdot \sqrt{\pi^3}} = 0 + \frac{1}{2} = \frac{1}{2} = 0{,}5.$ Javobi: C.

(1997-5-33) $y = e^{sin^2x}$ funksiyaning hosilasini toping.

A) $e^{sin^2\pi}$ B)$e^{sin^2\pi} \cdot sin2x$ C) $2e^{sin^2\pi} \cdot sinx$

D)$e^{sin^2\pi-1}\cdot sin^2x$ E)$e^{sin^2\pi}\cdot cos^2x$

Yechilishi: $y=e^{sin^2x}\Rightarrow y'=e^{sin^2x}\cdot(sin^2x)'=$

$=e^{sin^2x}\cdot 2sinx\cdot(sinx)'=$

$=e^{sin^2x}\cdot 2sinxcosx=sin2x\cdot e^{sin^2x}$. Javobi: B.

(1997-9-88) $y=\lg(tg4x)+sin(x^2+x+4)$ funksiyaning hosilasini toping.

A) $\frac{1}{\ln 10\cdot tg4x\cdot cos^2 4x}+(2x+1)\cdot cos(x^2+x+4)$

B) $\frac{4}{\ln 10\cdot tg4x\cdot cos^2 4x}+(2x+1)\cdot cos(x^2+x+4)$

C) $\frac{4\ln 10}{tg4x\cdot cos^2 4x}+(2x+1)\cdot cos(x^2+x+1)$

D) $\frac{\ln 10}{tg4x\cdot cos^2 4x}+(2x+1)\cdot cos(x^2+x+1)$

E) $\frac{1}{tg4x\cdot cos^2 4x}+(2x+1)\cdot cos(x^2+x+1)$

Yechilishi: $y=\lg(g4x)+sin(x^2+x+4)$;

$y'=\frac{1}{tg4x\cdot\ln 10}\cdot(tg4x)'+cos(x^2+x+4)\cdot$

$\cdot(x^2+x+4)'=$

$=\frac{1}{tg4x\ln 10}\cdot\frac{1}{cos^2 4x}\cdot(4x)'+$

$+(2x+1+0)\cdot cos(x^2+x+4)=$

$=\frac{4}{\ln 10 tg4x\cdot cos^2 4x}+(2x+1)\cdot cos(x^2+x+4).$

Javobi: B.

(1996-1-28) Agar $f(x)=x\cdot 2^{x+1}$ bo‘lsa, $f'(0)$ ni toping.

A) -2 B) -1 C) 1 D) 2 E) 2 ln 2

Yechilishi: $f(x)=x\cdot 2^{x+1}$; $f'(0)$;

Buni yechishda ko‘paytmadan hosila olish formulasidan foydalaniladi:

$f'(x) = (x \cdot 2^{x+1})' = x' \cdot 2^{x+1} + x(2^{x+1})' =$

$= 1 \cdot 2^{x+1} + x \cdot 2^{x+1} \ln 2 \Rightarrow$

$\Rightarrow f'(0) = 2^{0+1} + 0 \cdot 2^{0+1} \ln 2 = 2 + 0 = 2$. Javobi: D.

(1996-3-81) $f(x) = \frac{x}{1-x}$, $f'(2) - ?$

A) -1 B) -2 C) 2 D) 1 E) 4

Yechilishi: $f(x) = \frac{x}{1-x}$, $f'(2) - ?$

Bo‘linmadan hosila olish formulasidan foydalaniladi:

$f'(x) = \left(\frac{x}{1-x}\right)' = \frac{x'(1-x)-x(1-x)'}{(1-x)^2} =$

$= \frac{1\cdot(1-x)-(0-1)}{(1-x)^2} = \frac{1-x+x}{(1-x)^2};$

$f'(2) = \frac{1}{(1-2)^2} = \frac{1}{(-1)^2} = 1.$ Javobi: D.

(1996-3-83) To‘g‘ri chiziq bo‘ylab $x(t) = -t^3 + 6t^2 + 15t$ qonun bo‘yicha harakatlanayotgan moddiy nuqta harakat boshlangandan necha sekund to‘xtaydi?

A) 1 B) 2 C) 3 D) 4 E) 5

Yechilishi: $x(t) = -t^3 + 6t^2 + 15t$;

1) Harakat qonun deyilsa, yo‘lning formulasini tushunish kerak;

2) Yo‘ldan hosila olinsa, tezlik kelib chiqadi;

3) Tezlik nolga teng bo‘lsa, harakat to‘xtaydi;

$x(t) = S \Rightarrow S = -t^3 + 6t^2 + 15t \Rightarrow$

$\Rightarrow (S)' = (t^3 + 6t^2 + 15t)' \Rightarrow V = -3t^2 + 12t + 15 \Rightarrow$

$\Rightarrow \begin{cases} V = 0 \\ -3t^2 + 12t + 15 = 0 \end{cases} \Rightarrow t^2 - 4t - 5 = 0 \Rightarrow$

$\Rightarrow \begin{cases} t_1 = -1; \\ t_2 = 5. \end{cases}$

4) Vaqt $''-''$ bo‘lmaydi, demak $t = 5$. Javobi: E.

A) $\frac{4}{9}$ B) $-\frac{4}{9}$ C) $\frac{3}{4}$ D) $-\frac{3}{4}$ E) $\frac{5}{9}$

(1996-9-79) Agar $f(x) = 3x \cdot 2^x$ bo‘lsa, $f'(0)$ ni toping.

A) -3 B) 3 C) 1 D) -1 E) 3ln 2

Yechilishi: $f(x) = 3x \cdot 2^x$; $f'(0)$;

$f'(x) = (3 \cdot x \cdot 2^x)' = 3 \cdot (x \cdot 2^x)' =$

$= 3[x' \cdot 2^x + x \cdot (2^x)'] = 3[1 \cdot 2^x + x \cdot 2^x \cdot \ln 2] =$

$= 3(2^x + x \cdot 2^x \ln 2)$;

$f'(x) = 3(2^0 + 0 \cdot 2^0 \cdot \ln 2) = 3(1 + 0) = 3.$ Javobi: B.

Funksiyaning ekstrimumi

(1997-9-90) $f(x) = 3x^2 - 4x - 4$ funksiyaning $[0; 3]$ oraliqdagi eng katta qiymatii toping.

A) 10 B) 20 C) 11 D) 16 E) 18

Yechilishi: $f(x) = 3x^2 - 4x - 4$; $[0; 3]$;

1) funksiyadan hosila olinadi: $f'(x) = 6x - 4$;

2) hosila nolga tenglanib, kritik nuqta topiladi:

$6x - 4 = 0 \Rightarrow x = \frac{2}{3} \in [0; 3]$;

3) oraliqning chetki nuqtalari va $x = \frac{2}{3}$ kritik nuqta $f(x)$ funksiyaga qo‘yiladi:

$f(0) 3 \cdot 0^2 - 4 \cdot 0 - 4 = -4$;

$f\left(\frac{2}{3}\right) = 3 \cdot \left(\frac{2}{3}\right)^2 - 4 \cdot \frac{2}{3} - 4 = -5\frac{1}{3}$;

$f(3) = 3 \cdot 3^2 - 4 \cdot 3 - 4 = 27 - 12 - 4 = 11.$ Javobi: C.

(1997-9-40) $y = \frac{x^2-5}{x^2+5}$ funksiyaning eng kichik qiymatini toping.

A) 5 B) -5 C) -1 D) 1 E) 0

Yechilishi: $x^2 \geq 0$ ekanligidan, $y = \frac{x^2-5}{x^2+5} \Rightarrow -1$. Javobi: C.

(1997-9-25) $y = x^2 - 2$ funksiyaning kamayish oralig‘ini ko‘rsating.

A) $(-\infty; -2)$ B) $(-\infty; 2)$ C) $(2; \infty)$

D) $(-2; \infty)$ E) $(-\infty; 0]$

Yechilishi: $y = x^2 - 2;$ hosilani noldan kichik yoki teng deb ishlanadi:

$y' = 2x; \quad 2x \leq 0 \Rightarrow (-\infty; 0]$. Javobi: E.

(1997-10-30) Quyidagilardan qaysi biri $y = \frac{10}{5^{|cosx|}} + 2\ln e^3$ funksiyaning eng katta qiymatini toping.

A) 8 B) 16 C) $2 + 2e^3$

D) 18 E) aniqlab bo‘lmaydi

Yechilishi: $0 \leq |cosx| \leq 1;$ $y = \frac{10}{5^{|cosx|}} + 2\ln e^3$;

1) kasrning kattartirish uchun maxrajni kichraytirish kerak:

$|cosx| = 0 \Rightarrow y = \frac{10}{5^0} + 2 \cdot 3 \cdot \ln e = 16.$ Javobi: B.

(1997-12-43) k ning qanday qiymatlarida $f(x) = kx - sinx$ funksiya o‘zining aniqlanish sohasida kamayadi?

A) $k \leq -1$ B) $k > -1$ C) $k < 0$

D) $k > 0$ E) $0 < k < 1$

Yechilishi: $f(x) = kx - sinx; \quad y' = k - cosx \Rightarrow$

$\Rightarrow \begin{cases} f'(x) \leq 0 \\ k - cosx \leq 0 \end{cases} \Rightarrow k \leq cosx$ ni $-1 \leq cosx \leq 1$ bilan taqqoslanadi; Demak, $k \leq -1 \Rightarrow (-\infty; -1]$. Javobi: A.

(1997-10-29) $y = -4x^3 + 12x$ funksiyaning minimumini toping.

A) 0 B) -8 C) -16 D) 8 E) mavjud emas

Yechilishi: $y = -4x^3 + 12x \Rightarrow -12x^2 + 12 = 0 \Rightarrow$

$\Rightarrow x^2 = 1 \Rightarrow \begin{cases} x_1 = -1; \\ x_2 = 1. \end{cases}$

$y = -4(-1)^3 + 12(-1) = -8;$

$y = -4 \cdot 1^3 + 12 \cdot 1 = 8.$

Demak, $x_1 = -1$ berilgan unksiyaning minimum nuqtasi, $y = -8$ esa minimum qiymati. Javobi: B.

(1996-1-14) Quyidagi funksiyalardan qaysi biri $(-\infty; 0)$ oraliqda o‘suvchi bo‘ladi?

A) $y = 3x + 2$ B) $y = \frac{3}{x}$ C) $y = 6 - 3x$

D) $y = x^2$ E) $y = \sqrt{-x}$

Yechilishi: 1) $(-\infty; 0)$ oraliqdan, aytaylik usish tartibidagi -10 va -1 sonlarni funksiyalarga qo‘yib tekshirish qulay;

$x = -10 \Rightarrow y = 3x + 2 = 3 \cdot (-10) + 2 = -28;$

$x = -1 \Rightarrow y = 3 \cdot (-1) + 2 = -1;$ Javobi: A.

(1996-1-56) $y = 2sin3x + cos3x$ funksiyaning eng katta qiymatini toping.

A) 3 B) 2 C) $\sqrt{5}$ D) 4 E) 1,5

Yechilishi: $y = 2sin3x + cos3x;$

$y' = (2sin3x + cos3x)' = 6cos3x - 3sin3x \Rightarrow$

$\Rightarrow 6cos3x - 3sin3x = 0 \Rightarrow 6cos3x = 3sin3x \Rightarrow$

$\Rightarrow tg3x = 2 \Rightarrow 3x = argtg2;$

2) Bu kritik nuqta funksiyaga qo‘yiladi:

$y = 2sinargtg2 + cosargtg2 =$

$= 2 \cdot \frac{2}{\sqrt{1+2^2}} + \frac{1}{\sqrt{1+2^2}} = \frac{4}{\sqrt{5}} + \frac{1}{\sqrt{5}} = \frac{5}{\sqrt{5}} = \sqrt{5}.$ Javobi: C.

(1996-3-20) $f(x) = -x^2 + 2x - 1$ funksiyaning o‘sish oralig‘ini toping.

A) $(1;\infty)$ B) $(0;\infty)$ C) $(-\infty;-1)$

D) $(-1;\infty)$ E) $(-\infty;-1)$

Yechilishi: $f(x)=-x^2+2x-1;$

Funksiya hosilasi noldan katta yoki teng deb yechiliadi:

$-2x+2\geq 0\Rightarrow 2x\leq 2\Rightarrow x\leq 1\Rightarrow(-\infty;-1]$. Javobi: E.

(1996-6-44) a ning qanday qiymatlarida $f(x)=ax+sinx$ funksiya o‘zining aniqlanish sohasida o‘sadi?

A) $|a|>1$ B) $0<a<1$ C) $a\geq 1$

D) $a=0$ E) $a>2$

Yechilishi: $f(x)=ax+sinx\Rightarrow a+cosx\geq 0\Rightarrow$

$-a\leq cosx;\quad -1\leq cosx\leq 1;\ \ a\geq 1\Rightarrow[1;\infty)$.

Javobi: C.

(1996-7-29) $f(x)=3x-x^2$ funksiyaning maksimumini toping.

A) -1 B) 2 C) -2 D) 4 E) maksimumi yo‘q

Yechilishi: $f(x)=3x-x^3\Rightarrow f'(x)=3-3x^2\Rightarrow$

$\Rightarrow 3x^2=3\Rightarrow x\pm 1;$

$f(-1)=3(-1)-(-1)^3=-3+1=-2;$

$f(1)=3\cdot 1-1^3=2;$ Demak, maksimumi 2. Javobi: B.

(1996-7-30) $y=5^{1-sinx}-e^{\ln 2}$ funksiyaning eng kichik qiymatini toping.

A) $1-e^2$ B) 2 C) -2

D) -2,29 E) aniqlab bo‘lmaydi

Yechilishi: $y=5^{1-sinx}-e^{\ln 2}=\frac{5}{5^{sinx}}-2;$

$-1\leq sinx\leq 1;\quad y(1)=1-2=-1.$ Javobi: C.

(1997-2-44) m ning qanday qiymatlarida $y=cosx+mx$ funksiya aiqlanish sohasida kamayadi?

A) $m \in (-\infty; -1]$ B) $m \in (-1; \infty)$ C) $m \in [-1; \infty)$
D) $m \in (-\infty; -1)$ E) $m \in [-1; -1]$

Yechilishi: $y = cosx + mx \Rightarrow -sinx + m \leq 0 \Rightarrow$
$m \leq sinx;\ \ -1 \leq sinx \leq 1.\ m \in (-\infty; -1]$. Javobi: A.

(1997-9-99) k ning qanday qiymatlarida $y = 6 + k^3 cos4x$ funksiyaning eng katta qiymati 70 bo‘ladi?

A) 4 B) 6 C) -4 D) ± 4 E) ± 6

Yechilishi: $y = 6 + k^3 cos4x$;

$$y' = -4k^3 sin4x \Rightarrow -4k^3 sin4x = 0 \Rightarrow \begin{cases} -4k^3 \neq 0 \\ sin4x = 0 \end{cases} \Rightarrow$$

$$\Rightarrow 4x = \pi n \Rightarrow x = \frac{\pi}{4} \cdot n \Rightarrow \begin{cases} n = 0 \\ n = 1 \end{cases} \Rightarrow \begin{cases} x = 0 \\ x = \frac{\pi}{4} \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} 70 = 6 + k^3 cos4 \cdot 0 \\ 70 = 6 + k^3 cos4 \cdot \frac{\pi}{4} \end{cases} \Rightarrow \begin{cases} k^3 = 64 \\ k^3 = -64 \end{cases} \Rightarrow \begin{cases} k = 4 \\ k = -4 \end{cases} \Rightarrow$$

$\Rightarrow k = 4.$

Javobi: A.

(1997-4-39) k ning qanday qiymatlarida $y = 1 + k^2 sin^2 x$ funnksiyaning eng katta qiymati 10 bo‘ladi?

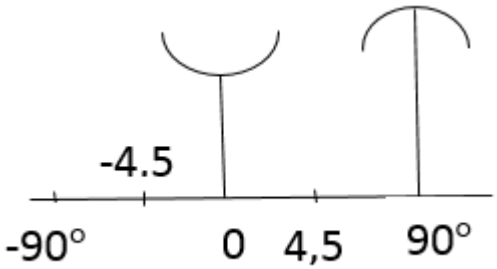
A) 9 B) -9 C) 3 D) -5; 3 E) 3; -3

Yechilishi: $y = 1 + k^2 sin^2 x \Rightarrow y' = 0 + k^2 \cdot 2sinxcosx \Rightarrow$

$$\Rightarrow y' = k^2 sin2x \Rightarrow sin2x = 0 \Rightarrow 2x = \pi n \Rightarrow x = \frac{\pi}{2} n \Rightarrow$$

$$\Rightarrow \begin{cases} n = 0 \Rightarrow x = 0°; \\ n = 1 \Rightarrow x = 90°; \end{cases}$$

$$\begin{cases} 10 = 1 + k^2 \cdot (sin0)^2 \\ 10 = 1 + k^2 \cdot (sin90°)^2 \end{cases} \Rightarrow$$



$\Rightarrow \begin{cases} 9 \neq 0 \\ 9 = k^2 \Rightarrow k = \pm 3. \end{cases}$ Javobi: E.

(1997-6-21) $y = 2sinx - 1$ funksiyaning $[0; \frac{\pi}{6}]$ kesmadagi eng katta qiymatini toping.

A) 0 B) 1 C) 0,5 D) $\sqrt{2} - 1$ E) $\sqrt{3} - 1$

Yechilishi: $y = 2sinx - 1 \Rightarrow y' = 2cosx \Rightarrow cosx = 0 \Rightarrow$

$\Rightarrow x = \frac{\pi}{2} + \pi k \Rightarrow x \notin \left[0; \frac{\pi}{6}\right] \Rightarrow y = 2sin0 - 1 = -1;$

$y = 2sin\frac{\pi}{6} - 1 = 2 \cdot \frac{1}{2} - 1 = 0.$ Javobi: A.

Integral

(1996-1-32) $f(x) = 1 - \frac{1}{cos^2 3x}$ funksiya boshlang‘ich funksiyasining umumiy ko‘rinishini toping.

A) $x + \frac{1}{3}ctgx + C$ B) $x - \frac{1}{3}tgx + C$

C) $x - \frac{1}{3}tg3x + C$ D) $tg3x + C$ E) $x - \frac{1}{3}ctg3x + C$

Yechilishi: $f(x) = 1 - \frac{1}{cos^2 3x}$;

1) $F(x)$ boshlang‘ich funksiyani topish talab etilsa, f(x) funksiyani integrallash kerak: $F(x) = \int f(x) \cdot dx;$

$F(x) = \int \left(1 - \frac{1}{cos^2 x}\right) dx =$

2) yig‘indi (ayirma) ning integrali formulasidan foydalaniladi:

$= \int dx - \int \frac{dx}{cos^2 3x} =$

3) funksiya argumentining koeffitsiyinti, integral oldiga teskari bo‘lib chiqadi:

$= x - \frac{1}{3}tg3x + C \Rightarrow F(x) = x - \frac{1}{3}tg3x + C.$ Javobi: C.

(1996-1-31) $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} sinxdx$ ni hisoblang.

A) $\frac{\sqrt{3}}{2}$ B) $\frac{\sqrt{2}}{2}$ C)$\frac{1}{2}$ D) $-\sqrt{2}$ E)$-\frac{1}{2}$

Yechilishi: $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} sinxdx = -cosx \Big|_{\frac{\pi}{3}}^{\frac{\pi}{2}} =$

1) Integraldan chiqqan boshlang‘ich funksiya oldida ″−„ ishora yoki birdan boshqa son bo‘lsa, undan keyin o‘rta qavs ochilishi, yo‘i qo‘yilishi mumkin bo‘lgan xatolarning oldini oladi;

2) Integraldan chiqqan boshlang‘ich funksiyadagi x ning o‘rniga oldin $\frac{\pi}{2}$ yuqori chegara , keyin $\frac{\pi}{3}$ quyi chegara qo‘yilib ayriladi:

$= -\left[cos\frac{\pi}{2} - cos\frac{\pi}{3}\right] = -\left(0 - \frac{1}{2}\right) = \frac{1}{2}.$ Javobi: C.

(1996-6-47) Quyidagi funksiyalarning qaysi biri uchun $F(x) = 2cosx + sinx + c$ funksiya boshlang‘ich funksiyasi bo‘ladi?

A) $f(x) = -2sinx - cosx$ B) $f(x) = 2sinx + cosx$

C) $f(x) = -2sinx + cosx$ D) $f(x) = 2sinx - cosx$

E) $f(x) = -2sinx - cosx$

Yechilishi: $F(x) = 2cosx + sinx + c;\quad f(x) =?$

1) Katta $F(x)$ berilsa, kichik $f(x)$ ni topish uchun, katta $F(x)$ dan hosila olish kerak. $[F(x)]' = f(x);$

$f(x) = [F(x)]' = (2cosx + sinx + c)' =$

$= 2 \cdot (-sinx) + cosx + 0 \Rightarrow f(x) = -2sinx + cosx.$

Javobi: C.

(1996-3-84) $f(x)=x^3$ funksiyaning $(2;1)$ nuqtadan o‘tuvchi boshlang‘ich funksiyasini toping.

A)$\frac{x^2}{2}-1$ B)$\frac{x^2}{2}+1$ C)$\frac{x^4}{4}-3$ D)$\frac{x^4}{2}+3$

E) $(2;1)$ nuqtadan o‘tuvchi boshlang;ich funksiya yo‘q

Yechilishi: $f(x)=x^3;\ \ (2;1);$

$F(x)=\int f(x)dx=\int x^3dx=\frac{x^{3+1}}{3+1}+C=\frac{x^4}{4}+C;$

$F(x)=\frac{1}{4}\cdot x^4+c;$

1) $(2;1)$ nuqta berilsa, $F(x)$ o‘rniga berilgan nuqtaning ordinatasi $1,x$ o‘rniga esa bssissasi 2 qo‘yilib C o‘zgarmas son tpiladi:

$1=\frac{1}{4}\cdot 2^4+C\Rightarrow 1=\frac{1}{4}\cdot 16+C\Rightarrow 1=4+c\Rightarrow$

$\Rightarrow c=-3.$

2) C ning topilgan qiymat $-3,\ F(x)$ umumiy boshlang‘ich funksiyaga qo‘yilib, $(2;1)$ nuqtadan o‘tuvch kuyidagi xususis boshlang‘ich funksiya topiladi:

$F(x)=\frac{x^4}{4}-3.$ Javobi: C.

(1996-6-48) Agar $y=f(x)$funksiyaning boshlang‘ich funksiyasi $F(x)$ bo‘lsa, $y=2f(2x)$ funksiyaning boshlang‘ich funksiyasini toping.

A) $2F(2x)$ B)$\frac{1}{2}F(2x)$ C) $F(2x)$ D) $2F(x)$ E)$\frac{1}{2}F(x)$

Yechilishi: $F(x)=\int 2f(2x)dx=2\int f(2x)dx=$

$=2\cdot\frac{1}{2}\cdot F(2x)=F(2x).$ Javobi: C.

(1997-9-91) Agar $f'(x)=\frac{1}{x\cdot\ln 10}+10x+5$ va $f(1)=6$ bo‘lsa, $f(x)$ ni toping.

A) $f(x) = lnx + 5x^2 + 5x - 4$

B) $f(x) = \frac{1}{10} lnx + 5x^2 + 5x + 4$

C) $f(x) = -lgx + 5x^2 + 5x + 10$

D) $f(x) = lgx + 5x^2 + 5x - 4$

E) $f(x) = \frac{1}{10} lgx + 5x^2 + 5x + 6$

Yechilishi: $f'(x) = \frac{1}{x \ln 10} + 10 \cdot x + 5;$

$f(1) = 6,\ f(x) = ?;$

masala sharti oydinlashtriladi

$f(x) = \frac{1}{x \ln 10} + 10x + 5. \quad F(1) = 6; \quad F(x) = ?$

$F(x) = \int \left[\frac{1}{x \cdot \ln 10} + 10x + 5\right] dx =$

$= \int \frac{dx}{x \cdot \ln 10} + 10 \int x dx + 5 \int dx =$

$= \lg x + 10 \cdot \frac{x^2}{2} + 5x + C;$

$F(x) = \lg x + 5x^2 + 5x + C;$

2) $x = 1, F(1) = 6$ ekanligi e'tiborga olinib, C topiladi:

$F(1) = \lg 1 + 5 \cdot 1^2 + 5 \cdot 1 + C;$

$6 = 0 + 5 + 5 + C \Rightarrow C = -4;$

U holda $F(x) = \lg x + 5x^2 + 5x - 4.$ Javobi: D.

(199-1-49) $\int_0^{e^2-1} \frac{dx}{x+1}$ ni hisoblang.

A) 3 B) 2 C) -2 D) -3 E) e^2

Yechilishi: $\int_0^{e^2-1} \frac{dx}{x+1}$ =maxraji $x + 1$, dx differensialning tagiga kiritiladi.

2) funksiyaning differensialini topish uchun funksiyadan hosila olinib, dx ga ko'paytiriladi:

$d(x + 1) = (x + 1)' \cdot dx = (1 + 0)dx = dx.$

Bundan $= \int_0^{e^2-1} \frac{d(x+1)}{x+1} = \ln|x+1| \Big|_0^{e^2-1} = \ln|e^2 - 1 + 1| - \ln|0+1| = \ln|e^2| - \ln 1 = = \ln e^2 - 0 = 2\ln e = 2 \cdot 1 = 2.$ Javobi: B.

(1996-7-31) $\int_0^2 (1-2x)^2 dx$ ni hisoblang.

A) $4\frac{1}{2}$ B) $-3\frac{1}{3}$ C) 9 D) $4\frac{2}{3}$ E) $-4\frac{1}{2}$

$\int_0^2 (1-2x)^2 dx = \int_0^2 (1-4x-4x^2)dx =$

$= \int_0^2 dx - \int_0^2 4x dx + \int_0^2 4x^2 dx =$

$= x\Big|_0^2 - 4\int_0^2 x dx + 4\int_0^2 x^2 dx =$

$= 2 - 0 - 4 \cdot \frac{x^2}{2}\Big|_0^2 + 4 \cdot \frac{x^3}{3}\Big|_0^2 = 2 - 2x^2\Big|_0^2 + \frac{4x^3}{3}\Big|_0^2 =$

$= 2 - 2[2^2 - 0^2] + \frac{4}{3}[2^3 - 0^3] = 2 - 8 + \frac{32}{3} = -6 +$

$+ \frac{32}{3} = \frac{14}{3} = 4\frac{2}{3}.$ Javobi: D.

(1996-7-32) $f(x) = 2 \cdot cos^2 x$ funksiya boshlang‘ich funksiyasining umumiy ko‘rinishini toping.

A) $2 \cdot sin^2 x$ B) $x + \frac{1}{2} sin2x + C$ C) $\frac{2}{3} cos^3 x + C$

D) $2x - \frac{1}{2} sin2x + C$ E) $-\frac{2}{3} sin^3 x + C$

Yechilishi: $f(x) = 2 \cdot cos^2 x;$

1) triganometrik funksiyalarni integrallash uchun, dastlab uning darajasini pasaytirish kerak

$f(x) = 2 \cdot \frac{1}{2}(1 + cos2x) = 1 + cos2x;$

$F(x) = \int f(x)dx = \int (1 + cos2x)dx =$

$= \int dx + \int cos2x dx = x + \frac{1}{2} sin2x + c.$ Javobi: B.

(199-1-35) $f(x) = ctg^2x$ funksiyaning boshlang‘ich funksiyasini toping.

A) $x - ctgx + C$ B)$-x - ctgx + C$ C)$-x + tgx + C$

D)$-x - tgx + C$ E)$-\frac{2ctgx}{sin^2x} + C$

Yechilishi: $f(x) = ctg^2x$;

1) Daraja pasaytiriladi:

$f(x) = \frac{1}{sin^2x} - 1;$

$F(x) = \int \left(\frac{1}{sin^2x} - 1\right) dx = \int \frac{dx}{sin^2x} - \int dx =$

$= -ctgx - x + C \Rightarrow F(x) = -x - ctgx + C.$

Javobi: B.

(1997-11-23) Agar $F'(x) = x - 4$ va $F(2) = 0$ bo‘lsa, $F(x)$ funksiyani toping.

A) $F(x) = x^2 - 2x$ B) $F(x) = x^2 - 4x + 4$

C) $F(x) = 2x^2 - 4x$ D) $F(x) = \frac{1}{2}x^2 - 4x + 6$

E) $F(x) = \frac{1}{2}x^2 - 2x + 2$

Yechilishi: $F'(x) = x - 4;$ $F(2) = 0;$ $F(x) =?$

masala shartiga oydinlik kiritiladi:

$f(x) = x - 4;$ $F(2) = 0;$ $F(x) =?$

$F(x) = \int f(x)dx = \int (x - 4)\, dx = \int xdx - 4\int dx =$

$= \frac{x^2}{2} - 4x + C \Rightarrow F(x) = \frac{1}{2} \cdot x^2 - 4x + C;$

2) $x = 2;$ $F(2) = 0$ ekanligi e’tiborga olinib, C topiladi.

$F(2) = \frac{1}{2} \cdot 2^2 - 4 \cdot 2 + C;$ $0 = 2 - 8 + C \Rightarrow C = 6;$

3) U holda, $F(x) = \frac{1}{2}x^2 - 4x + 6.$

Javobi: D.

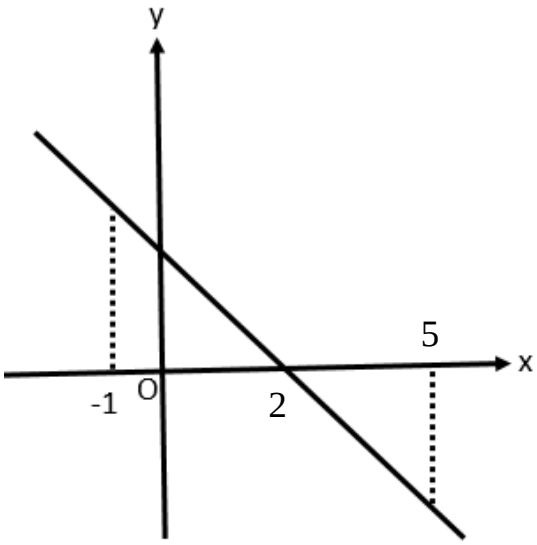
(1997-1-62) $\int_{-1}^{5}|2-x|\,dx$ ni hisoblang (chegaralari –1 dan 2 gacha bo‘lgan masala sharti, –1 dan 5 gacha kengaytirib olindi).

A) 2 B) 3 C) 3,5 D) 4 E) 9

Yechilishi: $\int_{-1}^{5}|2-x|\,dx=$

1) integral ostidagi funksiya modulsiz yozib olinib, grafigi chiziladi:

$y=2-x;$



2) funksiya grafigining absissasidan yuqorida joylashgan qismi uchun modul belgisi shuday, absissadan pastda joylashgan qismi uchun oldiga $''-''$ qo‘yib tashlanadi:

$=\int_{-1}^{2}|2-x|\,dx-\int_{2}^{5}|2-x|\,dx=\int_{-1}^{2}2\,dx-\int_{-1}^{2}xdx-$

$-\int_{2}^{5}2dx+\int_{2}^{5}xdx=2\cdot\int_{-1}^{2}dx-\int_{-1}^{2}xdx-2\int_{2}^{5}dx+$

$+\int_{2}^{5}xdx=2x\big|_{-1}^{2}-\frac{x^2}{2}\big|_{-1}^{2}-2x\big|_{2}^{5}+\frac{x^2}{2}\big|_{2}^{5}=$

$=2[2-(-1)]-\frac{1}{2}[2^2-(-1)^2]-2[5-2]+$

$+\frac{1}{2}[5^2-2^2]\;=6-\frac{1}{2}\cdot3-6+\frac{1}{2}\cdot21=-\frac{3}{2}+\frac{21}{2}=$

$\frac{-3+21}{2}=\frac{18}{2}=9.$ Javobi: E

(1997-2-49) $\int_{0}^{\frac{\pi}{4}}(1+tg^2x)\,dx$ ni hisoblang.

A) $\sqrt{3}$ B) 1 C) $\frac{\sqrt{3}}{3}$ D) -1 E) $-\sqrt{3}$

Yechilishi: $\int_0^{\frac{\pi}{4}}(1+tg^2x)\,dx=\int_0^{\frac{\pi}{4}}\frac{dx}{cos^2x}=tgx\Big|_0^{\frac{\pi}{4}}=$

$=tg\frac{\pi}{4}-tg0=1-0=1.$ Javobi: B.

(1997-3-32) $f(x)=sin^2 2x$ funksiya boshlang‘ich funksiyasining umumiy ko‘rinishini ko‘rsating.

A)$\frac{1}{3}sin^3 2x+C$ B)$-\frac{1}{2}cos^2 2x+C$ C)$\frac{1}{2}x-\frac{1}{8}sin4x+C$

D) $\frac{1}{2}x+\frac{1}{3}cos4x+C$ E) $x-cos4x+C$

Yechilishi: $f(x)=sin^2 2x=\frac{1}{2}(1-cos4x)$; Javobi: C.

(1997-7-97) $f(x)=sinx\cdot cos2x$ funksiya boshlang‘ich funksiyasining umumiy ko‘rinishini ko‘rsating.

A) $\frac{1}{3}sin3x+\frac{1}{2}sinx+C$ B)$\frac{1}{2}cosx-\frac{1}{3}cos3x+C$

C) $\frac{1}{2}cosx-\frac{1}{6}cos3x+C$ D)$-cosx\cdot sin2x+C$

E)$-\frac{1}{2}sin2x\cdot cosx+C$

Yechilishi: $f(x)=sinx\cdot cos2x=$

Ko‘paytmadan yig‘indiga o‘tish formulasidan foydalanib, daraja pasaytiriladi.

$=\frac{1}{2}[\sin(x+2x)+\sin(x-2x)]=\frac{1}{2}[sin3x-sinx];$

$F(x)=\frac{1}{2}\int sin3xdx-\frac{1}{2}\int sinxdx=$

$=\frac{1}{2}\cdot\frac{1}{3}\cdot(-cos3x)-\frac{1}{2}(-cosx)+C=$

$=-\frac{1}{6}cos3x+\frac{1}{2}cosx+C;$

$F(x)=\frac{1}{2}cosx-\frac{1}{6}cos3x+C.$

Javobi: C.

(1997-12-48) $\int_e^{2e}\frac{dx}{2x-e}$ ni hisoblang.

A) $\ln 3$ B)$2\ln 3$ C) $\ln\frac{1}{3}$ D) 3 E)$\ln\sqrt{3}$

Yechilishi: $\int_e^{2e}\frac{dx}{2x-e}=\frac{1}{2}\int_e^{2e}\frac{d(2x-e)}{2x-e}=$

$[Izoh: d(2x-e)=(2x-e)'dx=(2\cdot 1-0)dx=2dx]$

$=\frac{1}{2}\ln(2x-e)\Big|_e^{2e}=\frac{1}{2}[\ln(2\cdot 2e-e)-\ln(2e-e)]=$

$=\frac{1}{2}[\ln 3e-\ln e]=\frac{1}{2}[\ln 3+\ln e-\ln e]=$

$=\frac{1}{2}\ln 3=\ln 3^{\frac{1}{2}}=\ln\sqrt{3}.$

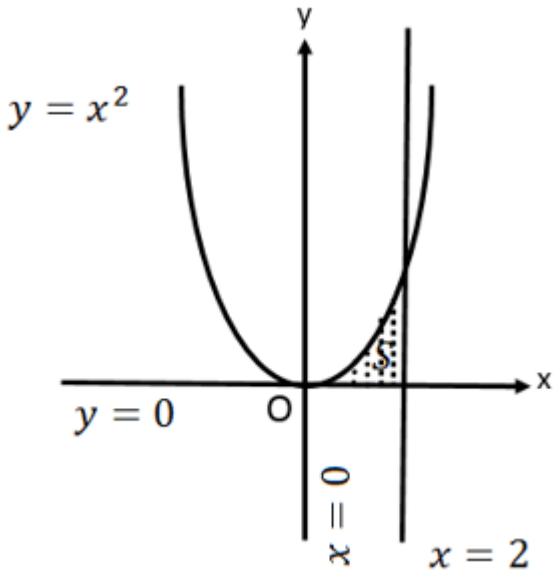
Javobi: E.

Yuz va hajmlarni hisoblash

(1996-3-32)$y=x^2,\ y=0,\ va\ x=2$ chiziqlar bilan chegaralangan figuraning yuzini toping.

A) $\frac{1}{2}$ B) 2 C) 4 D) 8 E) $2\frac{1}{2}$

Yechilishi: 1) bu masalada 4 ta chiziqlar bilan chegaralagan yuzini topish so‘ralgan.



2) Integralning quyi chegarasiga OX o‘qining chap nuqtasiga yuqori chegarasiga o‘ng nuqtasi qo‘yiladi;

3) Integral ostiga grafigi yuqorida joylashgan funksiya qo‘yiladi.

$S=\int_a^b f(x)dx=\int_0^2 x^2dx.$

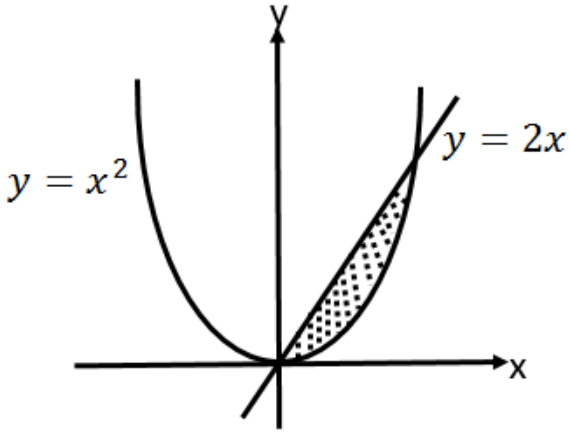
Javobi: E.

(1997-9-92)$y = x^2$ va $y = 2x$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.

A) $1\frac{1}{3}$ B) 1 C) $1\frac{1}{4}$ D) $1\frac{1}{2}$ E)$\frac{2}{3}$

Yechilishi: 1) bu masalada chegaralar ham, integral ostidagi funksiya ham berilmagan;

2) berilgan ikki funksiya sistema qilib yechilib, a va b integral chegaralari topiladi:



$$\begin{cases} y = x^2 \\ y = 2x \end{cases} \Rightarrow \begin{cases} y = y \\ x^2 = 2x \end{cases} \Rightarrow$$

$$\Rightarrow x^2 - 2x = 0 \Rightarrow$$

$$x(x-2) = 0 \Rightarrow$$

$$\Rightarrow \begin{cases} x = 0 \\ x = 2 \end{cases} \Rightarrow \begin{cases} a = 0; \\ b = 2; \end{cases}$$

3) ikki funksiya grafigi chiziladi;

4) integral ostidagi funksiyani hosil qilish uchun grafigi yuqorida joylashgan funksiyadan pastda joylashgani ayriladi:

$$S = \int_a^b (f(x) - g(x))\,dx = \int_0^2 (2x - x^2)\,dx.$$

Javobi: A.

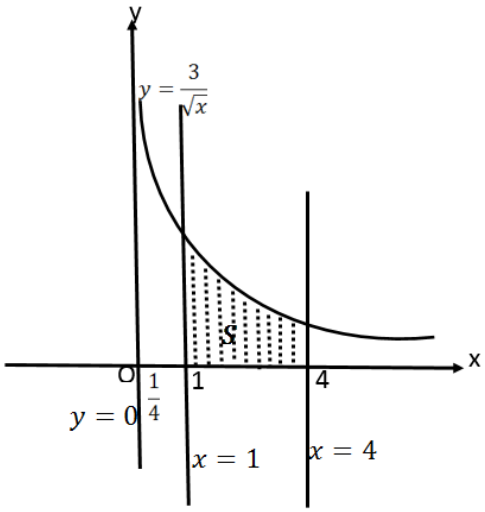
(1997-9-36) $y = \frac{3}{\sqrt{x}}$, $y = 0$, $x = 1$ va $x = 4$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.

A) 6 B) 7 C) 5 D) 4 E) 2

Yechilishi: $y = \frac{3}{\sqrt{x}}$, $y = 0$, $x = 1$ va $x = 4$ chiziqlarning grafiklari chiziladi:

$$y = \frac{3}{\sqrt{x}} = \frac{3}{x^{\frac{1}{2}}} = 3 \cdot x^{-\frac{1}{2}};$$

$$y = \frac{3}{\sqrt{\frac{1}{4}}} = \frac{3}{\frac{1}{2}} = 6;$$



x	$\frac{1}{4}$	1	4	9
$y = \frac{3}{\sqrt{x}}$	6	3	1,5	1

$$S = \int_1^4 3 \cdot x^{-\frac{1}{2}}\,dx =$$

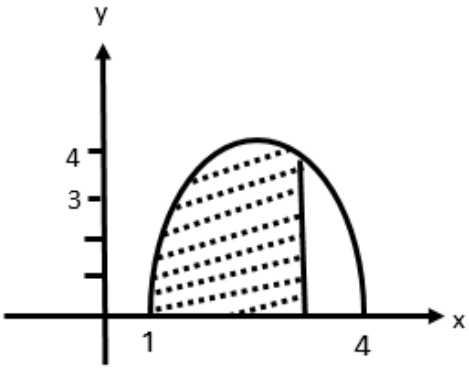
$$= 3 \cdot \int_1^4 x^{-\frac{1}{2}}\,dx =$$

$$= 3 \cdot \frac{x^{-\frac{1}{2}+1}}{-\frac{1}{2}+1}\Big|_1^4 = \frac{3 \cdot x^{\frac{1}{2}}}{\frac{1}{2}}\Big|_1^4 =$$

$$= 6\sqrt{x}\Big|_1^4 = 6\left[\sqrt{4} - \sqrt{1}\right] = 6(2-1) = 6\ kv\ birlik.$$

Javobi: A.

(1996-3-85) Rasmda ko‘rsatilgan parabola va $y = 0, x = 4$ to‘g‘ri chiziqlar bilan chegaralangan figuraning yuzini toping.



A) 9 B) 8 C) 7 D) $\frac{28}{3}$ E) $\frac{31}{3}$

Yechilishi: 1) bu masalada integralning chegaralari $x = 1$ va $x = 4$ shakldan ko‘rinib turibdi.

2) integral ostiga qo‘yiladigan funksiyani shakldan foydalanib topiladi:

$x_1 = 1;\ x_2 = 5 \Rightarrow y = (x - x_1)(x - x_2) =$

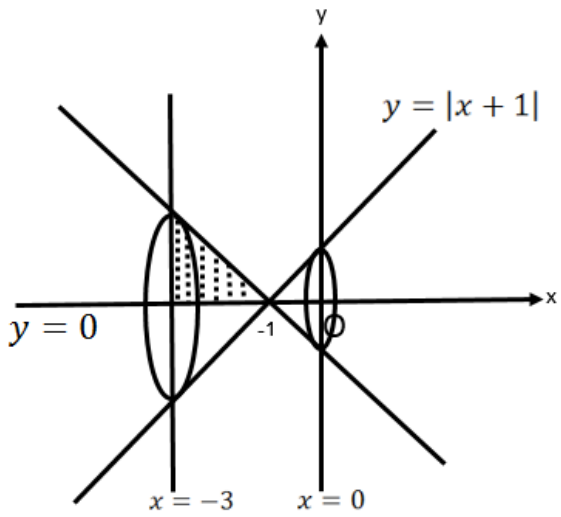
$= (x - 1)(x - 5) = x^2 - 5x - x + 5 = \mathrm{x}^2 - 6x + 5;$

3) parabola pastga qaraganligi uchun x^2 ning oldi ″−„ bo‘lishi kerak. U holda

$$y = -x^2 + 6x - 5; \quad S = \int_1^4 (-x^2 + 6x - 5)\,dx.$$

Javobi: A.

(1996-3-53) $y = |x + 1|, x = -3, x = 0$ va $y = 0$ chiziqlar bilan chegaralangan figurani absissalar o‘qi atrofida aylanishidan hosil bo‘lgan jismning hajmini toping.



A) π B) 2π

C) 3π D) 4π

E) 5π

Yechilishi: $V = V_1 + V_2;$

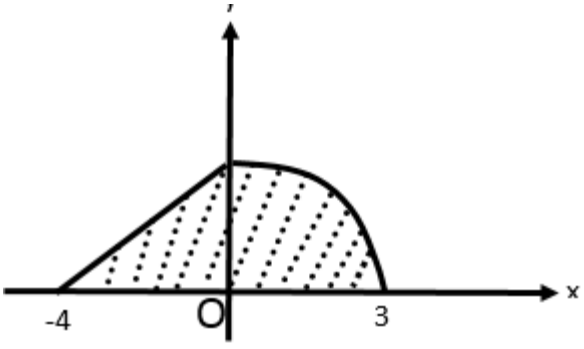
$V_1 = \frac{1}{3}\pi {R_1}^2 H_1 = \frac{1}{3}\pi \cdot 1^2 \cdot 1 = \frac{\pi}{3};$

$V_2 = \frac{1}{3}\pi {R_2}^2 H_2 = \frac{1}{3}\pi \cdot 2^2 \cdot 2 = \frac{8\pi}{3};$

$V = V_1 + V_2 = = \frac{\pi}{3} + \frac{8\pi}{3} = 3\pi.$

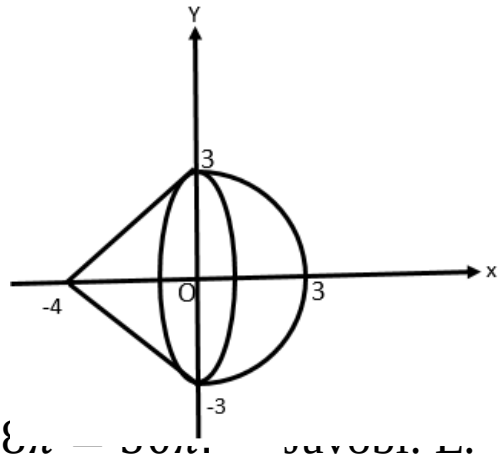
Javobi: C.

(1996-3-109) Rasmda ko‘rsatilgan figurani Ox o‘qi atrofida aylantirishdan hosil bo‘lgan jismning hajmini toping.



A) 25π B) 48π C) 35π D) 45π E) 30π

Yechilishi: $V = V_k + \frac{V_{sh}}{2}$;



$V_k = \frac{1}{3}\pi R^2 \cdot H =$

$= \frac{1}{3} \cdot \pi \cdot 3^2 \cdot 4 = 12\pi;$

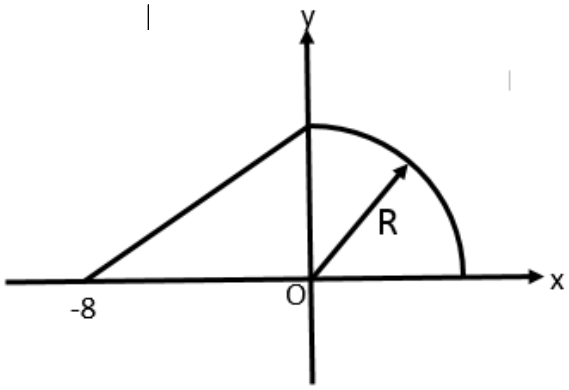
$V_{sh} = \frac{4}{3}\pi R^3 =$

$= \frac{4}{3} \cdot \pi \cdot 3^3 = 36\pi;$

$\frac{V_{sh}}{2} = \frac{36\pi}{2} = 18\pi;$ $V = 12\pi + 18\pi = 30\pi.$ Javobi: E.

(1996-13-51)

Rasmda ko‘rsatilgan figurani Ox o‘qi atrofida aylantirishdan hosil bo‘lgan jism sirtining yuzini toping.



A) 120π B) 135π

C) 130π D) 132π

E) 133π

Yechilishi: $S = S_k + \frac{S_{sh}}{2}$;

$S = \pi Rl = \pi \cdot 6 \cdot 10 = 60\pi;$

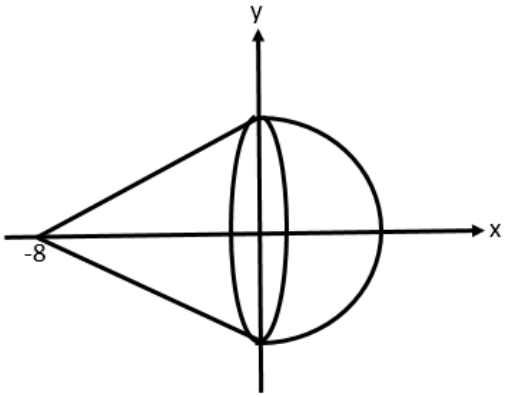
$S_{sh} = 4\pi R^2 = 4\pi \cdot 6^2 =$

$144\pi;$

$\frac{S_{sh}}{2} = 72\pi;$

$S = 60\pi + 72\pi = 132\pi.$

Javobi: D.



(1996-11-36) $2y' = y$ tenglamaning yechimini toping.

A) $C\frac{e^x}{2}$ B)$Ce^{\frac{x}{2}}$ C)Ce^{2x} D) $2e^x$ E) e^x

Yechilishi: 1) hosila qatnashgan tenglamaga , differensial tenglama deyiladi:

$y' = \frac{1}{2}y$;

2) $y' = \frac{dy}{dx}$ – almashtirish olinadi;

$\frac{dy}{dx} = \frac{y}{2} \Rightarrow dy = \frac{1}{2}y \cdot dx \Rightarrow$

3) o‘zgaruvchilarni ajratish uchun, tenglikning ikkala tomoni y ga bo‘linadi:

$\Rightarrow \frac{dy}{y} = \frac{1}{2}dx \Rightarrow$

4) differensial tenglama integrallash orqali yechiladi:

$\Rightarrow \int \frac{dy}{y} = \frac{1}{2}\int dx \Rightarrow$

5) integraldan natural logarifm chiqsa, C o‘rniga $\ln C$ qo‘shiladi.

$\Rightarrow \ln y = \frac{1}{2} \cdot x + \ln C \Rightarrow \ln y - \ln C = \frac{x}{2} \Rightarrow$

$\Rightarrow \ln\frac{y}{C} = \frac{x}{2} \Rightarrow \frac{y}{C} = e^{\frac{x}{2}} \Rightarrow y = C \cdot e^{\frac{x}{2}}$;

6) differensial tenglamaning yechimi funksiya bo‘lar ekan.

Javobi: B.

Pirnazar DAVRONOV

To‘g‘ri chiziq

(1996-7-16) k ning qanday qiymatlarida $y = kx + 6$ funksiyaning grafigi $M(0{,}5;\ 4{,}5)$ nuqtadan o‘tadi?

A) 3 B) -3 C) -2 D) 4 E) -30

Yechilishi: $y = kx + 6$;

$M(0{,}5;\ 4{,}5) \Rightarrow 4{,}5 = k \cdot 0{,}5 + 6 \Rightarrow$

$\Rightarrow 0{,}5k = -1{,}5 \Rightarrow k = -3.$ Javobi: B.

(1997-12-12) Agar $k > 0$ va $l < 0$ bo‘lsa, $y = kx + l$ funksiyaning grafigi qaysi choraklardan o‘tadi?

A) $I, II\ va\ IV$ B) $III\ va\ IV$ C) $II, III\ va\ IV$

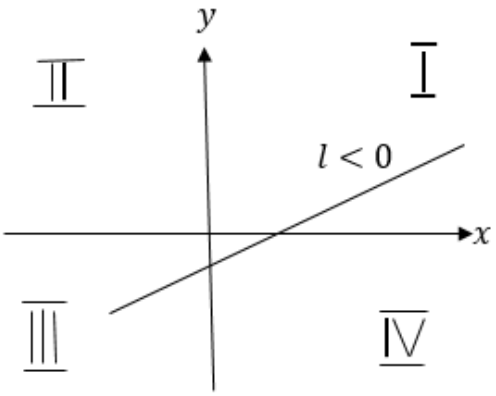
D) $I, II\ va\ III$ E) $I, III\ va\ IV$

Yechilishi: $y = kx + l$;

$k > 0;\ \ l < 0;$

$I, III\ va\ IV.$

Javobi: E.

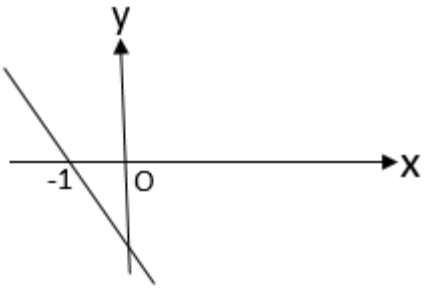


(1996-1-26) a ning qanday qiymatlarida $ax + 2y = 3$ va $2x - y = -1$ to‘g‘ri chiziqlar kesishadi?

A) $a = 0$ B) $a \neq 2$ C) $a \epsilon R$ D) $a \neq -4$ E) $a \neq -2$

Yechilishi: $\begin{cases} ax + 2y = 3; \\ 2x - y = -1; \end{cases}$ $\frac{a}{2} \neq \frac{2}{-1} \Rightarrow a \neq -4$. Javobi: D.

(1996-3-23) Grafigi rasmda tasvirlangan funksiyaning qiymatlari x ning qanday qiymatlarida manfiy bo‘lishini tengsizlik yordamida ifodlang.



A) $x > 0$ B) $x \geq 0$ C) $x \geq -1$
D) $x > -1$ E) $x \leq -1$
Yechilishi: $x > -1$.
Javobi: D.

(1996-3-30) $M(2;2)$ nuqtadan $y = x - 1$ to‘g‘ri chiziqqacha bo‘lgan eng qisqa masofani toping.

A) $\frac{1}{2}$ B) 2,5 C) $\frac{\sqrt{2}}{2}$ D) $\frac{1}{4}$ E) 6,25

Yechilishi: $M(2;2) \Rightarrow x = 2; y = 2.$
u: $y = x - 1 \Rightarrow x - y - 1 = 0 \Rightarrow A = 1;$
$B = -1;\ C = -1;$
$\rho(M;u) = \left|\frac{2-2-1}{\sqrt{1^2+(-1)^2}}\right| = \left|\frac{-1}{\sqrt{2}}\right| = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}.$ Javobi: C.

(1996 −9-77) a va b ning qanday qiymatlarida $ax + by = -4$ va $2x - 2y = 4$ to‘g‘ri chiziqlar ustma-ust tushadi?

A) $a = 2;\ b = -2$ B) $a = -2;\ b = 2$ C) $a = b = 2$
D) $a = 2;\ b = -1$ E) $a = 4;\ b = 2$

Yechilishi: $\begin{cases} ax + by = -4 \\ 2x - 2y = 4 \end{cases} \Rightarrow \begin{cases} ax + by + 4 = 0 \\ 2x - 2y - 4 = 0 \end{cases} \Rightarrow$

$\Rightarrow \frac{a}{2} = \frac{b}{-2} = \frac{4}{-4} \Rightarrow \frac{a}{2} = -1 \Rightarrow a = -2;\ \frac{b}{-2} = -1 \Rightarrow b = 2.$
Javobi: B.

(1996-10-27) a ning qanday qiymatlarida $ax + 2y = 4$ va $y - x = 4$ to‘g‘ri chiziqlar paralel bo‘ladi?

A) $a = 1$ B) $a = 2$ C) $a = -2$ D) $a \epsilon R$ E) $a = -1$

Yechilishi: $\begin{cases} ax + 2y = 4 \\ y - x = 4 \end{cases} \Rightarrow \begin{cases} ax + 2y = 4 \\ -x + y = 4 \end{cases} \Rightarrow \frac{a}{-1} = \frac{2}{1} \Rightarrow$

$\Rightarrow a = -2.$ Javobi: C.

(1997-4-57) $A(2;1)$ va $B(1;2)$ nuqtalar berilgan. AB to‘g‘ri chiziqqa perpendikulyar va B nuqtadan o‘tuvchi to‘g‘ri chiziq tenglamasini tuzing.

A) $x - y + 2 = 0$ B) $x + y + 2 = 0$ C) $x - y - 2 = 0$
D) $x - y + 1 = 0$ E) $x + y + 1 = 0$

Yechilishi: u to‘g‘ri chiziq tenglamasini topish uchun ikki nuqtadan o‘tuvchi to‘g‘ri chiziq tenglamasiga asosan

$\frac{x-x_1}{x_2-x_1} = \frac{y-y_1}{y_2-y_1} \Rightarrow \frac{x-2}{1-2} = \frac{y-1}{2-1} \Rightarrow x + y - 3 = 0.$

Bu to‘g‘ri chiziqning normal Vektori $\vec{n} = \{a; b\} = \{1; 1\}$ bo‘ladi. Bu vektor o‘z navbatida $B(1;2)$ nuqtadan o‘tuvchi to‘g‘ri chiziqning yo‘naltiruvchi vektori bo‘ladi.

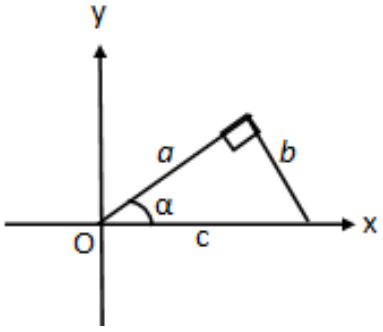
$\vec{U} = \{-b; a\} = \{-1; 1\}$

U holda $B(1;2)$ nuqtadan o‘tuvchi to‘g‘ri chiziq tenglamasi $ax + by + c = 0 \Rightarrow 1 \cdot 1 - 1 \cdot 2 + c = 0 \Rightarrow c = 1.$

Demak, $x - y + 1 = 0.$

Javobi: D.

(1997-8-60) Rasmda $a = 4; b = 3$ va $c = 5$ bo‘lsa, OC to‘g‘ri chiziqni burchak koeffisientini toping.



A) $\frac{4}{3}$ B) $\frac{3}{5}$ C) $\frac{4}{5}$
D) $\frac{3}{4}$ E) $\frac{5}{4}$

Yechilishi: Misr uchburchagidan $\Rightarrow tg\alpha = \frac{3}{4} \Rightarrow k = \frac{3}{4}.$

Javobi: D.

Urinma to‘gri chiziq

(1996-1-29) $f(x) = 2x^2 - 1$ funksiya grafigiga absissasi $x_0 = 0$ bo‘lgan nuqtadan o‘tkazilgan urinma tenglamasini ko‘rsating.

A) $y = -1$ B) $y = 2$ C) $y = 2x + 1$

D) $y = 1$ E) $y = x - 1$

Yechilishi: $f(x) = 2x^2 - 1;\ \ y - y_0 = f'(x_0)(x - x_0);$ $x_0 = 0;$ 1) y_0 ni topish uchun berilgan funksiyadagi x ning o‘rniga x_0 qo‘yiladi. U holda y han y_0 ga aylanadi :

$y = 2x^2 - 1 \Rightarrow y_0 = 2{x_0}^2 - 1 \Rightarrow y_0 = 2 \cdot 0^2 - 1 \Rightarrow$

$\Rightarrow y_0 = -1;$

2) $f(x)$ funksiyadan hosila olinadi

$f'(x) = 4x - 0 \Rightarrow f'(x) = 4x;$

3) $f'(x)$ hosiladagi x o‘rniga x_0 qo‘yiladi:

$f'(x_0) = 4x_0 \Rightarrow f'(0) = 4 \cdot 0 \Rightarrow f'(0) = 0;$

4) Topilgan y_0 va $f'(0)$ urinma tenglamasiga qo‘yiladi:

$y - y_0 = f'(x_0)(x - x_0) \Rightarrow$

$\Rightarrow y— 1 = f'(0)(x - 0) \Rightarrow$

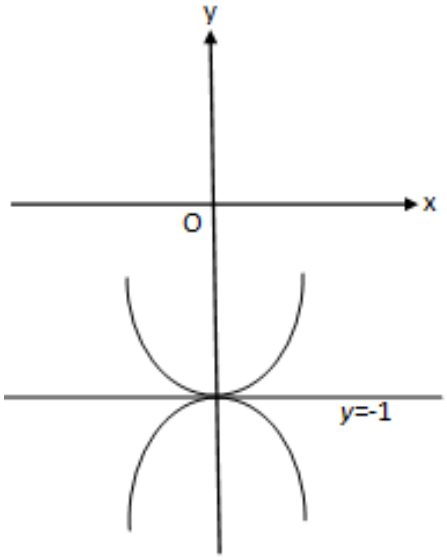
$\Rightarrow y + 1 = 0 \Rightarrow y = -1.$

Javobi: A.

(1996-3-82) $y = \frac{x}{1-x}$ funksiyaning grafigiga absissasi $x_0 = 3$ bo‘lgan nuqtada o‘tkazilgan urinmaning OX o‘qi bilan tashkil etgan burchagi α bo‘lsa, $cos2\alpha$ ni toping.

A) $\frac{1}{2}$ B) $\frac{13}{17}$ C) $\frac{15}{17}$

D) $\frac{13}{16}$ E) $\frac{15}{16}$



Yechilishi: 1) funksiyadan hosila olinadi:

$y' = \frac{x' \cdot (1-x) - x \cdot (1-x)'}{(1-x)^2} =$

$\frac{1 \cdot (1-x) - x \cdot (0-1)}{(1-x)^2} = \frac{1}{(1-x)^2};$

2) hosiladagi x o‘rniga qiymati $x_0 = 3$ qo‘yiladi, natija burchak koeffisenti bo‘ladi;

$y'(3) = \frac{1}{(1-3)^2} = \frac{1}{4};$

3) Demak, $k = \frac{1}{4} = tg\alpha = \frac{1}{4} \Rightarrow \alpha = arctg\frac{1}{4} \Rightarrow$

$\Rightarrow cos2\alpha = cos2 \cdot arctg\frac{1}{4} = cos^2 arctg\frac{1}{4} -$

$sin^2 arctg\frac{1}{4} =$

$= (cosarctg\frac{1}{4})^2 - (sinarctg\frac{1}{4})^2 =$

$= \left[\frac{1}{\sqrt{1+\left(\frac{1}{4}\right)^2}}\right]^2 - \left[\frac{\frac{1}{4}}{\sqrt{1+\left(\frac{1}{4}\right)^2}}\right]^2 = \left(\frac{4}{\sqrt{17}}\right)^2 - \left(\frac{1}{\sqrt{17}}\right)^2 = \frac{15}{17}.$

Javobi: C.

(1997-2-46) $y = \ln x + x^2$ funksiyaning grafigiga $x_0 = \frac{1}{2}$ nuqtada o‘tkazilgan urinmaning burchak koiffisentini toping.

A) 3 B) 6 C) 4 D) 6,5 E) 3,5

Yechilishi: $y = \ln x + x^2$;

$f(x) = y = \ln x + x^2 \Rightarrow f'(x) = \frac{1}{x} + 2x \Rightarrow$

$\Rightarrow f'\left(\frac{1}{2}\right) = \frac{1}{\frac{1}{2}} + 2 \cdot \frac{1}{2} = 3 \Rightarrow k = tg\alpha = 3.$ Javobi: A.

(1997-4-29) $y = 3x^2 + 2x$ funksiya grafigiga absissasi $x_0 = -3$ nuqtada o‘tkazilgan urima OX o‘qining musbat yo‘nalishi bilan qanday burchak hosil qiladi?

A) $arctg3$ B) $\pi - arctg16$ C) $\pi - arctg3$

D) $-arctg16$ E) $60°$

Yechilishi: $y = 3x^2 + 2x$;

$y' = 6x + 2 \Rightarrow y'(-3) = 6 \cdot (-3) + 2 = -16 \Rightarrow$

$\Rightarrow k = -16;$

$tg\alpha = -16 \Rightarrow \alpha = arctg(-16) = \alpha = -arctg16.$

Javobi: D

(1996-1-36) Hech qaysi uchtasi bir to‘g‘ri chiziqda yotmaydigan 7 ta nuqta berilgan. Shu 7 ta nuqtalar orqali nechta turli to‘g‘ri chiziqlar o‘tkazish mumkin?

A) 28 B) 21 C) 42 D) 35 E) 14

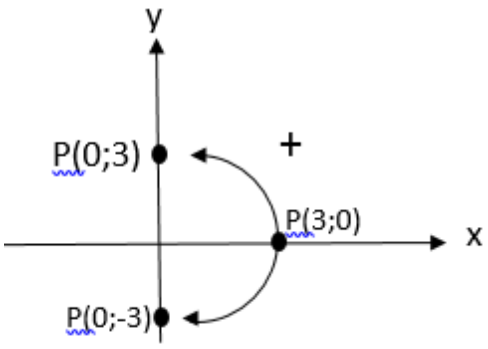
Yechilishi: $\frac{n(n-1)}{2}$ formulaga asosan: $\frac{7(7-1)}{2} = 21.$

Javobi: B.

(1996-3-42) P(3;0) nuqtani koordinata boshi atrofida $90°$ ga burganda u qaysi nuqtaga o‘tadi?

A) (-3;0) B) (0;-3)

C) (3;3) D) (0;3) E) (3;-3)



Yechilishi: Chizmadan ko‘rinadiki

(3;0) nuqta (0;3) nuqtaga o‘tadi.

Javobi: D.

(1996-3-106) Oxz tekisligiga nisbatan (1;2;3) nuqtaga simmetrik bo‘lgan nuqtani toping.

A) (-1;2;3) B) (-1;-2;3) C) (1;2;-3)
D) (1;-2;3) E) (-1;-2;-3)

Yechilishi: Oxz da y qatnashmagan. y ning ishorasi o‘zgaradi. $(1;2;3) \Rightarrow (1;-2;3)$. Javobi: D.

(1996-9-41) Koordinatalar boshiga nisbatan (1;2;3) nuqtaga simmetrik nuqtani toping.

A) (-1;2;3) B) (-1;-2;3) C) (1;2;-3)
D) (1;-2;3) E) (-1;-2;-3)

Yechilishi: Koordinatalar boshiga nisbatan bo‘lsa, barcha koordinatalar ishoralari o‘zgaradi.

(1;2;3) ⇒(-1; -2; -3).

Javobi: E.

Kesmani berilgan nisbatda bo‘lish

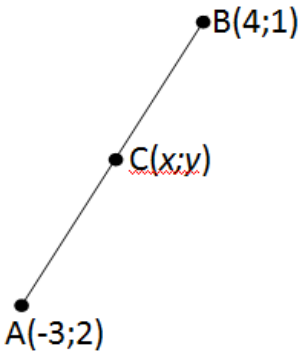
(1996-3-41) Uchlari A(-3;2) va B(4;1) nuqtalarda bo‘lgan AB kesma o‘rtasining koordinatalarini toping.

A) (-0,5;1,5) B) (1,5;-0,5) C) (1,5;0,5)
D) (0,5;-1,5) E) (0,5;1,5)

Yechilishi: $x = \frac{x_1+x_2}{2} = \frac{-3+4}{2} = 0{,}5;$

$y = \frac{y_1+y_2}{2} = \frac{1+2}{2} = 1{,}5; C(0{,}5;1{,}5).$

Javobi: E.



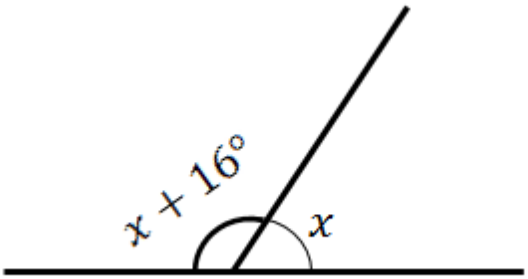
Burchak

(1996-3-36) Qo‘shni burchaklarda biri ikkinchisidan 16° katta. Shu qo‘shni burchaklarni toping.

A) 16°; 164° B) 80°; 96° C) 148°; 32°

D) 82°; 92° E) 62°; 118°

Yechilishi: 1) Qo‘shni burchaklar yig‘indisining 180° ga tengligi e’tiborga olinadi.



$x + x + 16° = 180°;$

$2x = 180° - 16°;$

$2x = 164°;\quad x = 82°;$

$x + 16° = 82° + 16° = 98°.$

Javobi: D.

(1996-3-37) Ikkita to‘g‘ri chiziqning kesisishidan hosil bo‘lgan qo‘shni burchaklarning gradus o‘lchovlari 2:3 nisbatda bo‘lsa, shu burchaklarni toping.

A)72°; 108° B) 60°; 120°

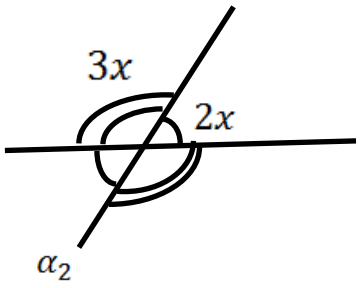
C) 30°; 150°

D) 50°; 130° E) 62°; 118°

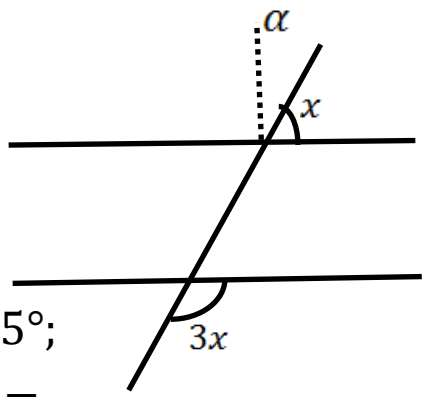
Yechilishi: 2:3 nisbat berilgan bo‘lsa, ular x ga ko‘paytirilib, so‘ngra qo‘shilib, 180° ga tenglanadi.

$2x + 3x = 180° \Rightarrow 5x = 180° \Rightarrow$

$\Rightarrow x = 36° \Rightarrow \begin{cases} 2x = 2 \cdot 36° = 72°; \\ 3x = 3 \cdot 36° = 108°. \end{cases}$



Javobi: A.



(1996-3-91) $a \,//\, b$. $\alpha -?$

A) 30° B) 60° C) 45°

D) 40° E) 50°

Yechilishi: $x + 3x = 180° \Rightarrow x = 45°$;

$\alpha + x = 90° \Rightarrow \alpha = 90° - x = 90° -$

$-45° = 45°$.

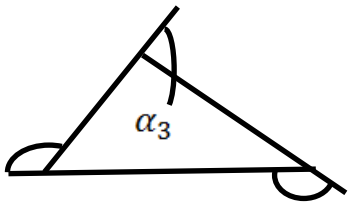
Javobi: C.

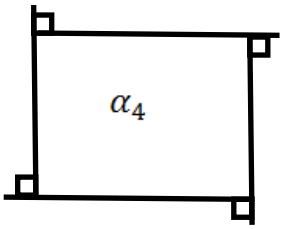
(1996-3-92) α_3, α_4 va α_5 mos ravishda uchburchak, qavariq to‘rtburchak va beshburchak tashqi burchaklarining yig‘indilari. Quyidagi munosabatlardan qaysi biri o‘rinli?

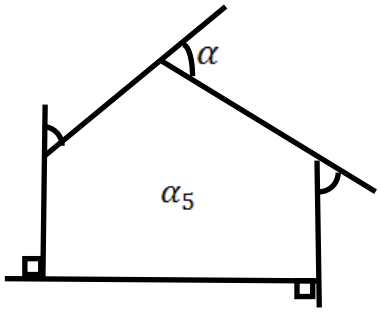
A) $\alpha_3 < \alpha_4 < \alpha_5$ B)$\alpha_3 = \alpha_4 < \alpha_5$ C)$\alpha_3 < \alpha_4 = \alpha_5$

D)$\alpha_3 = \alpha_5 < \alpha_4$ E)$\alpha_3 = \alpha_4 = \alpha_5$

Yechilishi:



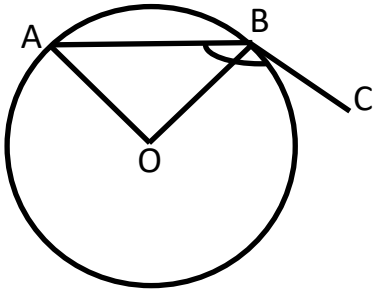




$\alpha_3 = \alpha_4 = \alpha_5 = 360°$. Javobi: E.

(1996-3-93) $OA = AB$

$\angle ABC -?$



A) 120° B) 150° C) 140° D) 135° E) 145°

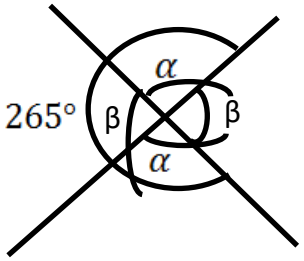
Yechilishi: $OA = AB = R$, OB ⊥ BC .

Javobi: B.

(1996-9-88) Ikkita to‘g‘ri chiziqning kesishishidan hosil bo‘lgan uchta burchak yig‘indisi $265°$. Shu burchaklardan kattasini toping.

A) $110°$ B) $95°$ C) $105°$ D) $150°$ E) $145°$

Yechilishi: Vertikal burchaklar tengligi e’tiborga olinadi: $\alpha < \beta$;



$2\alpha + 2\beta = 360°$;

$\beta = 360° - 265° = 95°, \quad \alpha = 85.$

Javobi: B.

(1996-10-39) Ikkita to‘g‘ri chiziqning kesishidan hosil bo‘lgan qo‘shni burchaklarning ayirmasi $40°$ ga teng. Shu burchaklardan kichigini toping.

A) $60°$ B) $40°$ C) $50°$ D) $70°$ E) $45°$

Yechilishi: $\begin{cases} x - y = 40° \\ x + y = 180° \end{cases} \Rightarrow 2x = 220° \Rightarrow x = 110° \Rightarrow$

$\Rightarrow y = 180° - x = 180° - 110° = 70°.$ Javobi: D.

Qavariq ko‘pburchaklar

(1996-3-45) Har bir ichki burchagi $150°$ bo‘lgan qavariq ko‘pburchakning nechta tomoni bor?

A) 5 B) 7 C) 10 D) 12 E) 15

Yechilishi: Qavariq ko‘pburchakka doir masalalar $180°(n-2)$ formulaga tenglab yechiladi:

$150° \cdot n = 180°(n-2) \Rightarrow 150°n = 180°n - 360° \Rightarrow$

$\Rightarrow 30°n = 360° \Rightarrow n = 12.$ Javobi: D.

(1996-7-42) $\beta -$ muntazam sakkizburchakning ichki burchagi bo‘lsa, $ctg\beta$ ning qiymatibi toping.

A) $-\frac{1}{\sqrt{2}}$ B) -1 C) $-\frac{1}{\sqrt{3}}$ D) $-\sqrt{3}$ E) 1

Yechilishi: Muntazam bo‘lish uchun figuraning hamma tomonilari va hamma burchaklari bir-biriga teng bo‘lishi kerak:

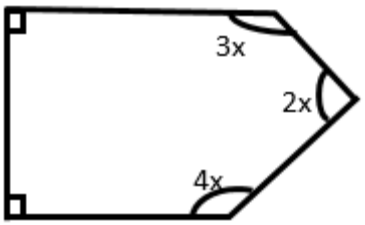
$n = 8;\ 8\beta = 180°(8-2) \Rightarrow 8\beta = 180° \cdot 6 \Rightarrow$

$\Rightarrow \beta = 135° \Rightarrow$

$\Rightarrow ctg135° = ctg(90° + 45°) = -tg45° = -1.$

Javobi: B.

(1996-9-93) Qavariq ko‘pburchak burchaklaridan ikkitasi to‘g‘ri, qolganlari o‘zaro 2:3:4 nisbatda. Beshburchakning katta burchagini toping.



A) 90° B) 120° C) 150° D) 110° E) 160°

Yechilishi:

$90° + 90° + 2x + 3x + 4x = 180°(5-2);$

$180° + 9x = 180° \cdot 3;$

$9x = 360° \Rightarrow x = 40°;\quad 4x = 4 \cdot 40° = 160°.$

Javobi: E.

(1996-11-46) Har bir ichki burchagi $135°$ bo‘lgan qavariq ko‘pburchakning nechta tomoni bor?

A) 5 B) 6 C) 8 D) 10 E) 12

Yechilishi: $135° \cdot n = 180°(n-2);$

$n = \frac{180°(n-2)}{135°} = \frac{4n-8}{3} \Rightarrow n = 8.$ Javobi: C.

(1996-12-93) Muntazam sakkiz burchakning tashqi burchagi necha gradus?

A) 40 B) 60 C) 72 D) 45 E) 35

Yechilishi: 1) $8\alpha = 180°(8-2) \Rightarrow 8\alpha = 180° \cdot 6 \Rightarrow$
$\Rightarrow \alpha = 135° \Rightarrow \beta = 180° - 135° = 45°;$
2) $\beta = \frac{360°}{8} = 45°.$ Javobi: D.

(1997-9-112) Muntazam o‘nsakkiz burchak ichki burchaklarining uchlanganligining kosinusini toping.

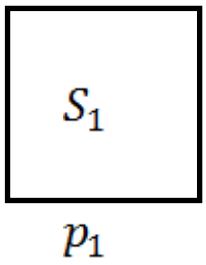
A) $-\frac{1}{2}$ B)$\frac{\sqrt{2}}{2}$ C)$\frac{\sqrt{3}}{2}$ D) 0 E) 1

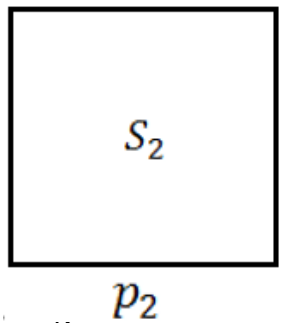
Yechilishi: $18\alpha = 180°(18-2) \Rightarrow 18\alpha = 180° \cdot 16 \Rightarrow$
$\Rightarrow \alpha = 160° \Rightarrow 3\alpha = 3 \cdot 160° \Rightarrow 3\alpha = 480° \Rightarrow$
$\Rightarrow cos3\alpha = cos480° = cos\left(3\pi - \frac{\pi}{3}\right) = -cos\frac{\pi}{3} = -\frac{1}{2}.$
Javobi: A.

(1996-6-39) Ikkita o‘xshash ko‘pburchak peremetrlarining nisbati 2:3 kabi. Katta ko‘pburchakning yuzi 27 bo‘lsa, kichik ko‘pburchakning yuzini toping.

A) 12 B) 18 C) 16 D) 14 E) 10

Yechilishi: 1) $\frac{p_1}{p_2} = k\ va\ \frac{S_1}{S_2} = k^2$ nisbatdan foydalaniladi.
2) Bunda kichikning nisbati kattaga qilib olinishi qulay.



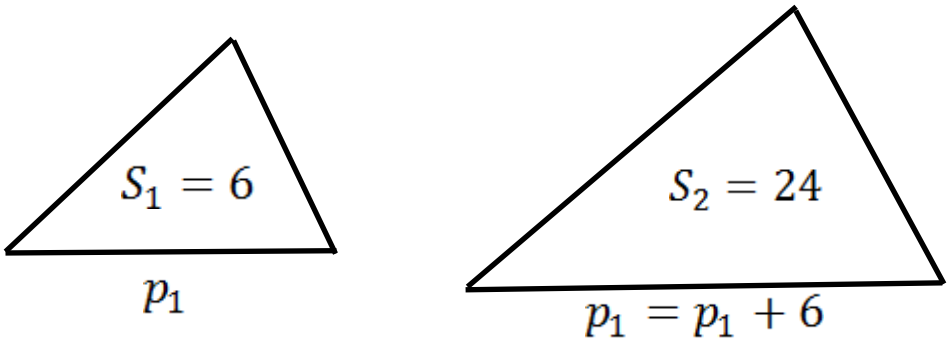


$k = \frac{p_1}{p_2} = \frac{2}{3};\quad k^2 = \frac{S_1}{S_2} \Rightarrow \left(\frac{2}{3}\right)^2 = \frac{S_1}{27} \Rightarrow S_1 = 12.$
Javobi: A.

(1996-7-42) Ikkita o‘xshash uchburchaklarning yuzlari 6 va 24, ulardan birining perimetri ikkinchisidan 6 ga ortiq. Katta uchburchakning perimetrini toping.

A) 18 B) 12 C) 20 D) 8 E) 24

Yechilishi: Kattaning kichikka nisbati olinsa qulay:



$k^2 = \frac{24}{6} = 4 \Rightarrow k = 2;\ \ k = \frac{p_2}{p_1} \Rightarrow 2 = \frac{p_1+6}{p_1} \Rightarrow S_1 = 6$

$\Rightarrow 2p_1 = p_1 + 6 \Rightarrow p_1 = 6 \Rightarrow$

$\Rightarrow p_2 = p_1 + 6 = 6 + 6 = 12 \Rightarrow$

$\Rightarrow p_2 = 12.$

Javobi: B.

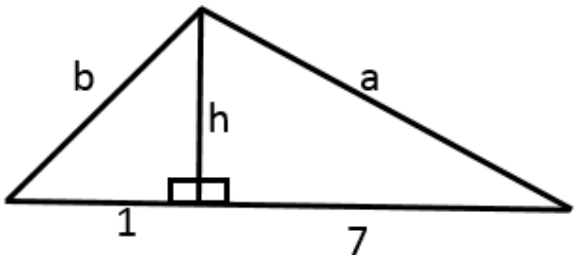
Uchburchaklar

(1997-7-49) Bir nuqtadan tekislikka ikkita og‘ma o‘tkazilgan. Og‘malarning uzunliklari 2:1 kabi nisbatda, ularning proeksiyalari 7 va 1 ga teng.

A) 4 B) $5\sqrt{3}$ C) $4\sqrt{2}$ D) 8 E) $\sqrt{15}$

Yechilishi: Ikkita to‘g‘ri burchakli uchburchakka keltirib yechiladi:

$\frac{a}{b} = \frac{2}{1} \Rightarrow a = 2b;$



$\begin{cases} h^2 = b^2 - 1^2 \\ h^2 = 0^2 - 7^2 \end{cases} \Rightarrow \begin{cases} h^2 = h^2 \\ b^2 - 1^2 = a^2 - 49 \Rightarrow \end{cases}$

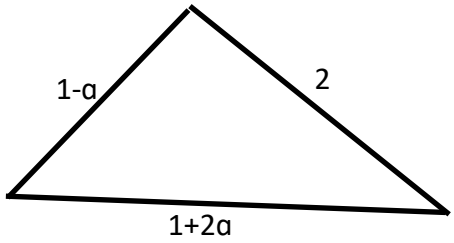
$\Rightarrow b^2-1=(2b)^2-49 \Rightarrow 4b^2-b^2=49-1 \Rightarrow$
$\Rightarrow 3b^2=48 \Rightarrow b^2=18 \Rightarrow h^2=16-1=15 \Rightarrow h=\sqrt{15}$.

Javobi: E.

(1996-9-33) a ning qanday qiymatlarida uzunliklari mos ravishda $1+2a, 1-a$ va 2 ga teng bo‘lgan kesmalardan uchburchak yasash mumkin?

A) $\emptyset$ B)$\left(-\frac{2}{3};0\right)$ C)$\left(0;\frac{2}{3}\right)$ D)$\left(-\frac{1}{2};0\right)$ E)$\left(-\frac{1}{2};1\right)$

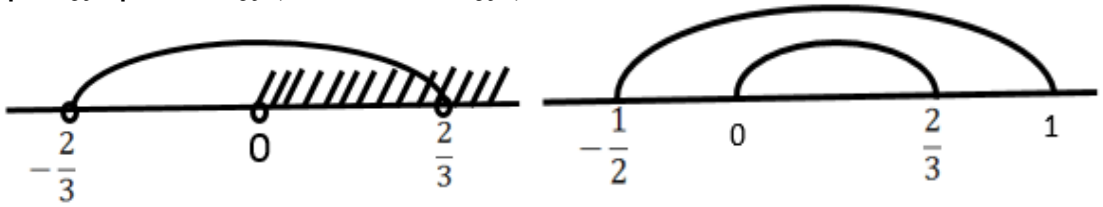
Yechilishi: 1$\begin{cases}1-a>0\\2>0\\1+2a>0\end{cases}\Rightarrow$



$\Rightarrow \begin{cases}a<1\\a>-\frac{1}{2}\end{cases}\Rightarrow$  $\Rightarrow \left(-\frac{1}{2};1\right)$.

2) Uchburchak ikki tomoni yig‘indisini uchunchi tomondan katta.

$\begin{cases}1-a+2>1+2a\\2+1+2a>1-a\\1+2a+1-a>2\end{cases}\Rightarrow\begin{cases}3a<2\\3a>-2\\a>0\end{cases}\Rightarrow\begin{cases}a<\frac{2}{3}\\a>-\frac{2}{3}\end{cases}\Rightarrow$

$\Rightarrow$ 

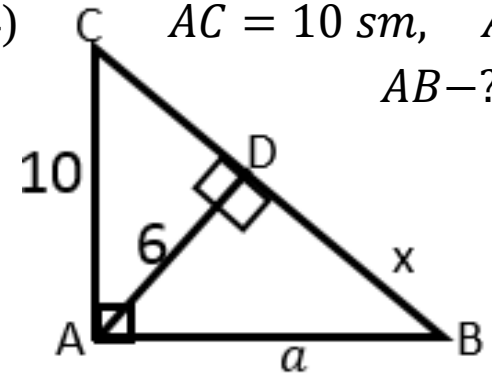
1) va 2) dan $\left(0;\frac{2}{3}\right)$

Javobi: C.

Pirnazar DAVRONOV

(1996-9-34) $AC = 10\ sm, \quad AD = 6\ sm.$

$AB-?$



A) 9 B) 7 C) 6,5 D) 7,5 E) 8

Yechilishi: 1) Misr uchburchagidan 8 topiladi;

2) $6^2 = 8 \cdot x \Rightarrow x = \frac{36}{8} = 4{,}5;$

$a^2 = (8 + 4{,}5)^2 - 10^2 = 56{,}25;$

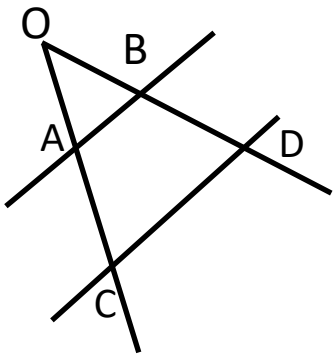
$a = 7{,}5.$ Javobi: D.

(1996-9-38)

AB||CD, OA=5 sm,

OB=4sm, OD=9sm

OC=?



A) 10,8 B) 10,5 C) 11,25 D) 11,3 E) 11

Yechilishi: 1)uchburchak biror tomoniga parallel to‘g‘ri chiziq chiziqlar bilan kesilsa, o‘xshash uchburchaklar hosil bo‘ladi.

Kattaning nisbati kichikka:

$\frac{CO}{AO} = \frac{DO}{BO} \Rightarrow \frac{CO}{5} = \frac{9}{4} \Rightarrow CO = 11{,}25.$ Javobi: C.

(1996-9-89) To‘g‘ri burchakli uchburchak gipotenuzasi 50 sm. Katta katetning gipotenuzadagi proyeksiyasi 32sm. Shu uchburchakning yuzini toping.

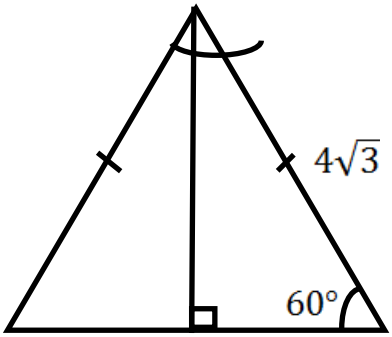
A) 1200 B) 576 C) 300 D) 600 E) 800

Yechilishi: Misr uchburchagidan foydalanish qulay: $S = \frac{1}{2} \cdot a \cdot b = \frac{1}{2} \cdot 30 \cdot 40 = 600.$ Javobi: D.

(1996-9-90) Yon tomoni $4\sqrt{3}$, uchidagi burchagi $60°$ ga teng bo‘lgan teng yonli uchburchakka ichki chizilgan aylananing radiusini toping.

A) $2\sqrt{3}$ B) 4 C) 2 D)$\sqrt{3}$ E) 1

Yechilishi: Uchidagi burchagi $60°$ bo‘lgan uchburchak muntazam uchburchak bo‘ladi.



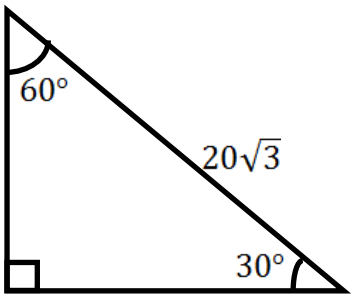
$r = \frac{a\sqrt{3}}{6} = \frac{4\sqrt{3} \cdot \sqrt{3}}{6} = 2.$

Javobi: C.

(1996-9-102) Tekislikka tushirilgan og‘ma bilan perpendikulyar orasidagi burchak $30°$, og‘maning uzunligi $20\sqrt{3}$. Perpendikulyarning uzunligini toping.

A) 10 B) 40 C) $10\sqrt{3}$ D) $5\sqrt{3}$ E) 20

Yechilishi:

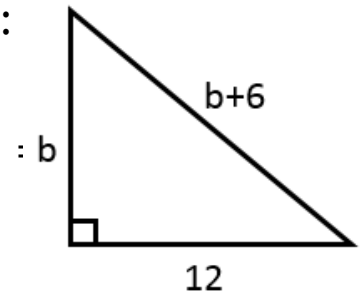


$h = \frac{c}{2} = 10\sqrt{3}.$

Javobi: C.

(1996-10-42) To‘g‘ri burchakli uchburchak katetlaridan biri 12 sm, gipotenuzasi ikkinchi katetdan 6 sm uzun. Gipotenuzaning uzunligini toping.

A) 15 B) 25 C) 26 D) 18 E) 32

Yechilishi: 

1) $(b+6)^2 = b^2 + 12^2 \Rightarrow$

$\Rightarrow b^2 + 12b + 36 = b^2 + 44$

$\Rightarrow 12b = 108 \Rightarrow b = 9 \Rightarrow$

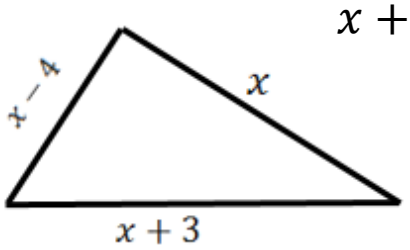
$\Rightarrow c = b + 6 = 15.$

2)Misir uchburchagiga asosan $a = 12$ ekanligidan,

$b = 9,\ \ c = 15$ bo′lishi ma'lum. Javobi: A.

(1996-11-18) Uchburchakning birinchi tomoni $x, (x > 7)\ sm$, ikkinchi tomoni undan 4 sm qisqa, uchuinchi tomoni esa birinchisidan 3 sm uzun. Shu uchburchakning perimetrini toping.

A)$3x - 1$ B)$3x + 4$ C)$3x - 3$ D)$3x + 7$ E)$3x - 4$

Yechilishi: 

$x + x + 3 + x - 4 = 3x - 1.$

Javobi: A.

(1996-11-40) Uchburchakning tomonlari 7; 5 va 6 m. 5 m li tomonning 7m li tomondagi proeksiyasi necha m?

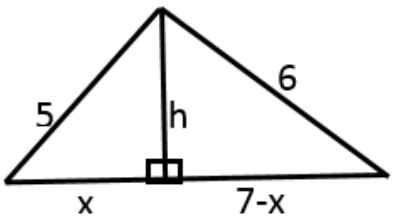
A) $2\frac{5}{7}$ B) $2\frac{5}{6}$ C) $2\frac{4}{5}$ D) $2\frac{2}{3}$ E) $2\frac{1}{3}$

Yechilishi: $\begin{cases} h^2 = 5^2 - x^2 \\ h^2 = 6^2 - (7-x)^2 \end{cases} \Rightarrow$

$\Rightarrow 5^2 - x^2 = 6^2 - (7-x)^2 \Rightarrow$

$\Rightarrow 25 - x^2 = 36 - 49 + 14x - x^2 \Rightarrow$

$\Rightarrow 14x = 38 \Rightarrow x = 2\frac{5}{7}.$

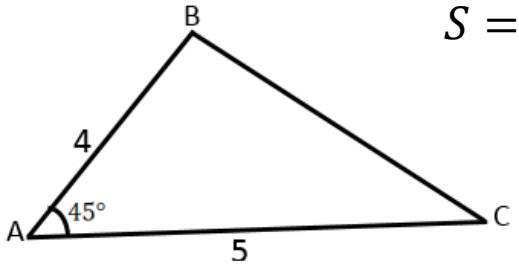


Javobi: A.

(1996-11-48) ABC uchburchakda AB=4 sm, AC= 5 sm va $\angle A = 45°$. Shu uchburchakning yuzi necha sm^2?

A) $3\sqrt{2}$ B)$\frac{3\sqrt{2}}{2}$ C) $4\sqrt{2}$ D)$\frac{3\sqrt{2}}{2}$ E) $5\sqrt{2}$

Yechilishi:



$$S = \frac{1}{2} \cdot a \cdot b \cdot sin\alpha = \frac{1}{2} \cdot 4 \cdot 5 \cdot sin45° = 10 \cdot \frac{\sqrt{2}}{2} = 5\sqrt{2}.$$

Javobi: E.

(1996-3-44) Uchlari $C\ (1;1),\ A\ (-2;3)$ va $B\ (-1;-2)$ nuqtalarda bo‘lgan uchburchakning A va C burchaklarini toping.

A)$45°; 90°$ B) $90°; 45°$ C) $30°; 90°$

D) $45°; 45°$ E) $90°; 30°$

Yechilishi: 1) $\overrightarrow{AB} = \{-2-1; 3-1\} = \{-3; 2\};$

$\left|\overrightarrow{AB}\right| = \sqrt{(-3)^2 + 2^2} = \sqrt{13};$

2) $\overrightarrow{AC} = \{-1-1; -2-1\} = \{-2; -3\};$

$\left|\overrightarrow{AC}\right| = \sqrt{(-2)^2 + (-3)^2} = \sqrt{13};$

3) $cos\left(\overrightarrow{AB}, \overrightarrow{AC}\right) = \frac{\overrightarrow{AB} \cdot \overrightarrow{AC}}{\left|\overrightarrow{AB}\right| \cdot \left|\overrightarrow{AC}\right|} = \frac{\{-3;2\} \cdot \{-2;-3\}}{\sqrt{13} \cdot \sqrt{13}} = \frac{6+(-6)}{13} =$

$0 \Rightarrow \angle A = 90° \Rightarrow \angle B = \angle C = 45°.$ Javobi: B.

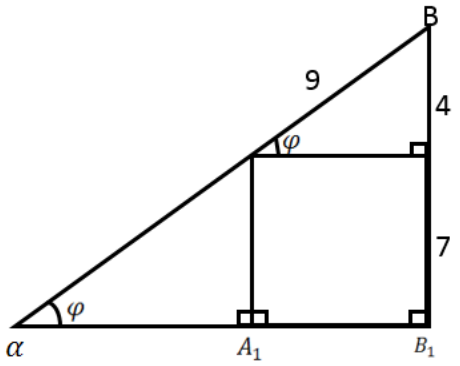
(1996-11-51) α tekislik va uni kesib o‘tmaydigan $AB = 9\ sm$ kesma berilgan. Agar kesmaning uchlaridan α tekislikkacha bo‘lgan masofalar $AA_1 = 7sm,\ \ BB_1 = 11\ sm$ bo‘lsa, AB kesma yotuvchi to‘g‘ri chiziqning α tekislik bilan tashkil qilgan burchak sinusini toping.

A) $\frac{5}{9}$ B)$\frac{1}{3}$ C)$\frac{2}{9}$ D)$\frac{3}{11}$ E)$\frac{4}{9}$

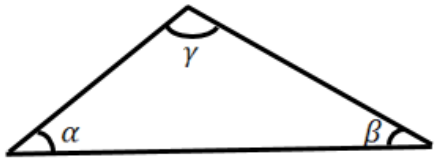
Yechilishi: $sin\varphi = \frac{4}{9}$;

1) to‘g‘ri chiziqlar parallel siljitilganda burchak kattaligi saqlanadi.

Javobi: E.



(1996-11-57) Uchburchakni ikkita burchagi yig‘indisining kosinusi $\frac{1}{4}$ ga teng. Uchinchi burchagining kosinusini toping.



A) $-\frac{1}{4}$ B)$\frac{1}{4}$ C)$\frac{\pi}{4}$ D)$-\frac{2}{3}$ E)$-\frac{1}{3}$

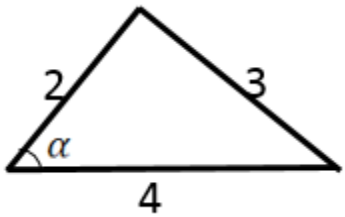
Yechilishi: $cos(\alpha+\beta) = \frac{1}{4}$;

$$\alpha+\beta+\gamma = 180° \Rightarrow$$

$$\Rightarrow \gamma = 180° - (\alpha+\beta) \Rightarrow$$

$$\Rightarrow cos\gamma = cos[180° - (\alpha+\beta)] = -\cos(\alpha+\beta) = -\frac{1}{4}.$$

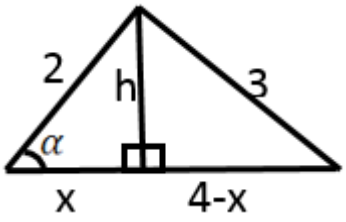
Javobi: A.

(1996-12-95) 

$tg\alpha - ?$

A) $\frac{\sqrt{137}}{11}$ B) 1,1 C) 2 D)$\frac{\sqrt{135}}{11}$ E)$\frac{\sqrt{15}}{11}$

Yechilishi: $\begin{cases} h^2 = 2^2 - x^2 \\ h^2 = 3^2 - (4-x)^2 \end{cases} \Rightarrow$



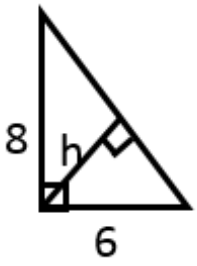
$\Rightarrow 4 - x^2 = 9 - 16 + 8x - x^2 \Rightarrow$

$\Rightarrow 8x = 11 \Rightarrow x = \frac{11}{8} \Rightarrow$

$\Rightarrow h^2 = 4 - \left(\frac{11}{8}\right)^2 = 4 - \frac{121}{64} \Rightarrow \frac{256-121}{64} = \frac{135}{64} \Rightarrow$

$\Rightarrow h = \frac{\sqrt{135}}{8} \Rightarrow tg\alpha = \frac{h}{x} = \frac{\sqrt{135}}{8} : \frac{11}{8} = \frac{\sqrt{135}}{11}$. Javobi: D.

(1996-13-35) $h-?$

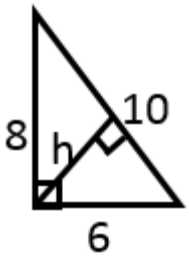


A) 4,8 B) 5 C) 4,5
D) 4,7 E) 4,9

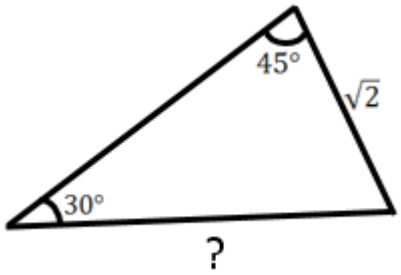
Yechilishi: $S = \frac{1}{2} \cdot a \cdot b = 24;$

$24 = \frac{1}{2} \cdot 10 \cdot h \Rightarrow h = \frac{24}{5} = 4{,}8.$

Javobi: A.



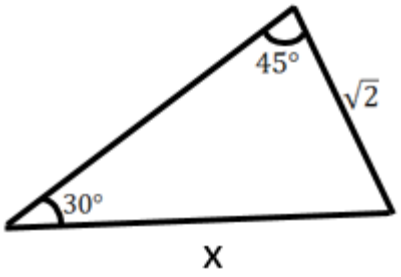
(1996-13-36)



A) $\sqrt{3}$ B) 2,5 C) 2 D) $\sqrt{5}$ E) 2,6

Yechilishi: Burchak va uning qarshisidagi tomon berilsa sinuslar teoremasidan foydalaniladi:

$\frac{x}{sin45°} = \frac{\sqrt{2}}{sin30°} \Rightarrow \frac{x}{\frac{\sqrt{2}}{2}} = \frac{\sqrt{2}}{\frac{1}{2}} \Rightarrow$



$\Rightarrow \frac{2x}{\sqrt{2}} = 2\sqrt{2} \Rightarrow x = 2.$

Javobi: C.

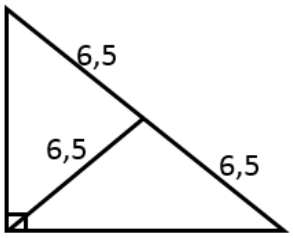
(1997-1-33) Uchburchak burchaklarning kattaliklari nisbati 1:1:2 kabi, katta tomonning uzunligi esa 13 ga teng. Uchburchakning katta tomoniga tushirilgan balandligini toping.

A) 6,5 B) 12 C) 8 D) 5 E) 10

Yechilishi: 1) Burchaklar nisbati x ga ko‘paytirilib, $180°$ ga tenglanadi.

$x + x + 2x = 180° \Rightarrow 4x = 180° \Rightarrow x = 45°;$

2) Demak, teng yonli to‘g‘ri burchakli uchburchak ekan.



3) To‘g‘ri burchakli uchburchakka tashqi chizilgan aylanaga qarang.

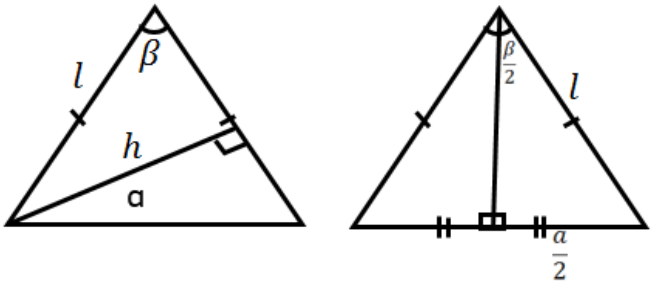
4) Bunda aylana markazi gipotenuzaning o‘rtasida yotadi.

5) Bunday holda gipotenuzaga tushirilgan balandlik aylana radiusi bo‘ladi. Javobi: A.

(1997-1-34) Teng yonli uchburchakning uchidagi burchagi β ga teng, yon tomoniga tushirilgan balandligi h ga teng. Uchburchakning asosini toping.

A) $\frac{h}{sin\frac{\beta}{2}}$ B) $\frac{h}{2sin\beta}$ C) $\frac{2h}{cos\frac{\beta}{2}}$ D) $\frac{h}{tg\beta}$ E) $\frac{h}{cos\frac{\beta}{2}}$

Yechilishi: Ikkita teng yonli uchburchak chizish orqali yechish qulay:



$\frac{h}{l} = sin\beta \Rightarrow l = \frac{h}{sin\beta} = \frac{h}{sin2.\frac{\beta}{2}} = \frac{l}{2sin\frac{\beta}{2}cos\frac{\beta}{2}};$

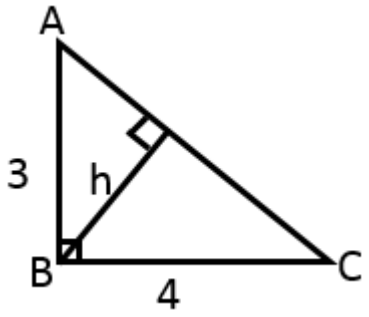
$\frac{a}{2} : l = sin\frac{\beta}{2} \Rightarrow a = 2l \cdot sin\frac{\beta}{2} =$

$= 2 \cdot \frac{h}{2sin\frac{\beta}{2} \cdot cos\frac{\beta}{2}} \cdot sin\frac{\beta}{2} = \frac{h}{cos\frac{\beta}{2}}.$ Javobi: E.

(1997-1-65) ABC uchburchakning B uchidan uchburchak tekisligiga perpendikulyar to‘g‘ri chiziq ’’b,, o‘ykazilgan. AB=3, BC=4. ’’b,, va AC tog‘ri chiziqlar orasidagi masofani toping.

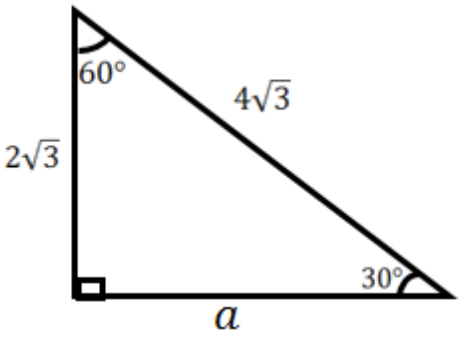
A) 1 B) 1,2 C) 1,5 D) 2,4 E) 2,5

Yechilishi: So‘ralayotgan masofa B nuqtadan gipotenuzaga tushirilgan balandlikka teng.



Javobi: D.

(1997-1-69) Kichik tomoni $2\sqrt{3}$ ga teng bo‘lgan uchburchakning burchaklari 1:2:3 kabi nisbatda bo‘lsa, uchburchakning perimetrini toping.



A) $8 + 3\sqrt{3}$ B) $3(2 + \sqrt{3})$

C) $11\sqrt{3}$ D) $9 + 4\sqrt{3}$ E) $6 + 6\sqrt{3}$

Yechilishi: Berilgan nisbatdan burchaklar kattaliklari topiladi.

$\frac{a}{4\sqrt{3}} = cos30° \Rightarrow a = 4\sqrt{3} \cdot \frac{\sqrt{3}}{2} = 6;$

$P = 6 + 2\sqrt{3} + 4\sqrt{3} = 6 + 6\sqrt{3}.$

Javobi: E.

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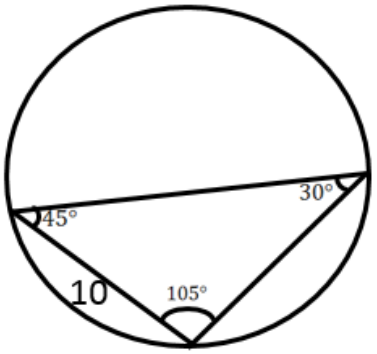
(1997-1-71) Bir tomoni 10, unga yopishgan burchaklari 105 va 45 gradus bo‘lgan uchburchakka tashqi chizilgan aylananing radiusini toping.

A) 5 B) 10 C) 15
D) 20 E) 25



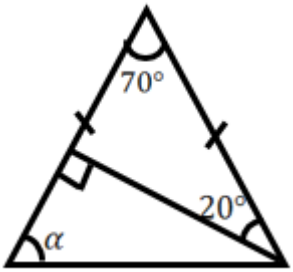
Yechilishi: $\frac{10}{sin30°} = 2R \Rightarrow$

$\Rightarrow 2R = \frac{10}{\frac{1}{2}} \Rightarrow 2R = 20 \Rightarrow$

$\Rightarrow R = 10$. Javobi: B.

(1997-1-28) Teng yomli uchburchakning yon tomoniga tushirilgan balandligi bilan ikkinchi yon tomoni orasidagi burchak $20°$ ga teng. Teng yonli uchburchaning asosidagi burchagini toping.

A) $50°$ B) $48°$ C) $55°$
D) $58°$ E) $65°$



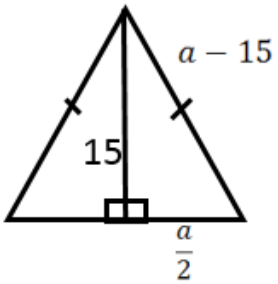
Yechilishi:

$\Rightarrow \alpha = 55°$. Javobi: C.

(1997-1-29) Teng yonli uchburchakning balandligi 15 ga teng. Yon tomoni asosidan 15 ga kam. Shu uchburchakning asosini toping.

A) 20 B) 40 C) 30 D) 24 E) 32

Yechilishi:



$\left(\frac{a}{2}\right)^2 + 15^2 = (a-15)^2 \Rightarrow$

$\Rightarrow \frac{a^2}{4} + 225 = a^2 - 30a + 225 \Rightarrow a^2 - \frac{a^2}{4} - 30a = 0 \Rightarrow$

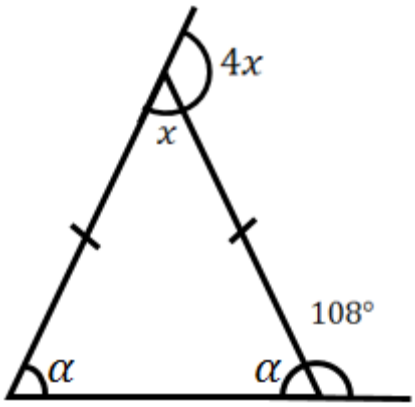
$\Rightarrow 3a^2 - 120a = 0 \Rightarrow \ a_1 = 0; \quad a_2 = 40;$

Tomon nol bo‘lishi mumkin emas, shuning uchun $a = 40$.
Javobi: B.

(1997-2-18) Teng yonli uchburchakning uchidagi burchagi o‘sha uchdagi ichki burchagidan 4 marta katta. Uchburchkning asosidagi tashqi burchagi necha gradus?

A) 100 B) 102 C) 96 D) 108 E) 104

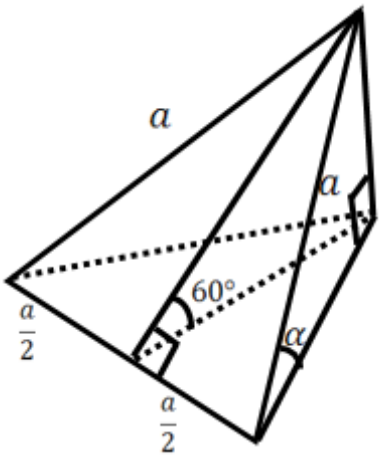
Yechilishi: $4x + x = 5x \Rightarrow$
$\Rightarrow 5x = 180° \Rightarrow x = 36°;$
$2\alpha = 180° - x \Rightarrow$
$\Rightarrow 2\alpha = 180° - 36° \Rightarrow$
$\Rightarrow 2\alpha = 144 \Rightarrow \alpha = 72°.$
$180° - 72° = 108°.$
Javobi: D.



(1997-1-64) Muntazam ABC uchburchakning AC tomoni orqali tekislik o‘tkazilgan. Uchburchakning BD medianasi tekislik bilan 60° li burchak tashkil etadi. AB to‘g‘ri chiziq bilan tekislik orasidagi burchakning sinusini toping.

A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{3}{4}$ D) $\frac{\sqrt{3}}{2}$ E) $\frac{\sqrt{2}}{2}$

Yechilishi: 1) to‘gri burchakli uchburchak ADB
dan $BD^2 = a^2 - \left(\frac{a}{2}\right)^2 = \frac{3a^2}{4} \Rightarrow$
$\Rightarrow BD = \frac{a\sqrt{3}}{4} \Rightarrow BD = \frac{a\sqrt{3}}{2};$
2) to‘gri burchakli uchburchak BED dan
$\frac{BE}{BD} = sin60° \Rightarrow BE = \frac{a\sqrt{3}}{2} \cdot \frac{\sqrt{3}}{2} = \frac{3a}{4};$



3) to‘gri burchakli uchburchak AEB dan $\frac{BE}{AB} = sin\alpha \Rightarrow$

$\Rightarrow \frac{3a}{4} : a = sin\alpha \Rightarrow sin\alpha = \frac{3}{4}$. Javobi: C.

(1997-2-40) Uchburchak tomonlarining uzunliklari m, n va k, $m^2 = n^2 + k^2 + \sqrt{2}nk$ tenglikni qanoatlantiradi. Uzunligi m ga teng.tomon qarshisidagi burchakni toping.

A) 45° B) 150° C) 120° D) 90°

E) 135°

Yechilishi: 1) Kosinuslar teoremasidan foydalaniladi:

$$-\begin{cases} m^2 = n^2 + k^2 + \sqrt{2}nk \\ m^2 = n^2 + k^2 - 2nkcos\alpha \end{cases} \Rightarrow$$

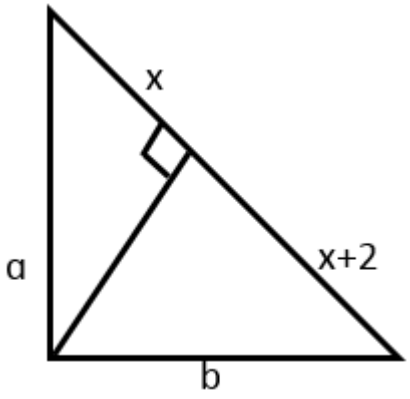
$\Rightarrow 0 = 0 + 0 + \sqrt{2}nk + 2nkcos\alpha \Rightarrow 2nkcos\alpha = -\sqrt{2}nk \Rightarrow$

$\Rightarrow cos\alpha = -\frac{\sqrt{2}}{2} \Rightarrow \alpha = 135°$. Javobi: E.

(1997-3-45) Katetlarining nisbati 3:2 kabi bo‘lgan to‘g‘ri burchakli uchburchakning balandligi gipotenuzani uzunliklaridan biri ikkinchisinikidan 2 ga ko‘p bo‘lgan ikki qismga ajratadi. Berilgan uchburchakning gipotenuzasini toping.

A) 5,2 B) 4,8 C) 6

D) 8 E) 7,6



Yechilishi: 1) $\frac{a}{b} = \frac{3}{2} \Rightarrow a = \frac{3}{2} \cdot b$;

2) $\begin{cases} a^2 = (x+2)(2x+2) \\ b^2 = x \cdot (2x+2) \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} \left(\frac{3}{2}b\right)^2 = (x+2)(2x+2) \\ b^2 = x \cdot (2x+2) \end{cases} \Rightarrow \frac{9}{4} \cdot x \cdot (2x+2) =$$

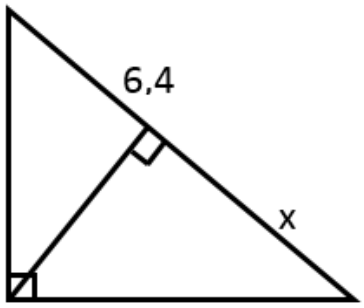
$= (x+2)(2x+2) \Rightarrow 9x = 4x + 8 \Rightarrow 5x = 8 \Rightarrow x = \frac{8}{5};$

$c = 2x + 2 = 2 \cdot \frac{8}{5} + 2 \Rightarrow \frac{16}{5} + 2 = 5{,}2.$ Javobi: A.

(1996-1-36) To‘g‘ri burchakli uchburchak kateti 8 sm, uning gipotenuzadagi proeksiyasi esa 6,4 sm. Shu uchburchakning yuzasi necha sm²?

A) 25,6 B) 48 C) 51,2 D) 24 E) 18

Yechilishi: 1) Misr uchburchagidan S = 24.



2)$8^2 = 6{,}4(6{,}4 + x) \Rightarrow$

$\Rightarrow 6{,}4 + x = \frac{64}{6{,}4} \Rightarrow$

$\Rightarrow x = 10 - 6{,}4 = 3{,}6;$

$c = 6{,}4 + 3{,}6 = 10.\ S = \frac{1}{2} \cdot a \cdot b = \frac{1}{2} \cdot 6 \cdot 8 = 24.$

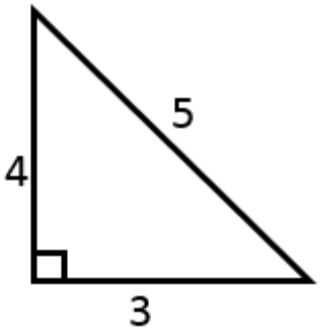
Javobi: D.

(1996-1-39) Muntazam uchburchakning balandligi 9 sm. Uchburchakka ichki chizilgan aylananing radiusini toping.

A) 6 B) 4,5 C) 3 D) 2,5 E) 5

Yechilishi: $r = \frac{1}{3} \cdot h = \frac{1}{3} \cdot 9 = 3.$ Javobi: C.

(1996-3-103) To‘g‘ri burchakli uchburchakning gipotenuzasi 5 sm, katetlardan birining gipotenuzadagi proeksiyasi 1,8 sm. Ushbu uchburchakka ichki chizilgan aylananing radiusini toping.



A) 1,2 B) 1 C) 1,5 D) 2 E) 1,6

Yechilishi: 1) Misr uchburchagidan:

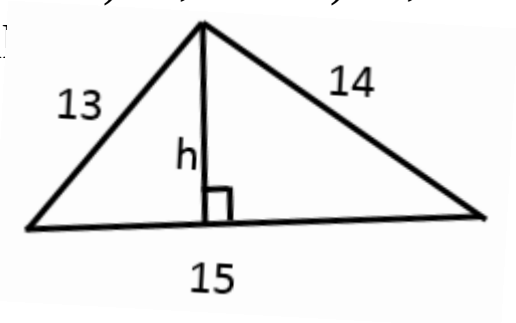
$S = \frac{1}{2} \cdot 3 \cdot 4 = 6;$

$r = \frac{2S}{a+b+c} = \frac{2 \cdot 6}{3+4+5} = 1$ yoki $r = \frac{a+b-c}{2} = \frac{3+4-5}{2} = 1.$

Javobi: B.

(1996-3-104) Tomonlari 13; 14 va 15 sm bo‘lgan uchburchakning eng kichik balandligi necha sm?

A) 11,2 B) 11,1 C) 11 D) 11,5 E) 11,6



Yechilishi: Eng kichik balandlik eng katta tomonga tushadi;

Geron formulasidan uchburchak yuzi topiladi.

$P = \frac{13+14+15}{2} = 21;$

$S = \sqrt{21(21-13)(21-14)(21-15)} =$

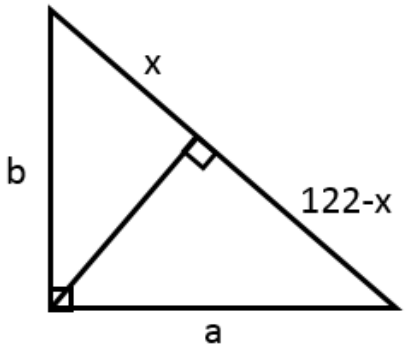
$\sqrt{21 \cdot 8 \cdot 7 \cdot 6} =$

$= \sqrt{3 \cdot 7 \cdot 2^3 \cdot 7 \cdot 2 \cdot 3} = \sqrt{2^4 \cdot 3^2 \cdot 7^2} = 4 \cdot 3 \cdot 7 = 84;$

$S = \frac{1}{2} \cdot a \cdot h \Rightarrow 84 = \frac{1}{2} \cdot 15 \cdot h \Rightarrow h = 11{,}2.$

Javobi: A.

(1996-7-45) To‘g‘ri burchakli uchburchakning katetlari 5:6 kabi nisbatda, gipotenuzasi esa 122 ga teng. Gipotenuzaning kesim ajratgan kesmalarini toping.



A) 45 va 72 B) 42 va 80 C) 50 va 72

D) 32 va 90 E) 60 va 62

Yechilishi: $\frac{b}{a} = \frac{5}{6} \Rightarrow b = \frac{5}{6}a;$

$$\begin{cases} b^2 = 122 \cdot x \\ a^2 = (122 - x) \cdot 122 \end{cases} \Rightarrow \begin{cases} \left(\frac{5a}{6}\right)^2 = 122 \cdot x \\ a^2 = (122 - x) \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} \frac{25a^2}{36} = 122 \cdot x \\ a^2 = 122(122 - x) \end{cases} \Rightarrow \frac{25}{36} \cdot 122(122 - x) = 122 \cdot x \Rightarrow$$

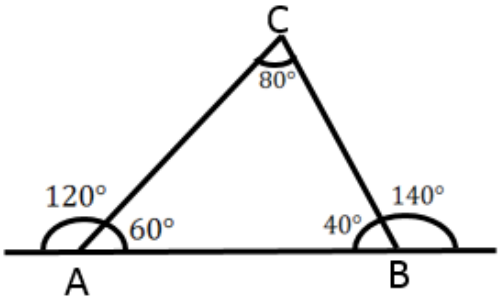
$\Rightarrow 25 \cdot 122 - 25x = 36x \Rightarrow x = 50 \Rightarrow 122 - 50 = 72.$

Javobi: C.

(1996-6-18) ABC uchburchakda A uchidagi tashqi burchagi $120°$ ga, C uchidagi ichki burchagi $80°$ ga teng. B uchidagi tashqi burchakni toping.

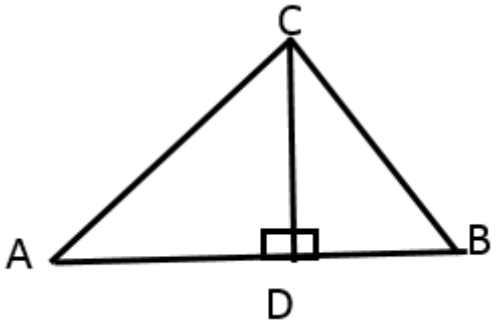
A) $160°$ B) $150°$ C) $130°$ D) $120°$ E) $140°$

Yechilishi:



Javobi: E.

(1996-7-37) Perimetri 24 bo‘lgan uchburchak balandligi uni perimetrlari 14 va 18 bo‘lgan ikkita uchburchakka ajratadi. Berilgan uchburchakning balandligini toping.



A) 10 B) 8 C) 6 D) 4 E) 3

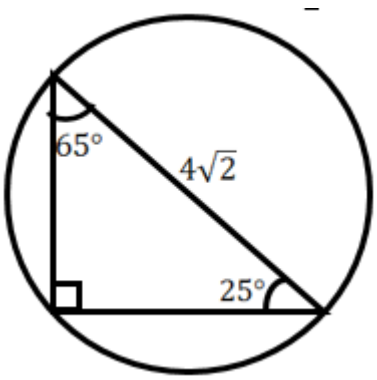
Yechilishi: $AB + BC + AC = 24$

$$\begin{cases} AC + AD + CD = 14 \\ DB + BC + CD = 18 \end{cases} \Rightarrow$$

$\Rightarrow BC + AC + AD + BD + 2CD = 32;$

$AB + AC + BC + 2CD = 32 \Rightarrow CD = 4.$ Javobi: D.

(1996-7-39) Uchburchak ikkita burchagi $25°$ va $65°$ katta tomoni $4\sqrt{2}$ ga teng. Uchburchakka tashqi chizilgan aylana radiusini toping.



A) 4 B) 2 C) $2\sqrt{2}$

D) $3\sqrt{2}$ E) $\frac{3\sqrt{2}}{2}$

Yechilishi: Aylanaga tashqi chizilgan to‘g'ri burchakli uchburchakka asosan: $R = 2\sqrt{2}$;

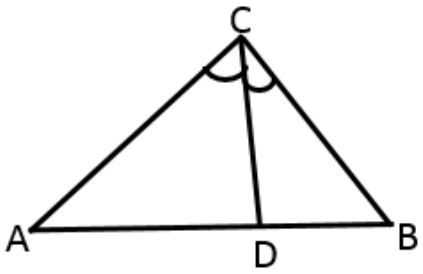
Javobi: C.

(1997-3-37) Perimetri 30 bo‘lgan uchburchakning bissekrissasi uni perimetrlari 16 va 24 bo‘lgan uchburchaklarga ajratadi. Berilgan uchburchakning bissektrissasini toping.

A) 6 B) 8 C) 10 D) 7 E) 5

Yechilishi: $AB + BC + AC = 30$;

$$\begin{cases} AC + AD + CD = 24 \\ DB + BC + CD = 16 \end{cases} \Rightarrow$$

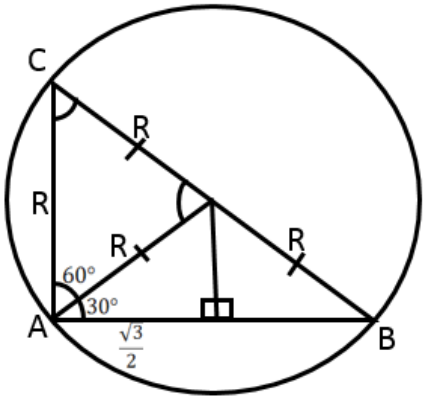


$\Rightarrow BC + AC + AD + DB + 2CD = 40;$

$AC + AB + BC + 2CD = 40 \Rightarrow$

$\Rightarrow CD = 5.$ Javobi: E.

(1997-4-47) ABC uchburchakda AD mediana AB va AC tomonlar bilan mos ravishda $30°$ li va $60°$ li burchaklar hosil qiladi. Agar $AB = \sqrt{3}$ bo‘lsa. AC ni toping.



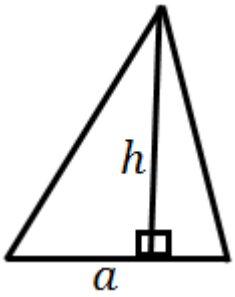
A) 1 B) $\frac{\sqrt{3}}{2}$ C) $\frac{\sqrt{3}}{3}$

D) $1\frac{1}{2}$ E) $1\frac{1}{3}$

Yechilishi: $\frac{\sqrt{3}}{2} : R = cos30° \Rightarrow \sqrt{3} = 2R \cdot \frac{\sqrt{3}}{2}$;

$R = 1$. Javobi: A.

(1997-4-55) Agar uchurchaking asosi 20% uzaytirilib, balandligi 20% qisqrtirilsa, uning yuzi qanday o‘zgaradi.

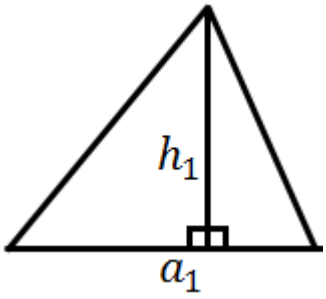


A) o‘zgarmaydi B) 4 % kamayadi C) 4% ortadi

D) 6 % kamayadi E) 6% ortadi

Yechilishi: $a_1 = \frac{100+20}{100} \cdot a = 1{,}2a$;

$h_1 = \frac{100-20}{100} \cdot h = 0{,}8h$;

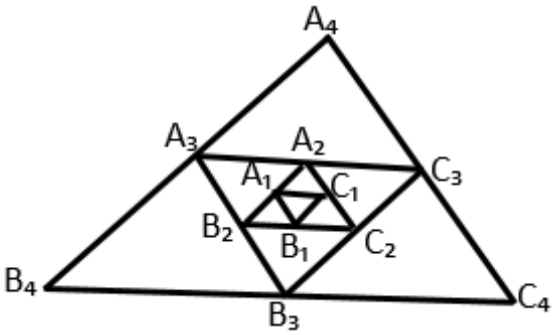


$S = \frac{1}{2} a \cdot h$; $S_1 = \frac{1}{2} \cdot a_1 \cdot h_1 =$

$= \frac{1}{2} \cdot 1{,}2a \cdot 0{,}8h = 0{,}96 \cdot \frac{1}{2} \cdot ah =$

$= 0{,}96 \cdot S$. Javobi: B.

(1997-4-44) Perimetri 1 bo‘lgan $A_1B_1C_1$ uhburchak $A_2B_2C_2$ uchburchakning tomonlari o‘rtasini, $A_2B_2C_2$ uchburchak $A_3B_3C_3$ uchburchakning tomonlari o‘rtasini , $A_3B_3C_3$ esa $A_4B_4C_4$ uchburchak tomonlari o‘rtasini tutashtirsa, $A_4B_4C_4$ uchburchakning perimetri qancha bo‘ladi?

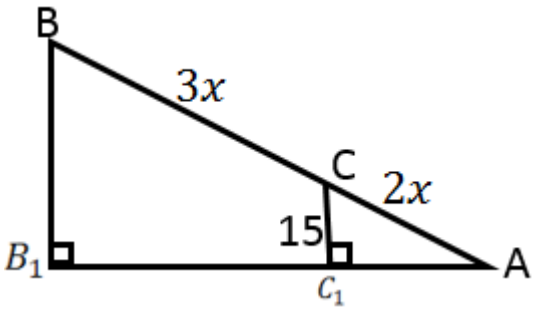


A) 3 B) 5 C) 4 D) 6 E) 8

Yechilishi: Uchburchak o‘rta chizig‘ining asosga parallel va uning yarmiga teniligidan: P= 8. Javobi: E.

Pirnazar DAVRONOV

(1997-5-51) AB kesmaning A oxiridan tekislik o‘tkazilgan. Shu kesmaning B oxiridan va C nuqtasidan tekislikni B_1 va C_1 nuqtalarda kesuvchi parallel to‘g'ri chiziqlar o‘tkazilgan. Agar $CC_1 = 15$ va $AC:BC = 2:3$ bo‘lsa, BB_1 kesmaning uzunligini toping.



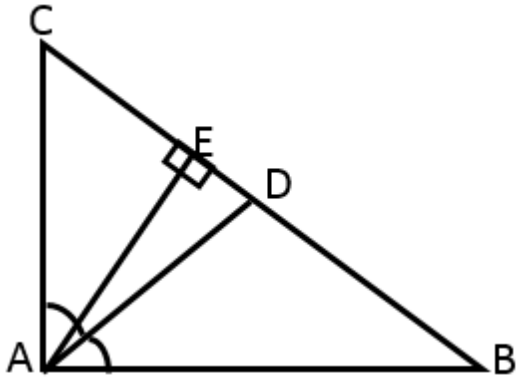
A) 10 B) 25,5 C) 37,5 D) 30,5 E) 30

Yechilishi: Kattasining kichikka nisbati olinadi.

$\frac{BB_1}{15} = \frac{5x}{2x} \Rightarrow BB_1 = 37{,}5.$

Javobi: C.

(1997-5-54) To‘g'ri burchakli uchburchak to‘g'ri burchagining bissektrissasi gipotenuzani 1:2 nisbatda bo‘ladi.Uchburchakning balandligi gipotenuzani qanday nisbatda bo‘ladi?



A) 2:1 B) 1:2 C) 3:1

Yechilishi: $\frac{CD}{DB} = \frac{1}{2}$; $\frac{CE}{EB} = ?$

1) bissektrissaning xossasidan foyalanamiz: $\frac{AC}{AB} = \frac{CD}{DB} = \frac{1}{2}$;

2) $\begin{cases} AC^2 = CE \cdot BC \\ AB^2 = BE \cdot BC \end{cases} \Rightarrow$

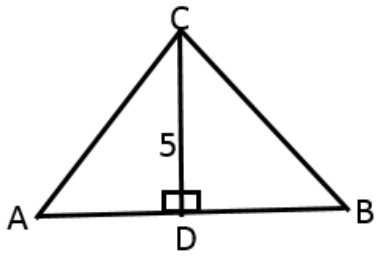
$\Rightarrow \frac{AC^2}{AB^2} = \frac{CE \cdot BC}{BE \cdot BC} \Rightarrow \left(\frac{AC}{AB}\right)^2 = \frac{CE}{BE} \Rightarrow \frac{CE}{BE} = \left(\frac{1}{2}\right)^2 = 1:4.$

Javobi: E.

(1997-10 -37) Uchburchakning 5 ga teng bo‘lgan balandligi uni perimetrlari 18 va 26 bo‘lgan ikkita uchburchakka ajratdi. Berilgan uchburchakning perimetrini toping.

A) 29 B) 31 C) 34 D) 36 E) 39

Yechilishi: $\begin{cases} AC + AD + 5 = 18 \\ BC + DB + 5 = 26 \end{cases} \Rightarrow$



$\Rightarrow AC + BC + AD + DB + 10 = 44 \Rightarrow$

$\Rightarrow AC + BC + AB = 34.$

Javobi: C.

(1997-10-46) Yuzlari 8 va 32 bo‘lgan ikkita o‘xshash uchburchak perimetrlarining yig'indisi 48 ga teng. Kichik uchburchakning perimetrini toping.

A) 12 B) 16 C) 20 D) 9,6 E) aniqlab bo‘lmaydi

Yechilishi: $k^2 = \frac{32}{8} = 4 \Rightarrow k = 2, \quad P_1 + P_2 = 48 \Rightarrow$

$\Rightarrow P_1 = 48 - P_2; \quad k = \frac{P_1}{P_2} \Rightarrow 2 = \frac{48 - P_2}{P_2} \Rightarrow$

$\Rightarrow 2P_2 = 48 - P_2 \Rightarrow 3P_2 = 48 \Rightarrow P_2 = 16 \Rightarrow$

$\Rightarrow P_1 = 48 - 16 = 32.$ Javobi: B.

(1997-12-37) Uchburchakning yuzi 6 ga teng. Shu uchburchakning 3 va 8 ga teng tomonlari orsidagi burchaklarni toping.

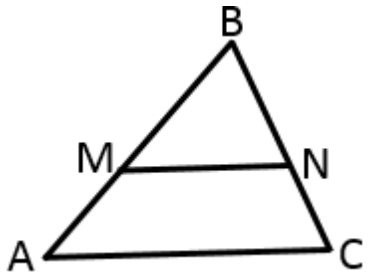
A) $30°$ B) $45°$ C) $60°$

D) $60°$ $yoki$ $120°$ E) $30°$ $yoki$ $150°$

Yechilishi: $S = \frac{1}{2} \cdot ab \cdot sin\alpha \Rightarrow 6 = \frac{1}{2} \cdot 3 \cdot 8 \cdot sin\alpha \Rightarrow$

$\Rightarrow sin\alpha = \frac{1}{2} \Rightarrow \alpha = 30°$ va $\alpha = 150°$. Javobi: E.

(1997-12-38) Rasmda MN||AC. MBN uchburchakning perimetri 42 sm, ABC uchburchakning perimetri 84 sm. MBN uchburchakning yuzi 27 sm^2. ABC uchburchakning yuzini toping.



A) 54sm^2 B)108sm^2 C)135sm^2 D) 81sm^2 E)162sm^2

Yechilishi: $k = \frac{P_1}{P_2} = \frac{84}{42} = 2$; $k^2 = \frac{S}{27} \Rightarrow \frac{S}{27} = 2^2 \Rightarrow$

$\Rightarrow S = 27 \cdot 4 = 108\ sm^2$. Javobi: B.

(1997-12-29) Muntazam uchburchakning balandligi 18 ga teng. Bu uchburchakka tashqi chizilgan aylananing radiusini toping.

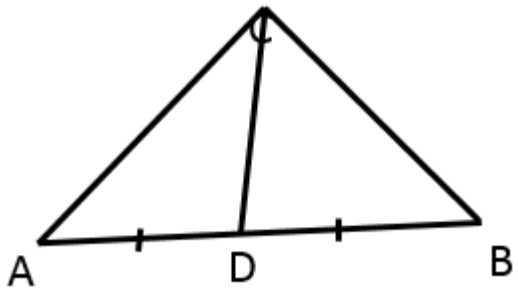
A) 8 B) 9 C) 13 D) 12 E) 10

Yechilishi: $R = \frac{2}{3} \cdot h = \frac{2}{3} \cdot 18 = 12$. Javobi: D.

(1997-7-37) Uchburchakning asosiga tushirilgan medianasi uni perimetrlari 18 va 24 ga teng bo‘lgan ikki uchburchakka ajratadi. Berilgan uchburchakning kichik yon tomoni 6 ga teng. Uning katta yon tomonnini toping.

A) 10 B) 12 C) 14 D) 9 E) 15

Yechilishi:



$\begin{cases} AC + AD + CD = 18 \\ DB + BC + CD = 24 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 6 + AD + CD = 18 \\ -\ AD + BC + CD = 24 \end{cases} \Rightarrow$

$\Rightarrow BC - 6 = 6 \Rightarrow BC = 12.$

Javobi: B.

(1997-7-38) Katetlaridan biri 8 ga teng bo‘lgan to‘g'ri burchakli uchburchak gipotenuzasining ikkinchi katetiga nisbati 5:3 ga teng. Uchburchakning yuzini toping.

A) 12 B) 15 C) 20 D) 24 E) 48

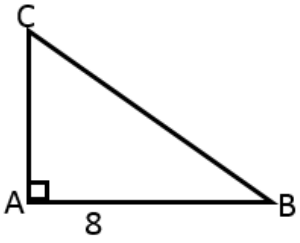
Yechilishi: $\frac{BC}{AC} = \frac{5}{3} \Rightarrow BC = \frac{5}{3} \cdot AC;$

$BC^2 = AC^2 + 8^2 \Rightarrow \left(\frac{5}{3}AC\right)^2 = AC^2 + 64 \Rightarrow$

$\Rightarrow 25AC^2 = 9AC^2 + 9 \cdot 64 \Rightarrow$

$\Rightarrow 16AC^2 = 9 \cdot 64 \Rightarrow AC = 6;$

$\Rightarrow S = \frac{1}{2} \cdot a \cdot b = \frac{1}{2} \cdot 8 \cdot 6 = 24.$



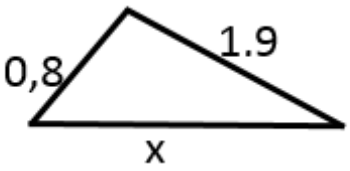
Javobi: D.

(1997-7-62) Tomoni 81 ga teng bo‘lgan teng tomonli uchburchakka tashqi chizilgan aylananing radiusini toping.

A)$27\sqrt{3}$ B)$28\sqrt{3}$ C)$23\sqrt{3}$ D)$24\sqrt{3}$ E)$27\sqrt{3}$

Yechilishi: $R = \frac{a\sqrt{3}}{3} = \frac{81\sqrt{3}}{3} = 27\sqrt{3}.$ Javobi: A.

(1997-7-64) Uchburchakning ikkita tomoni 0,8 va 1,9 ga teng. Uchinchi tomonining uznligi butun son ekanligini bilgan holda shu tomonni toping.

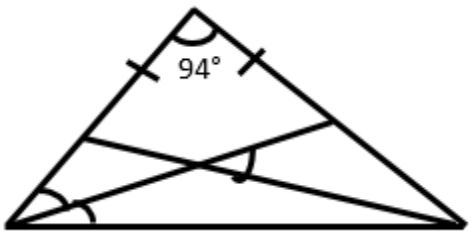


A) 1 B) 2 C) bunday tomon yo‘q D) 3 E) 4

Yechilishi: $0{,}8 + 1{,}9 > x \Rightarrow$

$\Rightarrow x < 2{,}7 \Rightarrow x = 2.$ Javobi: B.

(1997-6-28) Teng yonli uchburchakning uchidagi burchagi 94°. Asosidagi burchaklarning bissektrissalari



kesishishidan hosil bo‘lgan o‘tkir burchakni toping.

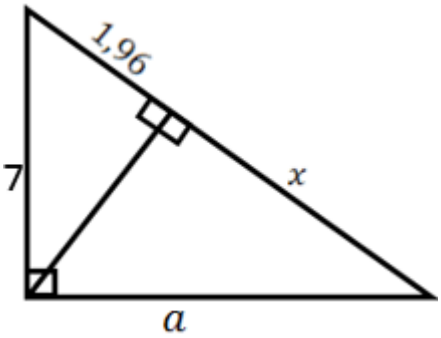
A) 137° B) 43° C) 48° D) 47° E) aniqlab bo‘lmaydi

Yechilishi: $\frac{180°-94°}{2} = 43°$. Javobi: B.

(1997-6-32) To‘g'ri burchakli uchburchakning kateti 7 ga, uning gipotenuzadagi proeksiyasi 1,96 ga teng. Ikkinchi katetning uzunligini toping.

A) 12 B) 16 C) 24 D) 15 E) 26

Yechilishi:



$7^2 = 1{,}96 \cdot (1{,}96 + x) \Rightarrow$

$\Rightarrow 49 = 1{,}96 \cdot 1{,}96 + 1{,}96x \Rightarrow$

$\Rightarrow 1{,}96x = 49 - 3{,}8416 \Rightarrow$

$\Rightarrow 1{,}96x = 45{,}1584 \Rightarrow x = 23{,}04;$

$c = 1{,}96 + 23{,}04 = 25;$ $a^2 = 23{,}04 \cdot 25 \Rightarrow a^2 = 576 \Rightarrow$

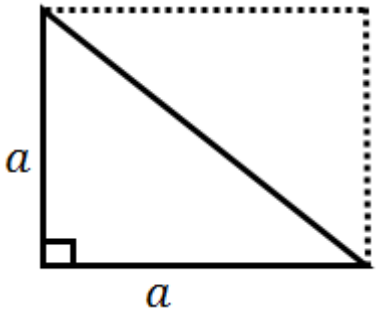
$\Rightarrow a = 24.$ Javobi: C.

(1997-9-113) Teng yonli to‘g'ri burchakli uchburchakning yuzi 8 ga teng bo‘lsa, shu uchburchakka tashqi chizilgan aylana uzunligini toping.

A) 4π B) $3\sqrt{2}\pi$ C) $4\sqrt{2}\pi$ D) 3π E) 5π

Yechilishi: $S_\Delta = \frac{1}{2}a^2 \Rightarrow 8 = \frac{1}{2} \cdot a^2 \Rightarrow$

$\Rightarrow a = 4 \Rightarrow d = 4\sqrt{2}.$



1) Kvadratga asosan $R = \frac{d}{2} = 2\sqrt{2};$

$l = 2\pi R = 2\pi \cdot 2\sqrt{2} = 4\sqrt{2}\pi.$

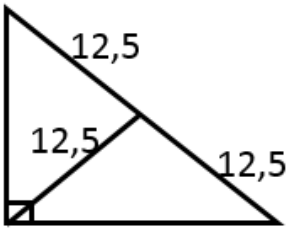
Javobi: C.

(1997-11-33) Burchaklarining kattaliklari nisbati 9:5:4 kabi bo‘lgan uchburchakning katta tomoniga tushirilgan

43°
137°

medianasi 12,5 ga teng. Uchburchakning katta tomonini toping.

A) 20 B) 16 C) 25 D) 32 E) 26



Yechilishi: $9x + 5x + 4x = 180° \Rightarrow$

$\Rightarrow x = 10°; \quad c = 25.$

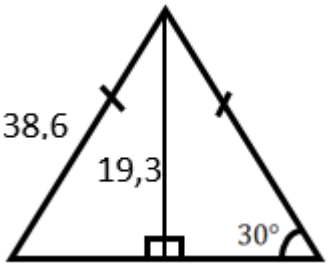
Javobi: C.

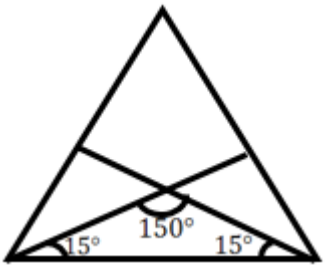
(1997-11-28) Teng yonli uchburchakning yon tomoni 38,6 ga, asosiga tushirilgan balandligi esa 19,3 ga teng. Asosidagi burchaklarning bissektrisalari kesishishidan hosil bo‘lgan o‘tmas burchakni toping.

A) $110°$ B) $120°$ C) $135°$ D) $140°$ E) $150°$

Yechilishi:

Javobi: E





Parallelogramm

(1996-3-102) $ABCD$ parallelogrammda

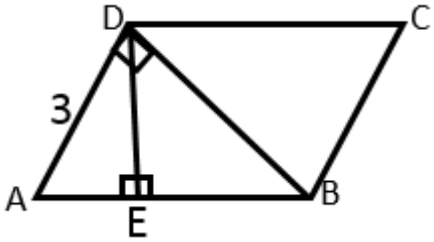
$AD = 3sm, \ S_{ABCD} = 12sm^2. \quad DE - ?$

A) 2cm B)2,2 sm C) 2,3sm D) 2,1sm E) 2,4sm

Yechilishi: $6 = \frac{1}{2} \cdot 3 \cdot BD \Rightarrow BD =$

$= 4 \Rightarrow AB = 5 \Rightarrow DE = \frac{AD \cdot BD}{AB} =$

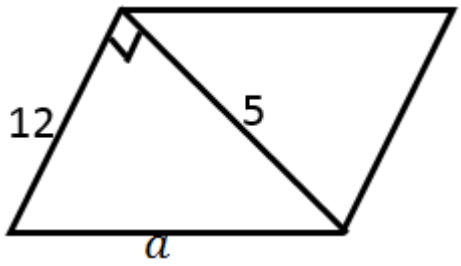
$= \frac{3 \cdot 4}{5} = 2{,}4.$ Javobi: E.



Pirnazar DAVRONOV

(1996-7-44) Parallelogrammning 5 ga teng bo‘lgan diagonali uning 12 ga teng bo‘lgan tomoniga perpendikulyar. Paralelogrammning perimetrini toping.

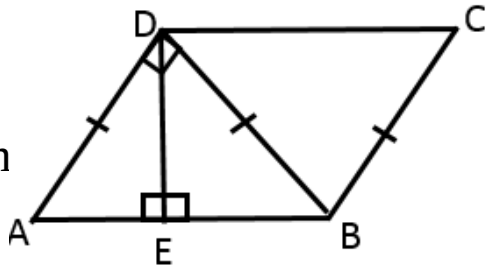
A) 50 B) 34 C) 100 D) 48 E) 68



Yechilishi: $a^2 = 12^2 + 5^2 = 169$
$\Rightarrow a = 13;\ P = 2(a+b) =$
$= 2(12+13) = 50.$

Javobi: A.

(1996-9-36) $ABCD$ paralelogrammda $AD = DB,\ S_{ABCD} = 32sm^2,$ bo‘lsa $DE-?$

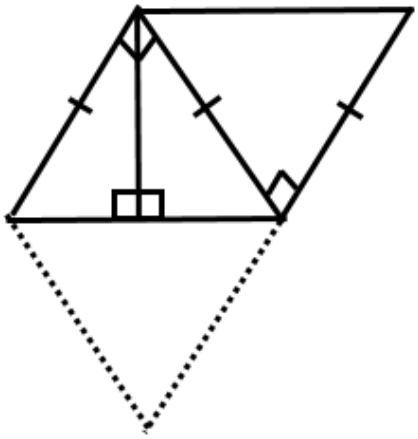


A) 4cm B)4,5 sm C) 3sm
D) 3,5sm E) 5sm

Yechilishi: $a^2 = 32 \Rightarrow a = 4\sqrt{2};$
$d = a\sqrt{2} = 8 \Rightarrow h = 4.$

Javobi: A.

(1996-9-97) Parallelogrammning diagonallari 6 sm va 8 sm, ular orasidagi burchak $30°$. Parallelogrammning yuzini toping.

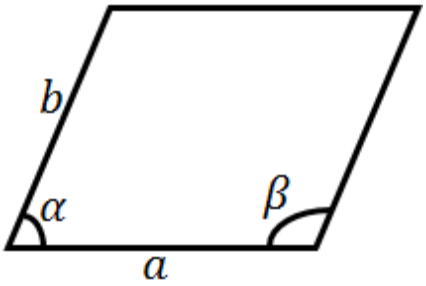


A) 48 B) 24 C) $24\sqrt{3}$
D) 12 E) $12\sqrt{3}$

Yechilishi: $S = \frac{1}{2}d_1d_2 \cdot sin\alpha = \frac{1}{2} \cdot 6 \cdot 8 \cdot sin30° = 12.$

Javobi: D.

(1997-1-30) Parallelogramm tomonlarining nisbati 3:5 kabi. Agar parallelogrammning perimetri 48 ga, burchaklaridan biri $120°$ ga teng bo‘lsa, uning yuzini toping.



A) 67,5 B) $\frac{135\sqrt{3}}{4}$ C) 48 D) $67{,}5\sqrt{3}$ E) $48\sqrt{3}$

Yechilishi: $\frac{b}{a}=\frac{3}{5}\Rightarrow b=\frac{3}{5}a$;

$P=48;\ \alpha+\beta=180°\Rightarrow$

$\Rightarrow \alpha+120°=180°\Rightarrow \alpha=60°;$

$2(a+b)=48\Rightarrow a+b=24\Rightarrow a+\frac{3}{5}a=24\Rightarrow$

$\Rightarrow 5a+3a=24\cdot 5\Rightarrow 8a=24\cdot 5\Rightarrow a=15\Rightarrow b=9;$

$S=ab\cdot sin\alpha=15\cdot 9\ sin30°=\frac{135\sqrt{3}}{2}=67{,}5\sqrt{3}.$

Javobi: A.

(1997-3-48) Parallelogramning diagonallari tomonlari bilan $20°$ va $50°$ li burchaklar tashkil qiladi. Parallelogrammning katta burchagini toping.

A) $100°$ B) $145°$ C) $130°$ D) $110°$ E) $135°$

Yechilishi: Parallelogrammda yonma-yon turgan burchaklar yig'indisi $180°$ ga teng. Javobi: D.

(1997-5-44) Parallellogramm burchaklaridan ikkitasining ayirmasi $70°$ga teng. Shu burchaklarni toping.

A) $45°; 115°$ B) $65°; 135°$ C) $75°; 105°$

D) $55°; 125°$ E) $60°; 130°$

Yechilishi: $\begin{cases}\alpha-\beta=70°\\ +\\ \alpha+\beta=180°\end{cases}\Rightarrow 2\alpha=250°\Rightarrow \alpha=125°\Rightarrow$

$\Rightarrow \beta=55°.$ Javobi: D.

(1997-8-37) Tomonlari 4 va 8 bo‘lgan parallelogrammning yuzi $16m^2$. Parallelogrammning o‘tmas burchagini toping.

A) $120°$ B) $150°$ C) $135°$

D) $105°$ E) $160°$

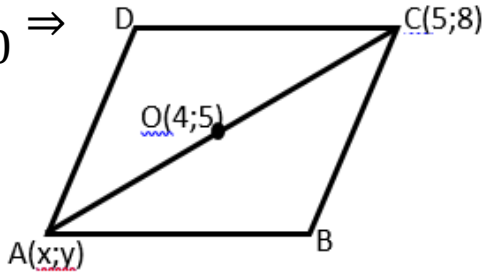
Yechilishi: $16 = 4 \cdot 8sin\alpha \Rightarrow sin\alpha = \frac{1}{2} \Rightarrow \alpha = 30°$;

U holda, o‘tmas burchak $\beta = 150°$. Javobi: B.

(1997-8-23) ABCD parallelogramm C uchining koordinatalari C(5; 8), O(4; 5) esa parallelogramm diagonallarining kesishish nuqtasi. Parallelogrammning A uchining koordinatalarini toping.

A) (2;3) B)(3;2) C)(1;4) D)(4;1) E)(3;3)

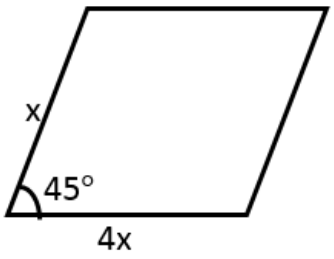
Yechilishi: $\begin{cases} 4 = \frac{x+5}{2} \\ 5 = \frac{y+8}{2} \end{cases} \Rightarrow \begin{cases} x + 5 = 8 \\ y + 8 = 10 \end{cases} \Rightarrow$



$\Rightarrow \begin{cases} x = 3 \\ y = 2 \end{cases} \Rightarrow A(x; y) = A(3; 2).$

Javobi: B.

(1997-6-30) Parallelogrammning tomonlari biri ikkinchisidan 4 marta katta. Agar uning perimetri $20\sqrt{2}$ ga, o‘tkir burchagi $45°$ ga teng bo‘lsa, yuzini toping.



A) $8\sqrt{2}$ B) $32\sqrt{2}$ C) 16 D) 8 E) $16\sqrt{2}$

Yechilishi: $2(x + 4x) = 20\sqrt{2} \Rightarrow$

$\Rightarrow 5x = 10\sqrt{2} \Rightarrow x = 2\sqrt{2} \Rightarrow$

$\Rightarrow 4x = 4 \cdot 2\sqrt{2} = 8\sqrt{2}.$

$S = x \cdot 4x \cdot sin\alpha = 2\sqrt{2} \cdot 8\sqrt{2} \cdot \frac{\sqrt{2}}{2} = 16\sqrt{2}.$

Javobi: E.

(1997-9-44) Parallelogramm burchaklaridan ikkitasining ayirmasi $50°$ ga teng. Shu burchaklarni toping.

A) $65°; 115°$ B) $60°; 110°$ C) $45°; 135°$

D) $55°; 115°$ E) $50°; 100°$

Yechilishi: $\begin{cases} \alpha - \beta = 50° \\ + \\ \alpha + \beta = 180° \end{cases} \Rightarrow 2\alpha = 230° \Rightarrow \alpha = 115° \Rightarrow$

$\Rightarrow \beta = 65°$. Javobi: A.

Kvadrat va to‘g'ri to‘rtburchak

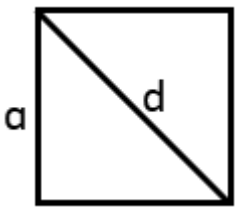
(1996-1-48) Diagonali $2\sqrt{2}$ bo‘lgan kvadratga aylana ichki chizilgan. Shu aylananing uzunligini hisoblang.

A) 2π B)4π C)$\pi\sqrt{2}$ D)8π E)$\pi\sqrt{3}$

Yechilishi: $r = \frac{a}{2}$; $R = \frac{d}{2}$; $d = a\sqrt{2}$;

$2\sqrt{2} = a\sqrt{2} \Rightarrow a = 2 \Rightarrow r = 1$;

$l = 2\pi r = 2\pi$.



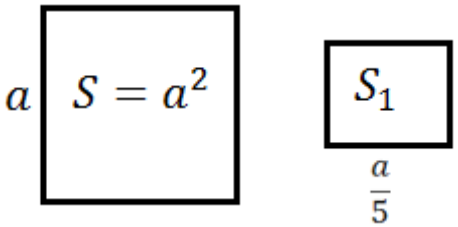
Javobi: A.

(1996-9-48) Agar kvadratning tomoni 5 marta qisqartirilsa, uning yuzi necha marta kamayadi?

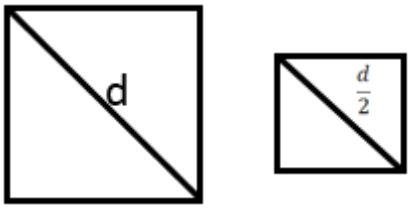
A) 5 B) 10 C) 20 D) 25 E) 7,5

Yechilishi: $S = a^2$; $S_1 = \left(\frac{a}{5}\right)^2 = \frac{a^2}{25} \Rightarrow 25$.

Javobi: D.



(1996-10-18) Agar kvadratning diagonali 2 marta kamaytirlsa, uning yuzi necha marta kichiklashadi?



A) 2 B) $\sqrt{2}$ C) 4 D) 8 E) $2\sqrt{2}$

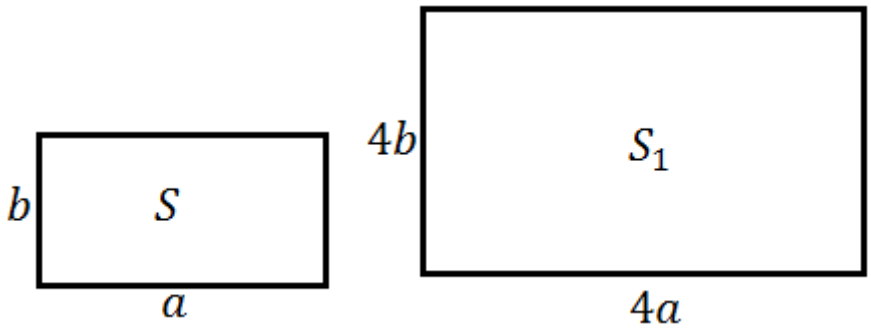
Yechilishi: $S = \frac{1}{2}d^2; S_1 = \frac{1}{2}\left(\frac{d}{2}\right)^2 = \frac{1}{4}\cdot\frac{1}{2}\cdot d^2 = \frac{1}{4}\cdot S \Rightarrow 4;$

Javobi: C.

(1996-1-46) Agar to‘g'ri to‘rtburchakning tomonlari 4 marta orttirilsa, uning yuzi necha marta ortadi?

A) 4 B) 8 C) 12 D) 16 E) 32

Yechilishi: S =$a \cdot b;\ S_1 = 4a \cdot 4b = 16ab = 16 \cdot S \Rightarrow 16.$

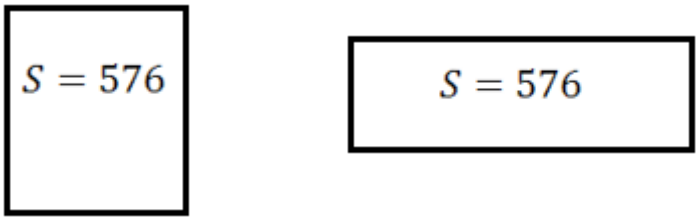


Javobi: D.

(1996-10-47) Tomonlari 72 va 8 m bo‘lgan to‘g'ri to‘rtburchakka tengdosh kvadratning tomonini toping.

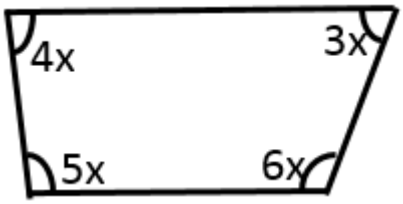
A) 36 B) 28 C) 24 D) 18 E) 26

Yechilishi: Tekislikda yuzlari teng figuralar tengdosh bo‘ladi. $a^2 = 576 \Rightarrow a = 24.$



Javobi: C.

(1996-1-40) To‘rtburchakning burchaklari o‘zaro 3:5:4:6 nisbatda. To‘rtburchakning kichik burchagini toping.



A) $80°$ B) $30°$ C) $60°$ D) $40°$ E) $25°$

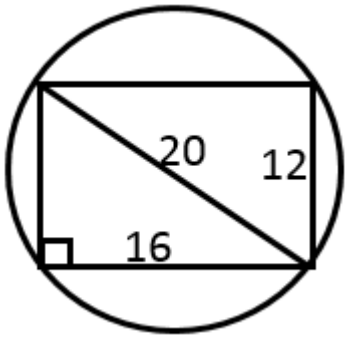
Yechilishi: $3x + 4x + 5x + 6x = 360°$

$18x = 360° \Rightarrow x = 20°$

$3x = 3 \cdot 20 = 60°.$

Javobi: C.

(1997-1-31) Doiraga ichki chizilgan to‘g'ri to‘rtburchakning tomonlari 12 va 16 ga teng. Doiraning yuzini toping.



A) $200\,\pi$ B) $100\,\pi$ C) $400\,\pi$

D) $120\,\pi$ E) $240\,\pi$

Yechilishi: $S = \pi R^2 =$

$= \pi \cdot 10^2 = 100\pi.$

Javobi: B.

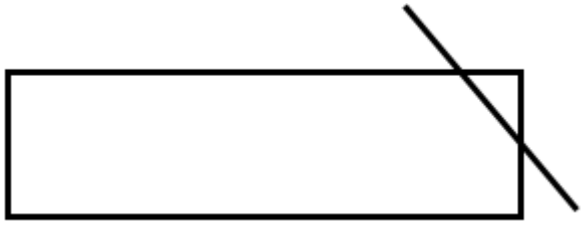
(1997-7-63) 30 ta gugurt cho‘pidan ularni sindirmay eng katta yuzali to‘g'ri to‘rtburchak yasalgan. Shu to‘g'ri to‘rtburchakning yuzini toping.

A) 64 B) 62 C) 56 D) 52 E) 49

Yechilishi: 15 tasi 2 tomonga sarflanadi;

$\begin{cases} 1\ 2\ 3\ 4\ 5\ 6\ 7 \\ 14\ 13\ 12\ 11\ 10\ 9\ 8 \end{cases} \Rightarrow$

$\Rightarrow S = ab = 7 \cdot 8 = 56.$

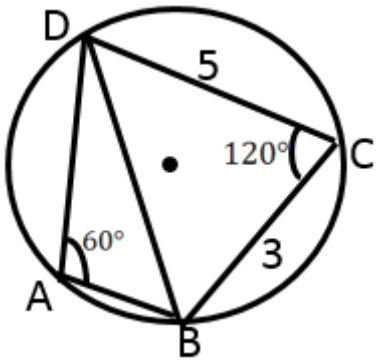


Javobi: C.

(1997-1-70) ABCD to‘rtburchak doiraga ichki chizilgan. $\angle A =$ $= 120°,\ CB = 4$ va $CD = 5$. BD diagonal uzunligini toping.

A) 8 B) 20 C) $\sqrt{20}$ D) $\sqrt{21}$ E) $\sqrt{8}$

Yechilishi: 1) aylanaga ichki chizilgan to‘rtburchakning qarama qarshi burchaklari yig‘indisi 180° ga tengligidan foydalaniladi.



2) kosinuslar teoremasi:

$BD^2 = 5^2 + 4^2 - 2 \cdot 5 \cdot 4 \cdot cos60° =$

$= 25 + 16 - 40 \cdot \frac{1}{2} = 21 \Rightarrow$

$\Rightarrow BD = \sqrt{21}.$ Javobi: D.

Romb

(1996-3-105) Tomoni 4 sm bo‘lgan rombga ichki chizilgan aylananing radiusi 1 sm. Rombning o‘tkir burchagi sinusini toping.

A) $\frac{\sqrt{3}}{2}$ B) $\frac{\sqrt{2}}{2}$ C) $\frac{2}{3}$

D) $\frac{1}{2}$ E) $\frac{\sqrt{3}}{4}$

Yechilishi: $4 = \frac{2 \cdot 1}{sin\alpha} \Rightarrow sin\alpha = \frac{1}{2} \Rightarrow \alpha = 30°.$

Javobi. D.

(1996-6-38) Rombning yuzi 18 ga, diagonallaridan biri 9 ga teng. Ikkinchi diagonalining uzunligi qancha?

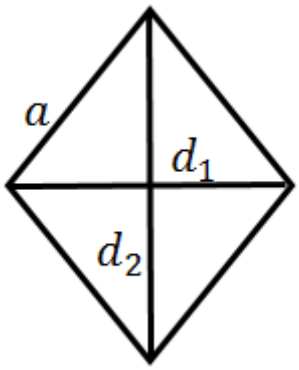
A) 3,5 B) 5 C) 4,5 D) 4 E) 6

Yechilishi: $18 = \frac{1}{2} \cdot 9 \cdot d_2 \Rightarrow d_2 = 4.$

Javobi: D.

(1996-7-47) Rombning diagonallari 3:4 kabi nisbatda, yuzi esa 384 ga teng. Uning tomonini toping.

A) 18 B) 20 C) 24 D) 28 E) 30



Yechilishi: $\frac{d_1}{d_2} = \frac{3}{4} \Rightarrow d_1 = \frac{3}{4}d_2;$

$384 = \frac{1}{2} \cdot \frac{3}{4} \cdot d_2 d_2 \Rightarrow {d_2}^2 = \frac{384 \cdot 8}{3} =$

$= 1024 \Rightarrow d_2 = 32 \Rightarrow d_1 = 24;$

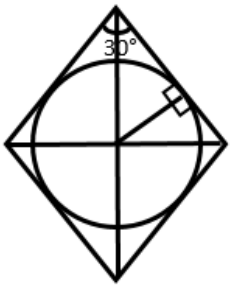
$4a^2 = 32^2 + 24^2 = 1024 + 576 =$

$= 1600 \Rightarrow a^2 = 400 \Rightarrow a = 20.$

Javobi: B.

(1996-9-101) Uzunligi 2π ga teng aylana o‘tkir burchagi $30°$ bo‘lgan rombga ichki chizilgan. Rombning perimetrini toping.

A) 2 B) 10 C) 8 D) 4 E) 16



Yechilishi: $2\pi r = 2\pi \Rightarrow r = 1;$

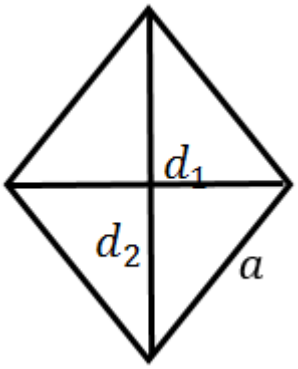
$a = \frac{2 \cdot 1}{sin30°} \Rightarrow a = 4 \Rightarrow P = 16.$

Javobi: E.

(1997-2-30) Rombning kichik diagonali va tomoni $18\sqrt{3}$ ga teng. Rombga ichki chizilgan aylananing radiusini toping.

A) 13,5 B) 27 C) $36\sqrt{2}$ D) $12\sqrt{3}$ E) $9\sqrt{3}$

Yechilishi: $d_1 = a = 18\sqrt{3} \Rightarrow \alpha = 60°;$



$18\sqrt{3} = \frac{2r}{sin60°} \Rightarrow r = 9 \cdot \sqrt{3} \cdot \frac{\sqrt{3}}{2} = 13{,}5.$

Javobi: A.

(1997-2-38) Rombning tomoni 6 ga, yuzi 18 ga t
o‘tmas burchagini toping,

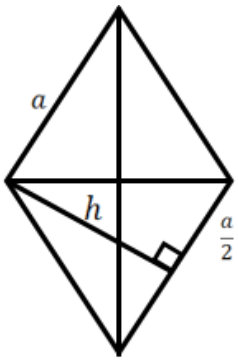
A) $135°$ B) $120°$ C) $150°$ D) $140°$ E) $165°$

Yechilishi: $S = a^2 sin\alpha \Rightarrow 18 = 6^2 sin\alpha \Rightarrow sin\alpha = \frac{1}{2} \Rightarrow$
$\Rightarrow \alpha = 30° \Rightarrow \beta = 150°$. Javobi: C.

(1997-7-44) Rombning $3\sqrt{3}$ teng bo‘lgan balandligi tomonini teng ikkiga bo‘ladi. Rombning perimetrini toping.

A) $12\sqrt{3}$ B) 24 C) 36 D) $36\sqrt{3}$ E) 48

Yechilishi: $h = 3\sqrt{3}$; $a^2 = h^2 + \left(\frac{a}{2}\right)^2 \Rightarrow$

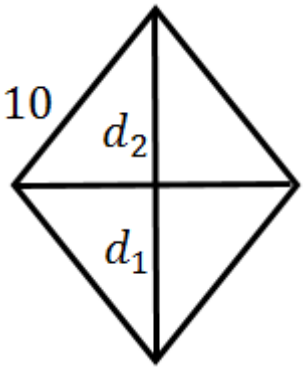


$\Rightarrow a^2 = h^2 + \frac{a^2}{4} \Rightarrow$
$\Rightarrow 4a^2 = 4h^2 + a^2 \Rightarrow$
$\Rightarrow 3a^2 = 4 \cdot \left(3\sqrt{3}\right)^2 \Rightarrow$
$\Rightarrow 3a^2 = 4 \cdot 9 \cdot 3 \Rightarrow a = 6;$
$P = 4a = 24.$ Javobi: B.

(1997-7-47) Rombning tomoni 10 ga, diagonallarining nisbati 4:3 ga teng. Rombning yuzini toping.

A) 192 B) 96 C) 24 D) 60 E) 48

Yechilishi: $\frac{d_2}{d_1} = \frac{4}{3} \Rightarrow d_2 = \frac{4}{3} d_1;$



$4 \cdot 10^2 = {d_1}^2 + \left(\frac{4}{3} d_1\right)^2 \Rightarrow$
$\Rightarrow 400 = {d_1}^2 + \frac{16}{9} {d_1}^2 \Rightarrow$
$\Rightarrow 400 \cdot 9 = 9{d_1}^2 + 16{d_1}^2 \Rightarrow$
$\Rightarrow {d_1}^2 = 16 \cdot 9 \Rightarrow d_1 = 12;$
$d_2 = \frac{4}{3} \cdot 12 = 16 \Rightarrow S = \frac{1}{2} \cdot 12 \cdot 16 = 96.$ Javobi: B.

(1997-9-115) Agar rombning bir diagonali 10% uzaytirilib, ikkinchi diagonalini 15% qisqartirilsa, rombning yuzi qanday o‘zgaradi?

A) 5% ortadi B) o‘zgarmaydi C) 6,5% kamayadi

D) 5,65% kamayadi E) 6,5% ortadi

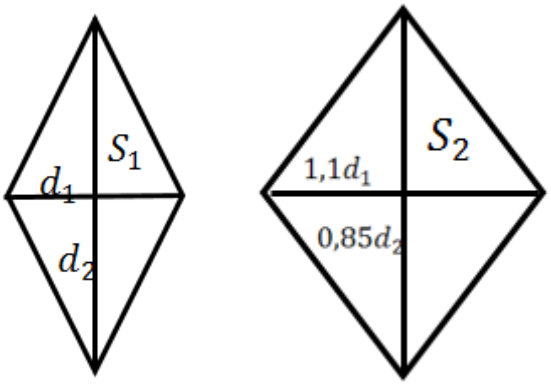
Yechilishi: $S_1 = \frac{1}{2} d_1 d_2$; $S_2 = \frac{1}{2} \cdot 1{,}1 d_1 \cdot 0{,}85 \cdot d_2 =$

$= 1{,}1 \cdot 0{,}85 \cdot \frac{1}{2} \cdot d_1 \cdot d_2 =$

$= 0{,}935 \cdot S_1;$

$1 - 0{,}935 = 0{,}065$

1) 6,5% kamaygan.

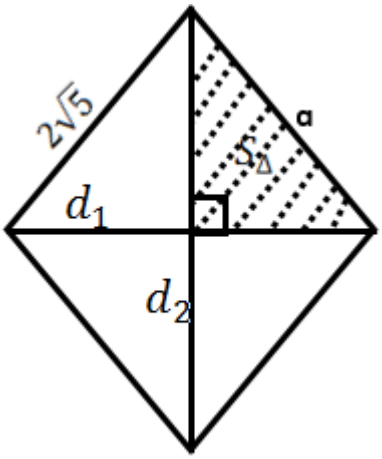


Javobi: C.

(1997-1-47) Tomoni $2\sqrt{5}$ ga , diagonallaridan biri 4 ga teng bo‘lgan rombning yuzini toping.

A) 20 B) $8\sqrt{5}$ C) 16

D) 32 E) $24\sqrt{5}$



Yechilishi: $h^2 = \left(2\sqrt{5}\right)^2 - 2^2 =$

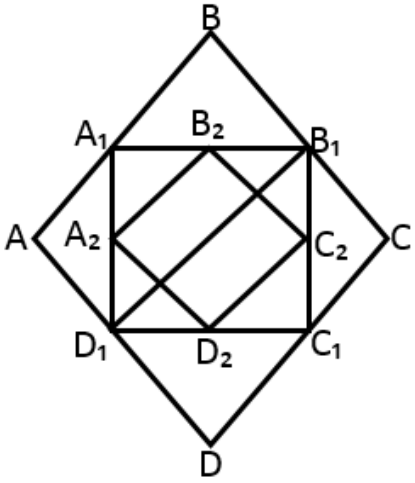
$= 20 - 4 = 16 \Rightarrow h = 4;$

$S_\Delta = \frac{1}{2} \cdot a \cdot b = \frac{1}{2} \cdot 4 \cdot 2 = 4;$

$S_{romb} = 4 \cdot S_\Delta = 4 \cdot 4 = 16.$

Javobi: C.

(1997-9-104) Perimetri 14 ga teng bo‘lgan ABCD romb berilgan. $A_1B_1C_1D_1$ to‘rtburchak ushbu rombning o‘rtalarini tutashtiradi. $A_2B_2C_2D_2$ to‘rtburchak $A_1B_1C_1D_1$ to‘rtburchakning o‘rtalarini tutashtiradi. $A_2B_2C_2D_2$ to‘rtburchakning perimetrini toping.



A) 7 B) 10 C) 8 D) 6 E) 9

Yechilishi: Uchburchakningo‘rta chizig‘i e’tiborga olinadi.

$P = 7.$

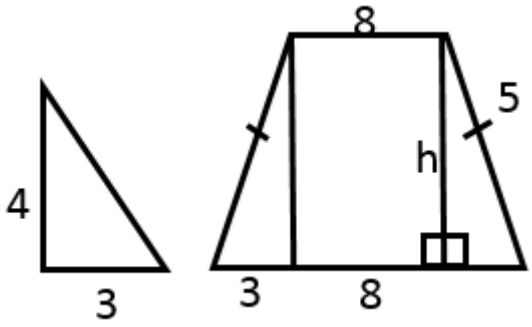
Javobi: A.

TRAPETSIYALAR

(1997-11-38) Teng yonli trapetsiyaning asoslari 8 va 14 ga, yon tomoni esa 5 ga teng. Trapetsiyaning yuzini hisoblang.

A) 22 B) 36 C) 44

D) 80 E) 224



Yechilishi: $h^2 = 5^2 - 3^2 =$

$= 16 \Rightarrow h = 4.$

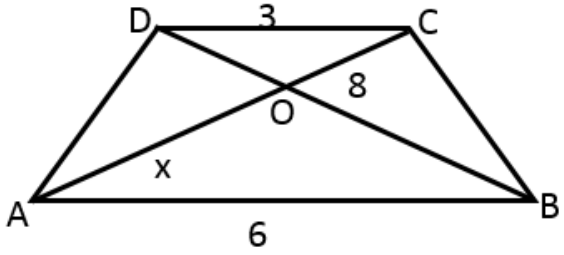
$S_{trapetsiya} = \frac{a+b}{2} \cdot h = 44.$

Javobi: C.

(1996-6-27) Rasmda AB||DC, O- to‘rtburchak diagonallarining kesish nuqtasi. DC=3, AB=6 va OC=8 bo‘lsa, OA ning uzunligini toping.

A) 16 B) 6 C) 12

D) 14 E) 8

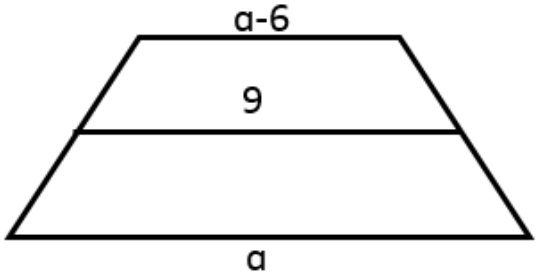


Yechilishi: Kattaning kichikka nisati olinadi:

$\frac{6}{3} = \frac{x}{8} \Rightarrow x = 16.$

Javobi: A.

(1996-1-43) Trapetsiyaning o‘rta chizig'i 9 sm, asoslaridan biri ikkinchisidan 6 sm qisqa. Trapetsiyaning katta asosini toping.



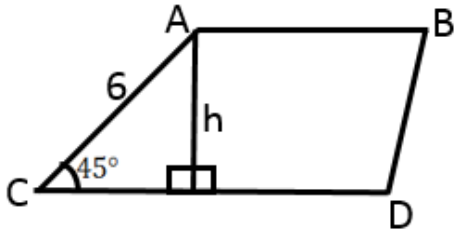
A) 15 B) 18 C) 14
D) 12 E) 10

Yechilishi: $\frac{a+a-6}{2} = 9 \Rightarrow$

$\Rightarrow 2a - 6 = 18 \Rightarrow a = 12.$

Javobi: D.

(1996-3-48) Rasmda berilgan trapetsiyaning yuzini toping. (AB||DC).

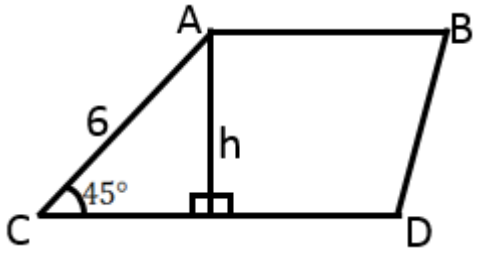


A)$18\sqrt{2}$ B)$14\sqrt{2}$ C)$16\sqrt{2}$ D)$15\sqrt{2}$ E)$12\sqrt{2}$

Yechilishi: $\frac{h}{6} = sin45° \Rightarrow$

$\Rightarrow h = 6 \cdot \frac{\sqrt{2}}{2} \Rightarrow h = 3\sqrt{2};$

$S = \frac{6+2}{2} \cdot 3\sqrt{2} = 12\sqrt{2}.$



Javobi: E.

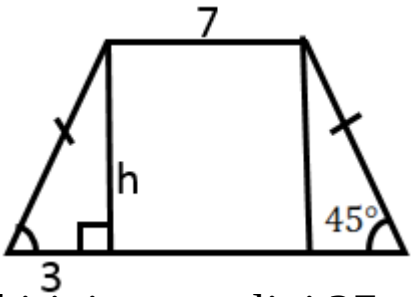
(1996-7-43) Teng yonli trapetsiyaning asoslari 7 va 13 ga, o‘tmas burchagi 135° ga teng. Shu trapetsiyaning yuzini toping.

A) 60 B) 30 C) $10\sqrt{3}$ D) 136,5 E) 120

Yechilishi: $\alpha = 180° - 135° =$

$\alpha = 45° \Rightarrow h = 3;$

$S = \frac{7+13}{2} \cdot 3 = 30.$



Javobi: B.

(1996-9-96) Trapetsiya diagonallaridan birining uzunligi 27 sm, ikkinchisi esa diagonallari kesishish nuqtasida 10 va 8 sm li

kesmalarga ajraldi. Birinchi diagonal qanday uzunlikdagi kesmalarga bo‘lingan?

A) 20 va 7 B) 14 va 13 C) 18 va 9

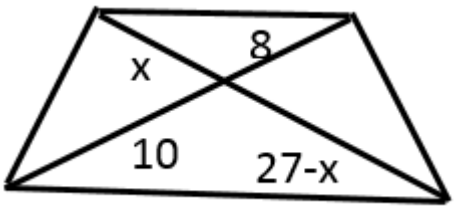
D) 12 va 15 E) 3,5 va 8,5

Yechilishi: $\frac{27-x}{x} = \frac{10}{8} \Rightarrow (27-x)\cdot 4 = 5x \Rightarrow$

$\Rightarrow 27\cdot 4 - 4x = 5x \Rightarrow$

$\Rightarrow 9x = 27\cdot 4 \Rightarrow x = 12 \Rightarrow$

$\Rightarrow 27 - x = 27 - 12 = 15.$



Javobi: D.

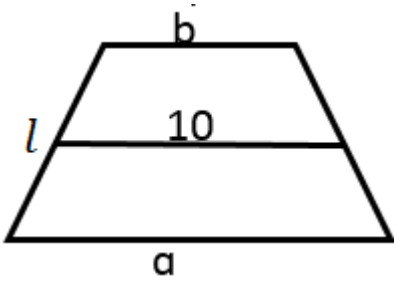
(1996-10-45) Teng yonli trapetsiyaning perimetri 36 sm, o‘rta chizig'i esa 10 sm. Shu trapetsiyaning yon tomonini toping.

A) 10 B) 8 C) 9 D) 13 E) 12

Yechilishi: $a + b + 2l = 36;$

$\frac{a+b}{2} = 10 \Rightarrow a + b = 20;$

$20 + 2l = 36 \Rightarrow l = 8.$



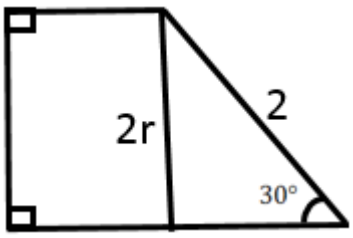
Javobi: B.

(1996-10-50) Katta yon tomoni 2 sm, o‘tkir burchagi 30° bo‘lgan to‘g'ri burchakli trapetsiyaga aylana ichki chizilgan. Shu aylananing uzunligini toping.

A) 2π B) π C) 4π D) $\frac{1}{2}\pi$ E) 6π

Yechilishi: $\frac{2r}{2} = sin30° \Rightarrow r = \frac{1}{2};$

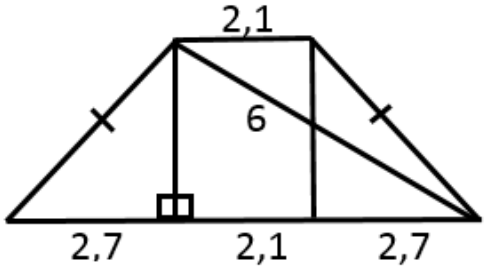
$l = 2\pi r = 2\pi\cdot\frac{1}{2} = \pi.$



Javobi: B.

(1997-1-38) Teng yonli rapetsiyaning asoslari 2,1 va 7,5 ga, diagonali esa 6 ga teng. Trapetsiyaning yuzini toping.

A) 16,8 B) 14,5 C) 20,4 D) 17,28 E) 19,88



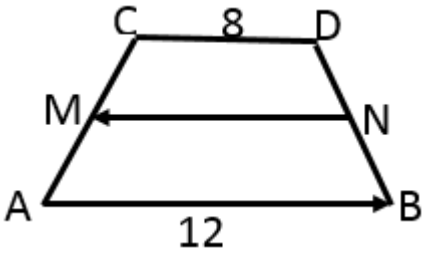
Yechilishi: $h^2 = 6^2 - (4{,}8)^2 =$
$= 36 - 23{,}04 = 12{,}96 \Rightarrow h = 3,$
$S = \frac{2{,}1+7{,}5}{2} \cdot 3{,}6 = 17{,}28.$
Javobi: D.

(1997-4-51) Teng yonli trapetsiyaning burchaklaridan biri $120°$ bo‘lsa, shu trapetsiya kichik asosining yon tomoniga nisbati qancha bo‘lishi mumkin?

A) 2 B) $\frac{1}{2}$ C) aniqlab bo‘lmaydi D) 1,5 E) 3

Yechilishi: Aniqlab bo‘lmaydi. Chunki yetarli ma'lumot berilmagan.
Javobi: C.

(1997-4-47) Trapetsiyada MN o‘rta chiziq, $AB = 12, CD = 8$ va $\overrightarrow{AB} = \gamma\overrightarrow{NM}$ bo‘lsa, γ nimaga teng?



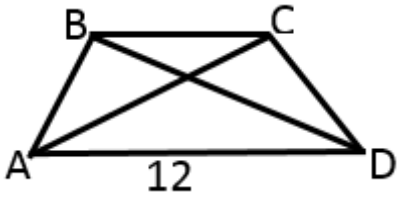
A) 1,2 B) -1,2 C) 1,5 D) -1,5 E) 2

Yechilishi: $MN = \frac{12+8}{2} = 10;$
$\overrightarrow{AB} = \gamma\overrightarrow{NM};\ \ 12 = \gamma \cdot 10 \Rightarrow \gamma = 1{,}2;$
Vektorlarning qarama-qarshi yo‘nalganligi e'tiborga olinsa, $\gamma = -1{,}2.$
Javobi: B.

(1997-8-25) Rasmda BC||AD, AO:OC=3:1 va AD=12. BC ning uzunligini toping.

A) 4,8 B) 9 C) 8 D) 6 E) 4

Yechilishi: $AO:OC = 3:1;$



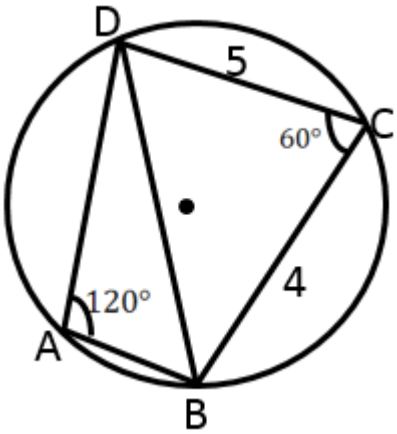
$\frac{AO}{OC} = \frac{AD}{BC} \Rightarrow \frac{3}{1} = \frac{12}{BC} \Rightarrow BC = 4.$

Javobi: E.

(1997-6-74) ABCD trapetsiya aylanaga ichki chizilgan. $\angle A = 120°;\ CB = 4;\ CD = 5.$ BD diagonalining uzunligini toping.

A) $11\sqrt{2}$ B)$\sqrt{21}$ C)$\sqrt{58}$ D)$\sqrt{37}$ E) $10\sqrt{3}$

Yechilishi: Aylanaga ichki chizilgan to‘rtburchakda qarama-qarsh burchaklar yig‘indisi 1



Kosinuslar teoremasi:

$BD^2 = 5^2 + 4^2 - 2 \cdot 5 \cdot 4 \cdot cos60° =$

$= 25 + 16 - 40 \cdot \frac{1}{2} = 21 \Rightarrow$

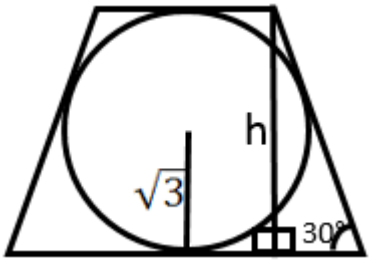
$\Rightarrow BD = \sqrt{21}.$

Javobi: D.

(1997-1-68) Radiusi $\sqrt{3}$ ga teng bo‘lgan doiraga tashqi chizilgan teng yonli trapetsiyaning asosidagi burchagi 60°. Trapetsiyaning yuzini toping.

A) $8\sqrt{3}$ B) 3 C) 10 D)$\frac{3}{2}$ E) to‘g'ri javob yo‘q

Yechilishi: 1) trapetsiyaga ichki chizilgan aylana formulasi;



2) yon tomon o‘rta chiziqqa teng;

3) balandlik aylana diametriga teng.

$h = 2\sqrt{3};\ \frac{h}{l} = sin60° \Rightarrow 2\sqrt{3} = l \cdot \frac{\sqrt{3}}{2} \Rightarrow \quad l = 4;$

4) trapetiya yuzi o‘rta chiziq bilan balandlik ko‘paytmasiga teng: $S = l \cdot h = 4 \cdot 2 \cdot \sqrt{3} = 8\sqrt{3}.$ Javobi: A.

(1997-4-49) Aylanaga tashqi chizilgan teng yonli trapetsiyaning o‘rta chizig'i 5 ga teng. Shu trapetsiyaning yon tomonini toping.

A) 4 B) 6 C) 7 D) 5 E) 8

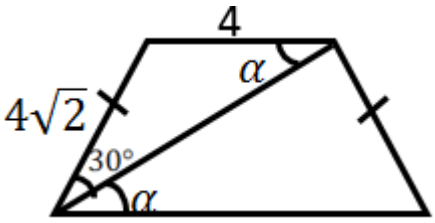
Yechilishi: $\frac{a+b}{2} = 5 \Rightarrow l = 5.$

Javobi: D.

(1997-9-107) Teng yonli trapetsiyaning yon tomoni $4\sqrt{2}$ ga, kichik asosi 4 ga teng. Uning diagonali yon tomoni va katta asosi bilan mos ravishda $30°$ va α burchak hosil qiladi. α burchakni toping.

A) $60°$ B) $35°$ C) $30°$ D) $50°$ E) $45°$

Yechilishi: 1) sinuslar teoremasi:



$\frac{4}{sin30°} = \frac{4\sqrt{2}}{sin\alpha}$;

$4sin\alpha = 4\sqrt{2} \cdot sin30° = \alpha = 45$

Javobi: E.

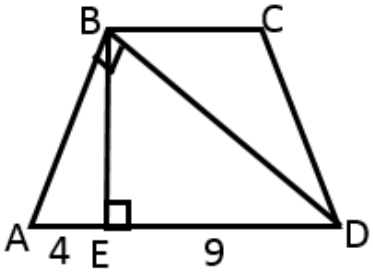
(1997-9-103) Teng yonli trapetsiyaning burchaklaridan biri ikkinchisidan 4 marta katta bo‘lsa, shu burchaklarni toping.

A) $30°; 120°$ B) $40°; 160°$ C) $25°; 100°$

D) $36°; 144°$ E) $32°; 128°$

Yechilishi: $x + 4x = 180° \Rightarrow \begin{cases} \alpha = 36°; \\ \beta = 144°. \end{cases}$ Javobi: D.

(1997-12-25) Rasmda ABCD teng yonli trapetsiya. $\angle ABD = 90°, BE \perp AD, AE = 4$ va $ED = 9$. Trapetsiyaning balandligini toping.



A) 4 B) 5 C) 6 D) 7 E) 8

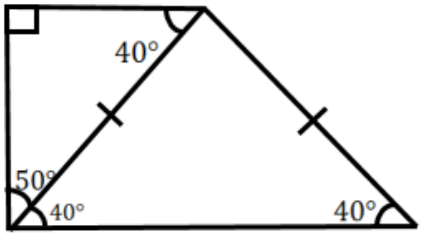
Yechilishi: $h^2 = 4 \cdot 9 \Rightarrow h = 2 \cdot 3 = 6$.

Javobi: C.

1997-12-17) ABCD to‘g'ri burchakli trapetsiyaning $(AB||BC\ va\ AB \perp AD)$ kichik diagonali katta yon tomoniga teng. Trapetsiyaning kichik diagoanli va kichik asosi orasidagi burchak $40°$ ga teng. Trapetsiyaning o‘tkir urchagini toping.

A) $40°$ B) $50°$ C) $30°$ D) $45°$ E) $35°$

Yechilishi: ichki almashinuvchi burchaklar tengligi va teng yonlilikdan: $\angle D = 40°$. Javobi: A.



Perimetr

(1996-1-45) Yuzi 144 sm², balandliklari 8 sm va 12 sm bo‘lgan parallelogrammning perimetrini toping.

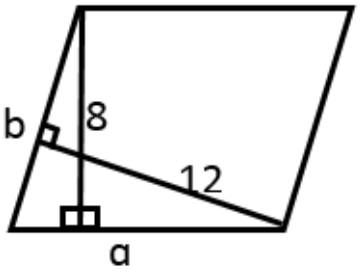
A) 40 B) 30 C) 80 D) 120 E) 60

Yechilishi: $S = a \cdot h$;

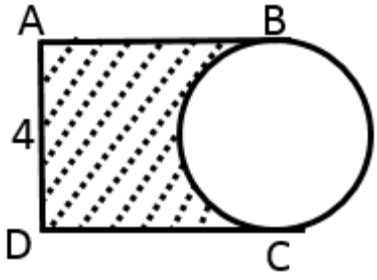
$\begin{cases} 144 = a \cdot 8 \\ 144 = b \cdot 12 \end{cases} \Rightarrow \begin{cases} a = 18 \\ b = 12 \end{cases} \Rightarrow$

$\Rightarrow P = 2(a + b) = 60$.

Javobi: E.



(1996-3-11) Rasmda tasvirlangan shaklning shtrixlangan qismini P perimetri va S yuzini aniqlang. Bunda ABCD kvadratning tomoni



4 sm ga teng. ($\pi = 3$ ga teng deb olinsin.)

A) $P = 10sm,\ S = 18sm^2$ B) $P = 10sm,\ S = 10sm^2$

C) $P = 22sm,\ S = 22sm^2$ D) $P = 18sm,\ S = 10sm^2$

E) $P = 16sm,\ S = 10sm^2$

Yechilishi: 1) perimetrini topish uchun kvadratning uchta tomoniga, aylana uzunligining yarmi qo‘shiladi.

$a = 4; r = 2;\ \ l = 2\pi r = 2\pi \cdot 2 = 4\pi \Rightarrow l = 12 \Rightarrow$

$\Rightarrow \frac{l}{2} = 6;\quad P = 3a + \frac{l}{2} = 3 \cdot 4 + 6 = 18;$

2) yuzni topish uchun kvadrat yuzidan doira yuzining yarmi ayriladi.

$S_k = 4^2 = 16;\ \ S_d = \pi r^2 = 3 \cdot 2^2 = 12 \Rightarrow \frac{S_d}{2} = 6;$

$S = S_k - \frac{S_d}{2} = 16 - 6 = 10.$ Javobi: D.

Aylana

(1996-6-29) Aylananing uzunligi $3\sqrt{3}$ ga teng bo‘lgan vatari $120°$ li yoyni tortib turadi. Aylananing uzunligini toping.

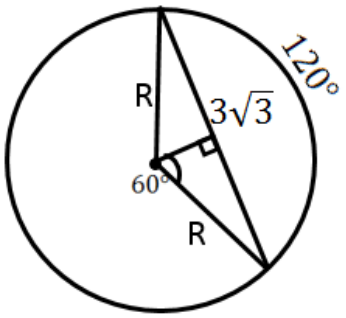
A) 12π B) 10π C) 13π D) 14π E) 9π

Yechilishi: To‘g‘ri burchakli uchburchakda 1 ta burchak va 1 ta tomon berilsa, trigonometriyadan foydalaniladi:

$\frac{3\sqrt{3}}{R} = sin60° \Rightarrow 3\sqrt{3} = R \cdot \frac{\sqrt{3}}{2} \Rightarrow$

$\Rightarrow R = 6 \Rightarrow l = 2\pi R = 12\pi.$

Javobi: A.



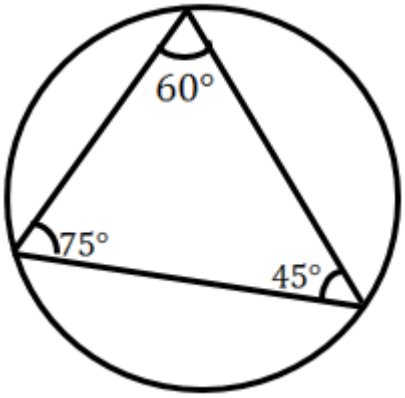
(1997-7-39) Ikkita burchagi $45°$ va $75°$ bo‘lgan uchburchakning uzuligi bo‘yicha o‘rtacha tomoni $3\sqrt{3}$ ga teng. Uchburchakka tashqi chizilgan aylananing radiusini toping.

A) $\sqrt{3}$ B) $\frac{3\sqrt{3}}{2}$ C) 3 D) $\sqrt{6}$ E) 2

Yechilishi: $45° + 75° + x = 180 \Rightarrow x = 60°$;

1) o‘rtacha tomon o‘rtacha burchak qarshisida yotadi.

2) tashqi aylana radiusi sinuslar teoremasidan topiladi.



$$\frac{3\sqrt{3}}{sin60°} = 2R \Rightarrow 2R = \frac{3\sqrt{3}}{\frac{\sqrt{3}}{2}} \Rightarrow R = 3.$$

Javobi: C.

(1997-9-46) A(12;20) Aylanadagi nuqta, C(5;-4) aylananing markazi bo‘lsa, aylananing radiusini toping.

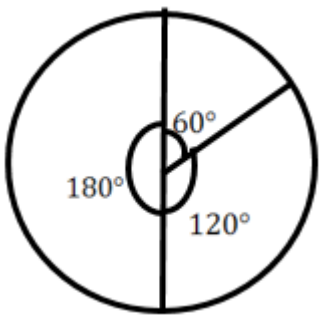
A) 15 B) 16 C) 17 D) 25 E) 27

Yechilishi: $\left|\overrightarrow{AC}\right|$ ni topish kifoya. Javobi: D.

(1997-9-48) Radiusi 1 ga teng bo‘lgan aylana 3 ta yoyga bo‘lingan. Ularga mos markaziy burchklar 1; 2 va 3 sonlariga proporsional. Yoylardan eng kattasining uzunligii toping.

A) $\frac{\pi}{3}$ B) π C) $\frac{3\pi}{2}$ D) $\frac{2\pi}{3}$ E) $\frac{4\pi}{3}$

Yechilishi: 1)berilgan sonlar x ga ko‘paytirilib, qo‘shiladi va $360°$ tenglanadi.



$x + 2x + 3x = 360° \Rightarrow x = 60°$;

$R = 1;\ \ l = \frac{\pi R n°}{180°} = \frac{\pi \cdot 1 \cdot 180°}{180°} = \pi.$

Javobi: B.

(1997-9-42) Markaziy burchakka mos yoy aylananing $\frac{2}{5}$ qismiga teng. Shu markaziy burchakni toping.

A) $72°$ B) $144°$ C) $15°$ D) $216°$ E) $36°$

Yechilishi: $\frac{2}{5} \cdot 360° = 144°$.

Javobi: B.

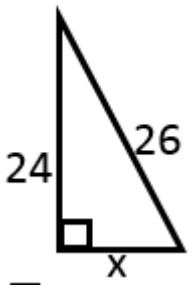
(1997-9-109) Aylanaga tashqi chizilgan parallelogrammning bir tomoni 6 ga teng bo‘lsa, uning ikkinchi tomonini toping.

A) 4 B) 5 C) 6 D) 7 E) 8

Yechilishi: 1) Romb yoki kvadratga aylana ichki chiziladi.

Demak, $a = b = 6$. Javobi: C.

(1997-11-31) Yuzi 169π bo‘lgan doiraga ichki chizilgan to‘g'ri to‘rtburchakning bir tomoni 24 ga teng. To‘g'ri to‘rtburchakning ikkinchi tomonini toping.



A) 7 B) 10 C) 5

D) 12 E) 16

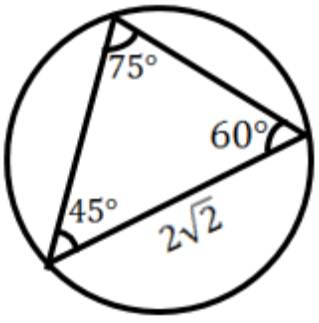
Yechilishi: $\pi R^2 = 169\pi \Rightarrow R = 13 \Rightarrow d = 26$;

$26^2 = 24^2 + x \Rightarrow 676 = 576 + x^2 \Rightarrow$

$\Rightarrow x^2 = 100 \Rightarrow x = 10$.

Javobi: B.

(1997-10-39) Kichik tomoni $2\sqrt{2}$ bo‘lgan uchburchakning ukkita burchagi $75°$ va $60°$. Uchburchakka tashqi chizilgan aylananing radiusini toping.

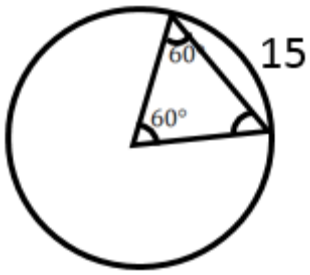


A) $\sqrt{2}$ B) 2 C) $\frac{\sqrt{3}}{2}$ D) $\frac{1}{\sqrt{2}}$ E) 1

Yechilishi: $\frac{2\sqrt{2}}{si45°} = 2R \Rightarrow$

$\Rightarrow 2R = \frac{2\sqrt{2}}{\frac{\sqrt{2}}{2}} \Rightarrow R = 2.$ Javobi: B.

(1997-12-28) Uzuligi 30π ga teng bo‘lgan aylananing $60°$ li yoyini tortib turuvchi vatari uzunligi qancha?

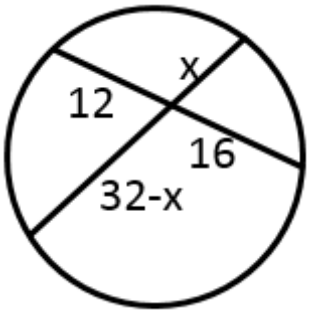


A) 12 B) 16 C) 15
D) 13 E) 17

Yechilishi: $2\pi R = 30\pi \Rightarrow R = 15 \Rightarrow 15.$
Javobi: C.

(1996-1-44) Aylananing ikkita kesishuvchi vatarlaridan birining uzunligi 32 sm, ikkinchisi kesishish nuqtasida 12 sm va 16 sm li kesmalarga ajraladi. Birichi vatarning kesmalarini aniqlang.

A) 12 va 20 B) 15 va 17 C) 24 va 8
D) 22 va 10 E) 20,5 va 11,5

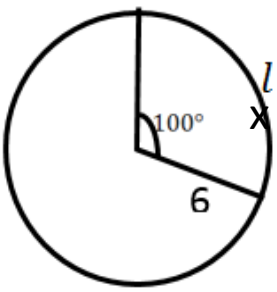


Yechilishi: $(32 - x) \cdot x = 16 \cdot 12;$
$32x - x^2 = 16 \cdot 12;$
$x^2 - 32x + 192 = 0 \Rightarrow$
$x_1 = 8;\ x_2 = 24.$
Javobi: C.

(1996-3-46) Aylananing markaziy burchagi $100°$, u tiralgan yoy uzuligi 10 sm bo‘lsa, aylananing radiusi necha sm. ($\pi = 3$ deb olinsin)?

A) 5 B) 6 C) 3 D) 2 E) 8

Yechilishi: $l = \frac{\pi \cdot R\ n°}{180°} \Rightarrow 10 = \frac{3 \cdot R \cdot 100°}{180°} \Rightarrow$
$\Rightarrow 10 \cdot 180° = 100° \cdot 3 \cdot R \Rightarrow$
$\Rightarrow R = \frac{1800°}{300°} = 6.$ Javobi: B.



(1996-3-96) $x^2+y^2+4x+6y-3=0$ tenglama bilan berilgan aylananing radiusini toping.

A) 3 B) 5 C) 4 D) 5 E) 4,5

Yechilishi: $x^2+y^2+4x+6y-3=0;$

x bilan y oldidagi koiffisiyentlar 2 ga bo‘linadi va ularning kvadratlarini ham qo‘shiladi ham ayriladi.

$x^2+4x+2^2-2^2+y^2-6y+3^2-3^2-3=0;$

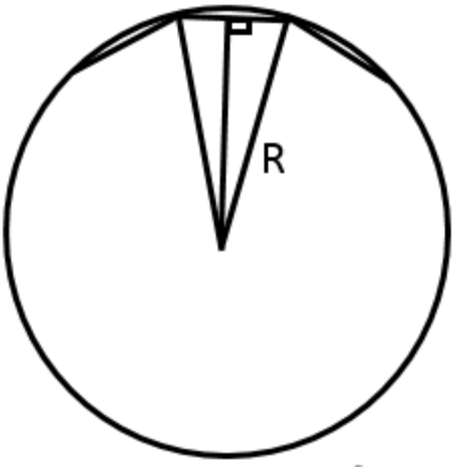
$$(x+2)^2+(y-3)^2=4^2 \Rightarrow \begin{cases} a=-2; \\ b=3; \\ R=4. \end{cases}$$

Javobi: C.

(1996-3-100) R radiusli aylanaga ichki chizilgan muntazam 12 burchakning tomonini toping.

A) $R\sqrt{2-\sqrt{3}}$ B) $R\sqrt{2-\sqrt{2}}$ C) 8

D) $R\frac{\sqrt{2}}{2}$ E) $R\frac{\sqrt{5-\sqrt{5}}}{2}$



Yechilishi: $12\alpha=180°(12-2);$

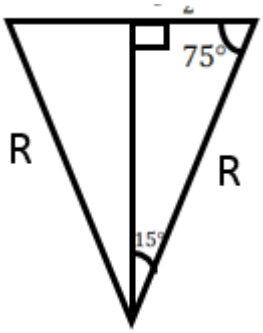
$12\alpha=180°\cdot 10 \Rightarrow \alpha=150°;$

$\frac{a}{2}:R=sin15° \Rightarrow$

$\Rightarrow \frac{a}{2R}=\sqrt{\frac{1}{2}(1-cos30°)} \Rightarrow$

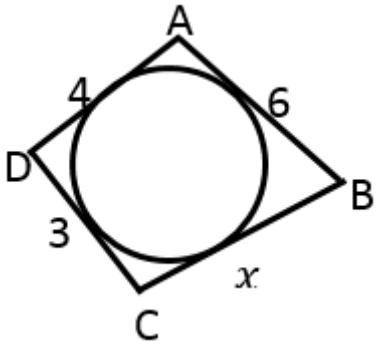
$\Rightarrow a=2R\sqrt{\frac{1}{2}(1-\frac{\sqrt{3}}{2})}=$

$=2R\sqrt{\frac{1}{2}\cdot\frac{2-\sqrt{3}}{2}} \Rightarrow a=R\sqrt{2-\sqrt{3}}.$



Javobi: A.

Pirnazar DAVRONOV



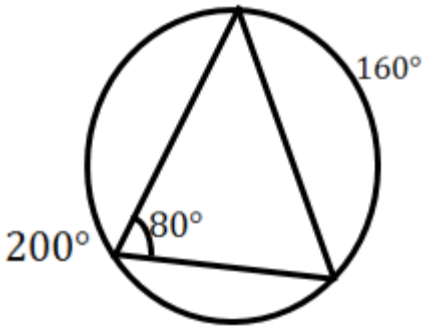
(1996-3-101) AB=6 sm, AD=4 sm, DC=3 sm, BC-?

A) 4 B) 4,5 C) 5

D) 5,5 E) 6

Yechilishi: Aylanaga tashqi chizilgan to‘rtburchak qarama- qarshi tomonlar yig'indisi bir-biriga tengligidan:

$x + 4 = 3 + 6 \Rightarrow x = 5.$ Javobi: C.



(1996-6-19) Aylanani AB vatar 2 ta yoyga ajratadi. Bu yoylarning nisbati 4 : 5 kabi. AB vatar katta yoyning ixtiyoriy nuqtasidan qanday burchak ostida ko‘rinadi.

A) 100° B)95° C)80°

D)85° E)90°

Javobi: $4x + 5x = 360° \Rightarrow x = 40;$

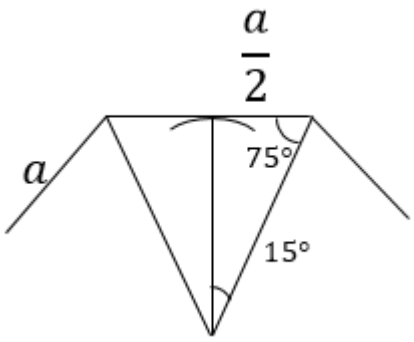
$4x = 4 \cdot 40 = 160°;$

$5x = 5 \cdot 40 = 200°.$ Javobi: C.

(1996-9-35) R radiusli aylanaga tashqi chizilgan muntazam 12 burchakning tomonini toping.

A) $\frac{2\sqrt{3}}{3}R$ B) $\frac{2\sqrt{2-\sqrt{2}}}{\sqrt{2+\sqrt{2}}}R$ C) $1{,}2R$

D) $2\left(2-\sqrt{3}\right)R$ E) $1{,}5R$



Yechilishi: $\frac{a}{2} : R = tg15° \Rightarrow$

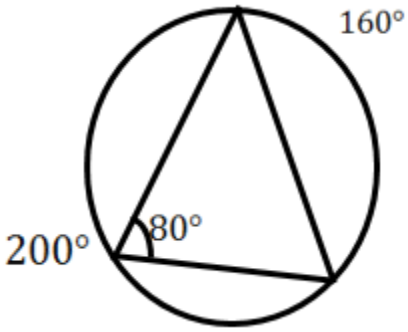
$\Rightarrow a = 2R \cdot tg15°.$

$tg\frac{\alpha}{2} = \frac{1-cos\alpha}{sin\alpha}$ formuladan foydalanamiz:

$$a = 2R \cdot \frac{1-cos30°}{sin30°} = 2R \cdot \frac{1-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = 2R \cdot \frac{2-\sqrt{3}}{2} \cdot \frac{2}{1} =$$

$$= 2R\left(2-\sqrt{3}\right) = 2\left(2-\sqrt{3}\right) \cdot R.$$

(1996-6-19) Aylanani AB vatar 2 ta yoyga ajratadi. Bu yoylarning nisbati 4 : 5 kabi. AB vatar katta yoyning ixtiyoriy nuqtasidan qanday burchak ostida ko‘rinadi.



A) 100° B)95° C)80°

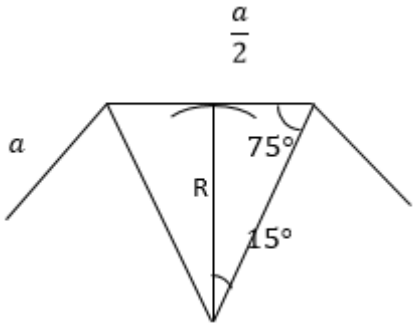
D)85° E)90°

Javobi: $4x + 5x = 360° \Rightarrow x$

$4x = 4 \cdot 40 = 160°;$

$5x = 5 \cdot 40 = 200°.$ Javobi: C.

(1996-9-35) R radiusli aylanaga tashqi chizilgan muntazam 12 burchakning tomonini toping.



A) $\frac{2\sqrt{3}}{3}R$ B) $\frac{2\sqrt{2-\sqrt{2}}}{\sqrt{2+\sqrt{2}}}R$

D) $2\left(2-\sqrt{3}\right)R$ E) $1{,}5R$

Yechilishi: $\frac{a}{2} : R = tg15° \Rightarrow$

$\Rightarrow a = 2R \cdot tg15°.$

$tg\frac{\alpha}{2} = \frac{1-cos\alpha}{sin\alpha}$ formuladan foydalanamiz

$$a = 2R \cdot \frac{1-cos30°}{sin30°} = 2R \cdot \frac{1-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = 2R \cdot \frac{2-\sqrt{3}}{2} \cdot \frac{2}{1} =$$

$$= 2R\left(2-\sqrt{3}\right) = 2\left(2-\sqrt{3}\right) \cdot R.$$

Javobi: D.

(1996-10-41) Aylananing radiusi 10 sm. Shu aylanaga ichki chizilgan muntazam uchburchak medianasi uzunligini toping.

A) 12 B) $\frac{10}{\sqrt{3}}$ C) 15 D) 18 E) $10\sqrt{3}$

Yechilishi: $R = 10 \Rightarrow h = \frac{3}{2}R = 15.$

Javobi: C.

(1996-12-49) Aylananing markaziy burchagi $60°$, u tiralgan yoy uzunligi 10 sm bo‘lsa, aylananing radiusi necha sm?

A) $\frac{15}{\pi}$ B) $\frac{18}{\pi}$ C) $\frac{30}{\pi}$ D) $\frac{36}{\pi}$ E) $\frac{24}{\pi}$

Yechilishi: $n = 60°; l = 10 \Rightarrow 10 = \frac{\pi \cdot R \cdot 60°}{180°} \Rightarrow R = \frac{30}{\pi}.$

Javobi: C.

(1996-12-107) $AB = 6\ sm,\ DB$ ABC uchburchakka ichki chizilgan aylananing raduisi necha sm?

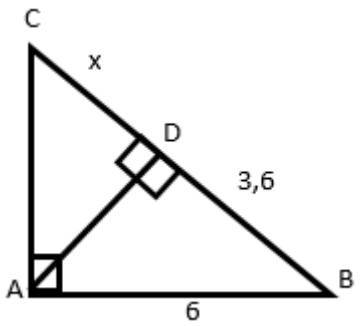
A) 3 B) 2,5 C) 2 D) 2,4 E) 1,8

Yechilishi: $6^2 = 3{,}6 \cdot (x + 3{,}6);$

$36 = 3{,}6x + 3{,}6^2;$

$3{,}6x = 36 - 12{,}96;$

$3{,}6x = 23{,}04 \Rightarrow x = 6{,}4;$



Misr uchburchagidan

$R = \frac{c}{2} = 5,\ r = \frac{a+b-c}{2} = 2.$ Javobi: C.

(1996-12-108) Tomonlari 8; 15 va 17 sm bo‘lgan uchburchakka tashqi chizilgan aylananing radiusi necha sm?

A) 8,5 B) 9 C) 8 D) 9,5 E) 7

Yechilishi: Geron formulasidan yuz topiladi:

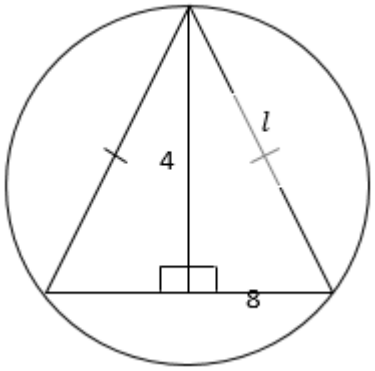
$P = \frac{8+15+17}{2} = 20;$

$S = \sqrt{20 \cdot 12 \cdot 5 \cdot 3} = \sqrt{4 \cdot 5 \cdot 3 \cdot 4 \cdot 5 \cdot 3} = 60;$

$R = \frac{8 \cdot 15 \cdot 17}{4 \cdot 60} = 8{,}5.$ Javobi: A.

(1996-13-46) Asosi 16 sm, balandligi 4 sm bo‘lgan teng yoli uchurchakka tashqi chizilgan aylananing radiusi necha sm?

A) 10 B) 11 C) 12 D) 10,5 E) 9,5



Yechilishi: $l^2 = 8^2 + 4^2 =$

$= 64 + 16 = 80 \Rightarrow l = \sqrt{80};$

$S = \frac{1}{2} \cdot 16 \cdot 4 = 32;$

$R = \frac{16 \cdot \sqrt{80} \cdot \sqrt{80}}{4 \cdot 32} = \frac{16 \cdot 80}{4 \cdot 32} = 10.$

Javobi: A.

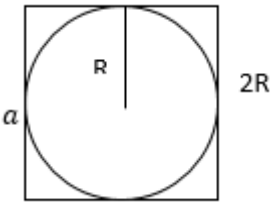
(1997-2-19) Aylananing AB vatari o‘zi ajratgan yoylardan birining ixtiyoriy nuqtasidan $80°$ li burchak ostida ko‘rinadi. A va B nuqta chegarasi bo‘lgan yoylar necha gradus?

A) $160°$ va $200°$ B) $80°$ va $280°$ C) $100°$ va $260°$

D) $110°$ va $250°$ E) $120°$ va $240°$

Yechilishi: Javobi: A.

(1997-4-53) Doiraning yuzi 36π bo‘lsa, shu doiraga tashqi chizilgan kvadrat yuzini toping.



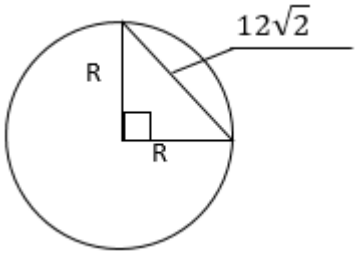
A) 121 B) 100 C) 169 D) 150 E) 144

Yechilishi: $\pi R^2 = 36\pi \Rightarrow R = 6;$

$a = 2R \Rightarrow a^2 = (2R)^2 = 4 \cdot 6^2 = 144.$

Javobi: E.

(1997-2-29) Aylananing $12\sqrt{2}$ ga teng vatari $90°$ li yoyni tortib turadi. Aylananing uzunligini toping,



A) 24π B) 20π C) 22π D) 26π E) 28π

Yechilishi: R = 12;

$l = 2\pi R = 24\pi$. Javobi: A.

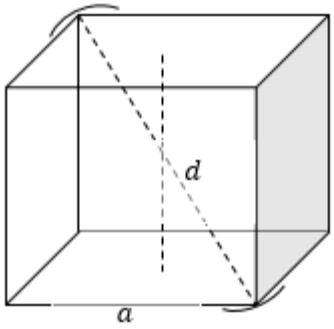
Kub

(199-1-53) To‘la sirtining yuzi 72 ga teng bo‘lgan kubga tashqi chizilgan sharning radiusini toping.

A) 3 B) 6 C) $3\sqrt{3}$ D) $2\sqrt{3}$ E) 4

Yechilishi: 1) yon sirti 4 ta kvadratlar yuzlari yig‘indisiga teng.

2) to‘la sirti 6 ta kvadratlar yuzlari yig‘indisiga teng.



$a = 2r;\ \ d = 2R;\ \ d^2 = 3a^2;$

$d = a\sqrt{3};\ \ 6a^2 = 72 \Rightarrow a^2 = 12 \Rightarrow$

$\Rightarrow a = 2\sqrt{3};\ \ d^2 = 3\left(2\sqrt{3}\right)^2 = 36 \Rightarrow$

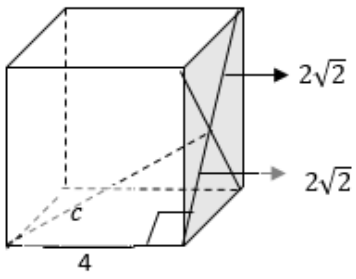
$\Rightarrow d = 6;\ \ R = 3.$ Javobi: A.

(1996-6-8) Kubning barcha qirralari yig‘idisi 96. Uning hajmini toping.

A) 256 B) 216 C) 384 D) 64 E) 51

Yechilishi: $a = \frac{96}{12} = 8;\ \ V = 8^3 = 512.$ Javobi: E.

(1996-6-60) Tomoni 4 ga teng bo‘lgan kubning uchidan shu uch bilan umumiy nuqtaga ega bo‘lmagan yog‘ining simmetriya markazigacha bo‘lgan masofani topinng.



A) $2\sqrt{6}$ B) $2\sqrt{3}$ C) $2\sqrt{2}$ D) 3 E) 2

Yechilishi: $c^2 = 4^2 + \left(2\sqrt{2}\right)^2 = 24;$

$c = 2\sqrt{6}.$ Javobi: A.

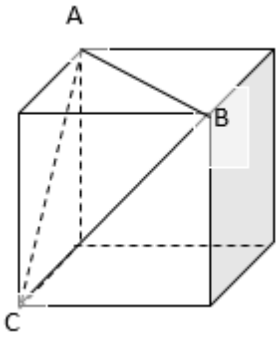
(1997-8-56) Hajmi 125 bo‘lgan kuga ichki chizilgan shar sirtining yuzini toping.

A) 125π B) 25π C) $24{,}5\pi$ D) 105π E) $25{,}5\pi$

Yechilishi: $a^3 = 125 \Rightarrow a = 5 \Rightarrow r = 2{,}5;$

$S = 4\pi R^2 = 4 \cdot \pi \cdot (2{,}5)^2 = 25\pi.$ Javobi: B.

(1997-7-65) Qirrasi 5 ga teng kub A, B va C nuqtalardan o‘tuvchi tekislik bilan ikki bo‘lakka bo‘ligan. Kichik bo‘lakning hajmi nimaga teng?



A) $20\frac{5}{6}$ B) $62\frac{1}{2}$ C) $41\frac{2}{3}$

D) $31\frac{1}{4}$ E) $12\frac{1}{2}$

Yechilishi: $V_k = 5^3 = 125;\ V_{tet} = \frac{1}{6} \cdot 125 = 20\frac{5}{6}.$

Javobi: A.

Prizma

(199-1-57) To‘rtta tengdosh prizma balandliklari uchun $h_1 > h_2 > h_3 > h_4$ munosabat o‘rinli. Prizmalar asoslarining yuzlari uchun quyidagi munosabatlardan qaysi biri to‘g‘ri?

A) $S_4 > S_3 > S_2 > S_1$ B) $S_4 < S_3 < S_2 < S_1$

C) $S_3 > S_4 > S_2 > S_1$ D) $S_2 > S_1 > S_3 > S_4$

E) $S_1 < S_2 < S_4 < S_3$

Yechilishi: 1) fazoviy jismlar tengdosh bo‘lishi uchun ularning hajmlari bir-biriga teng bo‘lishi kerak?

2) asos yuzi balandlikka teskari proporsional:

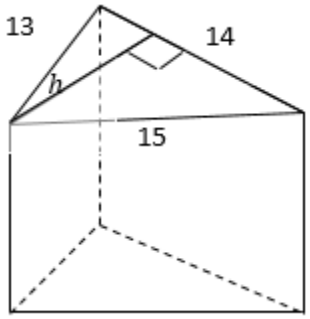
$S_1 < S_2 < S_3 < S_4$.

Javobi: A.

(1996-7-51) Uchurchakli to‘g‘ri prizma asosining tomolari 13; 14 va 15 ga, yon qirrasi asosining o‘rtacha balandligiga teng. Prizmaning hajmini toping.

A) 336 B) 504 C) 1008 D) 978 E) 1236

Yechilishi: 1) O‘rtacha balandlik, uchburchakning o‘rtacha balandligiga teng.



2) Geron formulasidan $\Rightarrow S = 84$;

$84 = \frac{1}{2} \cdot 14 \cdot h \Rightarrow h = 12$;

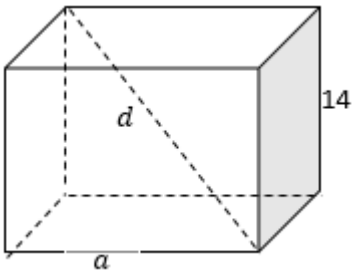
$V = S \cdot H = 84 \cdot 12 = 1008$.

Javobi: C.

(1996-9-92) To‘rtburchakli muntazam prizma asosining yuzi 144 sm², balandligi 14 sm. Shu prizma diagonalini toping.

A) $12\sqrt{2}$ B) 18 C) 22 D) 16 E) 24

Yechilishi: 1) to‘rtburchakli muntazam deyilsa, asosning kvadrat bo‘lishi tushiniladi.



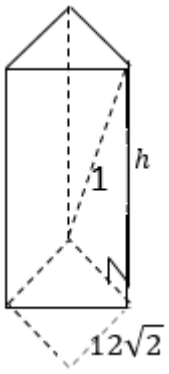
$a^2 = 144 \Rightarrow$

$d^2 = 12^2 + 12^2 + 14^2 = 484$;

$d = 22$. Javobi: C.

(1997-1-42) To‘g‘ri prizmaig asosi gipotenuzasi $12\sqrt{2}$ ga teng bo‘lgan teng yonli to‘g‘ri burchakli uchburchakdan iborat. Kateti orqali o‘tgan yon yog‘ining diagonali esa 13 ga teng. Prizmaning hajmini toping.

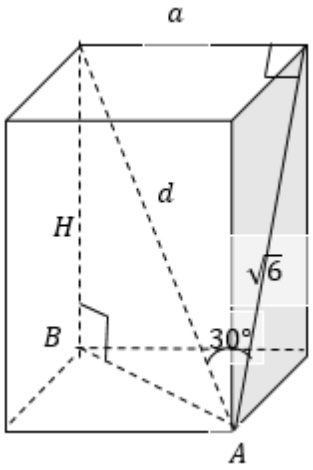
A) 360 B) 120 C) 720
D) 240 E) 480



Yechilishi: 1) to‘g‘ri prizmaning yon yoqlari to‘g‘ri to‘rtburchaklar bo‘ladi; kvadratga to‘ldirilsa asos tomoni $a = 12$ kelib chiqadi;
3) qirra asos tekisligiga perpendikulyar;
$H^2 = 13^2 - 12^2 \Rightarrow H = 5;\ V = S \cdot H = \frac{144}{2} \cdot 5 = 360.$
Javobi: A.

(1997-6-42) Muntazam to‘rtburchakli prizma yon yog‘ining diagonali $\sqrt{6}$ ga teng. Prizmaning diagonali yon yog‘i bilan 30° li burchak tashqil qiladi. Prizmaning hajmini toping.

A) $2\sqrt{2}$ B) 4 C) 8
D) $4\sqrt{3}$ E) $1\frac{1}{3}$



Yechilishi: $\frac{\sqrt{6}}{d} = cos30° \Rightarrow$
$\Rightarrow \sqrt{6} = d \cdot \frac{\sqrt{3}}{2} \Rightarrow 2\sqrt{2} \cdot \sqrt{3} =$
$= d \cdot \sqrt{3} \Rightarrow d = 2\sqrt{2} \Rightarrow a = \sqrt{2};$
1) 30° li burchak qarshisidagi katet gipotenuzaning yarmiga teng;
2) asos diagonali $AB = a\sqrt{2} = \sqrt{2} \cdot \sqrt{2} = 2;$
$H^2 = d^2 - AB^2 = (2\sqrt{2})^2 - 2^2 = 8 - 4 = 4 \Rightarrow H = 2;$
$V = a^2 \cdot H = (\sqrt{2})^2 \cdot 2 = 4.$ Javobi: B.

(1997-12-57) Og‘ma prizmaning perpendikulyar kesimi tomonlari 6 va 3 ga teng bo‘lgan to‘g‘ri to‘rtburchakdan iborat. Prizmaning hajmi 54 ga teng. Prizmaning yon qirrasini toping.

A) 4 B) C) 3 D) 3,5 E) 4,5

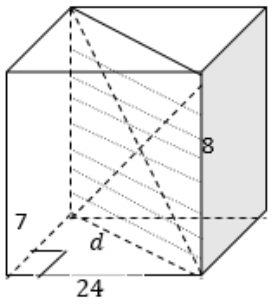
Yechilishi: 1) Formulaga qarang. $V = S_{kesim} \cdot AA_1$;

$54 = 3 \cdot 6 \cdot AA_1 \Rightarrow AA_1 = 3.$ Javobi: C.

(1996-10-53) To‘g‘ri burchakli paralelepiped asosining tomonlari 7 va 24 sm, balandligi esa 8 sm. Diagonal kesimning yuzini aniqlang.

A) 168 B) 1344 C) 100 D) 200 E) 672

Yechilishi: To‘g‘ri burchakli paralelepipedning 6 ta yog‘i ham to‘rtburchak bo‘ladi;



$d^2 = 24^2 + 7^2 =$

$= 576 + 49 = 625;$

$d = 25;\quad S_{d.kesim} = 25 \cdot 8 = 200.$

Javobi: D.

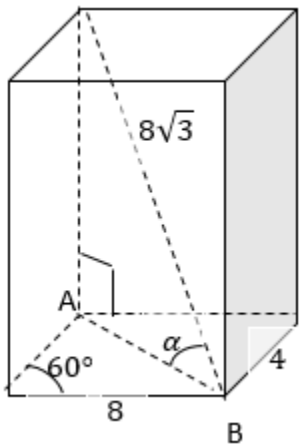
(1997-1-39) To‘g‘ri paralelepiped asosining tomonlari 8 va 4 ga teng bo‘lib, ular $60°$ li burchak tashkil etadi.

Paralelepipedning kichik diagonali $8\sqrt{3}$ ga teng bo‘lsa, shu diagonalning asos tekisligi bilan tashkil etgan burchagini toping.

A) $60°$ B) $30°$ C) $arctg2$ D) $arccos\frac{1}{\sqrt{3}}$ E) $45°$

Yechilishi: 1) to‘g‘ri parallelepipedning to‘rtta yon yoqlari to‘g‘ri to‘rtburchaklar, 2 ta asoslari parallelogramm bo‘ladi;

2) kosinuslar teoremasi:



$AB^2 = 8^2 + 4^2 - 2 \cdot 4 \cdot 8 \cdot cos60° =$

$= 64 + 16 - 64 \cdot \frac{1}{2} = 48 \Rightarrow AB = 4\sqrt{3};$

3) $\frac{AB}{8\sqrt{3}} = cos\alpha \Rightarrow cos\alpha = \frac{4\sqrt{3}}{8\sqrt{3}} = \frac{1}{2} \Rightarrow$

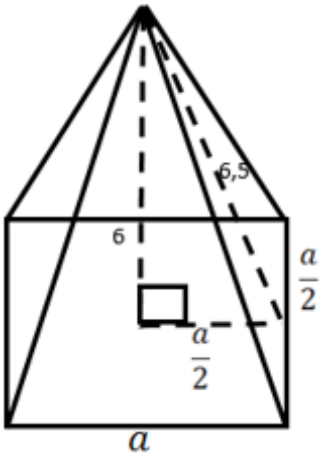
$\Rightarrow \alpha = 60°.$ Javobi: A.

Piramida

(1996-1-51) Muntazam to‘rtburchakli piramidaning balandligi 6 sm, apofemasi esa 6,5 sm. Piramida asosining perimetrini toping.

A) 10 B) 12 C) 24

D) 20 E) 8



Yechilishi:

1) muntazam to‘rtburchak— asos kvadrat;

2) apofema yon yoq—balandligi;

$\left(\frac{a}{2}\right)^2 = 6{,}5^2 - 6^2 = 6{,}25 \Rightarrow$

$\Rightarrow \frac{a^2}{4} = 6{,}25 \Rightarrow a = 5 \Rightarrow p = 20$

Javobi: D.

(1996-3-51) To‘rtburchakli muntazam piramida asosining tomoni 2 marta kattalashtirildi, balandligi esa ikki marta kichiklashtirildi. Hosil bo‘lga piramida hajmining dastlabki piramida hajmiga nisbatini toping.

A) 1:1 B) 2:1 C) 4:1 D) 1:4 E) 1:2

Yechilishi: $V_1 = \frac{1}{3}a^2 \cdot H - asli;$

$V_2 = \frac{1}{3} \cdot (2a)^2 \cdot \frac{H}{2} — o'zgargani;$

$\frac{V_2}{V_1} = \frac{1}{3} \cdot 4a^2 \cdot \frac{H}{2} : \frac{1}{3}a^2H = \frac{a^2 \cdot H \cdot 2}{3} \cdot \frac{3}{a^2 \cdot H} = 2:1.$ Javobi: B.

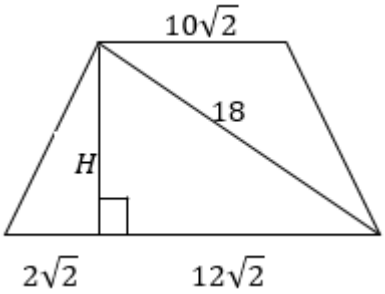
(1996-3-110) Muntazam to‘rtburchakli kesik piramida asoslarining tomonlari 14 va 10 sm, diagonali 18 sm. Kesik piramidaning balandligi necha sm?

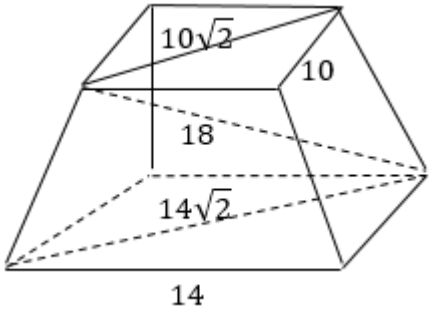
A) 6 B) 7 C) 8 D) 5 E) 9

Yechilishi:

$H^2 = 18^2 - \left(12\sqrt{2}\right)^2 = 324 - 288 = 36 \Rightarrow H = 6.$

Javobi: A.





(1996-6-59) Muntazam piramidaning yon sirti 24 ga, asosining yuzi 12 ga teng. Piramidaning yon yog‘i bilan asos tekisligi orasidagi burchakni toping.

A) 45° B) 30° C) 60° D) 35° E) 40°

Yechilishi: $S_{yon} = 24;\ S_{asos} = 12;\ S_{yon} = \frac{S_{asos}}{cos\alpha} \Rightarrow$

$\Rightarrow 24 = \frac{12}{cos\alpha} \Rightarrow cos\alpha = \frac{1}{2} \Rightarrow \alpha = 60°.$ Javobi: C.

(1996-11-53) To‘rtburchakli muntazam piramida asosining yuzi 36 ga, yon sirtininng yuzi esa 60 ga teng. Piramida hajmini toping.

A) 64 B) 120 C) 144 D) 72 E) 48

Yechilishi: $4S_{\Delta} = 60 \Rightarrow S_{\Delta} = 15;$

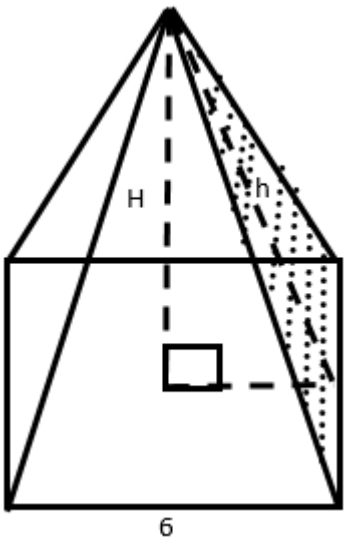
$S_{\Delta} = \frac{1}{2} \cdot h \cdot a \Rightarrow 15 = \frac{1}{2} \cdot 6 \cdot h \Rightarrow$

$\Rightarrow h = 5.$ Misr uchburchagidan

$H = 4;$

$V = \frac{1}{3} \cdot a^2 \cdot H = 48.$

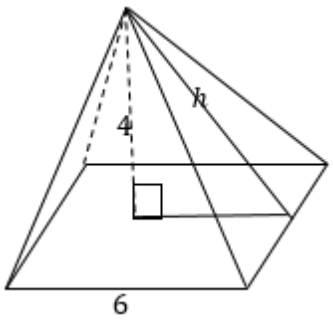
Javobi: E.



(1997-3-53) To‘rtburchakli muntazam piramidaning hajmi 48 ga, balandligi 4 ga teng. Piramida yon sirtining yuzini toping.

A) 120 B) 144 C) 60 D) 96 E) 72

Yechilishi: $V = 48; H = 4;\ S_{yon} =?$



$48 = \frac{1}{3} \cdot a^2 \cdot H \Rightarrow a = 6;$

$Misr$ uchburchagidan $\Rightarrow h = 5;$

$S_{\Delta} = \frac{1}{2} \cdot 6 \cdot 5 = 15;$

$S_{yon} = 4 \cdot S_{\Delta} = 60.$ Javobi: C.

(1997-4-61) Muntazam piramida yon sirtining yuzi 48 ga, apofemasi 8 ga teng. Piramida asosining perimetrini toping.

A) 6 B) 12 C) 8 D) 10 E) 14

Yechilishi: $S_{yon} = 48;\ \ h = 8;\ \ P_{asos} =?$

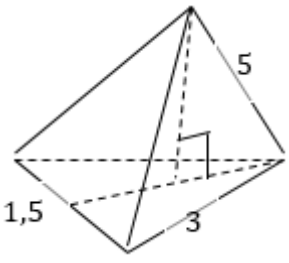
$S_{yon} = \frac{1}{2} \cdot P_{asos} \cdot h \Rightarrow 48 = \frac{1}{2} \cdot P_{asos} \cdot 8 \Rightarrow P_{asos} = 12.$

Javobi: B.

(1997-9-16) Muntazam uchburchakli piramidaning balandligi 4 ga, asosining balandligi esa 4,5 ga teng. Piramidaning yon qirrasini toping.

A) 6 B) 6,5 C) 5 D) 5,5 E) 5,3

Yechilishi: Misr uchburchagidan.



Asos muntazam uchburchak:

$R = \frac{2}{3} \cdot h = \frac{2}{3} \cdot 4{,}5 = 3.$

Javobi: C.

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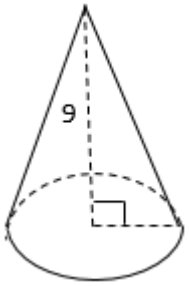
Konus

(1996-1-52) Asos aylanasining uzunligi $8\sqrt{\pi}$ ga, balandligi 9 sm ga teng bo‘lgan konusning hajmini toping.

A) 16π B) 24 C) 16

D) 48 E) 144



Yechilishi: $2\pi R = 8\sqrt{\pi} \Rightarrow$

$\Rightarrow R = \frac{8\sqrt{\pi}}{2\sqrt{\pi}\cdot\sqrt{\pi}} = \frac{4}{\sqrt{\pi}};\ V = \frac{1}{3}\pi R^2 H =$

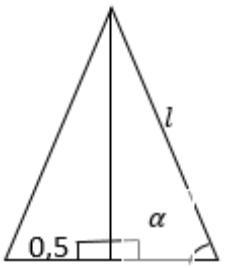
$= \frac{1}{3}\pi \cdot \frac{16}{\pi} \cdot 9 = 48.$ Javobi: D.

(1996-3-52) Konus asosining radiusi 0,5 ga teng. Konus yasovchisi bilan uing asosi tekisligi orasidagi burchak qanday bo‘lganda konus yon sirtining yuzi $0{,}5\pi$ ga teng bo‘ladi?

A) 30° B) 60° C) 45° D) $arccos\frac{1}{3}$ E) $arccos\frac{1}{\sqrt{3}}$

Yechilishi:Konusning tekislikdagi proyeksiyasi

teng yonli uchburchak bo‘ladi:



$\pi R l = 0{,}5\pi \Rightarrow 0{,}5l = 0{,}5 \Rightarrow l = 1;$

$0{,}5 : 1 = cos\alpha \Rightarrow \alpha = 60°.$

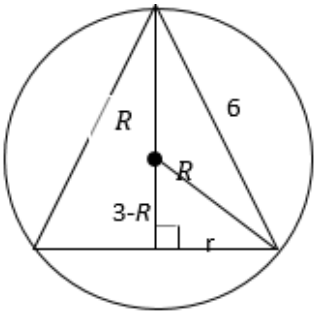
Javobi: B.

(1996-7-52) Sharga ichki chizilga konusning balandligi 3 ga, asosining radiusi $3\sqrt{3}$ ga teng. Sharning radiusini toping.

A) 5 B) 6 C) $4\sqrt{3}$ D) $5\sqrt{2}$ E) 5,6

Yechilishi: Sharning tekislikdagi proeksiyasi doira;

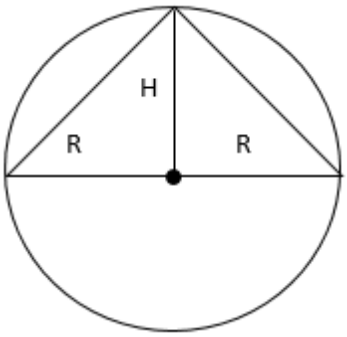
$R^2 = (3-R)^2 + \left(3\sqrt{3}\right)^2 \Rightarrow$



$\Rightarrow R^2 = 9 - 6R + R^2 + 27 \Rightarrow$
$\Rightarrow 6R = 36 \Rightarrow R = 6.$
Javobi: B.

(1997-1-41) Sharga ichki chizilgan konusning asosi sharning eng katta doirasidan iborat. Sharning hajmi kousning hajmidan echa marta katta?

A) 2 B) 4 C) 3
D) 1,5 E) 2,5



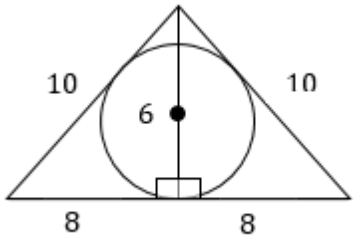
Yechilishi: $H = R$; $V_{sh} = \frac{4}{3}\pi R^3$;

$V_k = \frac{1}{3}\pi R^2 H = \frac{\pi R^3}{3}$;

$\frac{V_{sh}}{V_k} = \frac{4\pi R^3}{3} \cdot \frac{3}{\pi R^3} = 4.$ Javobi: B.

(1997-3-52) Konusning balandligi 6 ga, yasovchisi 10 ga teng. Konusga ichki chizilgan sharing radiusini toping.

A) 3 B) $2\frac{2}{3}$ C) 4 D) $3\sqrt{3}$ E) $2\sqrt{2}$

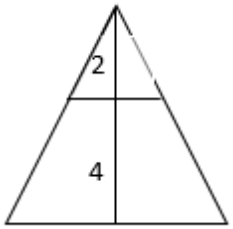


Yechilishi:Misr uchburchakdan: $R = 8$;

$S_\Delta = \frac{1}{2} \cdot 16 \cdot 6 = 48;$

$r = \frac{2S}{a+b+c} = \frac{96}{36} = 2\frac{2}{3}.$ Javobi: B.

(1997-4-58) Konusning balandligi 6 ga teng. Konusing asosidan 4 ga teng masofada unga paralel tekislik o‘tkazilgan. Hosil bo‘lgan kesim yuzining konus asosi yuziga nisbatini toping.

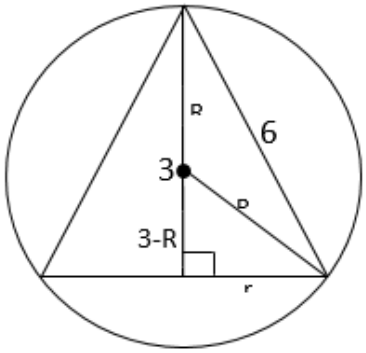


A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{4}{9}$ D) $\frac{2}{5}$ E) $\frac{1}{9}$

Yechilishi: $k = \frac{2}{6} = \frac{1}{3} \Rightarrow k^2 = \frac{1}{9}$.

Javobi: E.

(1997-7-52) Balandligi 3 ga, yasovchisi 6 ga teng bo‘lgan konusga tashqi chizilgan sharning radiusini toping.



A) $3\sqrt{3}$ B) 5 C) 6

D) $4\sqrt{2}$ E) 4,5

Yechilishi: $r^2 = 6^2 - 3^2 = 36 - 9 = 27;$

$R^2 = (3 - R)^2 + r^2 \Rightarrow$

$\Rightarrow R^2 = 9 - 6R + R^2 + 27;$

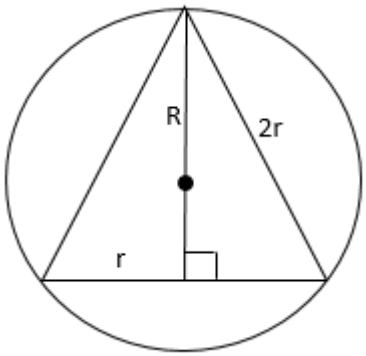
$6R = 36 \Rightarrow R = 6.$

Javobi: C.

(1997-6-41) Sharga konus ichki chizilgan. Konusning yasovchisi asosining diametriga teng. Shar hajmining konus hajmiga nisbatini toping.

A) 32:9 B) 8:3 C) 16:9 D) 27:4 E) 9:4

Yechilishi: $H^2 = (2r)^2 - r^2 = 3r^2 \Rightarrow$



$\Rightarrow H = r\sqrt{3}; V_k = \frac{1}{3}\pi R^2 H =$

$= \frac{1}{3}\pi r^3\sqrt{3};\ \ R = \frac{2}{3}H = \frac{2}{3}r \cdot \sqrt{3};$

$V_{sh} = \frac{4}{3}\pi R^3 = \frac{4\pi}{3}\left(\frac{2\sqrt{3} \cdot r}{3}\right)^3 =$

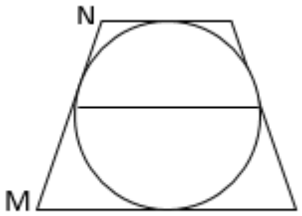
$= \frac{4}{3}\pi \cdot \frac{8 \cdot 3\sqrt{3} \cdot r^3}{27} = \frac{32\pi\sqrt{3}r^3}{27};$

$\frac{V_{sh}}{V_k} = \frac{32\sqrt{3} \cdot \pi R^3}{27} \cdot \frac{3}{\sqrt{3}\pi R^3} = \frac{32}{9} = 32:9.$

Javobi: A.

(1997-9-79) Sharga tashqi chizilgan kesik konusning yasovchilari o‘rtalaridan o‘tuvchi tekislik bilan shu kesik konus hosil qilgan kesimning yuzi 4π ga teng. Kesik konusning yasovchisini toping.

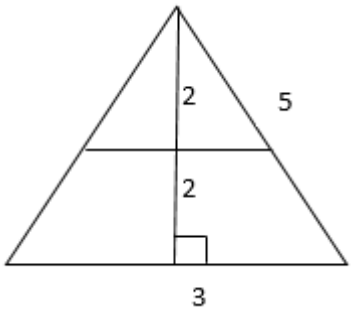
A) 2 B) 4 C) 3
D) 5 E) 6



Yechilishi: $\pi R^2 = 4\pi \Rightarrow R = 2 \Rightarrow$
$\Rightarrow MN = l = 4.$
Javobi: B.

(1997-9-59) Yasovchisi 5 ga, balandligi 4 ga teng konus asosidan 2 ga teng masofada shu asosga paralell tekislik bilan kesildi. Hosil bo‘lgan kesimning yuzii toping.

A) $2{,}25\pi$ B) $3{,}16\pi$ C) $2{,}64\pi$ D) $2{,}25\pi$
E) $3{,}26\pi$



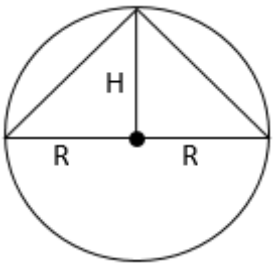
Yechilishi: $k = \frac{4}{2} = 2;\ \frac{3}{r} = 2 \Rightarrow$
$\Rightarrow r = 1{,}5 \Rightarrow$
$\Rightarrow S = \pi r^2 = 2{,}25\pi.$
Javobi: A.

(1997-11-41) Sharga ichki chizilgan konusning o‘q kesimi teng yonli to‘g‘ri burchakli uchburchakdan iborat. Konusning hajmi shar hajmining qanday qismini tashkil etadi.

A) 0,25 B) $\frac{1}{3}$ C) $\frac{2}{3}$ D) $\frac{3}{7}$ E) 0,75

Yechilishi: $V_k = \frac{1}{3}\pi R^3;\ V_{sh} = \frac{4}{3}\pi R^3;$

$\frac{V_k}{V_{sh}} = \frac{\pi R^3}{3} \cdot \frac{3}{4\pi R^3} = 0{,}25.$ Javobi: A.



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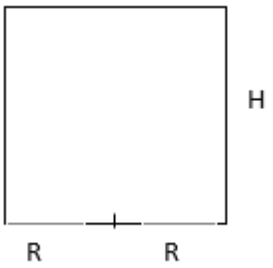
Silindr

(1996-9-99) Silindr yon sirtining yuzi 24π ga, hajmi esa 48π ga teng. Silindrning balandligini toping.

A) 2 B) 4 C) 8 D) 3 E) 6

Yechilishi: Silindrning frontal proeksiyasi to‘g‘ri to‘rtburchak;



$S_{yon} = 24\pi;\ \ V = 48\pi;\ \ H = ?$

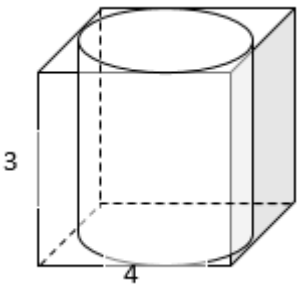
$24\pi = 2\pi RH \Rightarrow RH = 12 \Rightarrow R = \frac{12}{H};$

$V = \pi R^2 H \Rightarrow 48\pi = \pi R^2 H \Rightarrow$

$\Rightarrow H = \frac{48}{R^2} \Rightarrow H = \frac{48}{\left(\frac{12}{H}\right)^2} \Rightarrow$

$\Rightarrow H \cdot \frac{144}{H^2} = 48 \Rightarrow H = \frac{144}{48} = 3.$ Javobi: D.

(1997-4-59) Silindr va unga tashqi chizilgan muntazam to‘rtburchakli parallelepiped asosining tomoni 4 ga, balandligi 3 ga teng. Silindrning hajmini toping.



A) 10π B) 12π C) 16π

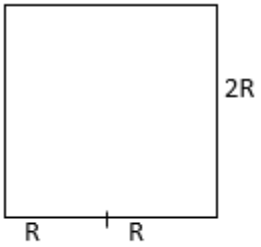
D) 20π E) 8π

Yechilishi: $V = \pi R^2 H =$

$= \pi \cdot 2^2 \cdot 3 = 12\pi.$

Javobi: B.

(1997-4-62) Hajmi 432π ga teng bo‘lgan silindrning o‘q kesimi kvadratdan iborat. Silindrga ichki chizilgan shar sirtining yuzini toping.



A) 120π B) 134π C) 144π

D) 150π E) 124π

Yechilishi: $432\pi = \pi R^2 H$;

$432 = R^2 \cdot 2\text{R}$; $R^3 = 216 \Rightarrow R = 6$;

$S_{sh} = 4\pi R^2 = 144\pi$. Javobi: C.

(1997-12-58) O‘q kesimi kvadratdan iborat silindrga ichki chizilgan sharning hajmi $\frac{9\pi}{16}$ ga teng. Silindrning yon sirtini toping.

A) $\frac{3\pi}{4}$ B) $\frac{7\pi}{4}$ C) $\frac{9\pi}{4}$ D) $\frac{5\pi}{4}$ E) 3π

Yechilishi: $\frac{9\pi}{16} \cdot \pi = \frac{4}{3}\pi R^3 \Rightarrow R^3 = \frac{27}{64} \Rightarrow R = \frac{3}{4}$;

$S_{yon} = 2\pi RH = 2\pi R \cdot 2R = 4\pi R^2 = 4\pi \cdot \left(\frac{3}{4}\right)^2 =$

$= 4 \cdot \pi \cdot \frac{9}{16} = \frac{9\pi}{4}$. Javobi: C.

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Mustaqil bajarish uchun topshiriqlarlar

(1996-7-1) $21 \cdot 18 - 19 \cdot 18 + 18 \cdot 17 - 17 \cdot 16 + 16 \cdot 15 - 15 \cdot 14$ ni hisoblang.

A) 50 B) 100 C) 90 D) 24 E) 110

(1996-9-52) $18 \cdot 36 - 16 \cdot 36 + 24 \cdot 27 - 25 \cdot 24 - 21 \cdot 5$ ning qiymatini toping.

A) 45 B) 1 C) 0 D) 15 E) 115

(1997-3-1) $21 \cdot 17 - 18 \cdot 17 + 17 \cdot 15 - 15 \cdot 14 + 18 \cdot 13 - 15 \cdot 13$ ni hisoblang.

A) 125 B) 135 C) 205 D) 180 E) 165

(1997-7-1) $36 \cdot 24 - 33 \cdot 24 + 17 \cdot 11 - 14 \cdot 11 + 18 \cdot 1 - 15 \cdot 16$ ni hisoblang.

A) 166 B) 155 C) 180 D) 235 E) 153

(1997-10-1) $27 \cdot 23 \cdot -24 \cdot 23 + 21 \cdot 19 - 18 \cdot 19 + 17 \cdot 11 - -14 \cdot 11$ ni hisoblang.

A) 165 B) 159 C) 253 D) 203 E) 189

(1996-9-41) 7^{100} ning oxirgi raqamini toping.

A) 3 B) 5 C) 7 D) 9 E) 1

(1996-12-69) 3^{101} ning oxirgi raqamini toping.

A) 3 B) 1 C) 7 D) 9 E) 5

(1996-13-11) 2^{100} ning oxirgi raqamini toping.

A) 2 B) 0 C) 4 D) 6 E) 8

(1997-5-13) 6^{1971} ning oxirgi raqamini toping.

A) 2 B) 6 C) 8 D) 4 E) 1

(1997-9-13) 2^{1971} ning oxirgi raqamini toping.

A) 2 B) 6 C) 4 D) 8 E) 0

(1996-9-6) $\left(1-\frac{1}{5^2}\right)\left(1-\frac{1}{6^2}\right)\cdot\ldots\cdot\left(1-\frac{1}{103^2}\right)$ ni hisoblang.

A) $\frac{64}{103}$ B) $\frac{67}{103}$ C) $\frac{69}{103}$ D) $\frac{415}{515}$ E) $\frac{416}{515}$

(1996-13-6)) $\left(1-\frac{1}{4^2}\right)\left(1-\frac{1}{5^2}\right)\cdot\ldots\cdot\left(1-\frac{1}{102^2}\right)$ ni hisoblang.

A) $\frac{251}{408}$ B) $\frac{331}{408}$ C) $\frac{71}{102}$ D) $\frac{103}{136}$ E) $\frac{111}{136}$

(1996-1-5) $\left(2{,}5-2\frac{1}{3}\right)\cdot 5{,}2 : 2\frac{3}{5}$ ni hisoblang.

A) $\frac{2}{5}$ B) $\frac{1}{3}$ C) 3 D) $\frac{3}{7}$ A) $2\frac{1}{3}$

(1996-6-1) $1{,}75-\left(-1\frac{2}{7}\right)\cdot 6{,}5\cdot\frac{7}{9}$ ni hisoblang.

A) -4,75 B) 2,15 C) 8,25 D) 4,75 E) 7,55

(1996-6-9) Quyidagi ifodalardan qaysi biri (-1) ga teng.

A) $((-1)^2)^3$ B)$(-(-1)^2)^3$ C)$((-1)^3)^2$

D)$(-(-1)^3)^3$ E)$-((-1)^5)^3$

(1996-7-2) $x=220350, y=3{,}21\cdot 10^6$ va $z=1024145$ sonlardan qaysilari 15 ga qoldiqsiz bo‘linadi?

A) $faqat\ x$ B) $faqat\ y$ C) $y\ va\ z$ D) $x\ va\ y$ E) $x\ va\ z$

(1996-7-6) $5\frac{5}{7}:2\frac{2}{5}\cdot 5\frac{1}{4}:1\frac{1}{6}\cdot\frac{2}{3}$ ni hisoblang.

A) $7\frac{1}{7}$ B)$8\frac{1}{7}$ C) $6\frac{6}{7}$ D) $7\frac{5}{7}$ E) $4\frac{5}{6}$

(1996-7-9) $\left(\frac{1}{7}\right)^0+6\cdot 2^3+\left(\frac{2}{5}\right)^{-2}$ ni hisoblang.

A) 8 B) $7\frac{1}{7}$ C) 7 D) $-47\frac{4}{25}$ E) $17\frac{1}{2}$

(1996-7-14) $\sqrt{\frac{65^3+35^3}{10^2}-35\cdot 65}$ ni hisoblang.

A) 100 B) 30 C) 10 D) 45 E) 65

(1996-7-24) $\frac{3-\sqrt{5}}{3+\sqrt{5}}+\frac{3+\sqrt{5}}{3-\sqrt{5}}$ ning qiymatini toping.

A) 2 B) $\frac{3\sqrt{5}}{2}$ C) 4,5 D) $\frac{3\sqrt{5}+2}{2}$ E) 7

(1996-9-3) Quyidagi oddiy kasr ko‘rinishida berilgan sonlardan qaysilarini o‘nli kasr ko‘rinishida keltirib bo‘lmaydi:

1) $\frac{7}{32}$; 2) $\frac{11}{100}$ 3) $\frac{5}{48}$ 4) $\frac{5}{14}$?

A) 2; 3 B) 3; 4 C) 4; 1 D) 1;2 E) 2; 4

(1996-9-4) $1{,}011\cdot 10^{-3}+2{,}1\cdot 10^{-4}$ yig‘indi quyidagi sonlarning qaysi biriga teng?

A) $3{,}111\cdot 10^{-3}$ B) $3{,}111\cdot 10^{-4}$ C) $3{,}111\cdot 10^{-7}$

D) $1{,}221\cdot 10^{-3}$ E) $1{,}221\cdot 10^{-4}$

(1996-9-53) Bir nechta natural sonlarning yig‘indisi 77 ga teng. Agar shu sonlarning har biridan 4 ni ayirib yig‘indi hisoblansa, u 61 ga teng bo‘ladi. Yig‘indida nechta son qatnashgan?

A) 4 B) 6 C) 8 D) 12 E) 24

(1996-9-54) $\frac{0{,}7\cdot 1{,}8\cdot 2{,}6}{7{,}2\cdot 7{,}8\cdot 1{,}4}$ ni qiymatini toping.

A) $\frac{1}{24}$ B) $\frac{2}{5}$ C) 0,04 D) $\frac{1}{12}$ E) $\frac{2}{3}$

(1996-9-56) $6\frac{3}{8}-\left(2{,}5-2\frac{1}{3}\right):1\frac{1}{3}$ ni hisoblang.

A) $5\frac{2}{3}$ B) $6\frac{1}{4}$ C) $4\frac{1}{2}$ D) $2\frac{1}{3}$ E) $5\frac{1}{4}$

(1996-9-57) 0,8 soniga teskari sonni toping.

A) – 0,8 B) 8 C) $-\frac{5}{4}$ D) 1,25 E) 0,2

(1996-9-62) $0,(5)$ soni quyidagi sonlardan qaysi biriga teng?

A) $\frac{1}{2}$ B) $\frac{10}{18}$ C) 0,555 D) $\frac{1}{5}$ E) $\frac{4}{7}$

(1996-9-65) $\frac{27^3}{3^4 \cdot 9^2}$ ni hisoblang.

A) 3 B) $\frac{1}{2}$ C) 1 D) 9 E) $\frac{1}{9}$

(1996-10-2) Bir nechta natural sonlarning yig‘indisi 60 ga teng. Agar shu sonlarning har biriga 2 ni qo‘shib yig‘indi hisoblansa, u 76 ga teng bo‘ladi. Yig‘indida nechta son qatnashgan?

A) 5 B) 8 C) 9 D) 16 E) 18

(1996-96-10) $\frac{0{,}15 \cdot 1{,}6 \cdot 4{,}6}{9{,}2 \cdot 0{,}03 \cdot 6{,}4}$ ning qiymatini toping.

A) $\frac{5}{8}$ B) $\frac{2}{5}$ C) 2 D) 0,2 E) $\frac{5}{4}$

(1996-10-7) $-1{,}5$ ga teskari sonni toping.

A) 1,5 B) $-0{,}75$ C) $-\frac{2}{3}$ D) $\frac{2}{3}$ E) -3

(1997-2-1) $-1\frac{3}{4} \cdot 6{,}5 \cdot \left(-\frac{4}{7}\right) - 3{,}75$ ni hisoblang.

A) $-2{,}75$ B) $-10{,}25$ C) $2{,}75$

D) $10{,}25$ E) $3{,}75$

(1997-2-2) 215 ni 19 ga bo‘lgancha, qoldiq 6 bo‘ladi. Bo‘linma nechaga teng?

A) 13 B)12 C) 9 D) 11 E) 14

(1997-2-9) Quyidagi ifodalardan qaysi biri 1 ga teng?

A) $(-(-1)^2)^3$ B) $((-1)^3)^5$ C)$-((-1)^5)^4$

D) $((-1)^3)^4$ E) $-((-1)^2)^3$

(1997-3-2) $x = 30112,\ y = 3{,}3 \cdot 10^5\ va\ z = 102588$ sonlardan qaysilari 12 gaqoldiqsiz bo‘linadi.

A) $faqat\ y$ B) $faqat\ x$ C) $x\ va\ z$

D)$faqat\ x$ E) $y\ va\ z$

(1997-4-2) 17827516 son quyidagi sonlardan qaysi biriga qoldiqsiz bo‘linadi?

A) 3 B) 10 C) 4 D) 5 E) 9

(1997-4-3) Eng katta son berilgan javobni toping.

A) $\sqrt{15}$ B) $\sqrt[3]{65}$ C) $\sqrt[4]{81}$ D) 4 E) $\sqrt[4]{4^3}$

(1997-4-4) k raqamning qanday qiymatlarida $\sqrt{30+k}$ ning butun qismi 5 bo‘ladi?

A) 6;7;8;9 B) 0;1;2;3 C)1;2;3

D) 5;6 E) 0;1;2;3;4;5

(1997-3-9) $\left(5\frac{3}{4}-4\frac{8}{9}\right)\cdot 2+67\frac{1}{2}:2\frac{1}{7}$ ni hisoblang.

A) $24\frac{1}{3}$ B) $33\frac{2}{9}$ C) $36\frac{1}{9}$ D) $31\frac{1}{3}$ E) $28\frac{2}{3}$

(1997-3-11) $4\frac{1}{2}\cdot 6^{-2}+\left(\frac{2}{5}\right)^{-3}-\left(\frac{2}{5}\right)^{0}$ ni hisoblang.

A) $15\frac{3}{4}$ B) $15\frac{1}{8}$ C) $11\frac{1}{5}$ D) $6\frac{3}{8}$ E) $14\frac{3}{4}$

(1997-3-14) $\sqrt{\frac{68^3-32^3}{36}+68\cdot 32}$ ifodaning qiymatini toping.

A) $16\frac{2}{3}$ B) 85 C) 100 D) $25\frac{5}{6}$ E) 120

(1997-3-24) $\frac{4+\sqrt{6}}{4-\sqrt{6}}+\frac{4-\sqrt{6}}{4+\sqrt{6}}$ ning qiymatini toping.

A) 2 B) $\frac{3\sqrt{6}}{8}$ C) $4\frac{2}{5}$ D) $\frac{\sqrt{6}+8}{4}$ E) 3,2

(1997-5-6) $-6-2(2-y)-2y+2$ ni soddalashtiring.

A) 8 B) $-8-4y$ C) $8-4y$ D) -8 E) $-8+4y$

(1997-5-9) Amalni bajaring. $1\frac{3}{5}-3\frac{1}{5}$

A) $-1\frac{2}{5}$ B) $1\frac{2}{5}$ C) $1\frac{3}{5}$ D) $2\frac{2}{5}$ E) $-1\frac{3}{5}$

(1997-5-20) Binoning 4-qavatigacha bo‘lgan zinaning uzunligi 2-qavatigacha bo‘lgan zina uzunligidan necha marta uzun? (Qavatlar orasidagi zinalar soni bir xil deb olinsin).

A) 4 B) 3,5 C) 3 D) 2,5 E) 2

(1996-10-5) $\left(5\frac{1}{3}-3{,}2\right):2\frac{2}{3}+1\frac{2}{5}$ ni hisoblang.

A) $2\frac{1}{2}$ B) 2,2 C) 3,2 D) 2 E) 1,8

(1996-10-8) $\frac{2}{3}$ va $\frac{5}{6}$ sonlari orasida maxraji 30 ga teng bo‘lgan nechta kasr son bor?

A) 1 B) 2 C) 4 D) 5 E) 3

(1996-10-12) Quyidagi sonlardan qaysi biri $0,(7)$ ga teng?

A) $\frac{7}{10}$ B) 0,777 C) $\frac{14}{18}$ D) $\frac{1}{7}$ E) $\frac{5}{7}$

(1996-10-13) $\frac{4{,}5^2-1{,}5^2}{0{,}3\cdot 0{,}7-0{,}3}$ ni hisoblang.

A) -20 B) 20 C) 200 D) -2 E) -200

(1996-11-1) $15-9:3+4\cdot 3$ ning qiymatini toping.

A) 24 B) 18 C) 48 D) 6 E) $7\frac{1}{3}$

(1996-11-6) $-8-6:(-2)-2\cdot(-11)$ ni hisoblang.

A) 17 B) -55 C) 55 D) 77 E) -77

(1996-11-9) $-\frac{3}{15}+\frac{1}{5}+\frac{1}{3}$ ning qiymatini toping.

A) $-\frac{1}{3}$ B) $\frac{2}{15}$ C) $\frac{3}{4}$ D) $\frac{1}{3}$ E) $\frac{4}{15}$

(1996-11-11) $\left(-\frac{1}{3}\right)\cdot\frac{2}{7}:\frac{5}{42}$ ni hisoblang.

A) $\frac{4}{5}$B) $\frac{5}{441}$ C) $-\frac{4}{5}$ D) $\frac{10}{882}$ E) $-\frac{5}{441}$

(1996-11-13) $\frac{1}{4}-\frac{4}{5}$ ni hisoblang.

A) $-\frac{9}{20}$ B) $-\frac{2}{9}$ C) $-\frac{1}{10}$ D) $\frac{9}{20}$ E) $\frac{2}{9}$

(1996-11-15) $\left(-1\frac{1}{3}\right)^3$ ni hisoblang.

A) $-2\frac{10}{27}$ B) $2\frac{10}{27}$ C) $1\frac{1}{27}$ D) $-\frac{1}{27}$ E) $-1\frac{1}{27}$

(1996-12-1) $18-12:2+5\cdot 3$ ning qiymatini toping.

A) $15\frac{1}{2}$ B) 51 C) 24 D) 54 E) 27

(1996-12-6) $8+6:(-2)-2\cdot(-11)$ ni hisoblang.

A) 99 B) 15 C) 33 D) -52 E) 27

(1996-12-8) Birinchi ish kuni ish normasining $\frac{1}{3}$ qismi bajarildi. Ikkinchi kuni birinchi kunda bajarilgan ishning $\frac{1}{6}$ qismicha ko‘p ish bajarildi. Shu ikki kunda qancha ish normasi bajarilgan?

A) $\frac{1}{2}$ B) $\frac{2}{9}$C) $\frac{13}{18}$ D) $\frac{5}{6}$ E) $\frac{23}{24}$

(1996-12-9) $\frac{3}{15}-\frac{1}{5}-\frac{1}{3}$ ning qiymatini toping.

A) $\frac{1}{3}$ B) $-\frac{3}{10}$ C) $\frac{3}{10}$ D) $\frac{1}{7}$ E) $-\frac{1}{3}$

(1996-12-10) $-\frac{1}{3}\cdot\left(-\frac{2}{7}\right):\frac{5}{42}$ ni hisoblang.

A) $\frac{5}{441}$ B) $\frac{4}{5}$ C)$-\frac{5}{441}$ D) $-\frac{4}{5}$ E) $\frac{10}{882}$

(1996-13-12) $-\frac{1}{3}-\frac{1}{4}$ ni hisoblang.

A) $-\frac{2}{7}$ B) $-\frac{7}{12}$ C)$\frac{1}{6}$ D) $-\frac{1}{6}$ E) $\frac{7}{12}$

(1996-12-14) $\frac{1}{3}-\frac{3}{4}$ ayirmani toping.

A) $-\frac{1}{6}$ B) $-\frac{5}{12}$ C)$\frac{1}{6}$ D) $\frac{5}{12}$ E) 1

(1996-12-15) $\left(-1\frac{1}{2}\right)^3$ ni hisoblang.

A) $6\frac{3}{4}$ B) $1\frac{1}{8}$ C) $-3\frac{3}{8}$ D) $-1\frac{1}{8}$ E) $-2\frac{1}{4}$

(1996-12-22) $\frac{x^2+3xy}{9y^2-x^2}$ kasrni qisqartiring.

A) $\frac{x}{x+3y}$ B) $-\frac{x}{x+3y}$ C) $\frac{x}{x-3y}$ D) $\frac{y}{3y-x}$ E) $\frac{x}{3y-x}$

(1996-12-61) Quyidagi oddiy kasr ko‘rinishida berilgan sonlardan qaysilarini chekli o‘nli kasr ko‘rinishiga keltirib bo‘lmaydi: 1) $\frac{35}{88}$ 2) $\frac{4}{125}$ 3) $\frac{34}{75}$ 4) $\frac{11}{80}$?

A) 1; 2 B) 3; 4 C) 1; 3 D) 2; 4 E) 1; 4

(1996-12-62) $1{,}015 \cdot 10^{-4} + 3{,}14 \cdot 10^{-5}$ yig‘indi quyidagi sonlardan qaysi biriga teng?

A) $4{,}155 \cdot 10^{-4}$ B) $4{,}155 \cdot 10^{-5}$ C) $4{,}155 \cdot 10^{-9}$

D) $1{,}329 \cdot 10^{-4}$ E) $1{,}329 \cdot 10^{-6}$

(1996-13-3) Quyidagi oddiy kasr ko‘rinishida berilgan sonlardan qaysilarini chekli o‘nli kasr ko‘rinishiga keltirib bo‘lmaydi: 1) $\frac{14}{625}$ 2) $\frac{3}{64}$ 3) $\frac{32}{75}$ 4) $\frac{11}{375}$?

A) 1; 2 B) 2; 3 C) 3; 4 D) 4; 1 E) 2; 4

(1996-13-4) $3{,}104 \cdot 10^{-2} + 1{,}81 \cdot 10^{-3}$ yig‘indi quyidagi sonlardan qaysi biriga teng?

A) $3{,}285 \cdot 10^{-3}$ B) $3{,}285 \cdot 10^{-2}$ C) $4{,}914 \cdot 10^{-2}$

D) $4{,}914 \cdot 10^{-3}$ E) $4{,}914 \cdot 10^{-5}$

(1997-1-1) $\frac{0{,}215-1{,}6\cdot 0{,}215}{3{,}45-3\frac{3}{4}}$ ni hisoblang.

A) $-0{,}43$ B) 0,43 C) 4,3 D) $-4{,}2$ E)0,45

(1997-1-2) $17 \cdot 28 \cdot 41 \cdot 35 - 24 \cdot 12 \cdot 87$ ayirma qanday raqam bilan tugaydi?

A) 0 B) 2 C) 4 D) 6 E) 8

(1997-9-9) Amalni bajaring. $3\frac{4}{7} - 5\frac{2}{7}$.

A) $-1\frac{5}{7}$ B) $1\frac{4}{7}$ C) $1\frac{5}{7}$ D) $-\frac{4}{7}$ E) $1\frac{2}{7}$

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(1997-9-6) $-8-2(1-b)-2b+1$ ni soddalashtiring.

A) 9 B) $9-4b$ C) $9+4b$ D) -9 E)$-9-4b$

(1997-11-7) $0{,}2+1{,}8\cdot\left(\frac{4}{9}-1\frac{1}{2}+\frac{1}{6}\right)$ ni hisoblang.

A) $-1{,}4$ B) 1,8 C) 0,04 D) $-0{,}3$ E) -2

(1997-11-8) $2\sqrt{5\frac{1}{3}}+\frac{1}{3}\sqrt{99}-2\sqrt{2\frac{3}{4}}$ ni soddalashtiring.

A) $3\sqrt{11}$ B) $2\sqrt{22}$ C) $\sqrt{22}$ D) 2 E) 0

(1997-9-2) $7x-14x+6x$ ni soddalashtiring.

A) x B) $-2x$ C) $2x$ D) $-x$ E)$4x$

(1997-9-4) $3{,}7(3)$ davriy kasr qaysi oddiy kasrga teng?

A) $3\frac{1}{3}$ B) $3\frac{67}{99}$ C) $3\frac{11}{15}$ D) $3\frac{73}{90}$ E) $3\frac{7}{9}$

(1997-11-3) $\left(3\frac{17}{36}-5\frac{7}{12}\right):\frac{2}{9}-\frac{3}{26}\cdot 4\frac{1}{3}$ ni hisoblang.

A) -9 B) $8\frac{1}{2}$ C) 9 D) -10 E) $-9\frac{1}{2}$

(1997-11-1) $\frac{0{,}64\cdot 0{,}45-0{,}45}{1{,}05-1\frac{1}{2}}$ ni hisoblang.

A) $-3{,}6$ B) 0,36 C) 0,64 D) $-0{,}36$ E) 0,19

(1997-11-2) $15\cdot 25\cdot 37\cdot 43+34\cdot 48\cdot 77$ yig‘indini oxirgi raqamini topimg.

A)4 B) 9 C) 0 D) 5 E) 7

(1997-10-2) $x=123386,\ y=402108\ va\ z=2{,}61\cdot 10^5$ sonlardan qaysilari 6 ga qoldiqsiz bo‘linadi?

A)$faqat\ x$ B)$faqat\ y$ C)$faqat\ z$ D)$y\ va\ z$ E)$x\ va\ z$

(1997-10-5) $2\frac{2}{3}\cdot\left(1\frac{1}{2}a-2\frac{1}{4}\right)+1\frac{1}{5}\cdot\left(2\frac{1}{2}a-\frac{5}{6}\right)$ ni soddalashtiring.

A) $a+5$ B)$7a-7$ C) 7 D)$1\frac{1}{2}a-5$ E)$6\frac{1}{3}$

(1997-10-6) $1\frac{8}{17}\cdot 3\frac{2}{5}:\frac{11}{12}\cdot 2\frac{1}{5}:\frac{4}{9}$ ni hisoblang.

A) 2,7 B) $24\frac{3}{17}$ C) 24 D) $29\frac{1}{9}$ E) $7\frac{1}{3}$

(1996-9-60) $5{,}4;\ y;\ -2{,}2$ sonlarining o‘rta arifmetigi 1,2 ga teng. y ni toping.

A) 1,2 B) -0,8 C) 0,4 D) -0,4 E) 3

(1996-10-10) $y;\ 2{,}1;\ 3\ va\ 2{,}1$ sonlarining o‘rta arifmetigi 2,3 ga teng. y ni toping.

A) 2,1 B) 2,6 C) 2 D) 3,4 E) 3

(1997-12-26) $\frac{n^2-7n+6}{n^2-1}$ ni qisqartiring.

A) $\frac{n+6}{n-1}$ B) $\frac{n-6}{n+1}$ C) $\frac{n+6}{n+1}$ D) $\frac{n-6}{n-1}$ E) $\frac{n-3}{n+1}$

(1997-12-1) $-\frac{8}{9}\cdot 12{,}25\cdot 1\frac{1}{8}-(-2{,}25)$ ni hisoblang.

A) 10 B) -14,5 C) -10 D) 14,5 E) -10,25

(1997-12-4) $2m^2 3dm^2 4sm^2$ necha santimetr kvadrat?

A) 2034 B) 20244 C) 21034 D) 23004 E) 20304

(1996-6-4) 2 soat 30 minut 3 sekund necha sekunddan iborat?

A) 10203 B) 8203 C) 9003 D) 9803 E) 8993

(1996-6-5) Natural sonlarga nisbatan quyidagi mulohazalardan qaysi biri noto‘g‘ri?

A) berilgan sonlarga bo‘linadigan sonlarning eng kichigi bu sonlarning eng kichik karralisi bo‘ladi.

B) agar qo‘shiluvchilardan har biri 13 ga bo‘linsa, u holda ularning yig‘indisi ham 13 ga bo‘linadi.

C) agar biror sonning raqamlari yig‘indisi 9 ga bo‘linsa, u holda bu son 9 ga bo‘linadi.

D) oxirgi raqami 4 bo‘lgan son 4 ga bo‘linadi.

E) 3 hamda 2 ga bo‘linadigan sonlarning barchasi 6 ga bo‘linadi.

(1997-2-5) Natural sonlar uchun quyidagi mulohazalardan qaysi biri noto‘g'ri?

A) berilgan sonlar bo‘linadigan sonlarning eng kattasi ularning eng katta umumiy bo‘luvchisi bo‘ladi

B) agar ikki qo‘shiluvchilardan biri 11 ga bo‘linib, ikkinchisi 11 ga bo‘linmasa, ularning yig‘indisi 11 ga bo‘linmaydi

C) 3 ga bo‘lingan son 9 ga ham bo‘linadi

D) 3 va 5 ga bo‘linadigan son 15 ga bo‘linadi

E) Raqamlari yig‘indisi 3 ga bo‘linadigan juft son 6 ga bo‘linadi.

(1997-8-5) Quyidagi mulohazalarning qaysi biri natural sonlarga nisbatan noto‘g‘ri?

A) berilgan sonlarga bo‘linadigan sonlarning eng kichigi bu sonlarning eng kichik karralisi bo‘ladi

B) 3 hamda 4 ga bo‘linadigan son 12 ga ham bo‘linadi

C) oxirgi raqami 0 yoki 4 bo‘lgan son 4 ga bo‘linadi

D) oxirgi raqami 0 yoki 5 bo‘lgan son 5 ga bo‘linadi

E) faqat o‘ziga va 1 ga bo‘linadigan son tub son bo‘ladi.

(1997-8-6) $\frac{10n-24}{n}$ ifoda natural son bo‘linadigan n ning natural qiymatlari nechta?

A) 4 B) 7 C) 6 D) 5 E) 4

(1997-12-7) Quyidagi ifodalardan qaysi biri 1 ga teng?

A) $(-(-1)^2)^3$ B) $((-1)^3)^3$ C) $(-(-1)^4)^5$

D) $((-1)^5)^3$ E) $((-1)^3)^4$

(1996-6-6) $\frac{6n-12}{n}$ ifoda n ning nechta natural qiymatida natural son bo‘ladi?

A) 6 B) 5 C) 3 D) 2 E) 4

(1997-2-6) $\frac{12-3n}{n}$ ifoda n ning nechta natural qiymatida natural son bo‘ladi?

A) 6 B) 3 C) 5 D) 4 E) 2

(1997-4-10) $n(n\epsilon N)$ ning $\frac{5n^4+4n^2+8}{n^2}$ kasr butun son bo‘ladigan barcha qiymatlarini toping.

A) 1 B) 1; 2 C) 2 D) 1; 2; 4 E) 2; 4

(1997-4-11) $5,(8)$ ni oddiy kasr ko‘rinishda yozing.

A) $5\frac{8}{10}$ B) $5\frac{3}{5}$ C) $5\frac{888}{1000}$ D) $5\frac{8}{9}$ E) $5\frac{88}{100}$

(1997-5-2) $4a-13a+5a$ ni soddalashtiring.

A) $4a$ B) $-4a$ C) $6a$ D) $-6a$ E) $5a$

(1997-10-11) $12\cdot 3^{-3}+\left(\frac{3}{5}\right)^{-2}-\left(\frac{1}{2}\right)^{0}$ ni hisoblang.

A) 2 B) $2\frac{2}{9}$ C) $4\frac{1}{3}$ D) $3\frac{2}{9}$ E) 0

(1997-10-14) $\sqrt{\frac{82^3-18^3}{64}+82\cdot 18}$ ifodaning qiymatini toping.

A) 64 B) 100 C) 12,5 D) 50 E) 82

(1996-3-19) $(x^2-xy+y^2)(x+y)$ ifodaning $x=-\frac{1}{2}$ va $y=\frac{1}{\sqrt[3]{2}}$ bo‘lgandagi qiymatini toping.

A) $-\frac{5}{8}$ B) $\frac{9}{8}$ C) $\frac{3}{8}$ D) $-\frac{1}{8}$ E) $-\frac{3}{8}$

(1996-3-21) $\frac{x^2-3xy}{9y^2-x^2}$ kasrni qisqartiring.

A) $\frac{x}{x+3y}$ B) $-\frac{x}{x+3y}$ C) $\frac{x}{x-3y}$

D)$-\frac{x}{x-3y}$ E)$\frac{y}{y+3x}$

(1996-6-10) $(x^4-x^2y^2+y^4)(x^2+y^2)$ ko‘paytma o‘xshash hadlar ixchamlangandan keyin nechta qo‘shiluvchidan iborat bo‘ladi?

A) 3 B) 4 C) 2 D) 5 E) 6

(1996-6-50) $\frac{1}{3-\sqrt{8}}-2\sqrt{2}+6$ ni soddalashtiring.

A) 8 B) 7 C) 9 D) 10

E) to‘g‘ri javob keltirilmagan

(1996-7-19) $\left(\frac{5m}{m+3}-\frac{14m}{m^2+6m+9}\right):\frac{5m+1}{m^2-9}+\frac{3\cdot(m-3)}{m+3}$ ni soddalashtiring.

A) $\frac{3}{m+3}$ B) 3 C) $m-3$ D) 1 E) $\frac{m-3}{m+3}$

(1996-9-67) Agar $f(x)=\left(x-\frac{1}{3}\right)\left(2x+\frac{1}{4}\right)$ bo‘lsa, $f(1)$ ni toping.

A) -4,5 B) $\frac{7}{12}$ C) 4,5 D) 1,5 E)-1

(1996-9-68) $(a-3b)^2-(a+b)^2$ ni soddalashtiring.

A) $8b^2-8ab$ B) $8b^2$ C) $2b^2-8ab$

D) $-8b^2$ E) $2b^2-4ab$

(1996-9-74) $\left(m^2-\frac{1+m^2}{m^2-1}\right):\frac{m^2+1}{m+1}$ ni soddalashtiring.

A) $m-1$ B) $\frac{1}{m-1}$ C) $\frac{1}{m+1}$ D) 1 E)$\frac{1}{1-m}$

(1996-10-17) Agar $f(x)=(2x+1)\left(\frac{3}{x}-3\right)$ bo‘lsa, $f(-1)$ ni toping.

A) 0 B) 6 C) -6 D) -3 E) 12

(1996-10-24) $\left(b^2-\frac{1+b^4}{b^2+1}\right):\frac{1-b}{1+b^2}$ ni soddalashtiring.

A) 1 B) -1 C) $b-1$ D) $\frac{1}{b+1}$ E) $-b-1$

(1996-10-25) $\frac{0{,}5^5 \cdot 32^2}{4^3}$ ni hisoblang.

A) 2 B) $\frac{1}{2}$ C) 4 D) $\frac{1}{4}$ E) 8

(1996-10-26) $(x-1)(2-x)+(2x-3)^2$ ifodani ko‘phadning standart shakliga keltiring.

A) $5x^2+9x-7$ B) $3x^2-8$ D) $3x^2-9x+7$

D) $12x+4-x^2$ E) $5x^2-10x+7$

(1997-1-13) $1-(2x-3)^2$ ni ko‘paytuvchilarga ajrating.

A) $2(x+2)(x+1)$ B) $3(x-2)(x+1)$

C) $4(2-x)(x-1)$ D) $2(1-x)(x-2)$

E) $(2-3x)(x-1)$

(1997-2-10) $(y^4-y^2+1)(y-1)(y+1)$ ni soddalashtirgandan keyin hosil bo‘lgan ko‘phadning nechta hadi bo‘ladi?

A) 3 B) 4 C) 2 D) 5 E) 6

(1997-2-50) $2\sqrt{3}-5-\frac{11}{\sqrt{12}-1}$ ni soddalashtiring.

A) $2\sqrt{3}-4$ B) 4 C) -4 D) -6 E) 6

(1997-3-5) $2\frac{1}{3}\cdot\left(\frac{6}{7}m+3\right)-1\frac{2}{3}\cdot\left(\frac{3}{5}m-3\right)$ ni soddalashtiring.

A) $m-2$ B) 4 C) $m+2$ D) $\frac{2}{3}m+2$ E) $4+m$

(1997-3-6) $\frac{3}{4}\cdot 1\frac{1}{7}:\frac{2}{15}\cdot 12\frac{1}{4}:7\frac{1}{2}$ ni hisoblang.

A) $10\frac{1}{2}$ B) 11 C) $9\frac{1}{4}$ D) $7\frac{1}{2}$ E) $5\frac{1}{7}$

(1997-3-18) $(x^2+1)^2-4x^2$ ni ko‘paytuvchilarga ajrating.

A) $(x^2+1)(x^2-1)$ B) $x^2(x^2-2)$ C) $(x-1)^2(x+1)^2$

D) $(x-2)^2(x^2+1)$ E) $(x+2)^2(x-2)^2$

(1997-3-19) $\left(\frac{3a}{a-4}+\frac{10a}{a^2-8a+16}\right):\frac{3a-2}{a^2-16}-\frac{4(a+4)}{a-4}$ ni soddalashtiring.

A) $a+4$ B) a C) $-\frac{4}{a+4}$ D) $\frac{1}{a-4}$ E) $4-a$

(1997-8-50) $\frac{19}{\sqrt{20}-1}-2\sqrt{5}+3$ ni soddalashtiring.

A) $4\sqrt{5}+4$ B) $4\sqrt{5}-4$ C) $2\sqrt{5}+4$ D) 4 E) $2\sqrt{5}-4$

(1997-8-26) $\frac{y^2-3y-4}{y^2-1}$ ni qisqartiring.

A) $\frac{y+4}{y+1}$ B) $\frac{4-y}{y-1}$ C) $\frac{y+4}{y-1}$ D) $\frac{y-4}{y+1}$ E) $\frac{y-4}{y-1}$

(1997-8-10) $(x^2+1)(x^4-x^2+1)+(x^3-1)^2$ ni soddalashtirgandan keyin hosil bo‘lgan ko‘phadning nechta hadi bo‘ladi?

A) 5 B) 4 C) 3 D) 6 E) 2

(1997-7-18) $(a^2+4)^2-16a^2$ ni ko‘paytuvchilarga ajrating.

A) $(a^2+2)(a^2-2)$ B) $(a+2)^2(a-2)^2$

C) $x^2(4+a^2)$ D) $(a^2-2)(a^2-2)$

(1997-7-19) $\left(\frac{2x}{x-5}+\frac{x}{x^2-10x+25}\right):\frac{2x-9}{x^2-25}-\frac{5(x+5)}{x-5}$ ni soddalashtiring.

A) 5 B) $\frac{x+5}{x-5}$ C) $\frac{5}{x+5}$ D) $\frac{1}{x-5}$ E) $5+x$

(1997-6-13) $9-(2c-1)^2$ ni ko‘paytuvchilarga ajrating.

A) $2(c-1)(c+2)$ B) $4(c-2)(c+1)$

C) $(3c-1)(c+4)$ D) $(2c+1)(4c-3)$

E) $4(c+1)(2-c)$

(1997-6-57) $\frac{(\sqrt{m}+n)\sqrt{m-2\sqrt{m}n+n^2}}{m-n^2}$ ifodani $m=15$ va $n=3\sqrt{2}$ bo‘lganda hisoblang.

A) 1 B) -1 C)-3 D) 0

E) to‘g‘ri javob keltirilmagan

(1997-6-18) $\left(\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}}+\frac{2\sqrt{a}\sqrt{b}}{a-b}\right)\cdot\frac{b-2\sqrt{a}\sqrt{b}+a}{a+b}$ ni soddalashtiring.

A) $\frac{1}{\sqrt{a}+\sqrt{b}}$ B) 1 C) $\sqrt{a}-\sqrt{b}$ D) -1 E)$\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}}$

(1997-6-7) $0{,}8+0{,}2:\left(\frac{7}{15}-1\frac{1}{6}+\frac{9}{20}\right)$ ni hisoblang.

A) 0 B) 1 C) 1,6 D)-0,6 E) -1

(1997-6-8) $15\sqrt{\frac{3}{5}}-0{,}5\sqrt{60}+2\sqrt{3\frac{3}{4}}$ ni soddalashtiring.

A) 0 B) $\sqrt{15}$ C)$5\sqrt{3}$ D)$3\sqrt{15}$ E)$4\sqrt{5}$

(1997-9-67) Agar $ab=9$ va $3b=8c(b\neq 0)$ bo‘lsa, ac ni hisoblang.

A) $3\frac{1}{3}$ B)$3\frac{5}{8}$ C)$3\frac{4}{9}$ D)$3\frac{5}{7}$ E)$3\frac{3}{8}$

(1997-9-70) n $(n\in N)$ ning $\frac{5n^3+6n^2+7n}{n}$ kasr natural son bo‘ladigan barcha qiymatlarini toping.

A)1; 2; 3 B)$n\in N$ C)1; 2; 3; 4

D)1; 2; 3 E)1; 2; 3; 4

(1997-9-71) 8,(5) ni oddiy kasrga aylantiring.

A) $8\frac{4}{9}$ B) $8\frac{5}{8}$ C) $8\frac{7}{8}$ D) $8\frac{5}{9}$ E) $8\frac{5}{10}$

(1997-9-72) n raqamining qanday qiymatlarida $7851n$ soni 9 ga qoldiqsiz bo‘linadi?

A) 2 B) 4 C) 6 D) 9 E) 2; 6

(1997-11-18) $\frac{a+b}{a+\sqrt{ab}+b}:\left(\frac{a^{0.5}+b^{0,5}}{a^{0,5}-b^{0,5}}-\frac{2a^{0,5}b^{0,5}}{a-b}\right)$ ni soddalashtiring.

A) $\sqrt{a}+\sqrt{b}$ B) $\frac{1}{\sqrt{a}+\sqrt{b}}$ C) $\frac{2\sqrt{a}\sqrt{b}}{\sqrt{a}+\sqrt{b}}$

D) 1 E) $\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}}$

(1997-10-24) $\frac{4-\sqrt{2}}{4+\sqrt{2}}-\frac{4+\sqrt{2}}{4-\sqrt{2}}$ ning qiymatini toping.

A) $-\frac{8\sqrt{2}}{-7}$ B) $8\sqrt{2}$ C) 6 D) -4 E) $-4\sqrt{2}$

(1997-10-9) $\left(12\frac{1}{9}-10\frac{2}{5}\right):38\frac{1}{2}+2\frac{3}{8}\cdot 18$ ni hisoblang.

A) $24\frac{1}{15}$ B) $32\frac{7}{45}$ C) $38\frac{3}{5}$

D) 47 E) $57\frac{2}{45}$

(1996-3-79) $|x+3|+|x-1|+|x-4|=6$ tenglamaning ildizlari yig‘indisini toping.

A) ildizi yo‘q B) 0 C) -4 D) 1 E) -2

(1996-6-14) Agar $a>b>c$ bo‘lsa,

$|a-b|+|c-a|-|b-c|$ ni soddalashtiring.

A) $a-2a$ B) $2c$ C) $2a$ D) $2a-2b$ E) $b-2c$

(1996-7-8) $|x-2|\leq 5$ tengsizlik nechta butun yechimga ega?

A) 11 B) 10 C) 8 D) 7 E) 6

(1996-9-20) $|x+2|+|x|+|x-2|=4$ tenglama nechta ildizga ega?

A) ildizi yo‘q B)cheksiz ko‘p C) 1 D) 2 E) 4

(1996-10-11) $|m|\cdot(-0{,}6)=-5{,}4$ tenglamani qanoatlantiradigan m ning barcha qiymatlarini toping.

A) 9 B) 9 va -9 C) 0,9 va -0,9 D) $\emptyset$ E) 3,24

(1996-12-27) $|x-1|\leq 2$ tengsizlikni yeching.

A) yechimga ega emas B) $(-\infty;-1]\cup[3;+\infty)$

C) $[-1;3]$ D) $[1;3]$ E) $(-\infty;3]$

(1996-13-20) $|x-4|+|x-1|+|x+2|=6$ tenglamaning ildizlari yig‘indisini toping.

A) ildizi yo‘q B) 2 C) 3 D) 1 E) cheksiz ko‘p

(1997-1-73) $|3x-7|<5$ tengsizlikni qanoatlantiradigan natural sonlarning eng kattasi topilsin.

A) 4 B) 3 C) 2 D) 1 E) $\emptyset$

(1997-2-14) Agar $x>y>z$ bo‘lsa,

$|x-y|-|z-y|-|z-x|$ ni soddalashtiring.

A) $2x$ B) $2y-2x$ C) $2z-2y$ D) $2y$ E) $2y-2z$

(1997-4-6) Quyidagi munosabatlardan qaysi biri noto‘g‘ri?

A) $|a^2+b^2|=a^2+b^2$

B)$a>0\ bo'lsa,\ |a+b^4|=a+b^4$

C) $a<0\ bo'lsa,\ |a^3+b^2|\geq a^3+b^2$

D) $a<0,\ b<0\ bo'lsa, |a+b|=-a-b$

E) $a<0, b>0\ bo'lsa, |a+b|=b-a$

(1997-8-14) Agar $p>q>k>0$ bo‘lsa,

$|p+q|-|k-q|+|k-p|$ ni soddalashtiring.

A) $2p$ B) $2p+2q-2k$ C) $2p+2q+2k$

D) $2p+2k$ E) $2q-2k$

(1997-6-70) $|2x+3|<7$ tengsizlikni qanoatlantiruvchi eng katta sonni toping.

A) 1 B) 2 C) 3 D) 4 E) 5

(1997-6-71) $|x|=|2x-5|$ tenglamaning nechta ildizi bor?

A) 1 B) 2 C) 3 D) cheksiz ko‘p E) ildizi yo‘q

(1997-10-8) $|4-x|<6$ tengsizlik nechta butun yechimga ega?

A) 3 B) 5 C) 8 D) 11 E) 10

(1997-12-13) Agar $m>n>k>0$ bo‘lsa,

$|n-m|+|n+k|-|m-k|$ ni soddalashtiring.

A) $2k-2m$ B) $2k-2n$ C) $2k$

D) $2m-2k$ E) $2m-2n$

(1996-1-11) $|b|:(-2{,}5)=-2{,}5$ tenglamani qanoatlantiradigan b ning barcha qiymatlarini toping.

A) 0,5 B) 5 va -5 C) $\frac{5}{4}$ va $-\frac{5}{4}$ D) 5 E) $\emptyset$

(1996-1-20) m ning qanday qiymatlarida $my+1=m$ tenglama yechimga ega bo‘lmaydi?

A)$m=1$ B)$m=0$ C)$m=-1$ D)$m=2$ E)$m\epsilon R$

(1996-1-34) $3^1\cdot 3^2\cdot 3^3\cdot \ldots \cdot 3^x=\frac{1}{9^{-33}}$ tenglamani yeching.

A) 12 va -11 B) 11 C) 12 D) 33 E) -12 va 11

(1996-3-8) Birinchi kuni ish normasining $\frac{1}{4}$ qismi bajarildi. Ikkinchi kuni birinchi kunda bajarilgan ishning $\frac{1}{8}$ qismicha ko‘p ish bajarildi. Shu ikki kunda qancha ish normasi bajarilgan?

A) $\frac{9}{32}$ B) $\frac{5}{32}$ C) $\frac{3}{32}$ D) $\frac{17}{32}$ E) $\frac{1}{32}$

(1996-3-72) $(\alpha x-2y)(x+3y)=\alpha x^2+5xy-6y^2$ ayniyatdagi noma’lum koeffitsent α ni toping.

A) $\frac{5}{2}$ B) 2 C) $\frac{5}{3}$ D) $\frac{7}{3}$ E) 3

(1996-6-2) 243 ni qandaydir songa bo‘lganda bo‘linma 15 ga, qoldiq 3 ga teng chiqdi. Bo‘luvchi nechaga teng?

A) 17 B) 16 C) 18 D) 19 E) 21

(1996-6-12) 1. $-\frac{a-1}{a+b}=\frac{a+1}{a+b}$; 2. $-\frac{a-1}{a+b}=\frac{-a-1}{a+b}$; 3. $-\frac{a-1}{a+b}=\frac{1-a}{a+b}$; 4. $\frac{a-1}{a+b}=-\frac{1-a}{a-b}$ tengliklardan qaysi biri ayniyat?

A) 1 B) 2 C) 3 D) 4 E) hech biri

(1996-7-3) $6{,}4 \cdot (2 - 3x) = 6 \cdot (0{,}8x - 1) + 6{,}8$ tenglamani yeching.

A) 5 B) -0,5 C) 0,5 D) -2 E) 2,5

(1996-7-7) $\left(18\frac{1}{3} + x\right) : 3\frac{1}{7} = 7$ tenglamani yeching.

A) $4\frac{1}{3}$ B) $3\frac{2}{3}$ C) $3\frac{1}{3}$ D) $5\frac{2}{3}$ E) $4\frac{2}{3}$

(1996-7-12) $6{,}9 : 4{,}6 = x : 5{,}4$ tenglamani yeching.

A) 7,1 B) 7,7 C) 8,1 D) 8,4 E) 9,2

(1996-9-7) Qadimiy masala. Meshdagi suv Anvarning o‘ziga 14 kunga, ukasi ikkalasiga esa 10 kunga yetadi. Meshdagi suv Anvarning ukasiga necha kunga yetadi?

A) 35 B) 39 C) 28 D) 26 E) 32

(1996-9-59) Ikki son yig‘indisi 54 ga teng. Agar shu sonlardan birining 85% i ikkinchisining $\frac{7}{20}$ qismiga teng bo‘lsa, shu sonlarni toping.

A)18 va 6 B)20 va 4 C)7 va 17 D) 8 va 16 E)15 va 9

(1996-9-69) $\frac{2}{x} = x + 2$ tenglamaning nechta ildizi bor?

A) 3 B) 2 C) 1 D) ildizi yo‘q E) cheksiz ko‘p

(1996-9-75) $3\frac{3}{5} : 2\frac{7}{10} = 3\frac{3}{4} : x$ proporsiyaning noma’lum hadini toping.

A) $2\frac{13}{16}$ B) $2\frac{3}{10}$ C) $3\frac{1}{3}$ D) $1\frac{15}{16}$ E) $1\frac{13}{18}$

(199-9-76) $(4x - 3)^2 - x(4x + 1)$ ifodani ko‘phadning standart shakliga keltiring.

A) $2x^2 + x - 9$ B) $12x^2 + 25x + 9$ C)$4x^2 - 13x$

D)$8x^2 + x + 7$ E)$12x^2 + 23x + 9$

(1996-10-6) $5\frac{5}{8}:7\frac{1}{2}=x:6\frac{2}{5}$ proporsiyaning noma'lum hadini toping.

A) $4\frac{4}{5}$ B) $3\frac{2}{5}$ C) $5\frac{1}{8}$ D) $4\frac{1}{5}$ E) $3\frac{3}{8}$

(1996-10-19) $x+6=-\frac{3}{x}$ tenglamaning nechta ildizi bor?

A)1 B)2 C)3

D)ildizi yo‘q E)cheksiz ko‘p

(1996-10-21) n ning qanday qiymatlarida $nx+1=n+x$ tenglama cheksiz ko‘p yechimga ega bo‘ladi?

A) $n=0$ B)$n=1$ C)$n=2$ D)$n\neq 1$ E)$n=-2$

(1996-10-36) $5^2\cdot 5^4\cdot 5^6\cdot \ldots\cdot 5^{2x}=0{,}04^{-28}$ tenglamani yeching.

A) 5 B) 10 C) 14 D) 7 E) 28

(1996-11-5) Ikki sonning yig‘indisi 7 ga teng. Ulardan birini ikkinchisidan 4 marta katta bo‘lsa, shu sonlarni kattasini toping.

A) 5,2 B) 5,2 C) 5,6 D) 5,4 E) 4,8

(1996-12-5) Ikki sonning yig‘indisi 4,8 ga teng. Ulardan birini ikkinchisidan 3 marta kichik bo‘lsa, shu sonlarning kichigini toping.

A) 1,2 B) 1,4 C) 1,6 D) 2,1 E) 2,2

(1996-12-23) Buvisi 100, nabirasi 28 yoshda. Necha yil oldin nabirasi buvisidan 4 marta yosh bo‘lgan?

A) 8 yil B) 5 yil C) 4 yil D) 6 yil E) 7 yil

(1996-12-65) Qadimiy masala. Meshdagi suv Anvarning o‘ziga 14 kunga, ukasiga 35 kunga yetadi. Meshdagi suv ikkalasiga necha kunga yetadi?

A) 12 B) 10 C) 8 D) 9 E) 7

(1997-7-13) Agar $(x-5)\left(\frac{1}{5}x+4\right)=0$ bo‘lsa, $\frac{1}{5}x+4$ qanday qiymatlar qabul qiladi?

A) faqat 0 B) faqat -20 C) 0 yoki 5

D) 0 yoki 8 E) -20 yoki 0

(1997-7-22) m ning qiymatlarida $mx^2-m=x+1$ tenglamaning ildizlari cheksiz ko‘p bo‘ladi?

A) $m=1$ B) $m=0$ C) $m=-1$ D) $m=\pm 1$

(1997-6-57) $(0{,}8)^{3-2x}=1{,}25^3$ tenglamani yeching.

A) 0 B) 1 C) 2 D) 3 E) 4

(1997-11-26) $2^{5x+6}-7^{5x+2}-2^{5x+3}-7^{5x+1}=0$ tenglamani yeching.

A) 1 B) 2 C) 3 D) 0 E) $\frac{1}{5}$

(1997-11-16) b ning qanday qiymatlrida $b(2-x)=6$ tenglamaning ildizi manfiy?

A) $b\in(-\infty;0)$ B) $b\in(0;3)$ C) $b\in(-3;0)$

D) $b\in[3;\infty)$ E) $b\in R$

(1997-11-6) $\frac{x-3}{6}+x=\frac{2x-1}{3}-\frac{4-x}{2}$ tenglamani yeching.

A) 3 B) 2 C) -2 D) -4 E) $\emptyset$

(1997-10-22) n ning qanday qiymatlarida $nx+5==n-2x$ tenglamaning ildizi bo‘lmaydi?

A) 5) -2 C) 1 D) -5 E) bunday qiymatlar yo‘q

(1997-94-9) $\left(\frac{20}{64}\right)^{7x-6}=\left(\frac{64}{25}\right)^{2+3x-6x^2}$ tenglamani yeching.

A) -4;1 B) -1;4 C) 1;4 D) -4;-1 E) 3;4

(1997-10-7) $\left(3\frac{19}{22}+x\right):4\frac{1}{5}=5$ tenglamani yeching.

A) $17\frac{10}{22}$ B) $18\frac{3}{22}$ C) $17\frac{3}{22}$ D) 21 E) $18\frac{3}{11}$

(1997-10-12) $0{,}25:1{,}4=0{,}75:x$ tenglamani yeching.

A) 3,6 B) 2,4 C) 4,2 D) 5,2 E) 3,4

(1997-10-13) $(4x+1)\left(x-\frac{1}{4}\right)$ bo‘lsa, $4x+1$ qanday qiymatlar qabul qiladi?

A) faqat $-\frac{1}{4}$ B) faqat $\frac{1}{4}$ C) faqat 0

D) 0 yoki 2 E) $-\frac{1}{4}$ yoki $\frac{1}{4}$

(1997-11-4) Uchta birigada 768 sr makkajo‘xori yig‘ishtirdi ikkinchi brigada birinchi birigadaga nisbatan 2 marta ko‘p, uchinchi brigada esa, ikkala brigada qancha yig‘ishtirgan bo‘lsa, o‘shancha makkajo‘xori yig‘di. Ikkinchi brigada qancha makkajo‘xori yig‘di?

A) 240 B) 256 C) 210,5 D) 302,8 E) 128

(1996-12-70) $(\alpha x+2y)(3x+\beta y)=\gamma x^2+7xy+y^2$ ayniyatdagi noma’lum koeffitsentlardan biri γ ni toping.

A) 5 B) 6 C) 7 D) 4 E) 2

(1996-13-12) $(-3x+\alpha y)(\beta x+2y)=\gamma x^2+7xy+y^2$ ayniyatdagi noma’lum koeffitsentlardan biri β ni toping.

A) 1 B) -1 C) 2 D) -2 E) 3

(1997-1-4) Poezdda 936 yolovchi bor edi. Agar erkaklar bolalardan 7 marta, ayollar esa 5 marta ko‘p bo‘lsa, poezdda qancha ayol bo‘lgan?

A) 320 B) 350 C) 360 D) 40 E) 375

(1997-1-6) $\frac{3x-11}{4}-\frac{3-5x}{8}=\frac{x+6}{2}$ tenglamani yeching.

A) 5 B) -4,5 C) -6,5 D) 7 E) 8

(1997-1-16) k ning qanday qiymatlarida $k(x+1+=5$ tenglamaning ildizi musbat bo‘ladi?

A)$(0;5)$ B)$(0;5)$ C)$(-5;0)$ D)$(5;\infty)$ E)$(-\infty;\infty)$

(1997-1-26) $3^{4x+3} - 2^{4x+7} - 3^{4x+3} - 2^{4x+4} = 0$ tenglamani yeching.

A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) 2 E) $-\frac{3}{4}$

(1997-1-67) $\sqrt[3]{9^{x-3}} = \frac{3}{\sqrt[3]{3}}$ tenglamani yeching.

A) 3 B) 4 C) 5 D) 1 E) 0

(1997-1-76) $(0{,}75)^{x-1} = \left(1\frac{1}{3}\right)^3$ tenglamani yeching.

A) 1 B) -1 C) 2 D) -2 E) 0

(1997-2-12) 1) $2a^2 - 4ab - 2b^2 = -(a-b)^2$

2) $-\frac{x^3-y^3}{x^2+xy+y^2} = x - y$; 3) $-(a-b+c) = -a+b-c$;

4) $-\frac{a^2-1}{b} = \frac{a^2-1}{b}$. Ushbu tengliklarning qaysi biri ayniyat?

A) 1 B) 2 C) 3 D) 4 E) hech biri ayniyat emas

(1997-3-3) $0{,}7 \cdot (6y-5) = 0{,}4 \cdot (y-3) - 1{,}16$ tenglamani yeching.

A) 0,3 B) -3 C) -0,3 D) 2 E) 30

(1997-3-7) $\left(x + 2\frac{22}{25}\right) : 7\frac{1}{3} = 3$ tenglamani yeching.

A) $20\frac{22}{25}$ B) $19\frac{22}{25}$ C) $19\frac{3}{25}$ D) $18\frac{3}{25}$ E) $18\frac{28}{75}$

(1997-3-12) $3{,}5 : x = 0{,}8 : 2{,}4$ tenglamani yeching.

A) 10,5 B) 9,2 C) 13,5 D) 7,8 E) 11,5

(1997-3-13) $(2x+1)(x-1{,}5) = 0$ bolsa, $2x+1$ qanday qiymatlar qabul qiladi?

A) faqat 0 B) faqat $-\frac{1}{2}$ C) 0 yoki $-\frac{1}{2}$

D) 0 yoki 1,5 E) 4 yoki 0

(1997-3-22) a ning qanday qiymatlarida $ax-3=a+2$ tenglamaning yechimi bo‘lmaydi?

A) $a=0$ B) $a=2$ C) $a=-1$ D) $a=0$ E) $a\epsilon\emptyset$

(1997-5-15) $x+\frac{1}{y+\frac{1}{x}}=\frac{10}{7}$ tenglamaning natural sonlardagi yechimida x nimaga teng?

A) 3 B) 4 C) 1 D) 2 E) 7

(1997-3-35) $(0{,}5)^x=x+3$ tenglama nechta ildizga ega?

A) 1 B) 2 C) 3 D) ildizi yo‘q E) aniqlab bo‘lmaydi

(1997-4-34) $\left(\frac{6}{5}\right)^{x^2+27(x-1)}=\left(\frac{5}{6}\right)^{-9x^2}$ tenglamaning ildizini toping.

A) -3 B) 4 C) 5 D) 3,5 E) 3

(1997-4-35) $1-x+x^2-x^3+\cdots+x^8-x^9=0$ tenglamani yeching.

A) 10 B) 1 C) -1; 1 D) -1 E) -1; 10

(1997-5-18) $[x^2]=9$ tenglamani yeching.

A) 3 B) -3 C) $\left(-\sqrt{10};-3\right)\left(3;\sqrt{10}\right)$

D) $\left[-\sqrt{10};-3\right]\cup\left[\sqrt{10};\ 3\right]$ E)$(-\sqrt{10};-3]\cup\left[\sqrt{10};3\right)$

(1997-8-51) $\left(\frac{5}{4}\right)^x\cdot\left(\frac{16}{5}\right)^x=2\sqrt{2}$ tenglamani yeching.

A) 1,25 B) 0,5 C) 0,25 D) 1.5 E) 0,75

(1997-8-2) 358 ni qanday songa bo‘lganda bo‘linma 17 qoldiq 1 bo‘ladi?

A) 19 B) 21 C) 22 D) 20 E) 23

(1997-7-3) $0{,}9\cdot(4x-2)=0{,}5\cdot(3x-4)+4{,}4$ tenglamani yeching.

A) 1,2 B) 2,5 C) -3 D) 2 E) 0,2

(1997-7-12) $5{,}4:2{,}4=x:1{,}6$ tenglamani yeching.

A) 3,6 B) 4 C) 2,8 D) 4,6 E) 3,9

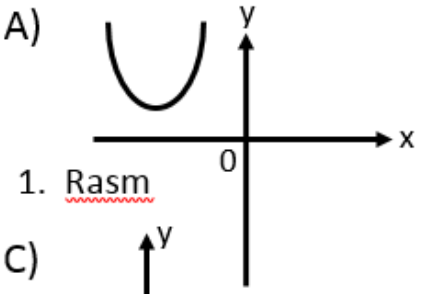
(1996-3-18) x^2-x-2 kvadrat uchhadni chiziqli ko‘paytuvchilarga ajrating.

A) $(x-1)(x+2)$ B)$(x-1)(x-2)$ C)$(x+1)(x+2)$

D)$(x+1)(x-2)$ E)$(1-x)(x+2)$

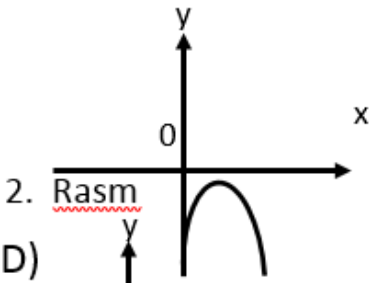
(1996-6-22) $y=ax^2+bx+c$ $(a>0, b^2-4ac>0)$ funksiyaning grafigi quyidagilardan qaysi biri bo‘lishi mumkin?

A)



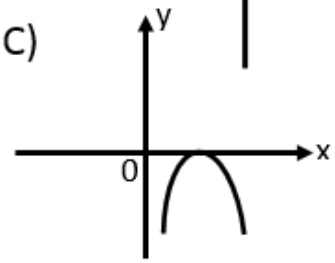
1. Rasm

B)



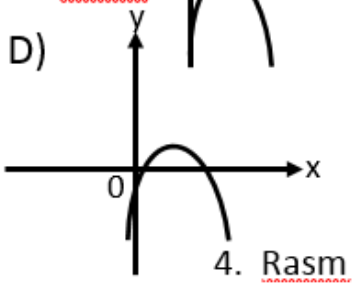
2. Rasm

C)



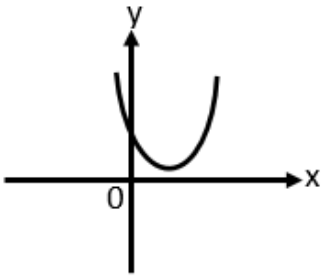
3. Rasm

D)



4. Rasm

E)



5. Rasm

A) 1 rasm B) 2 rasm C) 3 rasm D) 4 rasm E) 5 rasm

(1996-6-26) $\frac{x^2-3x+2}{x^2-1}$ kasrni qisqartiring.

A) $\frac{x+2}{x-1}$ B) $\frac{x+2}{x+1}$ C) $\frac{x-2}{x-1}$ D)$\frac{x-2}{x+1}$ E)$\frac{x+3}{x-1}$

(1996-11-19) x^2-3x+2 kvadrat uchhadni chiziqli ko‘paytuvchilarga ajrating.

A) $(x-1)(x+2)$ B) $(x-2)(x+1)$ C)$(x-1)(x-2)$
D)$(x+1)(x+2)$ E)$(1-x)(x+2)$

(1996-12-19) x^2+x-2 kvadrat uchhadni chiziqli ko‘paytuvchilarga ajrating.

A)$(x-1)(x-2)$ B)$(x-1)(x+2)$ C)$(1-x)(x+2)$
D) $(x+1)(x-2)$ E)$(x+1)(x+2)$

(1996-12-20) $(x^2+xy+y^2)(x-y)$ ifodaning $x=1$ va $y=-2$ bo‘lgandagi qiymatini toping.

A) 5 B) -9 C) 7 D) 9 E) -7

(1996-12-75) x_1 va x_2 $x^2+ax+6=0$ tenglamaning ildizlari bo‘ib, $\frac{1}{x_1}+\frac{1}{x_2}=\frac{1}{2}$ tenglikni qanoatlantirsa, a ning qiymatini toping.

A) -1 B) -2 C) -3 D) 3 E) 2

(1996-13-18) x_1 va x_2 $x^2+x-5=0$ tenglamaning ildizlari ekanligi ma’lum ${x_1}^2+{x_2}^2$ ning qiymatini toping.

A) 10 B)12 C) 11 D) 9 E) 8

(1997-1-12) $x^3+2x^2-9x-18=0$ tenglamaning ildizlari yig‘indisini toping.

A) 9 B) -2 C) 6 D) -18 E) 2

(1997-2-21) $y=x^2+4x-2$ parabolaning uchlari koordinata tekisligining qayerida joylashgan?

A) I chorakda B) II chorakda C) OYo‘qida
D) III chorakda E) IV chorakda

(1997-2-22) Agar $a<0$ va $b^2-4ac<0$ bo‘lsa, $y=ax^2+bx+c$ funksiyaning grafigi koordinatalar tekisligining qaysi choraklarida joylashgan?

A) I, IV B) $I, II\ va\ IV$ C)$faqt\ IV$

D) III, IV E) I, II

(1997-2-25) $x^2 - 6x + q = 0$ tenglamaning ildizlaridan biri 2 ga teng. Bu tenglamaning barcha koiffitsientlari yig‘indisni toping.

A) 2 B) -6 C) 3 D) -5 E) 4

(1997-3-15) $x^4 - 17x^2 + 16 = 0$ tenglamaning ildizlari yig‘indisini toping.

A) 17 B)0 C) -16 D) -17 E) 4

(1997-5-22) $x^2 + 5x - 6 = 0$ kvadrat tenglamaning kichik ildizini katta ildiziga nisbatini toping.

A) 6 B) -6 C) $\frac{1}{6}$ D) $-\frac{1}{6}$ E) 1

(1997-8-21) $y = x^2 - 6x + 10$ parabolaning uchi koordinatalar tekisligining qayerida joylashgan?

A) II chorakda B) III chorakda C) OY o‘qida

D) IV chorakda E) I chorakda

(1997-8-24) $x^2 + px - 12 = 0$ tenglamaning ildizlaridan biri 4 ga teng. Shu tenglamaning koeffitsientlari yig‘indisini toping.

A) -13 B) -10 C) -12 D) -11 E) -9

(1997-8-11) Agar $(x-4)^2 + (x-y^2)^2 = 0$ bo‘lsa, $x + 2y$ nechaga teng?

A) 0 B) 4 C) 6 D) 8 E) 0 yoki 8

(1997-8-12) Quyida keltirilgan tengliklardan qaysi biri ayniyat?

A) $\frac{m^3-n^3}{m+n} = m^2 + mn + n^2$ B) $2mn - n^2 - m^2 = (m+n)^2$

C) $m - (m-n) - (m-n) = 2n - m$

D) $-\frac{m-n}{n} = \frac{-m-n}{n}$ E) $m^3n^3 = (mn)^9$

(1997-7-61) $\sqrt{3+2x}=-x$ tenglik x ning qanday qiymatlarida o‘rinli?

A) -1 B) 1 C) -3 D) hech qanday qiymatida E) 3

(19979-84) Agar a va b sonlari $x^2-8x+7=0$ kvadrat tenglamaning ildizlari bo‘lsa, $\frac{1}{a^2}+\frac{1}{b^2}$ ni hisoblang.

A) $1\frac{1}{49}$ B) $1\frac{1}{50}$ C) $2\frac{1}{15}$ D) $1\frac{1}{10}$ E) $2\frac{1}{49}$

(1997-9-18) $[x^2]=36$ tenglamani yeching.

A) 6 B) -6 C) $\left(-\sqrt{37};-6\right]\cup\left[6;\sqrt{37}\right)$

D) $[-37;-6)\cup\left(6;\sqrt{37}\right)$ E) $[-37;-6]\cup[6;37]$

(1997-9-22) $x^2+5x+6=0$ kvadrat tenglamaning kichik ildizini katta ildiziga nisbatini toping.

A) $\frac{2}{3}$ B) $-\frac{1}{3}$ C) $\frac{3}{2}$ D) $-\frac{1}{2}$ E) -3

(1997-11-12) $x^3+5x^2-4x-20=0$ tenglamaning ildizlari ko‘paytmasini toping.

A) -10 B) 20 C) -4 D) -20 E) 16

(1997-10-15) $x^4-13x^2+36=0$ tenglamaning eng katta va eng kichik ildizlari ayirmasini toping.

A) 5 B) 1 C) 7 D) 0 E) 6

(1997-12-50) $(3^{-x}-9)(x^2-49)=0$ tenglamaning ildizlari yig‘indisini toping.

A) 5 B) 9 C) -2 D) 10 E) -3

(1997-12-20) $y=x^2+8x+12$ parabolaning uchi koordinatalar tekisligining qayerida joylashgan?

A) I chorakda B) II chorakda C) OYo‘qida

D) IV chorakda E) III chorakda

(1997-12-21) Agar $a < 0$ va $b^2 - 4ac < 0$ bo‘lsa, $y = ax^2 + bx + c$ funksiyaning grafigi koordinatalar tekisligining qaysi choraklarida joylashgan?

A) I, IV B) I, II va IV C)$faqt\ IV$

D) III, IV E) I, II

(17-12-24) $x^2 + px - 12 = 0$ tenglamaning ildizlaridan biri 2 ga teng. p: (-12) nimaga teng?

A) $\frac{1}{3}$ B)$-\frac{5}{12}$ C)$\frac{2}{3}$ D)$-\frac{1}{3}$ E)$-\frac{2}{3}$

(1997-12-11) Quyidagi tengliklardan qaysi biri ayniyat?

1) $\frac{p^2-q^2}{p^2+q^2} = -\frac{p^2-q^2}{q^2-p}$ 2)$\frac{p^2-q^2}{p^2+q^2} = -\frac{p^2-q^2}{p^2+q^2}$

3) $-\frac{p^2+q^2}{p^2-q^2} = \frac{p^2+q^2}{q^2-p^2}$ 4) $-\frac{p^2-q^2}{q^2-p^2} = \frac{p^2-q^2}{p^2+q^2}$

A) 1 B) 2 C) 3 D) 4 E) bular ichida ayniyat yoq

(1996-1-9) Ikki sonning ayirmasi 33 ga teng. Agar shu sonlardan kattasining 30% i kichigining $\frac{2}{3}$ qismiga teng bo‘lsa, shu sonlarni toping.

A) 56 va 23 B) 27 va 60 C) 17 va 50

D) 37 va 70 E) 63 va 30

(1996-3-24) $\begin{cases} x + y = 5 \\ x - y = 1 \end{cases}$ tenglamalar sistemasini qanoatlantiruvchi sonlar juftligini aniqlang.

A)$(2; 3)$ B)$(-2; 3)$ C)$(3; 2)$ D)$(-2; -3)$ E)$(-3; 2)$

(1996-3-76) $\begin{cases} 2x - 3y = 3 \\ x + 2y = 5, \end{cases}$ $x-?$

A) 1 B) 2 C) 3 D)-2 E) -1

(1996-6-20) $\begin{cases} x^2 - y^2 - 3x = 12 \\ x - y = 0. \end{cases}$ tenglamalar sistemasini yeching.

A) $(-4; 4)$ B)$(4; -4)$ C)$(4; 4)$

D)$(-4; -4)$ E) javob ko‘rsatilganlardan farqli

(1996-7-17) $3^x = 9^{y+1}$ va $4y = 5 - x$ ekanligi ma’lum bo‘lsa, $x + y$ ning qiymatini toping.

A) 3,5 B) 5 C) 2 D) -4 E) -3

(1996-7-21) Agar $\begin{cases} y - 3x = -5 \\ 5x + 2y = 23 \end{cases}$ bo‘lsa, $x^2 + y^2$ qiymatini toping.

A) 16 B) 25 C) 9 D) 10 E) 36

(1996-9-17) $\begin{cases} 3x - 4y = 3 \\ x + 2y = 1, \end{cases}$ $y-?$

A) 1 B) 0 C) -1 D) 2 E) -2

(1996-9-70) $\begin{cases} x^2 + y^2 - 2xy = 16 \\ x + y = 2 \end{cases}$ sistemaning yechimini toping.

A) $(1; -3)$ B) $(-3; 1)$ C) $(0; -2)$

D) $(1; -3)$ va $(-3; 1)$ E) $(2; -4)$ va $(-4; 2)$

(1996-9-72) $(x; y)$ sonlar jufti $\begin{cases} 3x - 2y = -8 \\ x + 3y = 1 \end{cases}$ sistemaning yechimi bo‘lsa, $y - x$ ni toping.

A) 0 B) 1 C) -2,5 D) 1 E) 3

(1996-10-22) $(x; y)$ sonlar jufti $\begin{cases} 2x - 3y = 5 \\ 3x + y = 2 \end{cases}$ sistemaning yechimi bo‘lsa, $x + y$ ni toping.

A) 3 B) -3 C) 4 D) -1 E) 0

(1996-11-25) Quyidagi juftliklardan qaysi biri $\begin{cases} x+y=5 \\ x-y=-1 \end{cases}$ tenglamalar sistemasini qanoatlantiradi?

A) (2; 3) B) (1; 4) C) (4; 1) D) (3; 2) E) (5; 6)

(1996-12-25) Quyidagi sonlarning qaysi jufti $\begin{cases} x+y=7 \\ x-y=-1 \end{cases}$ tenglamalar sistemasini qanoatlantiradi.

A) (4; 3) B) (1; 6) C) (2; 5) D) (5; 2) E) (3; 4)

(1996-12-73) $\begin{cases} x^2+y^2=3 \\ x-y=1, \end{cases}$ $x \cdot y = -?$

A) 2 B) 3 C) 1,5 D) 2,5 E) 1

(1996-12-74) $\begin{cases} 2x-3y=3 \\ x+2y=5, \end{cases}$ $y-?$

A) 2 B) 1 C) 3 D) 1,5 E) -1

(1996-13-16) $\begin{cases} x^2+y^2+xy=8 \\ x+y=3, \end{cases}$ $x \cdot y-?$

A) 4 B) 1 C) 2 D) 0,5 E) 5

(1996-13-17) $\begin{cases} 3x-4y=3 \\ x+2y=1, \end{cases}$ $x-?$

A) -1 B) 3 C) 2 D) -2 E) 1

(1997-11-1) $(x; y)$ sonlar jufti $\begin{cases} 2x+y-8=0 \\ 3x+4y-7=0 \end{cases}$ tenglamalar sistemasining yechimi $x \cdot y$ ni toping.

A) -90 B) 12 C) -10 D) 80 E) -16

(19997-3-21) Agar $\begin{cases} 5x+2y=-3 \\ x-3y=-4 \end{cases}$ bo‘lsa, x^2-y^2 ning qiymatini toping.

A) 2 B) 1 C) 0 D) 2,5 E) -2

(1997-3-23) $\begin{cases} x^2+y^2=25 \\ x-y=5 \end{cases}$ tenglamalar sistemasi nechta yechimga ega?

A) 4 B) 3 C) 2 D) 1 E) yechimga ega emas

(1997-8-20) $\begin{cases} y+4=2 \\ x^2y=-2 \end{cases}$ tenglamalar sistemasini yeching.

A) (1; -2) B) (-1; -2) C) (1; 2)

D) (-1; -2); (1; -2) E) (-1; 2); (1; -2)

(1997-8-17) Agar $2m+n=2; 2n+p=6$ va $2p+m=4$ bo‘lsa, $m+n+p$ ni toping.

A) 6 B) 4 C) 5 D) 3 E) 8

Tenglamalar sistemasi 17.

(1997-7-17) Agar $2^{x+1}=4^y$ va $x+y=-4$ bo‘lsa, $y-x$ ni toping.

A) 4 B) -2 C) 2 D) -3 E) -1,5

(1997-7-21) Agar $\begin{cases} 2x+3y=3 \\ x-2y=5 \end{cases}$ bo‘lsa, x^2+y^2ning qiymatini toping.

A) 2 B) 4 C) 8 D) 10 E) 13

(1997-7-23) $\begin{cases} x^2+y^2=16 \\ y-x=4 \end{cases}$ tenglamalar sistemasini yeching.

A) 1 B) 1 C) 3 D) 4 E) yechimga ega emas

(1997-6-11) $(x;y)$ sonlar jufti $\begin{cases} x+2y-3=0 \\ 2x-3y+8=0 \end{cases}$ tenglamalar sistemasini yechimi $x+y$ ni hisoblang.

A) -1 B) 1 C) 3 D) 4,5 E) 0,5

(1997-9-85) Agar $\begin{cases} x^3-3x^2y=y^3+20 \\ 3xy^2=7 \end{cases}$ bo‘lsa, $\frac{x-y}{3}$ ni hisoblang.

A) 3 B) 2 C) 1 D) 0 E) 6

(1997-9-83) Agar $\begin{cases} x+3y=6 \\ 2x+ky=8 \end{cases}$ bo‘lsa, k ning qanday qiymatida $x+y=2$ tenglik o‘rinli bo‘ladi?

A) 0 B) 1 C) 2 D) 3 E) 4

(1997-9-26) Agar $\begin{cases} \sqrt{x}+\sqrt{y} \\ \sqrt{xy}=4 \end{cases}$ bo‘lsa, $x+y$ ni toping.

A) 17 B) 18 C) 19 D) 16 E) 15

(1997-9-39) $\begin{cases} \sqrt{(x+5)^2}=x+5 \\ \sqrt{(x-5)^2}=5-x \end{cases}$ tenglamalar sistemasini yeching.

A) $-5 \le x \le 5$ B) $x \le 5$ C) $x \ge -5$

D) $-5 < x < 5$ E) $x < 5$

(1997-11-11) Agar $\begin{cases} 6x-2y-6=0 \\ 5x-y-17=0 \end{cases}$ bo‘lsa, $y-x$ ning qiymatini toping.

A) 11 B) -9 C) -25 D) 25 E) 18

(1997-10-23) $\begin{cases} x^2+y^2=4 \\ x-y=-2 \end{cases}$ tenglamalar sistemasi nechta yechimga ega?

A) 4 B) 3 C) 2 D) 1 E) yechimga ega emas

(1997-10-17) $2^x=4^{y+1}$ va $3x=6-2y$ ekanligi ma’lum bo‘lsa, $x+y$ ning qiymatini toping.

A) 4 B) -1,5 C) -3 D) 2 E) 1

(1997-10-21) Agar $\begin{cases} 3x-2y=1 \\ 4x-y=-2 \end{cases}$ bo‘lsa, y^2-x^2 ning qiymatini toping.

A) -1 B) -3 C) 3 D) 5 E) 2

(1997-12-16) Agar $2q-4p=-9,\ 2t-4q=-7$ va $2p-4t=2$ bo‘lsa, $p+q+t$ ning qiymatini toping.

A) -7 B) 8 C) 7 D) -8 E) 6

(1996-7-20) $2x^2-9x+2<0$ tengsizlikning butun yechimlar ko‘paytmasini toping.

A) 0 B) 4 C) 24 D) 8 E) 6

(1996-9-81) $f(x)=x^3+1{,}5x^2-6x$ bo‘lsa, $\frac{f'(x)}{x+6}\geq 0$ tengsizlikning eng kichik butun yechimini toping.

A) -7 B) -2 C) -1 D) 1 E) -5

(1996-11-26) $(x-1)(x+2)>0$ tengsizlikni yeching.

A)$(-\infty;1)\cup(2;\infty)$ B)$(0;\infty)$ C)$(-\infty;-2)\cup(1;\infty)$

D) $(-\infty;\infty)$ E)$(-\infty;-1)\cup(2;\infty)$

(1996-11-27) $|x-1|\geq 1$ tengsizlikni yeching.

A) $[0;2]$ B)$(-\infty;0]\cup[2;\infty)$ C) $[-2;0]$

D) $[0;2]$ E) $[-1;2]$

(1996-12-26) $(x+2)(x-3)>0$ tengsizlikni yeching.

A) $(-\infty;\infty)$ B) $(-\infty;-3)\cup(2;\infty)$ C) $(0;\infty)$

D) $(-\infty;-2)\cup(3;\infty)$ E)$(-\infty;2)\cup(3;\infty)$

(1996-12-66) $a=0{,}6(4),\ b=\frac{59}{90}$ va $c=1-0{,}36(9).\ a,b$ va c sonlar uchun quyidagi munosabatlar qaysi biri o‘rinli?

A) $a<c<b$ B) $a<b<c$ C) $b<a<c$

D) $b<c<a$ E) $c<a<b$

(1996-12-66) $a=0{,}7(2),\ b=\frac{11}{15}$ va $c=1-0{,}2(8).\ a,b$ va c sonlar uchun quyidagi munosabatlar qaysi biri o‘rinli?

A) $c<a<b$ B) $a<c<b$ C) $a<b<c$

D) $b<a<c$ E) $b<c<a$

(1997-1-10) $(x-2)^2+3(x-2)\geq 7-x$ tengsizlikni yeching.

A) $[0;1]\cup[3;\infty)$ B) $[-2;1]$ C) $[-3;3]$

D) $[3;\infty)$ E) $(-\infty;-3]\cup[3;\infty)$

(1997-2-11) Quyidagi tengsizliklardan qaysi biri x va y ning $xy>0$ shartni qanoatlantiradigan barcha qiymatlarida o‘rinli?

A) $(x-y)^2>0$ B) $\frac{x}{y}+\frac{y}{x}\geq 2$ C) $x^2-y^2>0$

D) $x^2-6xy+9y^2<0$ E) $x^3-y^3>0$

(1997-3-34) Quyidagilardan qaysi biri $(x-3)\sqrt{x^2+x-2}\leq 0$ tengsizlikning yechimi?

A) $(-\infty;3]$ B)$(-\infty;3]\cup[1;3]$ C) $[-2;3]$

D) $[-1;3]\cup[3;\infty)$ E) $[-2;\infty)$

(1997-3-20) $2x^2\leq 5x+12$ tengsizlikning butun yechimlari yig‘indisini toping.

A) 4 B) 9 C) 7 D) 5 E) 6

(1997-5-23) $\frac{x-1}{x-2}\geq 0$ tengsizlikni yeching.

A) $(-\infty;1)\cup(2;\infty)$ B) $[1;2)$ C) $(1;2)$

D) $(2;\infty)$ E) $(-\infty;1]\cup(2;\infty)$

(1997-5-24) $\frac{(x+2)(x-1)}{x+3}\leq 0$ tengsizlikni yeching.

A) $(-\infty;-3)\cup[-2;1]$ B)$(-2;1)$ C)$(-\infty;-3)$

D)$(-\infty;-3]\cup(-2;1]$ E)$(-\infty;-3)\cup(-2;1)$

(1997-8-54) $\sqrt{0{,}2^{x(x+5)}}>1$ tengsizlikning eng katta butun manfiy yechimini toping.

A) -5 B) -4 C) -3 D) -1 E) -2

(1997-8-22) $\frac{(x-4)(x+2)}{(x+1)^2} < 0$ tengsizlikning eng katta va eng kichik butun yechimlari ayirmasini toping.

A) 6 B) 4 C) 5 D) 2 E) 3

(1997-7-20) $3x^2 \leq 13x - 4$ tengsizlikning butun yechimlari ko‘paytmasini toping.

A) 12 B) 6 C) 30 D) 24 E) 0

(1997-6-58) $x^6 < 6x$ tengsizlikning nechta butun yechimi bor?

A) $\emptyset$ B) 1 C) 2 D) 3 E) cheksiz ko‘p

(1997-7-33) $\log_{\frac{2}{\sqrt{5}}} \frac{5x}{5x-1} < 0$ tengsizlikni yeching.

A) $\left(\frac{1}{5}; 0\right)$ B)$(0{,}2; \infty)$ C)$(-\infty; 0)$

D)$(-\infty; \frac{1}{5})$ E)$\left(0; \frac{1}{5}\right)$

(1997-7-34) $(x-2) \cdot \sqrt{3+2x-x^2} \geq 0$ tengsizlikni yechimini ko‘rsating.

A) $[2; \infty)$ B) $[-1; 3]$ C) $[3; \infty)$

D) $[2; 3]$ E) $[2;\ 2\frac{1}{3}]$

(1997-6-10) $(x+2)(x-2) - 2(x-1) \leq 23 - 2x$ tengsizlikni yeching.

A) $(-\infty; 5]$ B) $(0; 25]$ C) $[-5; 5]$

D) $\left[-\sqrt{21}; \sqrt{21}\right]$ E) $\emptyset$

(1997-9-17) $a = \sqrt{1996} + \sqrt{1998}$ va $b = 2 \cdot \sqrt{1997}$ ni taqqoslang.

A) $a > b$ B)$a < b$ C)$a = b$ D)$a = b + 1$ E)$a = b - 1$

(1997-9-23) $\frac{x-2}{x-1} \leq 0$ tengsizlikni yeching.

A) $(1; 2]$ B)$[1; 2)$ C)$[1; 2]$ D)$(-\infty; 1)$ E)$(-\infty; 1]$

(1997-9-24) $\frac{(x+3)(x-5)}{x+1} \geq 0$ tengsizlikni yeching.

A) $(3;-1] \cup [5;\infty)$ B) $(-3;1) \cup [5;\infty)$

C) $[-3;-1) \cup [5;\infty)$ D)$[-3;-1)$ E) $[5;\infty)$

(1997-11-10) $2 \cdot (x-1)(x+1) - x(x+3) < 2 - 3x$

A) $(-\infty;2)$ B) $(-2;2)$ C) $(0;4)$ D) $(1;\infty)$ E) $(5;\infty)$

(1997-10-34) $(x-1) \cdot \sqrt{6+x-x^2} \leq 0$ tengsizlikning yechimini ko‘rsating.

A) $(-\infty;1]$ B) $[-2;1]$ C) $[-2;1]$ D) $[3;\infty)$ E) $[-3;1]$

(1997-10-20) $2x^2 - 3x \leq 9$ tengsizlikning butun yechimlariyig‘indisini toping.

A) 3 B) 4 C) 5 D) 6 E) 8

(1997-12-22) $\frac{(x+4)(3-x)}{(x-2)^2} > 0$ tengsizlikning eng katta va eng kichik butun yechimlari yig‘indisini toping.

A) 1 B) -1 C) -2 D) 2 E) 7

(1997-9-69) $m = |8,(8)|; n = |-8{,}8|; p = \left|8\frac{7}{8}\right|$ va $q = \left|-8\frac{6}{7}\right|$ sonlarni kamayish tartibida yozing.

A) $n > m > p > q$ B) $m > n > p > q$

C) $m > q > n > p$ D) $q > m > n > p$

E) $q > n > m > p$

(1996-68-3) $a = 0{,}5(3)$, $\frac{47}{90}$ va $c = 1 - 0{,}48(1)$. a, b, c sonlar uchun quyidagi munosabatlardan qaysi biri o‘rinli?

A) $a < b < c$ B) $b < c < a$ C) $c < b < a$

D) $b < a < c$ E) $a < c < b$

(1996-3-78) Ushbu $\begin{cases} ax > 5a - 1 \\ ax < 3a + 1 \end{cases}$ tengsizliklar sistemasi a ning qanday qiymatlarida yechimga ega bo‘lmaydi?

A) (1) B)$(-\infty;0)$ C)$(-\infty;0)\cup[1;\infty)$
D) $[1;\infty)$ E) $\emptyset$

(1996-6-16) $\begin{cases}-2x<22\\x+4<8\end{cases}$ tengsizliklar sistemasining eng katta butun yechimini toping.

A) 4 B) 3 C) -11 D) -12 E) -10

(1996-6-17) Agar $3x+y=45,\ z+3y=-15$ va $3z+x=6$ bo‘lsa, $x+y+z$ nimaga teng?

A) 12 B) 10 C) 15 D) 9 E) 7

(1996-7-25) $\begin{cases}x(x+1)+10>(x+1)^2+3\\3x-4(x-7)\geq 16-3x\end{cases}$ tengsizliklar sistemasini yeching.

A) $[-3;5)$ B)$(2;4)$ C)$[-6;6)$ D)$[-6;\infty)$ E)$\emptyset$

(1996-9-8) $a=1-0{,}3(5),\ b=\frac{2}{3}$ va $c=0{,}65.\ a,b\ va\ c$ sonlar uchun quyidagi munosabatlardan qaysi biri o‘rinli?

A) $c<a<b$ B) $a<c<b$ C) $c<a<b$
D) $b<a<c$ E) $b<c<a$

(1996-9-73) $\begin{cases}3-4x>5\\2+3(x-1)\leq 4x+3\end{cases}$ tengsizliklar sistemsi nechta yechimga ega?

A) 1 B) 2 C) 4 D) 6 E) 3

(1996-10-23) $\begin{cases}2-3x>1\\5x+1\geq 3(x-2)\end{cases}$ tengsizliklar sistemasi nechta butun yechimga ega?

A) 4 B) 5 C) 3 D) 8 E) 2

(1997-1-14) $\begin{cases}5x-2\geq 2x+1\\2x+3\leq 18-3x\end{cases}$ tengsizliklar sistemasi butun yechimlarining o‘rta arifmetigini toping.

A) 3 B) 2,5 C) 2 D) 1,5 E) $1\frac{2}{3}$

(1997-2-16) $\begin{cases} x+8<12 \\ -3x<15 \end{cases}$ tengsizliklar sistemasining eng kichik butun yechimini toping.

A) -5 B) -3 C) -6 D) -4 E) 3

(1997-3-25) $\begin{cases} 2x-3(x-5)>10-3x \\ x(x+2)-4\le(x-1)^2+7 \end{cases}$ tengsizliklar sistemasini yeching.

A) $[2;12{,}5)$ B) $[2{,}5;\infty)$ C) $[-3;2)$

D) $(-2{,}5;3]$ E) yechimga ega emas

(1997-8-16) $\begin{cases} -4y<12 \\ y+6<6 \end{cases}$ tengsizliklar sistemasining barcha butun yechimlari ko‘paytmasini toping.

A) 2 B) 6 C) -6 D) -2 E) 8

(1997-7-8) $|x+2|\le 3$ tengsizlik nechta yechimga ega?

A) 5 B) 6 C) 7 D) 4 E) 8

(1997-7-25) $\begin{cases} 3x+7\ge 5(x+1)+6 \\ (x-2)^2-8<x(x-2)+10 \end{cases}$ tengsizliklar sistemasining yechimini toping.

A) $(-11;2]$ B) $[-2;7)$ C) $(-7;-2]$

D) $[2;11)$ E) $(-\infty;-7)$

(1997-6-14) $\begin{cases} 7x+3\le 9x-1 \\ 20-3x\ge 4x-15 \end{cases}$ tengsizliklar sistemasi butun yechimlarining o‘rta arifmetigini toping.

A) 3,5 B) 7 C) 4 D) 3 E) $4\frac{1}{3}$

(1997-11-14) $\begin{cases} 2x-1\ge 3x-4 \\ 8x+7>5x+4 \end{cases}$ tengsizliklar sistemasi butun yechimlarining o‘rta arifmetigini toping.

A) 2 B) 2,5 C) 1,5 D) 0,75 E) 3

(1996-13-1) $\begin{cases} bx \geq 5b - 3 \\ bx \leq 4b + 3 \end{cases}$ tengsizliklar sistemasi b ning qanday qiymatlarida yechimga ega bo‘lmaydi?

A) $(6; \infty)$ B) $[6; \infty)$ C)$(-\infty; 0) \cup (6; \infty)$
D) $(-\infty; 0)$ E) $(-\infty; 0) \cup [6; \infty)$

(1997-10-25) $\begin{cases} 4(x-3) - 3 > 8x + 1 \\ 2 + x(x+3) \leq (x+2)^2 + 5 \end{cases}$ tengsizliklar sistemasini yeching.

A) $(4; 7]$ B)$(-\infty; -7)$ C) $(-4; \infty)$
D) $[-7; -4)$ E) $\emptyset$

(1997-12-15) $\begin{cases} -2x > -26 \\ x - 3 > 1 \end{cases}$ tengsizliklar sistemasining eng katta va eng kichik butun yechimlari yig‘indisini toping.

A) 17 B) 16 C) 18 D) 19 E) 15

(1996-9-1) 594 va 378 ning umumiy bo‘luvchilari nechta?

A) 8 B) 7 C) 9 D) 5 E) 6

(1996-9-2) 1dan 100 gacha bo‘lgan sonlar orasida 2 ga ham, 7 ga ham bo‘linmaydiganlari nechta?

A) 40 B) 41 C) 43 D) 48 E) 20

(1996-11-2) 10 va 8 sonlarning eng kichik karralisini toping.

A) 80 B) 10 C) 18 D) 40 E) 24

(1996-12-2) 6 va 4 sonlarning eng kichik umumiy karralisini toping.

A) 6 B) 14 C) 24 D) 28 E) 12

(1996-12-59) 840 va 264 ning umumiy bo‘luvchilari nechta?

A) 9 B) 4 C) 6 D) 8 E) 7

(1996-13-1) 420 va 156 ning umumiy bo‘luvchilari nechta?

A) 7 B) 5 C) 6 D) 4 E) 8

(1997-9-10) qaysi juftlik o‘zaro tub sonlardan iborat?

A) $(21;14)$ B) $(21;10)$ C) $(12;15)$
D) $(10;15)$ E) $(8;14)$

(1997-9-61) n raqamining qandy qiymatlarida $50+n$ soni eng kam tub ko‘paytuvchilarga ajraladi?

A) 3 B) 5 C) 3; 9 D) 1; 9 E) 9

(1997-9-14) 3607 sonini tub son ekanini aniqlash uchun uni ketma-ket 2, 3, 5 va hakozo tub sonlarga bo‘lib boriladi.Qanday songa yetganda bo‘lishni to‘xtatish mumkin?

A) 41 B) 43 C) 47 D) 53 E) 59

(1997-9-7) Bolalar archa bayramida bir xil sovg‘a olishdi. Hamma sovg‘alarda 76 ta mandarin va 57 ta konfet bo‘lgan. Bayramda nechta bola qatnashgan va har bir bola nechta mandarin va nechta konfet olgan?

A) 19; 3; 4 B) 3; 25; 15 C) 57; 1; 1
D) 19; 4; 3 E) 4; 19; 16

(1996-6-28) $\sqrt{23-8\sqrt{7}}+\sqrt{23+8\sqrt{7}}$ ni hisoblang.

A) 7 B) 6 C) 8 D) 9 E) 5

(1996-9-13) $\sqrt{11+6\sqrt{2}}+\sqrt{11-6\sqrt{2}}$ yig‘indining qiymatini toping.

A) 6 B) 4 C) 3 D) 5 E) 7

(1996-12-71) $\sqrt{9+2\sqrt{20}}-\sqrt{9-2\sqrt{20}}$ ayirmaning qiymatini toping.

A) 4 B) 5 C) 6 D) 3 E) -4

(1996-13-13) $\sqrt{7+4\sqrt{3}}+\sqrt{7-4\sqrt{3}}$ yig‘indining qiymatini toping.

A) 3 B) 5 C) 6 D) 6 E) 7

(1997-1-25) $\sqrt{\sqrt{18-16\sqrt{3}}}$ ni hisoblang.

A) $3-\sqrt{3}$ B) $4\sqrt{3}-1$ C) $2-\sqrt{3}$

D)$\sqrt{3}-1$ E) $2\sqrt{3}-1$

(1997-1-55) $\sqrt{4-\sqrt{7}}-\sqrt{4+\sqrt{7}}$ ni hisoblang.

A) 0 B) -4 C) $-2\sqrt{2}$ D)$-\sqrt{2}$ E)$-\sqrt{10}$

(1997-2-28) $\sqrt{19+8\sqrt{3}}-\sqrt{19-8\sqrt{3}}$ni hisoblang.

A) 6 B) 7 C) 9 D) 8 E) 5

(1997-5-21) $\sqrt{7-4\sqrt{3}}$ ni soddalashtiring.

A) $2+\sqrt{3}$ B)$\sqrt{3}-2$ C) $3+\sqrt{3}$

D) $2-\sqrt{3}$ E) $3-\sqrt{3}$

(1997-8-27) $\sqrt{11-6\sqrt{2}}+\sqrt{11+6\sqrt{2}}$ ni hisoblang.

A) 8 B) 4 C) 3 D) 6 E) 5

(1997-6-53) $\sqrt{3-\sqrt{5}}+\sqrt{3+\sqrt{5}}$ ni hisoblang.

A) $2\sqrt{3}$ B) $\sqrt{10}$ C) 2 D) $\sqrt{2}$

E) to‘g‘ri javob keltirilmagan

(1997-6-25) $\sqrt{\sqrt{17-12\sqrt{2}}}$ ni hisoblang.

A) $3-2\sqrt{2}$ B) $2-\sqrt{2}$ C) $2\sqrt{2}-1$

D) $\sqrt{2}-1$ E) $3-\sqrt{2}$

(1997-9-21) $\sqrt{9+4\sqrt{2}}$ ni soddalashtiring.

A) $2\sqrt{2}+1$ B) $2\sqrt{2}-1$ C) $3+\sqrt{2}$

D)$3-\sqrt{2}$ E) $3+2\sqrt{2}$

(1997-11-25) $\sqrt{15-4\sqrt{7+4\sqrt{3}}}$ ni hisoblang.

A) $\sqrt{3}-1$ B)$4-\sqrt{3}$ C) $3\sqrt{3}$

D) $3-\sqrt{3}$ E)$2-\sqrt{3}$

(1997-12-27) $\sqrt{9-4\sqrt{2}}-\sqrt{9+4\sqrt{2}}$ ni hisoblang.

A) 2 B) 3 C) -3 D) -4 E) -2

(1996-3-4) Ishchining oylik maoshi 350 so‘m. Agar uning maoshi 30% ortsa, u qancha maosh oladi?

A) 405 so‘m B) 380 so‘m C) 1050 so‘m

D) 455 so‘m E) 595 so‘m

(1996-7-4) Ishchining ish normasini bajarishga ketadigan vaqti 20% ga qisqardi. Uning mehnat unumdorligi necha foiz ortgan?

A) 20 B) 15 C) 5 D) 25 E) 10

(1996-3-4) ishchining oylik maoshi 350 so‘m. Agar uning maoshi 30% ortsa u qancha maosh oladi?

A) 405 so‘m B) 380 so‘m C) 1050 so‘m

D) 455 so‘m E) 595 so‘m

(1996-9-55) Olxo‘ri quritilganda 35% olxo‘ri qoqisi hosil bo‘ladi. 64 kg olxo‘ri quritilsa, qancha olxo‘ri qoqisi olinadi?

A) 20 B) 18,2 C) 22,4 D) 25 E) 21,4

(1996-10-4) Yangi ekilgan nokdan 16% qoqi tushadi. 48 kg nok kokisi olish uchun necha kg yangi uzilgan nok olish keak?

A) 300 B) 640 C) 200 D) 240 E) 360

(1996-10-9) Ikki sonning ayirmasi 5 ga teng. Agar shu sonlarning kattasining 20% i kichigining $\frac{2}{9}$ qismiga teng bo‘lsa, shu sonlarni toping.

A) 30 va 35 B) 36 va 41 C) 45 va 50
D) 63 va 68 E) 90 va 95

(1996-11-4) Nafaqaxo‘rning oylik nafaqasi 450 so‘m. Agar uning nafaqasi 20% ortsa, u qancha nafaqa oladi?

A) 540 so‘m B) 470 so‘m C) 900 so‘m
D) 490 so‘m E) 810 so‘m

(1996-12-4) Talabaning stependiyasi 400 so‘m. Agar uning stependiyasi 25% oshsa, u qancha stependiya oladi?

A) 425 so‘m B) 500 so‘m C) 600 so‘m
D) 700 so‘m E) 1000 so‘m

(1996-12-63) Go‘sht qaynatilganda o‘z vaznining 40% ni yo‘qotadi. 6 kg go‘sht qaynatilganda vazni necha kg ga kamayadi?

A) 2,4 B) 2,2 C) 1,9 D) 2 E) 2,5

(1997-1-5) Noma’lum sonning 28% i $3\frac{1}{3}$ ning 42% iga teng. Noma’lum sonni toping.

A) $4\frac{2}{3}$ B) 5 C) $6\frac{1}{3}$ D) 4,2 E) 6

(1997-3-4) Ishchining mehnat unumdorligi 20% ortsa, uning ish normasini bajarishga ketadigan vaqti necha foizga qisqaradi?

A) 20% B) 25% C) $10\frac{1}{3}\%$ D) $16\frac{2}{3}$ E) 24%

(1997-8-3) Kutubxonadagi kitoblarning 55 % i o‘zbek tilida, qolgan kitoblar rus tilida . Rus tilidagi kitoblar 270 ta. Kutubxonada o‘zbek tilida nechta kitob bor?

A) 325 B) 310 C) 320 D) 315 E) 330

(1996-13-5) 32 dan 60 necha protsent ortiq?

A) 90 B) 82,5 C) 83,5 D) 85 E) 87,5

(1997-7-4) Agar tezlik 25% ga ortsa, ma'lum masofani bosib o'tish uchun ketadigan vaqt necha foizga kamayadi?

A) 25% B) 30 % C) 20 % D) 16 % E) 24 %

(1997-6-5) Noma'lum sonning 14 % i 80 ning 35% iga teng. Noma'lum sonni toping.

A) 120 B) 168 C) 200 D) 280 E) 140

(1997-9-65) Brigada ekin maydonining 180 gektariga paxta, 60 gektariga sholi ekdi. Sholi maydoni paxta maydonining necha foizini tashkil qiladi?

A) $33\frac{1}{3}$ B) 33 C) $33\frac{2}{3}$ D) 34 E) $34\frac{1}{3}$

(1997-9-12) Qo'rg'oshin va misdan quyilgan ikkita quyma bor. Birinchi quymada 3 kg qo'rg'oshin va 2 kg mis bor. Ikkinchi quymada 13 kg qo'rg'oshin va 7 kg mis bor. Qaysi quymada qo'rg'oshinning foiz miqdori ko'p va u necha foiz ko'p?

A) $1-quymada\ 5\%$ B) $2-quymada\ 65\%$

C) $2-quymada\ 5\%$ D) $1-quymada\ 60\%$

E) $2-quymada\ 20\%$

(1997-9-5) Qutiga 12 kg massali yuk joylandi. Agar qutining massasi yuk massasining 25 % ni tashkil etsa, qutining massasini toping.

A) 4 kg B) 3 kg C) 3,5 kg D) 4,5 kg E) 5 kg

(1997-11-5) Noma'lum sonni 36 % i 80 ning 45 % iga teng. Noma'lum sonni toping.

A) 92 B) 98 C) 108 D) 120 E) 100

(1997-10-4) Muayyan masofani bosib o‘tish uchun ketadigan vaqtni 25 % ga kamaytirish uchun tezlikni necha foiz orttirish kerak?

A) 25 B) 20 C) $33\frac{1}{3}$ D) 30 E) $24\frac{2}{3}$

(1997-12-3) Go‘sht qaynatilganda o‘z og‘irligining 40 % yo‘qotadi. 6 kg pishgan go‘sht olish uchun qancha go‘sht qaynatish kerak?

A) 8 kg B) 10 kg C) 10,5 kg D) 9 kg E) 7,5 kg

(1996-6-52) $y = \log_3(2 - x)$ funksiyaning aniqlanish sohasini toping.

A) $(-\infty; 2)$ B) $(2; \infty)$ C) $(0; 2)$

D) $(0; 2]$ E) $\left(0; \frac{1}{3}\right) \cup \left(\frac{1}{3}; 2\right)$

(1996-7-33) $\log_{\frac{1}{\sqrt{2}}} \frac{4x-1}{4x+8} < 0$ tengsizlikni yeching.

A)$(\frac{1}{4}; \infty)$ B)$(2; \infty)$ C)$(-2; \infty)$ D)$\left(-2; \frac{1}{4}\right)$ E)$(-\infty; -2)$

(1996-9-25) $a = \log_{\frac{1}{3}} 3\,, b = \log_{\frac{1}{4}} 3$ $va\ c = \log_{\frac{1}{3}} 4$ bo‘lsa, $a, b\ va\ c$ sonlar uchun quyidagi munosabatlarning qaysi biri o‘rinli?

A) $c < a < b$ B) $c < b < a$ C) $a < b < c$

D) $b < a < c$ E) $b < c < a$

(1996-9-28) $a = \log_{50} 40$ bo‘lsa, $\log_5 2$ ni a orqali ifodalang.

A) $\frac{3a-1}{2-a}$ B)$\frac{a-3}{1-2a}$ C)$\frac{a-3}{2a-1}$ D)$\frac{2a-1}{a-3}$ E)$\frac{1-2a}{a-3}$

(1996-9-29) $y = \log_2 \log_{\frac{1}{2}} \sqrt{4x - x^2 - 2}$ funksiyaning aniqlanish sohasini toping.

A) $\left(2 - \sqrt{2}; 1\right) \cup \left(3; 2 + \sqrt{2}\right)$ B) $\left(2 - \sqrt{2}; 2 + \sqrt{2}\right)$

C) $(1; 3)$ D) $(-\infty; 1) \cup (3; \infty)$

E)$\left(-\infty; 2-\sqrt{2}\right) \cup \left(2+\sqrt{2}; \infty\right)$

(1996-9-30) $x^{\log_{0,3}\left(x^2-5x+4\right)} < x^{\log_{0,3}(x-1)}$ tengsizlik x ning qanday qiymatlarida o‘rinli?

A) $\emptyset$ B) $(4; \infty)$ C)$(5; \infty)$ D)$(-\infty; 1)$ E)$(3; \infty)$

(1996-9-31) $\left(\sqrt{7}\right)^{\frac{3}{\log_9 7}}$ ni hisoblang.

A) 10 B) 9 C) 3 D) 7 E) 11

(1996-9-86) $\log^2{}_3\, x - 4\log_3 x + 3 = 0$ tenglamaning ildizlari ko‘paytmasini toping.

A) 4 B) 81 C) 24 D) $9\frac{1}{4}$ E) 30

(1996-10-37) $\log^2{}_2\, x - 5\log_2 x + 6 = 0$ tenglamaning ildizlari ko‘paytmasini toping.

A) 5 B) 6 C) 32 D) $\frac{3}{2}$ E) $\frac{1}{2}$

(1996-11-50) $6^{\log_6\left(\sqrt{3}cosx\right)} + 5^{\frac{1}{2}\log_5 6} = 27^{\frac{1}{3}+\log_{27} sinx}$ tenglamani yeching.

A) $\frac{3\pi}{4} + 2\pi n,\ n \in Z$ B) $\frac{7\pi}{12} + 2\pi n,\ n \in Z$

C)$\frac{5\pi}{12} + 2\pi n,\ n \in Z$ D)$\frac{\pi}{4} + 2\pi n,\ n \in Z$

E)$\frac{\pi}{2} + 2\pi n,\ n \in Z$

(1996-12-86) $a = \log_{147} 63$ bo‘lsa, $\log_7 3$ ni a orqali ifodalang.

A) $\frac{1-2a}{a-2}$ B)$\frac{2a-1}{a-2}$ C)$\frac{a-2}{1-2a}$ D)$\frac{a-2}{2a-1}$ E)$\frac{a-2}{2a+1}$

(1996-12-88) $(x-2)^{\log_{\frac{1}{2}}\left(x^2-5x+5\right)} < (x-2)^{\log_{\frac{1}{2}}(x-3)}$ tengsizlik x ning qanday qiymatlarida o‘rinli?

A) $(-\infty; 2) \cup (4; \infty)$ B) $(2; 4)$ C) $\left(\frac{5+\sqrt{5}}{2}; 4\right)$

D)$(4;\infty)$ E) $\left(-\infty;\frac{5-\sqrt{5}}{2}\right)\cup\left(\frac{5+\sqrt{5}}{2};\infty\right)$

(1996-12-90) $a=\log_{\frac{1}{6}}4,\ \ b=\log_{\frac{1}{5}}6\ \ va\ c=\log_{\frac{1}{5}}4$ bo‘lsa, $a,b\ va\ c$ sonlar uchun quyidagi qaysi biri o‘rinli?

A) $c<b<a$ B) $b<c<a$ C) $c<a<b$

D) $a<b<c$ E) $a<c<b$

(1996-12-98) $\log_{cosx} sin2x-4+4\log_{sin2x} cosx=0$ tenglamani yeching.

A) $arcctg2+k\pi,\ \ k\epsilon Z$ B)$-arcctg2+k\pi,\ \ k\epsilon Z$

C) $arcctg\sqrt{2}+2k\pi,\ \ k\epsilon Z$ D)$-arcctg2+2k\pi,\ \ k\epsilon Z$

E) $arcctg2+2k\pi,\ \ k\epsilon Z$

(1996-13-27) $a=\log_{75}45\ \ bo'lsa,\log_5 3\ \ ni\ a$ orqali ifodalang.

A) $\frac{1-2a}{a-2}$ B)$\frac{2a-1}{a-2}$ C)$\frac{a-2}{1-2a}$ D)$\frac{a-2}{2a-1}$ E)$\frac{a+2}{2a-1}$

(1996-13-28) $y=\log_2\log_3\sqrt{4x-4x^2}$ funksiyaning aniqlanish sohasini toping.

A) $\left\{\frac{1}{2}\right\}$ B) $\emptyset$ C) $\left(0;\frac{1}{2}\right)\cup\left(\frac{1}{2};1\right)$

D) $(-\infty;0)\cup(1;\infty)$ E) $\left(0;\frac{1}{2}\right)$

(1996-13-30)$\left(\sqrt{5}\right)^{\frac{3}{\log_4 5}}$ ni hisoblang.

A) 8 B) 7 C) 5 D) 4 E) 9

(1996-13-31) $a=\log_{\frac{1}{6}}4,\ \ b=\log_{\frac{1}{5}}6\ \ va\ c=\log_{\frac{1}{6}}4$ bo‘lsa, $a,b\ va\ c$ sonlar uchun quyidagi munosabatlarning qaysi biri o‘rinli?

A) $b < c < a$ B) $c < a < b$ C) $a < c < b$

D) $a < b < c$ E) $b < a < c$

(1996-13-54) $\log_{sinx} cos2x - 3 + 2\log_{cos2x} sinx = 0$ tenglamani yeching.

A) $\left\{\pm\frac{\pi}{6} + \pi k\right\}, k\epsilon Z$

B) $\left\{\pm\frac{\pi}{6} + k\pi,\ \pm arcsin\frac{1}{\sqrt{3}} + k\pi\right\}, k\epsilon Z$

C) $\left(\pm arcsin\frac{1}{\sqrt{3}} + k\pi\right), k\epsilon Z$

D) $\left\{(-1)^k \cdot \frac{\pi}{6} + \pi k,\ (-1)^k arcsin\frac{1}{\sqrt{3}} + \pi k\right\}, k\epsilon Z$

E) $\left\{\frac{\pi}{6} + 2\pi k,\ \ arcsin\frac{1}{\sqrt{3}} + 2\pi k\right\},\ k\epsilon Z$

(1997-1-6) $\log_5(5 - 2x) \leq 1$ tengsizlikni yeching.

A) $(-\infty; 2{,}5)$ B) $(0; 25)$ C) $(-\infty; 2{,}5)$

D) $[0; 25)$ E) $[0; 25]$

(1997-8-40) $4^{2\lg 4x} = 25$ tenglamani yeching.

A) 5 B) ± 5 C) -5 D)10 E) ± 10

(1997-7-58) $3^{1+\log_3 ctgx} = \sqrt{3}$ tenglamani yeching.

A) $\frac{\pi}{6} + \pi n, n\epsilon Z$ B) $\frac{\pi}{3} + \pi n, n\epsilon Z$ C) $\frac{\pi}{3} + 2\pi n, n\epsilon Z$

D) $\frac{\pi}{4} + \pi n, n\epsilon Z$ E) $\frac{\pi}{6} + 2\pi n, n\epsilon Z$

(1997-6-59) $x^{\lg 9} + 9^{\lg x} = 6$ tenglamani yeching.

A) 1 B) 10 C) $\sqrt{10}$ D) 2

E) to‘g‘ri javob keltirilmagan

(1997-6-64) $f(x) = \log_x(6 - x)$ funksiyaning aniqlanish sohasini toping.

A) $(-\infty; 6)$ B) $(1; 6)$ C) $(0; 1)$

D) $(0; 1) \cup (1; 6)$ E) $[1; 6)$

(1997-6-24) $\log_2(3-2x)-\log_{\frac{1}{8}}(3-2x)>\frac{4}{3}$ tengsizlikni yeching.

A) $(-\infty;0{,}5)$ B)$(-\infty;1{,}5)$ C) $(-4;-1)$

D) $(0;1)$ E) $(-\infty;0)$

(1997-2-53) $m=2\log_2 8-\log_2 4$, $n=\log_2 400-2\log_2 5$,

$p=\log_5 125+\log_5 5$ va $q=\ln 12e-\ln 12$ sonlardan qaysi biri qolgan uchtaiga teng emas?

A) m B) n C) p D) q E) hech qaysisi

(1997-8-53) Quyidagi sonlardan qaysi biri 2 dan kichik?

A) $\log_4 2+\log_4 8$ B)$\log_2 36-2\log_2 25$

C)$2\log_2 5-\log_2 25$ D)$\log_2 6+\frac{1}{2}\log_2 9$

E)$\log_3 45-\log_3 5$

(1997-9-37) $\log_5 \ln e^5$ ni hisoblang.

A) 5 B) $5e$ C) 50 D) 10 E) 1

(1997-9-38) $y=\log_5(5sinx)$ funksiyaning aniqlanish sohasini toping.

A)$\left(-\pi+2\pi n;\ \frac{\pi}{2}+2\pi n\right), n\epsilon Z$ B)$(2\pi n;\ \pi+2\pi n), n\epsilon Z$

C)$\left(-\pi n;\ \frac{\pi}{2}+2\pi n\right),\ n\epsilon Z$ D)$\left(\pi n;\ \frac{3\pi}{4}+2\pi n\right), n\epsilon Z$

E)$\left(\pi n;\ \frac{\pi}{2}+2\pi n\right),\ n\epsilon Z$

(1997-9-97) Ma’noga ega ifodalarni ko‘rsating.

1) $\lg(arccos 1)$ 2) $arcsin\left(\lg\frac{1}{2}\right)$

3) $arccos\left(\frac{a^4+1}{(a^2+1)^2}\right)$ 4) $arcsin\left(\sqrt[10]{2}\right)$

(1997-9-32) $\log_3 20=a$ va $\log_3 5=b$ bo‘lsa, $\log_4 500$ ni a va b orqali ifodalang.

A) $\frac{a+b}{a-b}$ B)$\frac{a+2b}{a+b}$ C)$\frac{a+2b}{a-b}$ D)$\frac{a-b}{a+2b}$ E)$\frac{a-b}{a+b}$

(1997-11-24) $\log_{\frac{1}{3}}(x+2) - \log_9(x+2) > -\frac{3}{2}$

tengsizlikni yeching.

A) $(0;1)$ B)$(1;\infty)$ C)$(2;3)$ D)$(-2;1)$ E)$(-2;5)$

(1997-10-33) $\log_{\frac{\sqrt{5}}{2}} \frac{2x-1}{2x+9} > 0$ tengsizlikni yeching.

A) $\left(\frac{1}{2};\infty\right)$ B)$\left(-9;\frac{1}{2}\right)$ C)$(-\infty;-4{,}5)$

D)$(-4{,}5;0{,}5)$ E) $\emptyset$

(1997-12-64) $3^{1+\log_3 tgx} = \sqrt{3}$ tenglamani yeching.

A) $\frac{\pi}{3} + \pi n,\ n\epsilon Z$ B)$\frac{\pi}{6} + \pi n,\ n\epsilon Z$ C)$\frac{\pi}{3} + 2\pi n, n\epsilon Z$

D)$\frac{\pi}{6} + 2\pi n,\ n\epsilon Z$ E) $\emptyset$

(1997-12-51) $y = \log_{x^2}(6-x)$ funksiyaning aniqlanish sohasini toping.

A) $D(y) = (0;6)$ B) $D(y) = [0;6]$ C) $D(y) = (0;6]$

D) $D(y) = (1;6)$ E) $D(y) = (0;1) \cup (1;6)$

(1997-12-52) Quyidagi sonlardan qaysi biri 1 ga teng emas?

A) $\log_3 12 - \log_3 4$ B)$\frac{1}{2}\log_4 36 - \log_4 \frac{2}{3}$

C)$\log_5 125 - \frac{1}{2}\log_5 625$ D) $2\log_2 5 - \log_2 30$

E)$\ln 4e - 2\ln 2$

(1997-12-53) $\frac{1}{2}^{\log_{0,5} x(x-4)} > 0$ tengsizlikning eng kichik butun musbat yechimini toping.

A) 4 B) 6 C) 5 D) 5,5 E) 4,5

(1997-12-54) $\log_2(x+2) + \log_2(x+3) = 1$ tenglamaning ildizi 8 dan qanchaga kam?

A) 7 B) 9 C) 10 D) 6 E) 11

(1996-6-36) Ikkinchi va o‘n to‘qqizinchi hadlarning yig‘indisi 12 ga teng bo‘lgan arifmetik progressiyaning dastlabki yigirmata hadining yig‘indisini toping.

A) 110 B) 120 C) 130 D) 115 E) 125

(1996-7-27) 100 dan katta bo‘lmagan 3 ga karrali barcha natural sonlarning yig‘indisini toping.

A) 1683 B) 2010 C) 1500 D) 1080 E) 1680

(1996-9-21) Ushbu 1234567891011...4950 sonning raqamlari yig‘indisini toping.

A) 335 B) 330 C) 320 D) 315 E) 210

(1996-10-29) Arifmetik progressiyada $a_2 = 10$ va $a_5 = 22$. Shu progressiyaning dastlabki sakkizta hadining yig‘indisini toping.

A) 162 B) 170 C) 115 D) 160 E) 156

(1996-11-28) Arifmetik progressiyada $a_3 + a_5 = 12$. S_7 ni toping.

A) 18 B) 36 C) 42 D) 48 E) 54

(1996-12-28) Arifmetik progressiyada $a_4 + a_6 = 10$. S_9 ni toping.

A) 25 B) 30 C) 35 D) 40 E) 45

(1996-12-60) 1 dan 100 gacha bo‘lgan sonlar orasida 2 ga ham , 5 ga ham bo‘linmaydiganlari nechta?

A) 35 B) 40 C) 41 D) 32 E) 34

(1996-12-78) Ushbu 21222324...6970 sonning raqamlari yig‘indisini toping.

A) 400 B) 430 C) 410 D) 420 E) 440

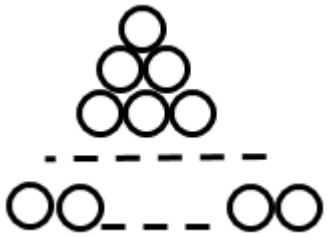
(1996-13-2) 1 dan 100 gacha bo‘lgan sonlar orasida 3 ga ham, 5 ga ham bo‘linmaydiganlari nechta?

A) 50 B) 52 C) 48 D) 53 E) 54

(1996-13-21) Ushbu 11121314...5960 sonning raqamlari yig‘indisini toping.

A) 380 B) 370 C) 360 D) 400 E) 390

(1997-5-27) G‘o‘la shaklidagi to‘sinlar rasmdagidek ustma-ust taxlangan. Agar taxlamning asosida 10 ta to‘sin bo‘lsa, taxlamda nechta to‘sin bor?



A) 53 B) 54 C) 55 D) 56 E) 57

(1997-7-27) 100 dan katta bo‘lmagan 4 ga karrali barcha natural sonlarning yig‘indisini toping.

A) 1250 B) 1300 C) 1120 D) 1000 E) 1296

(1997-6-17) $a_n = 4_n - 2$ formula bilan berilgan ketma-ketlikning dastlabki 50 ta hadining yig‘indisini toping.

A) 4500 B) 5050 C) 3480 D) 4900 E) 5000

(1997-9-19) $a = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot 59$ va $b = 30^{59}$ ni taqqoslang.

A) $a = b + 1$ B) $a = b - 1$ C) $a = b$

D) $a > b$ E) $a < b$

(1997-11-17) Hadlari $b_n = 3n - 1$ formula berilgan ketma-ketlikning dastlabki 60 ta hadining yig‘indisini toping.

A) 4860 B) 4980 C) 5140 D) 5260 E) 5430

(1997-10-27) 150 dan katta bo‘lmagan 6 ga karrali barcha sonlarning yig‘indisini toping.

A) 1800 B) 2024 C) 1760 D) 1950 E) 2100

(1997-12-35) Dastlabki beshta hadining yig‘indisi -62 ga, dastlabki oltita hadining yig‘indisi – 126 ga va maxraji 2 ga teng geometrik progressiyaning birinchi hadini toping.

A) -1 B) -3 C) -4 D) -2 E) 3

(1997-12-36) Ikkinchi, to‘rtinchi va oltinchi hadlarining yig‘indisi -18 ga teng arifmetik progressiyaning to‘rtinchi hadini toping.

A) 6 B) -5 C) -6 D) -4 E) 5

(1996-7-40) $\vec{a} = \{2; 5\}$ va $\vec{b} = \{-7; -3\}$ vektorlar orasidagi burchakni toping.

A) $150°$ B) $135°$ C) $120°$ D) $60°$ E) $45°$

(1996-7-41) $B(1;\ -2)$ va $C(-2; -6)$ nuqtalar orasidagi masofaning yarmini toping.

A) $\frac{\sqrt{65}}{2}$ B)3,5 C)$\frac{\sqrt{10}}{2}$ D) 2,5 E)$\frac{\sqrt{5}}{2}$

(1996-7-50) Agar $\vec{a} = \{1; 2; 3\}$ va $\vec{b} = \{4; -2; 9\}$ bo‘lsa, $\vec{c} = \vec{a} + \vec{b}$ vektorni uzunligini toping.

A) $5\sqrt{2}$ B)$\sqrt{3}$ C) 13 D) 11 E) 8

(1996-9-42) $A(x; 0; 0)$ nuqta $B(0; 1; 2)$ va $C(3; 1; 0)$ nuqtalarda teng uzoqlikdaligi ma’lum bo‘lsa, x ni toping.

A) $\frac{5}{6}$ B)$\frac{6}{5}$ C) $-\frac{5}{6}$ D) $-\frac{5}{6}$ E) 1

(1996-3-39) $|\vec{a}| = 4,\ |\vec{b}| = 3,\ \vec{a}\hat{}\vec{b} = 60°$. γ ning qanday qiymatida $(2\vec{a} - \gamma\vec{b}) \perp \vec{b}$ bo‘ladi.

A) 1 B) $-\frac{3}{4}$ C) $-\frac{4}{3}$ D) $\frac{3}{4}$ E) $\frac{4}{3}$

(1996-9-94) $\vec{a} = \{2; -3\}$ va $\vec{b} = \{-2; -3\}$ vektorlar berilgan $\vec{m} = \vec{a} - 2\vec{b}$ vektorning koordinatalarini ko‘rsating.

A)$(6;3)$ B)$(-3;6)$ C)$(-2;-9)$ D)$(2;-3)$ E)$(0;3)$

(1996-9-103) $\vec{a}=\{0;-4;2\}$ va $\vec{b}=\{-2;2;3\}$ vektorlarning skalyar ko‘paytmasini hisoblang.

A)14 B) 2 C) -2 D) 10 E) -14

(1996-10-44) $\vec{m}=\{-3;1\}$ va $\vec{n}=\{5;-6\}$ vektorlar berilgan. $\vec{a}=\vec{n}-3\vec{m}$ vektorning koordinatalarini toping.

A) $(14;-9)$ B) $(4;-3)$ C)$(14;-3)$

D)$(9;3)$ E) $(-5;6)$

(1996-10-52) $\vec{a}=\{2;-3;4\}$ va $\vec{b}=\{-2;-3;1\}$ vektorlar skalyar ko‘paytmasini hisoblang.

A) 9 B) 17 C) 13 D) 4 E) 5

(1996-11-41) $\vec{a}=\left\{2;\frac{15}{4}\right\}$ vektor berilgan. $4\cdot\vec{a}$vektorning modulini toping.

A) 13 B) 17 C) 18 D) 15 E) 12

(1996-11-44) $\vec{a}$ va $\vec{b}$ nokollinear vektorlar berilgan. $|\vec{a}|=|\vec{b}|=4$ bo‘lsa, $(\vec{a}+\vec{b})$ bilan $(\vec{a}-\vec{b})$ qanday burchak tashkil qiladi?

A) $30°$ B) $45°$ C) $60°$ D) $75°$ E) $90°$

(1996-11-52) $\vec{a}=\{1;-2;3\}$ vektorning oxiri $B\{2;0;4\}$ nuqta bo‘lsa, bu vektorning boshini toping.

A) $(1;2;1)$ B)$(-1;2;1)$ C)$(1;-2;1)$

D) $(1;2;-1)$ E)$(-1;2;-1)$

(1996-12-42) $\vec{a}=\left\{\frac{3}{2};2\right\}$ vektor berilgan. $2\cdot\vec{a}$ vektor modulini toping.

A) 5 B) 4 C) 7 D) $1\frac{1}{3}$ E) $2\frac{1}{3}$

(1996-12-46) $\vec{a}$ va $\vec{b}$ nokollinear vektorlar berilgan. $|\vec{a}| = |\vec{b}| = 2$ bo‘lsa, $(\vec{a} + \vec{b})$ bilan $(\vec{a} - \vec{b})$ qanday burchak tashkil qiladi?

A) $45°$ B) $90°$ C) $75°$ D) $60°$ E) $30°$

(1996-3-50) $B(0; 4; 2)$ nuqta $\vec{a} = \{2; -3; 1\}$ vektorning oxiri bo‘lsa, bu vektor boshining koordinatalarini toping.

A) $(2; 7; 1)$ B)$(-2; 7; 1)$ C)$(-2; -7; 1)$
D)$(-2; 7; -1)$ E)$(2; 7; -1)$

(1996-12-101) $|\vec{a}| = 4$, $|\vec{b}| = 3$, $\vec{a}\hat{}\vec{b} = 60°$. γ ning qanday qiymatida $(\vec{a} + \gamma\vec{b}) \perp \vec{a}$ bo‘ladi.

A) -2 B) $-1{,}5$ C) $-\frac{2}{3}$ D) -2,5 E) $-0{,}5$

(1996-12-103) $A(0; y; 0)$ nuqta $B(1; 2; 3)$ va $C(-1; 3; 4)$ nuqtalardan teng uzoqdaligi ma’lum bo‘lsa, y ni toping.

A) -6 B) 5 C) -5 D) 7 E) 6

(1996-13-41) $|\vec{a}| = 4$, $|\vec{b}| = 3$, $\vec{a}\hat{}\vec{b} = 60°$. γ ning qanday qiymatida $(\vec{a} + \gamma\vec{b}) \perp \vec{a}$ bo‘ladi.

A) $-\frac{7}{3}$ B) $-\frac{7}{4}$ C) $\frac{7}{3}$ D) $-\frac{8}{3}$ E) -3

(1996-13-49) $A(0; y; 0)$ nuqta $B(0; 2; 2)$ va $C(3; 1; 0)$ nuqtalardan teng uzoqdaligi ma’lum bo‘lsa, y ni toping.

A) 1 B) 1,5 C) -1,5 D) 2 E) -1

(1997-1-35) $\vec{a} = \{4; 1\}$ va $\overrightarrow{b} = \{-2; 2\}$ vektorlar berilgan. Agar $\vec{a} = \vec{c} + 3\vec{b}$ bo‘lsa, $\vec{c}$ vektorning koordinatalarini ko‘rsating.

A)$(-2; 5)$ B)$(2; -5)$ C)$(-10; 4)$
D)$(10; -5)$ E)$(-6; 4)$

(1997-1-36) Agar $M(1;1), N(2;3)$ va $K(-1;2)$ bo‘lsa, MNK uchburchakning eng katta burchagini toping.

A) $75°$ B) $90°$ C) $120°$ D) $135°$ E) $105°$

(1997-1-37) Agar $\vec{m}$ va $\vec{n}$ o‘zaro perpendikulyar birlik vektorlar bo‘lsa, $\vec{a} = 2\vec{m} + \vec{n}$ vektorning uzunligini toping.

A) 2 B) 3 C) $\sqrt{5}$ D) $\sqrt{3}$ E)$2\sqrt{2}$

(1997-3-50) Agar $\vec{a} = \{6; 2; 1\}$ va $\vec{b} = \{0; -1; 2\}$ bo‘lsa, $\vec{c} = 2\vec{a} - \vec{b}$ vektorning uzunligini toping.

A) 13 B)$4\sqrt{3}$ C) 15 D) $6\sqrt{2}$ E) 9

(1997-3-40) $\vec{m} = \{5; -3\}$ va $\vec{n} = \{4; 1\}$ vektorlar orasidagi burchakni toping.

A) $135°$ B) $120°$ C) $60°$ D) $45°$ E) $30°$

(1997-3-41) $C(-2; 3)$ va $D(1; 6)$ nuqtalar orasidagi masofani toping.

A) $\frac{\sqrt{10}}{2}$ B) 1,5 C) $\sqrt{3}$ D) $\frac{3}{\sqrt{2}}$ E) 2

(1997-5-53) n ning qanday qiymatida $\vec{a} = \{n; -2; 1\}$ va $\vec{b} = \{n; n; 1\}$ vektorlar perpendikulyar bo‘ladi?

A) 3 B) 1 C) 2 D) 5 E) 4

(1997-7-40) $\vec{c} = \{7; 3\}$ va $\vec{d} = \{-2; -5\}$ vektorlar orasidagi burchakni toping.

A) $30°$ B) $45°$ C) $60°$ D) $135°$ E) $150°$

(1997-7-41) $M(3; -2)$ va $N(-1; 1)$ nuqtalar orasidagi masofaning $\frac{2}{3}$ qismini toping.

A) 1,5 B) $\frac{2\sqrt{2}}{3}$ C)$\frac{2\sqrt{5}}{3}$ D) $1\frac{2}{3}$ E) $3\frac{1}{3}$

(1997-7-50) Agar $\vec{a} = \{-1; 2; 8\}$ va $\vec{b} = \{3; -2; 1\}$ bo‘lsa, $\overrightarrow{m} = \vec{b} - \vec{a}$ vektorning uzunligini toping.

A) 8 B) $9\sqrt{2}$ C) $12\sqrt{3}$ D) 12 E) 9

(1997-7-66) $A(3; -2; 5)$ va $B(-4; 5; -2)$ nuqtalar berilgan. $\overrightarrow{BA}$ vektorning koordinatalarini toping.

A) $(7; -7; -7)$ B)$(-1; 3; 3)$ C)$(-7; 7; -7)$
D)$(-7; -7; 7)$ E)$(7; -7; 7)$

(1997-6-36) Uchlari $O(0; 0), M(1; 1), P(0; 2)$ va $K(-1; 1)$ nuqtalarda bo‘lan, $OMPK$ to‘rtburchakning diagonallari orasidgi burchakni toping.

A) 90° B) 30° C) 45° D) 60° E) 75°

(1997-6-37) Agar $\vec{c} - 2\vec{b}$ va $4\vec{b} + 5\vec{c}$ vektorlar perpendikulyar bo‘lsa, $\vec{b}$ va $\vec{c}$ birlik vektorlar orasidagi burchakni toping.

A) 30° B) 45° C) 60° D) 120° E) 90°

(1997-6-35) $\vec{c} = \{(-5; 0\}$ va $\vec{b} = \{-1; 4\}$ vektorlar berilgan. Agar $\vec{c} = 2\vec{a} - \vec{b}$ bo‘lsa, $\vec{a}$ vektorning koordinatalarini toping.

A) $(-2; 2)$ B)$(-3; 2)$ C)$(1; 0)$
D)$(2; 2)$ E)$(3; -2)$

(1997-9-60) $A(-3; 0; 7)$ va $B(5; -4; 3)$ nuqtalqr berilgan. $\overrightarrow{BA}$ vektorning koordinatalarini toping.

A) $(-8; -4; 4)$ B)$(-8; -4; 4)$ C)$(2; -4; 10)$
D)$(8; -4; -4)$ E)$(8; -4; 4)$

(1997-9-53) n ning qanday qiymatida $\vec{a} = \{n; -2; 4\}$ va $\vec{b} = \{n; 4n; 4\}$ vektorlar perpendikulyar bo‘ladi?

A) 2 B) 5 C) 6 D) 4 E) 3

(1997-9-29) $\vec{a} = \{7; 3\}$ va $\vec{b} = \{5; 2\}$ vektorlar berilgan. $|\vec{a} + \vec{b}|$ ni hisoblang.

A) 19 B) 5 C) 8 D) 13 E) 12

(1997-10-40) $\vec{a} = \{1; 0\}$ va $\vec{b} = \{1; -1\}$ vektorlar orasidagi burchakni toping.

A) $30°$ B) $45°$ C) $60°$ D) $90°$ E)$135°$

(1997-11-35) $\vec{a} = \{(0; -4\}$ va $\vec{b} = \{-2; 2\}$ vektorlar berilgan. Agar $\vec{b} = 3\vec{a} - \vec{c}$ bo‘lsa, $\vec{c}$ vektorning koordinatalarini toping.

A) $(2; -14)$ B)$(3; -6)$ C)$(-2; 10)$

D)$(-2; -10)$ E)$(2; -10)$

(1997-11-36) Uchlari $A(1; 2), B(1; 4)$ va $C(3; 2)$ nuqtalarda bo‘lgan uchburchakning katta burchagini toping.

A) $110°$ B) $90°$ C) $120°$ D) $135°$ E) $150°$

(1997-9-110) $\vec{a} = \{2; 1\}$ va $\vec{b} = \{1; 2\}$ vektorlar berilgan. x ning qanday qiymatida $x\vec{a} + \vec{b}$ vektor $\vec{b}$ vektorga perpendikulyar bo‘ladi?

A) 1 B) 2 C) 4 D) -1,25 E) -2

(1997-9-116) x ning qanday qiymatlarida $\vec{a} = \{8; 4; 5x\}$ va $\vec{b} = \{2x; x; 1\}$ vektorlar o‘zaro perpendikulyar bo‘ladi?

A) $2\sqrt{5}$ B) $-\frac{2\sqrt{5}}{5}$ C) 0 D)$\pm\frac{3\sqrt{5}}{4}$ E) $4\sqrt{5}$

(1997-10-50) Agar $\vec{a} = \{2; 0; 1\}$ va $\vec{b} = \{1; -2; 3\}$ bo‘lsa, $\vec{n} = \vec{a} + 2\vec{b}$ vektorning uzunligini toping.

A) 9 B) $6\sqrt{2}$ C) 16 D) 13 E) $5\sqrt{3}$

(1997-10-41) $A(3; -2)$ va $B(1; 6)$ nuqtalar orasidagi masofaning uchdan birini toping.

A) $1\frac{1}{3}$ B)$\frac{2\sqrt{5}}{3}$ C)$\frac{4\sqrt{2}}{3}$ D)$\frac{2\sqrt{17}}{3}$ E) $2\frac{2}{3}$

(1997-12-23) $\vec{a} = \{x; 1; 2\}$ vektorning uzunligi 3 ga teng. x ning qiymatini toping.

A) 2 B) ± 2 C) 0 D) 1 E) -1

(1996-11-58) $sin180° + sin270° - cgt90° + tg180° - cos90°$ ning qiymatini hisoblang.

A) -1 B) 0 C) 1 D) -2 E) 2

(1996-11-59) $sin10° \cdot sin30° \cdot sin50° \cdot sin70°$ ni hisoblang.

A) $\frac{1}{2}$ B)$\frac{1}{3}$ C) $\frac{1}{4}$ D)$\frac{1}{8}$ E) $\frac{1}{16}$

(1996-12-11) $3tg0° + 2cos90° + 3sin270° - 3cos180°$ ni hisoblang.

A) 6 B) 0 C) -6 D) 9 E) -9

(1996-12-12) $cos20° \cdot cos40° \cdot cos80°$ ni hisoblang.

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{8}$ D) $\frac{\sqrt{3}}{8}$ E)$\frac{\sqrt{3}}{5}$

(1997-6-43) $\sin(-45°) + cos405° + tg(-945°)$ni hisoblang.

A) 1 B) -1 C) $-2\sqrt{2}$ D) $\sqrt{2} - 1$ E) $\sqrt{2} + 1$

(1997-2-31) $\frac{5\pi}{4}$ radian necha gradus bo‘ladi?

A) $220°$ B) $230°$ C) $225°$ D) $240°$ E) $235°$

(1997-2-32) $sin^2x + 2cos^2x$ ning eng kichik qiymatini toping.

A) 0,9 B) 0,8 C) 1,2 D) 1 E) 1,5

(1997-2-33) Quyidagi sonlardan qaysi biri musbat?

A) $tg247° \cdot sin125°$ B) $ctg215° \cdot cos300°$

C) $tg135° \cdot ctg340°$ E) $sin247° \cdot cos276°$

E) $sin260° \cdot cos155°$

(1997-2-34) $\frac{tg\left(\frac{\pi}{2}+\alpha\right)}{\cos(2\pi-\beta)}$ ni soddalashtiring.

A) $\frac{ctg\alpha}{cos\beta}$ B)$-\frac{ctg\alpha}{cos\beta}$ C)$-\frac{tg\alpha}{sin\beta}$ D)$\frac{tg\alpha}{sin\beta}$ E)$-\frac{tg\alpha}{cos\beta}$

(199$\frac{sin\alpha}{cos\alpha-cos3\alpha}$ quyidagilardan qaysi biriga teng?

A) $-\frac{1}{2sin2\alpha}$ B)$\frac{1}{2cos2\alpha}$ C)$\frac{1}{sin2\alpha}$

D) $-\frac{1}{sin2\alpha}$ E)$\frac{1}{2sin2\alpha}$

(1997-6-51) $sin\frac{\pi}{8}cos^3\frac{\pi}{8}-sin^3\frac{\pi}{8}cos\frac{\pi}{8}$ ni hisoblang.

A) 0 B) 1 C) 2 D) $\frac{1}{2}$ E) $\frac{1}{4}$

(1997-3-54) $\frac{sin56°\cdot sin124°-sin34°\cdot cos236°}{cos28\cdot cos88°+cos178°\cdot sin208°}$ ni soddalashtiring.

A) $\frac{2}{\sqrt{3}}$ B) $tg28°$ C) 2 D) $\frac{1}{sin26°}$ E) -2

(1997-8-33) $sin\left(\frac{3\pi}{2}+\alpha\right)ctg(\pi+\beta)$ ni soddalashtiring.

A) $cos\alpha ctg\beta$ B)$-cos\alpha ctg\beta$ C)$-cos\alpha tg\beta$

D $sin\alpha tg\beta$ E)$-sin\alpha ctg\beta$

(1997-8-34) $\frac{cos4\alpha}{sin5\alpha-sin3\alpha}$ quyidagilardan qaysi biriga teng?

A) $\frac{1}{2cos\alpha}$ B)$\frac{1}{sin\alpha}$ C)$\frac{1}{cos\alpha}$ D)$\frac{cos4\alpha}{sin2\alpha}$ E)$\frac{1}{2sin\alpha}$

(1997-8-31) $sin^2\alpha+2cos^2\alpha$ ning eng katta qiymatini toping.

A) 1,2 B)1,4 C) 1,6 D) 2 E) 1,8

(1997-7-54) $\frac{sin56°\cdot sin124°-sin34°\cdot cos236°}{cos28°\cdot sin88°+sin178°\cdot cos242°}$ ni soddalashtiring.

A) $\frac{1}{sin26°}$ B) $tg28°$ C) $-\frac{\sqrt{3}}{2}$ D) $\frac{2}{\sqrt{3}}$ E) 1

(1997-7-56) $\frac{sin(\pi-2\alpha)}{1-sin\left(\frac{\pi}{2}-2\alpha\right)}$ ni soddalashtiring.

A) $-tg\alpha$ B) $2sin\alpha$ C) $ctg\alpha$ D)$tg\alpha$ E)$-cos\alpha$

(1997-9-28) $4ctg30°+tg^215°$ ni hioblang.

A) 5 B) 7 C) 9 D) 8 E) 6

(1997-10-54) $\frac{cos18°\cdot cos28°+cos108°\cdot sin208°}{sin18°\cdot sin78°+sin108°\cdot sin168°}$ ni hisoblang.

A) $2cos10$ B) $\frac{1}{2}sin10°$ C) 2 D)$\frac{\sqrt{3}}{2}$ E)$cos46°$

(1997-7-60) $cos\left(2arcsin\frac{1}{3}\right)$ ni hisoblang.

A) $-\frac{2}{3}$ B) $-\frac{4}{9}$ C)$\frac{7}{9}$ D)$\frac{2}{9}$ E)$\frac{1}{3}$

(1997-6-44) Agar $cos\alpha=\frac{1}{2}$ va $\frac{3\pi}{2}<\alpha<2\pi$ bo‘lsa, $sin\left(\pi\cdot\frac{\alpha}{2}\right)$ ni toping.

A) $-\frac{1}{2}$ B)$-\frac{\sqrt{3}}{2}$ C)$\frac{1}{4}$ D)$\frac{1}{2}$ E)$\frac{\sqrt{3}}{2}$

(1997-11-43) $cos(-45°)+sin315°+tg(-855°)$ ni hisoblang.

A) 0 B)$\sqrt{2}-1$ C)$1+\sqrt{3}$ D) -1 E) 1

(1997-12-31) $2sin^2\beta+cos^2\beta$ ning eng kichik qiymatini toping.

A) 0,8 B) 1,2 C) 1 D) 0,9 E) 1,1

(1997-12-37) Quyidagi sonlardan qaysi biri manfiy?

A)$sin122°cos322°$ B) $cos148°cos289°$

C) $tg196°ctg189°$ D) $tg220°sin100°$

E) $ctg320°cos186°$

(1997-12-33) $cos\left(\frac{3\pi}{2}-\alpha\right)tg(\pi-\beta)$ ni soddalashtiring.

A) $-sin\alpha tg\beta$ B) $cos\alpha tg\beta$ C) $sin\alpha tg\beta$

D)$-cos\alpha tg\beta$ E) $sin\alpha ctg\beta$

(1997-12-34) $\frac{cos6\alpha-cos4\alpha}{sin5\alpha}$ quyidagilardan qaysi biriga teng?

A) $2sin\alpha$ B) $2cos\alpha$ C)$-2cos\alpha$

D)$-sin\alpha$ E)$-2sin\alpha$

(1996-3-56) $5sin90° + 2cos0° - 2sin270° + 10cos180°$ ni hisoblang.

A) -3 B) -6 C) -1 D) 9 E) 19

(1996-7-55) $sin\frac{\pi}{12}$ ni hisoblang.

A) $\sqrt{2-\sqrt{3}}$ B) $\frac{\sqrt{2+\sqrt{3}}}{2}$ C) $\frac{\sqrt{2-\sqrt{3}}}{2}$

D) $\frac{\sqrt{2-\sqrt{2}}}{2}$ E) $\frac{\sqrt{2+\sqrt{2}}}{2}$

(1997-4-63) $sin\left(2arccos\frac{1}{3}\right)$ ni hisoblang.

A) $\frac{2}{3}$ B) $\frac{2}{9}$ C) $\frac{4\sqrt{2}}{9}$ D) $\frac{4\sqrt{2}}{3}$ E) $\frac{2\sqrt{2}}{3}$

(1997-10-55) $sin\frac{5\pi}{12}$ ni hisoblang.

A) $\frac{\sqrt{2-\sqrt{2}}}{4}$ B) $\frac{2\sqrt{3}-1}{4}$ C) $\frac{\sqrt{1+\sqrt{3}}}{2}$

D) $\frac{\sqrt{2+\sqrt{3}}}{2}$ E) $\frac{\sqrt{2-\sqrt{3}}}{2}$

(1996-1-57) $\frac{\cos(\alpha+\beta)+2sin\alpha sin\beta}{\sin(\alpha+\beta)-2cos\beta sin\alpha}$ ifodani soddalashtiring.

A) $ctg(\beta-\alpha)$ B) $tg(\alpha-\beta)$ C) $2tg(\beta+\alpha)$

D) $2ctg(\alpha-\beta)$ E) $sin\alpha cos\beta$

(1997-12-66) $cos\left(2arccos\frac{1}{3}\right)$ ni hisoblang.

A) $\frac{2}{3}$ B) $-\frac{2}{9}$ C) $-\frac{4}{9}$ D) $-\frac{7}{9}$ E) $-\frac{2}{9}$

(1996-1-54) $2tg(-765°)$ ning qiymatini aniqlang.

A) $-\sqrt{2}$ B) $\frac{2}{\sqrt{3}}$ C) -2 D) 4 E) $-2\sqrt{3}$

(1996-12-85) $\frac{2}{tg\alpha+ctg\alpha}$ ni soddalashtiring.

A) $cos2\alpha$ B) $\frac{1}{cos2\alpha}$ C) $\frac{1}{sin2\alpha}$ D) 2 E) $sin2\alpha$

(1996-13-53) $tg\left(\frac{\pi}{4}+\alpha\right)=2$ bo‘lsa, $ctg\alpha$ ning qiymatini toping.

A) $\frac{1}{3}$ B) $-\frac{1}{3}$ C) -3 D) $\frac{1}{4}$ E) 3

(1997-6-68) $tg\alpha=\frac{3+\sqrt{x}}{2}$, $tg\beta=\frac{3-\sqrt{x}}{2}$ va $\alpha+\beta=\frac{\pi}{4}$ bo‘lsa, x ni toping.

A) $\frac{\pi}{3}$ B) -17 C) $-\frac{\pi}{6}+\pi k, k\epsilon Z$

D) 17 E) to‘g‘ri javob keltirilmagan

(1996-1-58) $cos3xcosx+0{,}5=sin3xsinx$ tenglamaning ildizlarini ko‘rsating.

A) $\frac{\pi}{4}+2\pi k,\ k\epsilon Z$ B) $\frac{\pi}{6}+2\pi k,\ k\epsilon Z$ C) $\frac{\pi}{4}+\pi k,\ k\epsilon Z$

D) $\pm\frac{\pi}{4}+\frac{1}{2}\pi k,\ k\epsilon Z$ E) $-\frac{\pi}{6}+\pi k,\ k\epsilon Z$

(1996-1-60) Agar $90°<x<180°$ bo‘lsa, $cos2xsinx=cos2x$ tenglamaning ildizlarini toping.

A) $120°$ B) $110°$ C) $170°$ D) $135°$ E) $135°$ va $165°$

(1996-3-58) $sin\left(2x-\frac{\pi}{2}\right)=0$ tenglamaning yechimini toping.

A) $\frac{\pi}{4}$ B) $\frac{\pi}{2}n$ C) $\frac{\pi}{4}+\frac{\pi}{2}n, n\epsilon Z$

D) $\pi n, n\epsilon Z$ E) $\frac{\pi}{4}+\pi n,\ n\epsilon Z$

(1996-3-60) $sinx\cdot cos2x+cosx\cdot sin2x=0$ tenglamani yeching.

A) $\frac{\pi}{4}n, n\epsilon Z$ B) $\frac{\pi}{3}n, n\epsilon Z$ C) $\frac{\pi}{2}n, n\epsilon Z$

D) $\frac{\pi}{5}n, n\epsilon Z$ E) $\frac{\pi}{8}n, n\epsilon Z$

(1996-3-11) $tg\left(\frac{\pi}{4}-\alpha\right)=2$ bo‘lsa, $tg\alpha$ ning qiymatini toping.

A) 3 B) -3 C) $\frac{1}{3}$ D)$-\frac{1}{3}$ E)$\frac{1}{2}$

(1996-6-43) $2sinx=-1$ tenglamani yeching.

A)$-\frac{\pi}{6}+2\pi k, k\epsilon Z$ B)$-\frac{\pi}{6}+2\pi k, k\epsilon Z$

C)$(-1)^k\frac{\pi}{6}+\pi k, k\epsilon Z$ D)$\pm\frac{2\pi}{3}+2\pi k, k\epsilon Z$

E)$(-1)^{k+1}\frac{\pi}{6}+\pi k, k\epsilon Z$

(1996-7-58) $5^{1+\log_5 cosx}=2{,}5$ tenglamani yeching.

A) $\frac{\pi}{3}+2\pi n, n\epsilon Z$ B)$\pm\frac{\pi}{6}+2\pi n, n\epsilon Z$ C)$\pm\frac{\pi}{3}+2\pi n, n\epsilon Z$

D)$\frac{\pi}{4}+2\pi n, n\epsilon Z$ E)$\pm\frac{\pi}{4}+2\pi n, n\epsilon Z$

(1996-7-59) $\frac{tgx}{1-cosx}=0$ tenglama $[-\pi;3\pi]$ oraliqda nechta ildizga ega?

A) 7 B) 2 C) 3 D) 5 E) 4

(1996-9-46) $tg\left(\frac{\pi}{4}-\alpha\right)=2$ bo‘lsa, $ctg\alpha$ ning qiymatini toping.

A) 3 B) $\frac{1}{3}$ C)$-\frac{1}{3}$ D) -4 E) -3

(1996-10-28) $sin5x\cdot cos2x=cos5x\cdot sin2x-1$ tenglamaning ildizlarini ko‘rsating.

A) $\pm\frac{\pi}{3}+2\pi k, k\epsilon Z$B)$\frac{\pi}{3}+\frac{2\pi k}{3}, k\epsilon Z$ C)$-\frac{\pi}{6}+\frac{2\pi k}{3}, k\epsilon Z$

D)$\frac{\pi}{4}+\pi k,\ k\epsilon Z$ E)$\frac{\pi}{6}+\pi k,\ k\epsilon Z$

(1996-11-10) $cos2xsin3x+sin2xcos3x=\frac{1}{2}$ tenglamani yeching.

A) $(-1)^n\frac{\pi}{5}+\frac{\pi n}{5}, n\epsilon Z$ B)$(-1)^n\frac{\pi}{30}+\frac{\pi n}{5}, n\epsilon Z$

C)$\frac{\pi n}{4}, n\epsilon Z$ D)$\frac{\pi n}{30}, n\epsilon Z$ E)$\frac{\pi n}{8}, n\epsilon Z$

(1996-11-60) $sin\left(3x-\frac{\pi}{2}\right)=0$ tenglamani yeching.

A) $\frac{\pi n}{3}, n\epsilon Z$ B)$\frac{\pi}{6}+\frac{\pi n}{3}, n\epsilon Z$ C) $3\pi n, n\epsilon Z$

D)$\frac{\pi}{2}+\frac{\pi n}{3}, n\epsilon Z$ E)$\frac{\pi n}{6}, n\epsilon Z$

(1996-12-44) $cos\left(2x-\frac{\pi}{2}\right)=0$ tenglamaning yechimini toping.

A) $\frac{\pi n}{2}, n\epsilon Z$B)$\frac{\pi}{2}$ C) πn D)$\frac{\pi}{2}+\frac{\pi n}{4}, n\epsilon Z$ E)$\frac{\pi}{4}+\frac{\pi n}{2}, n\epsilon Z$

(1996-12-53) $sinxcos3x+cosxsin3x=1$ tenglamani yeching.

A)$\frac{\pi n}{2}, n\epsilon Z$ B)$\frac{\pi}{8}$ C)$\frac{\pi n}{5}, n\epsilon Z$ D)$\frac{\pi n}{4}, n\epsilon Z$ E)$\frac{\pi}{8}+\frac{\pi n}{2}, n\epsilon Z$

(1996-12-97) $sin\frac{x}{2}+cosx-1=0$ tenglamaning $[0;2\pi]$ kesmada nechta ildizi bor?

A) 3 B) 4 C) 0 D) 2 E) 1

(1996-13-43) $4cos\frac{x}{2}+cosx+1=0$ tenglamaning $[0;2\pi]$ kesmada nechta ildizi bor?

A) 1 B) 2 C) 0 D) 3 E) 4

(1997-1-50) $2sin^2x-\sqrt{3}sin2x=0$ tenglamaning $(0°;90°]$ oraliqdagi ildizini toping.

A) 30° B) 45° C) 60° D) 90° E) 75°

(1997-1-60) Agar $tg(x+y)=3$ va $tg(x-y)=2$ bo‘lsa, $tg2x$ ni hisoblang.

A) 5 B) 2,5 C) 1 D) -1 E) -5

(1997-2-43) $2cosx=-\sqrt{3}$ tenglamani yeching.

A) $\pm\frac{\pi}{6}+\pi k, k\epsilon Z$ B) $(-1)^k\frac{\pi}{3}+\pi k, k\epsilon Z$

C) $\pm\frac{5\pi}{6}+2\pi k, k\epsilon Z$ D) $\pm\frac{\pi}{4}+2\pi k, k\epsilon Z$

E) $\pm\frac{3\pi}{4}+2\pi k, k\epsilon Z$

(1997-4-40) $cosx=\frac{\sqrt{2}}{2}$ tenglamaning $(0;2\pi)$ oraliqqa tegishli yechimlarini toping.

A) $\frac{3\pi}{4};\ \frac{5\pi}{4}$ B)$\frac{\pi}{4};\ \frac{7\pi}{4}$ C)$\frac{3\pi}{4};\ \frac{7\pi}{4}$ D)$\frac{5\pi}{4};\ \frac{7\pi}{6}$ E)$\frac{3\pi}{6};\ \frac{5\pi}{4}$

(1997-4-42) k ning quyida ko‘rsatilgan qiymatlaridan qaysi birida $sinkxcosx-sinxcoskx=0$ tenglamaning ildizlari $\frac{3\pi}{4}(n\epsilon Z)$ bo‘ladi?

A) 5 B) 4 C) 6 D) 7 E) 8

(1998-8-42) $tgxcosx=0$ tenglamani yeching.

A) $2\pi k, k\epsilon Z$ B) $\pi k, k\epsilon Z$ C)$\frac{\pi}{4}+\pi k;\ \frac{\pi}{2}+2\pi k, k\epsilon Z$

D)$\frac{\pi}{2}+\pi k, k\epsilon Z$ E)$\frac{\pi}{2}+2\pi k, k\epsilon Z$

(1997-7-59) $\frac{sin^2x+sinx}{cosx}=0$ tenglama $[0;4\pi]$ oraliqda nechta ildizga ega?

A) 5 B) 4 C) 7 D) 2 E) 6

(1997-6-61) $sinx+cosx=1$ tenglamaning $[-\pi;\pi]$ oraliqda nechta ildizi bor?

A) 0 B) 1 C) 2 D) 3 E) 4

(1997-6-45) $2sin^2x+5sin(1{,}5\pi-x)=2$ tenglamani yeching.

A) $\frac{\pi}{2}+\pi n, n\epsilon Z$ B)$(-1)^2\frac{\pi}{6}+\pi n, n\epsilon Z$ C)$\frac{\pi}{2}+2\pi n, n\epsilon Z$

D) $\pi n, n\epsilon Z$ E)$\pm\ \frac{\pi}{3}+2\pi n, n\epsilon Z$

(1997-6-50) $(3sin\pi x-\pi)(2cos\pi x-1)=0$ tenglamaning $[0;3]$oraliqda nechta ildizi bor?

A) 1 B) 2 C) 3 D) 4 E) cheksiz ko‘p

(1997-6-49) $cos2x\cdot sinx-cos2x=0$ tenglamaning $(90°;180°]$ oraliqdagi ildizini toping.

A) $120°$ B) $135°$ C) $150°$ D) $180°$ E)$\emptyset$

(1997-9-32) $sin^{1993}x+cos^{1993}x=1$ tenglamaning yeching.

A) $\pi n;\ \frac{\pi}{3}+2\pi n, n\epsilon Z$ B) $2\pi n;\ \frac{\pi}{2}+2\pi n, n\epsilon Z$

C) $2\pi n, n\epsilon Z$ D) $\pi n, n\epsilon Z$ E)$\frac{\pi}{2}+2\pi n, n\epsilon Z$

(1997-9-100) $cosx=-\frac{\sqrt{2}}{2}$ tenglamaning $(0;2\pi)$ oraliqqa tegishli yechimlarini toping.

A) $\frac{3\pi}{4};\frac{7\pi}{4}$ B)$\frac{3\pi}{4};\frac{5\pi}{4}$ C)$\frac{\pi}{4};\frac{5\pi}{4}$ D)$\frac{\pi}{4};\frac{3\pi}{4}$ E)$\frac{5\pi}{4};\frac{7\pi}{4}$

(1997-9-102) k ning quyida ko‘rsatilgan qiymatlaridan qaysi birida $coskx\cdot cos4x-sinkx\cdot sin4x=\frac{\sqrt{3}}{2}$ tenglamaning ildizlari $\pm\frac{\pi}{60}+\frac{\pi n}{5}$ $(n\epsilon Z)$ bo‘ladi?

A) 2 B) 3 C) 4 D) 5 E) 6

(1997-11-44) Agar $cos\alpha=-\frac{1}{2}$ va $\pi<\alpha<1{,}5\pi$ bo‘lsa, $cos\left(\frac{\pi}{2}+\frac{\alpha}{2}\right)$ ni toping.

A) $-\frac{\sqrt{2}}{2}$ B)$\frac{1}{2}$ C)$-\frac{1}{2}$ D)$\frac{\sqrt{3}}{2}$ E)$-\frac{\sqrt{3}}{2}$

(1997-11-45) $2sin^2(\pi-x)+5sin(1{,}5\pi+x)=2$ tenglamani yeching.

A) $\pi n, n\epsilon Z$ B)$\frac{\pi}{2}+\pi n, n\epsilon Z$ C)$\frac{\pi}{2}+2\pi n, n\epsilon Z$

D)$(-1)^n\frac{\pi}{6}+\pi n, n\epsilon Z$ E)$\pm\frac{\pi}{3}+2\pi n, n\epsilon Z$

(1997-12-63) $cosx - sin2xcosx = 0$ tenglamaning $[0°; 60°]$ oraliqdagi ildizini toping.

A) $0°$ B) $30°$ C) $45°$ D) $15°$ E) $60°$

(1997-12-65) $\frac{cos^2x - cosx}{sinx} = 0$ tenglamaning $[-2\pi; 2\pi]$ oraliqda nechta ildizga ega?

A) 6 B) 4 C) 3 D) 2 E) 1

(1997-12-42) $2sinx = -\sqrt{3}$ tenglamani yeching.

A) $x = (-1)^k \frac{\pi}{3} + \pi k, k\epsilon Z$ B) $x = \pm\frac{\pi}{3} + 2\pi k, k\epsilon Z$

C) $x = (-1)^k \frac{\pi}{6} + \pi k, k\epsilon Z$ D) $x = (-1)^{k+1} \frac{\pi}{3} + \pi k, k\epsilon Z$

E) $x = (-1)^{k+1} \frac{\pi}{3} + 2\pi k, k\epsilon Z$

(1997-10-57) $x = cos\frac{10\pi}{7}$, $y = cos\frac{6\pi}{7}$ va $z = sin\frac{5\pi}{7}$. x, y va z uchun quyidagi munosabatlardan qaysi biri o‘rinli?

A) $x < y < z$ B) $y < x < z$ C) $x < z < y$

D) $y < z < x$ E) $z < y < x$

(1996-11-56) Agar $tg\alpha \cdot cos\alpha > 0$ bo‘lsa, α burchak qaysi chorakka tegishli?

A) *II yoki III* B) *III yoki IV* C) *I yoki II*

D) *I yoki III* E) *I yoki IV*

(1996-13-26) $cos^2x - \frac{5}{2}cosx + 1 \leq 0$ tengsizlik $x(x\epsilon[0; 2\pi])$ ning qanday qiymatlarida o‘rinli?

A) $[0;\frac{\pi}{3}] \cup [\frac{5\pi}{3}; 2\pi]$ B) $[0;\frac{\pi}{3}]$

C)$[\frac{5\pi}{3}; 2\pi]$ D)$[\frac{\pi}{3};\frac{\pi}{2}] \cup [\frac{3\pi}{2};\frac{5\pi}{3}]$ E) $[\frac{\pi}{3};\frac{5\pi}{3}]$

(1996-12-58) Agar $sin\alpha \cdot cos\alpha > 0$ bo‘lsa, α burchak qaysi chorakka tegishli?

A) $I\ yoki\ II$ B) $I\ yoki\ III$ C) $I\ yoki\ IV$
D) $II\ yoki\ IV$ E) $III\ yoki\ IV$

(1997-5-34) $y = 2^x - 1$ funksiyaning $x = 1$ nuqtadagi hosilasi qiymatini hisoblang.

A) 1 B) ln 2 C) $\ln\frac{4}{e}$ D) ln 4 E) 2

(1997-10-55) Agar $f(x) = \frac{1}{3}x^3 - 16x$ bo‘lsa, $f'(4)$ ni toping.

A) 1 B) 2 C) 3 D) -1 E) 0

(1997-10-28) Agar $f(x) = 3cos2x - sin2x$ bo‘lsa, $f'\left(\frac{\pi}{8}\right)$ ni hisoblang.

A) $-4\sqrt{2}$ B)$\sqrt{2}$ C) $2\sqrt{2}$ D) $4\sqrt{3}$ E) $4\sqrt{2}$

(1997-12-67) $f(x) = 0{,}5tg2x.$ $f'\left(\frac{\pi}{6}\right)$ ni hisoblang.

A) $\frac{4}{3}$ B)$-\frac{1}{4}$ C) 4 D) 2 E) $-\frac{1}{2}$

(1997-7-28) Agar $f(x) = 2sinx - 4\sqrt{3}cosx$ bo‘lsa, $f'\left(\frac{\pi}{3}\right)$ ni hisoblang.

A) 7 B) -5 C)$2 + 4\sqrt{3}$ D)$2\sqrt{3} - 2$ E) 5

(1997-6-48) $g(x) = \frac{1}{3}ctg3x.$ $g'\left(\frac{\pi}{18}\right)$ ni hisoblang.

A) -2 B) $\frac{4}{3}$ C) 4 D) $-\frac{1}{4}$ E) -4

(1997-9-31) $y = \sin(cosx)$ funksiyaning hosilasini toping.

A) $sinx \cdot \sin(cosx)$ B) $cosx \cdot \sin(cosx)$
C)$-sinx \cdot \cos(cosx)$ D)$-cosx \cdot \sin(cosx)$
E) $cosx \cdot \cos(sinx)$

(1996-10-30) Agar $f(x) = 2 \cdot 3^x$ bo‘lsa, $f'(0)$ ni toping.

A) -1 B) 2 C) -2 D) 3 E) 0

(1996-10-32) $f(x) = x^3 - 12x + 7$ bo‘lsa, $\frac{f'(x)}{x-4} \leq 0$ tengsizlikning eng katta butun yechimini toping.

(1996-6-56) Agar $f(x) = \ln sinx$ bo‘lsa, $f'\left(\frac{\pi}{6}\right)$ ni toping.

A) $-\sqrt{3}$ B) $\frac{\sqrt{3}}{3}$ C) $\sqrt{3}$ D) $-\frac{\sqrt{3}}{3}$ E) 1

(1996-7-28) Agar $f(x) = 5sinx + 3cosx$ bo‘lsa, $f'\left(\frac{\pi}{4}\right)$ ni toping.

A) $-\sqrt{2}$ B) $\sqrt{2}$ C) $-2\sqrt{3}$ D) $4\sqrt{2}$ E) $4\sqrt{3}$

(1996-9-14) To‘g‘ri chiziq bo‘ylab $x(t) = -\frac{1}{3}t^3 + \frac{3}{2}t^2 + 4t$ qonun bo‘yicha harakatlanayotgan moddiy nuqta harakat boshlangandan necha sekund keyin to‘xtaydi?

A) 5 B) 3 C) 2 D) 4 E) 6

(1996-9-22) $f(x) = \frac{x^2}{x^2-1}$, $f'(-2) - ?$

A) 2 B) -4 C) 3 D) -2 E) 1

(1996-11-30) $y = cos(x^2 + 3)$ funksiyaning hosilasini toping.

A) $-3xsin(x^2 + 3)$ B) $-sin(2x + 3)$ C) $cos(2x + 3)$
D) $2xsin(x^2 + 3)$ E) $-2xsin(x^2 + 3)$

(1996-11-34) $f(x) = \ln(x^2 - 3cosx)$ funksiyaning hosilasini toping.

A) $x^2 - 3cosx$ B) $\frac{2x+3sinx}{x^2-3sinx}$ C) $\frac{2x+3sinx}{x^2-3cosx}$
D) $\frac{2x+3cosx}{x^2-3cosx}$ E) $\frac{2x-3cosx}{x^2-3cosx}$

(1996-11-35) $f(x) = e^{sin3x}$ funksiyaning hosilasini toping.

A) $3cos3x \cdot e^{sinx}$ B) $cos3x \cdot e^{sinx-1}$ C) $3cos3x \cdot e^{cosx}$
D) $cos3x \cdot e^{sinx}$ E) $3cos3x \cdot e^{sinx}$

(1996-12-30) $y = sin(x^3 - 5)$ funksiyaning hosilasini toping.

A) $-3x^2cos(x^3-5)$ B) $3x^2cos(x^3-5)$
C) $3x^2cos(x^3-5)$ D) $cos(3x^2-5)$
E) $3x^2sin(x^3-5)$

(1996-12-34) $f(x)=\ln(x^2+3sinx)$ funksiyaning hosilasini toping.

A)$\frac{3}{x^2+3sinx}$ B)$\frac{2x+3sinx}{x^2+3sinx}$ C)$\frac{2x+3cosx}{x^2+3sinx}$
D)$\frac{2x-3cosx}{x^2+3sinx}$ E)$\frac{2x}{x^2+3sinx}$

(1997-1-49) $f(x)=-\frac{1}{3}tg3x.$ $f'\left(\frac{\pi}{9}\right)$ ni toping.

A) $\frac{1}{4}$ B) $-\frac{1}{2}$ C) $-\frac{1}{4}$ D) 2 E)-4

(1996-12-36) $f(x)=e^{cos2x}$ funksiyaning hosilasini toping.

A) $2sin2xe^{cos2x}$ B) $2sin2xe^{cos2x-1}$
C) $-2sin2xe^{-sin2x}$ D)$-2sin2xe^{cos2x}$
E) $2sin2xe^{2sin2x}$

(1996-12-79) $f(x)=\frac{x}{x+1}$, $f'(-2)-?$

A) -1 B) -2 C) 1 D) 2 E) 4

(1996-12-81) To‘g‘ri chiziq bo‘ylab $x(t)=-t^3+3t^2+9t$ qonun bo‘yicha harakatlanayotgan moddiy nuqta harakat boshlangandan necha sekund keyin to‘xtaydi?

A) 1 B) 2 C) 3 D) 4 E) 5

(1996-13-22) $f(x)=\frac{x^2}{x^2+1}, f'(1)-?$

A) $-\frac{1}{2}$ B)$\frac{1}{2}$ C)$\frac{2}{3}$ D) $-\frac{2}{3}$ E)$\frac{1}{3}$

(196-13-24) To‘g‘ri chiziq bo‘ylab $x(t)=-\frac{1}{3}t^3+\frac{1}{2}t^2+6t$ qonun bo‘yicha harakatlanayotgan moddiy nuqta harakat boshlangandan necha sekud keyin to‘xtaydi?

A) 2 B) 1 C) 4 D) 5 E) 3

(1996-3-31) $2sin3x$ funksiya uchun boshlang‘ich funksiyaning umumiy ko‘rinishini toping.

A) $-\frac{2}{3}cos3x+C$ B) $\frac{2}{3}cos3x+C$ C) $-\frac{3}{2}sin2x+C$

D) $\frac{3}{2}sin2x+C$ E) $\frac{2}{3}sin2x+C$

(1996-9-24) $f(x)=-x+\frac{x^2}{2}$ funksiyaning $(6;0)$ nuqtadan o‘tuvchi boshlang‘ich funksiyasini toping.

A) $-1+x-5$ B) $-\frac{x^2}{2}+\frac{x^3}{6}-18$

C) $-1+x+5$ D) $-\frac{x^2}{2}+\frac{x^3}{6}+18$

E) $(6;0)$ nuqtadan o‘tuvchi boshlang‘ich funksiya yo‘q

(1996-9-82) $\int_0^4 sin2xdx$ ni hisoblang.

A) $\frac{1}{2}$ B) -1 C) $-\frac{1}{2}$ D) 7 E) $\sqrt{2}$

(1996-9-83) $f(x)=1+\frac{1}{cos^2 4x}$ funksiya boshlang‘ich funksiyasining umumiy ko‘rinishini toping.

A) $x-\frac{1}{4}xctgx+C$ B) $x+\frac{1}{4}tgx+C$

C) $x+\frac{1}{4}tg4x+C$ D) $tg4x+C$ E) $x+\frac{1}{4}ctg4x+C$

(1996-10-33) $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} cos2xdx$ ni hisoblang.

A) $\frac{1}{2}$ B) $-\frac{\sqrt{3}}{4}$ C) 0 D) $\frac{\sqrt{3}}{4}$ E) $-\frac{1}{4}$

(1996-10-34) $f(x)=1+\frac{1}{sin^2 4x}$ funksiya boshlang‘ich funksiyasining umumiy ko‘rinishini toping.

A) $x-\frac{1}{4}ctg4x+C$ B) $x+\frac{1}{4}tg4x+C$

C) $x-ctg4x+C$ D) $x+\frac{1}{4}ctgx+C$

E) $x+\frac{1}{4}ctg4x+C$

(1996-11-32) $3sin2x$ funksiya uchun boshlang‘ich funksiyaning umumiy ko‘rinishini ko‘rsating.

A) $-\frac{3}{2}\cdot cos2x+C$ B) $-\frac{2}{3}\cdot cos2x+C$ C) $\frac{3}{2}\cdot sin2x+C$

D) $-\frac{3}{2}\cdot sin2x+C$ E) $\frac{2}{3}\cdot cos2x+C$

(1996-12-32) $2cos3x$ funksiya uchun boshlang‘ich funksiyaning umumiy ko‘rinishini ko‘rsating.

A) $\frac{3}{2}\cdot sin3x+C$ B) $-\frac{3}{2}\cdot sin3x+C$ C) $\frac{2}{3}\cdot sin3x+C$

D) $-\frac{2}{3}\cdot cos3x+C$ E) $\frac{2}{3}\cdot cos3x+C$

(1996-12-82) $f(x)=x^2$ funksiyaning $(3;2)$ nuqtadan o‘tuvchi boshlang‘ich funksiyasini toping.

A) $\frac{x^3}{3}+7$ B) $\frac{x^3}{3}-7$ C) $2x-4$ D) $2x+4$

E) bu nuqtadan o‘tuvchi boshlang‘ich funksiya yo‘q

(1996-13-25) $f(x)=x-\frac{x^2}{2}$ funksiyaning $(6;0)$ nuqtadan o‘tuvchi boshlang‘ich funksiyasini toping.

A) $1-x+5$ B) $\frac{x^2}{2}-\frac{x^3}{6}-18$

C) $1-x-5$ D) $\frac{x^2}{2}-\frac{x^3}{6}+18$

E) $(6;0)$ nuqtadan o‘tuvchi boshlang‘ich funksiya yo‘q

(1996-3-35) Quyidagi funksiyalardan qaysi biri $y'=2y$ tenglamaning yechimini toping.

A) $C\frac{e^x}{2}$ B) Ce^{2x} C) $Ce^{\frac{x}{2}}$ D) $2e^x$ E) e^x

(1996-12-37) Quyidagi funksiyalardan qaysi biri $y'=3y$ tenglamaning yechimini toping.

A) $C\frac{e^x}{3}$ B)$Ce^{\frac{x}{3}}$ C)$3e^x$ D) e^x E) Ce^{3x}

(1997-11-22) $\int_0^{\frac{\pi}{2}} sin5xdx$ ni hisoblang.

A) $\frac{1}{5}$ B) $-\frac{2}{5}$ C) 1 D) -1 E) 0

(1997-10-31) $\int_{-1}^{0}(1+3x)^2dx$ ni hisoblang.

A) 1 B) -1 C)$\frac{7}{9}$ D)$-\frac{1}{3}$ E)$\frac{2}{3}$

(1997-1-22) $\int_{-\frac{\pi}{2}}^{0} cos3xdx$ ni hisoblang.

A) $\frac{1}{3}$ B) 0 C)$-\frac{1}{3}$ D)$\frac{2}{3}$ E)$-\frac{1}{2}$

(1997-1-23) Agar $F'(x)=x+2$ va $F(2)=2$ bo‘lsa, $F(x)$ funksiyani aniqlang.

A) $F(x)=\frac{1}{2}x^2+2x+2$ B) $F(x)=\frac{1}{2}x^2+2x-4$

C) $F(x)=2x^2+2x-10$ D) $F(x)=x^2+x-2$

E) $F(x)=x^2+2x-6$

(1997-2-47) $F(x)=3tgx+5x+c$ quyidagi funksiylardan qaysi birining boshlang‘ich funksiyasi?

A)$y=-\frac{3}{sin^2x}+5$ B)$y=\frac{3}{sin^2x}+5$ C)$y=3ctgx+c$

D) $y=-\frac{3}{cos^2x}+5$ E) $y=\frac{3}{cos^2x}+5$

(1997-2-48) Agar $y=F(x)$ funksiya $y=f(x)$ funksiyaning boshlang‘ich funksiyasi bo‘lsa, $y=f\left(\frac{x}{2}\right)$ funksiyaning boshlang‘ich funksiyasini toping.

A) $y=F\left(\frac{x}{2}\right)$ B) $y=\frac{1}{2}F\left(\frac{x}{2}\right)$ C) $y=2F\left(\frac{x}{2}\right)$

D) $y=2F(x)$ E) $y=\frac{1}{2}F(x)$

(1997-3-31) $\int_0^1 (3x-1)^2 dx$ ni hisoblang.

A) 3 B) 1 C) $-\frac{1}{3}$ D) $\frac{7}{9}$ E) $2\frac{1}{3}$

(1997-4-31) Agar $F'(x) = cosx + 2x$ va $F\left(\frac{\pi}{2}\right) = 3$ bo‘lsa, $F(x)$ ni toping.

A) $F(x) = -sinx + x^2 + 2$ B) $F(x) = sinx + \frac{1}{2}x + \frac{\pi^2}{4}$

C) $F(x) = sinx + \frac{1}{2}x^2 + 2 - \frac{\pi^2}{4}$

D) $F(x) = sinx + x^2 + 2 - \frac{\pi^2}{4}$

E) $F(x) = sinx + x^2 + 1 - \frac{\pi^2}{4}$

(1997-8-48) Agar $y = F(x)$ funksiya $y = f(x)$ funksiya uchun boshlang‘ich funksiya bo‘lsa, $y = 2f(-2x)$funksiyaning boshlang‘ich funksiyasini toping.

A) $y = -2F(-2x)$ B) $y = -F(-2x)$

C) $y = -\frac{1}{2}F(-2x)$ D) $y = F(-2x)$ E) $y = 2F(-2x)$

(1997-8-49) $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} (1 + ctg^2 x)\, dx$ ni hisoblang.

A) $\frac{\sqrt{3}}{3}$ B) 1 C) $\sqrt{3} - 1$ D) -1 E) $\frac{\sqrt{3}}{3} - 1$

(1997-6-93) $\int_{-2}^{3} |3 - x| dx$ ni hisoblang.

A) 9 B) 8 C) 4 D) 16 E) 12,5

(1997-8-47) $F(x) = ctgx - 2x + c$ quyidagi funksiylardan qaysi birining boshlang‘ich funksiyasi?

A) $f(x) = \frac{1}{sin^2 x} - 2$ B) $f(x) = \frac{1}{cos^2 x} - 2$

C) $f(x) = -\frac{1}{cos^2 x} - 2$ D) $f(x) = \frac{1}{sin^2 x} + 2$

E) $f(x) = -\frac{1}{sin^2x} - 2$

(1997-7-31) $\int_{-1}^{0}(2x+1)^2dx$ ni hisoblang.

A) $\frac{1}{6}$ B) $\frac{2}{3}$ C) 1 D) $\frac{1}{3}$ E) -1

(1997-6-22) $\int_{\frac{\pi}{4}}^{-\frac{\pi}{4}} cos2xdx$ ni hisoblang.

A) 0 B) -2 C) -1 D) $\sqrt{2}$ E) $-2\sqrt{2}$

(1997-6-23) Agar $F'(x) = 2x - 1$ va $F(1) = 2$ bo‘lsa, $F(x)$ funksiyani aniqlang.

A) $F(x) = 3x^2 - 3x + 2$ B) $F(x) = x^2 - x + 2$

C) $F(x) = x^2 + x$ D) $F(x) = \frac{1}{2}x^2 - x + 2\frac{1}{2}$

E) $F(x) = 2x^2 - x + 1$

(1997-10-32) Quyidagilardan qaysi biri $f(x) = sin2x \cdot cosx$ boshlang‘ich funksiyasining umumiy ko‘rinishini?

A) $-\frac{1}{2}cos2x \cdot sinx + C$ B) $\frac{1}{6}cos3x + \frac{1}{2}cosx + C$

C) $-\frac{1}{6}cos6x - \frac{1}{6}cosx + C$ D) $\frac{1}{2}cos2x \cdot sinx + C$

E) $-\frac{1}{2}cos2x - \frac{1}{6}cos3x + C$

(1997-12-46) $F(x) = -2ctgx - 3x + c$ funksiya quyidagi funksiyalardan qaysi birining boshlang‘ich funksiyasi bo‘ladi?

A) $f(x) = -\frac{2}{sin^2x} + 3$ B) $f(x) = \frac{2}{cos^2x} - 3$

C) $f(x) = \frac{2}{sin^2x} - 3$ D) $f(x) = -\frac{2}{cos^2x} + 3$

E) $f(x) = -\frac{2}{sin^2x} - 3$

(1997-12-47) Agar $y = F(x)$ funksiya $y = f(x)$ funksiya uchun boshlang‘ich funksiya bo‘lsa, $y = -2f(-2x)$funksiyaning boshlang‘ich funksiyasini toping.

A) $y = -F(-2x)$ B) $y = 2F(-2x)$

C) $y = -2F(-2x)$ D) $y = F(-2x)$ E) $y = F(-x)$

(1996-11-33) $y = x^2, y = 0$ va $x = -2$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.

A) $2\frac{2}{3}$ B) $2\frac{1}{3}$ C) $2\frac{5}{6}$ D) 2 E) $2\frac{3}{4}$

(1996-12-33) $y = x^3, y = 0$ va $x = 2$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.

A) 8 B) 4 C) $\frac{1}{2}$ D) $2\frac{2}{3}$ E) 16

(1997-4-32) $y = \sqrt{x}, y = 0$ va $x = 4$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.

A) $5\frac{1}{3}$ B) $5\frac{2}{3}$ C) $6\frac{1}{4}$ D) 5 E) $6\frac{3}{4}$

(1997-5-36) $y = \frac{1}{\sqrt{x}}, y = 0,\ x = 1$ va $x = 4$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.

A) 5 B) 2 C) 3 D) 1 E) 4

(1997-9-92) $y = x^2$ va $y = 2x$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.

A) $1\frac{1}{3}$ B) 1 C) $1\frac{1}{4}$ D) $1\frac{1}{2}$ E) $\frac{2}{3}$

(1996-11-55) $y = |x + 1|,\ x = -3,\ x = 0$ va $y = 0$ chiziqlar bilan chegaralangan figurani absissalar o‘qi atrofida aylanishdan hosil bo‘lgan jismning hajmini toping.

A) 2π B) 3π C) π D) 4π E) 5π

(1996-12-57)) $y = |x - 1|,\ x = -1,\ x = 2$ va $y = 0$ chiziqlar bilan chegaralangan figurani absissalar o‘qi atrofida aylanishdan hosil bo‘lgan jismning hajmini toping.

A) 2π B) 3π C) π D) 4π E) 5π

(1996-11-3) Kater va teplaxod bir-biriga tomon harakatlanmoqda. Ular orasidagi masofa 120 km. Teplaxodning tezligi 50 km/soat. Katerning tezligi teplaxodning tezligidan 60 % kam. Ular necha soatdan keyin uchrashadi?

A) $1\frac{5}{7}$ B) 2 C) $2\frac{1}{4}$ D) $2\frac{1}{3}$ E) $2\frac{1}{5}$

(1996-12-3) Mototsiklchi va velosipedchi bir-biriga tomon harakatlanmoqda. Ular orasidagi masofa 26 km. Velosipedchining tezligi 20 km/soat. Mototsiklchining tezligi velosipedchining tezligidan 60% ortiq. Ular necha soatdan keyin uchrashadi?

A) 3 B) $2\frac{1}{2}$ C) 2 D) $1\frac{1}{2}$ E) $\frac{1}{2}$

(1996-12-67) Uzunligi 600m bo‘lgan poezd uzunligi 1200 m bo‘lgan tuneldan 60 s da o‘tib ketdi. Poezdning tezligini toping.

A) $35\frac{m}{s}$ B) $40\frac{m}{s}$ C) $25\frac{m}{s}$ D) $30\frac{m}{s}$ E) $20\frac{m}{s}$

(1996-13-9) Uzunligi 400m bo‘lgan poezd uzunligi 800 m bo‘lgan tuneldan 60 s da o‘tib ketdi. Poezdning tezligini toping.

A) $22\frac{m}{s}$ B) $30\frac{m}{s}$ C) $15\frac{m}{s}$ D) $25\frac{m}{s}$ E) $20\frac{m}{s}$

(1997-3-10) Velosipedchi bir soatda butun yo‘lning 0,65 qismini o‘tdi, bu esa yo‘lning yarmidan 7,5 km ko‘p. Butun yo‘lning uzunligini toping.

A) 47,5 km B) 62,5 km C) 50 km
D) 65 km E) 42,5 km

(1997-5-8) Chumoli 5 minutda $15\frac{5}{6}$ m yuradi. U 1 minutda necha metr yuradi?

A) $3\frac{5}{6}$ B) $15\frac{1}{6}$ C) $3\frac{1}{6}$ D) 3 E) 4

(1997-9-11) Avtomashina bakiga 70 litr benzin quyildi. Gulistonga borish uchun benzinning $\frac{2}{5}$ qismi, Chimyonga borish uchun esa $\frac{3}{7}$ qismi sarflandi. Bakda necha litr benzin qolgan?

A) 13 B) 15 C) 18 D) 20 E) 12

(1996-11-43) P(-3;0) nuqtani koordinata boshi atrofida $90°$ ga burganda hosil bo‘ladigan nuqtaning koordinatalarini toping.

A) (3;0) B) (0;-3) C) (3;3) D) (0;3) E) (3;-3)

(1996-12-45) P(0;3) nuqtani koordinata boshi atrofida $90°$ ga burganda hosil bo‘ladigan nuqtaning koordinatalarini toping.

A) (3;0) B) (0;-3) C) (-3;0) D) (3;3) E) (3;-3)

(1996-12-11) Oxy tekisligiga nisbatan (1;2;3) nuqtaga simmetrik bo‘lgan nuqtani toping.

A) (-1;2;3) B) (-1;-2;3) C) (1;2;-3)
D) (1;-2;3) E) (-1;-2;-3)

(1996-13-48) Oxz tekisligiga nisbatan (1;2;3) nuqtaga simmetrik bo‘lgan nuqtani toping.

A) (-1;2;3) B) (-1;-2;3) C) (1;2;-3)
D) (1;-2;3) E) (-1;-2;-3)

(1997-1-40) Quyidagilardan qaysi biri xz tekisligiga nisbatan K(2;4;-5) nuqtaga simmetrik bo‘lgan nuqta?

A) (-2;4;5) B) (2;-4;5) C) (2;-4;-5)
D) (-2;-4;5) E) (-2;4;-5)

(1996-9-87) Har qanday uchtasi bir to‘g‘ri chiziqda yotmaydigan 9 ta nuqta berilgan. Shu 9 ta nuqtalar orqali nechta turli to‘g‘ri chiziqlar o‘tkazish mumkin?

A) 9 B) 18 C) 72 D) 36 E) 24

(1996-10-38) Har qanday uchtasi bir to‘g‘ri chiziqda yotmaydigan 6 ta nuqta berilgan. Shu 7 ta nuqtalar orqali nechta turlicha to‘g‘ri chiziqlar o‘tkazish mumkin?

A) 6 B) 12 C) 10 D) 16 E) 15

(1997-6-40) Quyidagilardan qaysi biri yz tekislikka nisbatan P(3;-2;4) nuqtaga simmetrik bo‘lgan nuqta?

A) (3;2;4) B) (3;2;-4) C) (-3;2;-4)
D) (3;-2;-4) E) (-3;-2;4)

(1997-11-40) Quyidagilardan qaysi biri xy tekislikka nisbatan M(7;-3;1) nuqtaga simmetrik bo‘lgan nuqta?

A) (-7;3;1) B) (-7;3;-1) C) (7;3;-1)
D) (7;-3;-1) E) (-7;-3;-1)

(1997-2-57) Asoslarining yuzlari $S_1 > S_2 > S_3 > S_4$ shartni qanoatlantiradigan tengdosh prizmalarning balandliklari h_1, h_2, h_3 va h_4 quyidagi munosabatlardan qaysi birini qanoatlantiradi?

A) $h_1 > h_2 > h_3 > h_4$ B) $h_4 < h_3 < h_1 < h_2$
C) $h_4 > h_3 > h_2 > h_1$ D) $h_1 > h_4 > h_3 > h_2$
E) $h_4 > h_2 > h_1 > h_3$

Pirnazar DAVRONOV

(1996-7-26) Quyidagi funksiyalardan qaysi biri juft?

A) $g(x)=\frac{5x^3}{(x-3)^2}$ B) $g(x)=\frac{x(x-2)\cdot(x-4)}{x^2-6x+8}$

C) $g(x)=\frac{9x^2}{x^2-25}$ D) $g(x)=x^2+|x+1|$

E) $g(x)=\frac{x^4-2x^2}{3x}$

(1997-2-41) Quyidagi funksiyalardan qaysi biri juft?

A) $f(x)=sinx+x^3$ B) $f(x)=cosxtgx$

C) $f(x)=x^2ctgx$ D) $f(x)=\frac{x^4+x^2}{cosx}$

E) $f(x)=x^3+\frac{3}{x^3}$

(1997-3-26) Quyidagi funksiyalardan qaysi biri toq?

A) $y=\frac{5x^3}{(x-3)^2}$ B) $y=\frac{x(x-4)(x-2)}{x^2-6x+8}$ C) $y=\frac{9x^2}{x^2-25}$

D) $y=|x+1|+x^2$ E) $y=\frac{x^4-2x^2}{3x}$

(1997-4-17) k ning qanday butun musbat qiymatlarida $y=(sinx)^{5k+4}$ funksiya juft bo‘ladi?

A) toq qiymatlarida B) juft qiymatlarida

C) 5 ga karrali qiymatlarida D) barcha qiymatlarida

E) 4 ga karrali qiymatida

(1997-8-41) Quyidagi funksiyalardan qaysi biri toq?

A) $f(x)=\frac{tgx}{cosx}-x^3$ B) $f(x)=\frac{sin^2x}{ctg^2x}$ C) $f(x)=tg^4x$

D) $f(x)=\frac{cosx}{x^4}$ E) $f(x)=(1-sinx)^2$

(1997-8-32) Quyidagi sonlardan qaysi biri musbat?

A) $\frac{ctg187^\circ}{sin316^\circ}$ B) $\frac{cos340^\circ}{sin185^\circ}$ C) $\frac{sin148^\circ}{cos317^\circ}$

D) $\frac{ctg105^\circ}{tg185^\circ}$ E) $\frac{tg215^\circ}{cos125^\circ}$

(1997-7-26) Quyidagilardan qaysi biri juft funksiya?

A) $y=\frac{(x-8)^2}{3}$ B) $y=2x|x|+5$ C) $y=\frac{x^4+x^2+1}{2}$

D) $y=\frac{7x}{x^2-9}$ E) $y=|x-3|+5x^2$

(1997-9-77) k ning qanday butun musbat qiymatlarida $y=(ctgx)^{3k+2}$ funksiya juft ham, toq ham bo‘lmaydi?

A) 2 ga karrali qiymatlarida B) 5 ga karrali qiymatlarida

C) toq qiymatlarida D) juft qiymatlarida

E) hech qanday butun qiymatida

(1997-10-26) Quyidagilardan qaysi biri toq funksiya?

A) $y=\frac{7x}{x+3}$ B) $y=\frac{3x^4+x^2}{8}$ C) $y=|x+3|-6x$

D) $y=\frac{2x}{x^2-9}$ E) $y=\frac{x(x-8)}{5x+3}$

(1997-12-40) Quyidagilardan qaysi biri toq funksiya?

A) $y=\frac{cos5x+1}{|x|}$ B) $y=\frac{sin^2x}{x^2-1}$ C) $y=\frac{cosx^2}{x(x^2-1)}$

D) $y=\frac{sin\frac{x}{2}}{x^3}$ E) $y=x^4cosx$

(1996-6-42) Quyidagi funksiyalardan qaysi birining eng kichik davri 2π ga teng?

A) $y=\frac{2tgx}{1-tg^2x}$ B) $y=sin\frac{x}{2}\cdot cos\frac{x}{2}$ C) $y=1-cos^2x$

D) $y=sin^2x-cos^2x$ E) $y=ctg2xsin2x$

(1996-12-105) $y=tg\frac{x}{3}-2sinx+3cos2x$ funksiyaning eng kichik davrini toping.

A) 6π B) 3π C) 4π D) 9π E) 2π

(1996-13-14) $y=tg\frac{x}{3}+tg\frac{x}{2}$ funksiyaning eng kichik davrini toping.

A) 6π B) 2π C) 3π D) 12π E) 5π

(1997-2-42) Quyidagi funksiyalardan qaysi birining eng kichik davri $\frac{\pi}{2}$ ga teng?

A) $y = cosxsinx$ B) $y = 1 + cos2x$

C) $y = 2sin\frac{x}{2}cos\frac{x}{2}$ D) $y = \frac{1-tg^2x}{2tgx}$ E) $y = tgxcosx$

(1997-4-38) $y = \cos(8x + 1)$, $y = \sin(4x + 3)$, $y = tg8x$ va $y = tg(2x + 4)$ funksiyalar uchun eng kichik davrni toping.

A) 2π B) π C) $\frac{\pi}{2}$ D) $\frac{\pi}{4}$ E) $\frac{\pi}{6}$

(1997-8-43) Quyidagi funksiyalardan qaysi birining eng kichik davri π ga teng?

A) $f(x) = \frac{tgx}{1-tg^2x}$ B) $f(x) = sin\frac{x}{2}cos\frac{x}{2}$

C) $f(x) = ctgxsinx$ D) $f(x) = -sin^2x + cos^2x$

E) $f(x) = x - cos^4x$

(1997-9-98) $y = tg3x$, $ctg6x$, $y = \cos(3x + 1)$ va $y = \sin(6x + 4)$ funksiyalar uchun eng kichik musbat davrini toping.

A) $\frac{2\pi}{3}$ B) $\frac{\pi}{3}$ C) $\frac{\pi}{6}$ D) π E) 2π

(1996-12-43) Uchlari A(2;-2) va B(3;1) nuqtalarda bo‘lgan AB kesma o‘rtasidagi nuqtaning koordinatalarini toping.

A) (-2,5; 0,5) B) (0,5; 2,5) C) (-0,5; 0,5)

D) (2,5;- 0,5) E) (2,5; 0,5)

(1996-11-42) Uchlari A(3;-1) va B(2;4) nuqtada bo‘lgan AB kesmaning o‘rtasidagi nuqtaning koordinatalarini toping.

A) (2,5; 1,5) B) (-2,5; 1,5) C) (2,5; -1,5)

D) (2,5; 3) E) (3; 2,5)

(1997-1-9) Quyidagilardan qaysi biri $y = \frac{3}{2-x} - 1$ funksiyaga teskari funksiya?

A) $y = x - 2$ B) $y = \frac{3}{x-2} + 1$ C) $y = \frac{x-2}{3} + 1$

D) $y = 2 - \frac{3}{x+1}$ E) $y = \frac{2-x}{3} + 1$

(1997-11-20) $y = 2x^3 + 3x^2 - 12x + 7$ funksiyaning kamayish oraliqlarini aniqlang.

A) $(-\infty; -2] \cup [1; \infty)$ B) $[-2; 1]$ C) $[-1; 2]$

D) $[-2; \infty)$ E) $(-\infty; -1] \cup [2; \infty)$

(1997-11-21) $y = 2 - 2sinx$ funksiyaning $[0; \frac{\pi}{6}]$ kesmadagi eng kichik qiymatini toping.

A) 0 B) $\frac{1}{2}$ C) $2 - \sqrt{3}$ D) 1 E) $2 - \frac{1}{\sqrt{3}}$

(1996-9-64) Quyidagi funksiyalardan qaysi biri $(-\infty; 0)$ oraliqda o‘sadi?

A) $y = 0{,}5 - 2x$ B) $y = \frac{5}{x}$ C) $y = 2 + 3x$

D) $y = 0{,}5 - 2x$ E) $y = 0{,}5x^2$

(1996-10-14) Quyidagi funksiyalardan qaysi biri $(0; \infty)$ oraliqda kamayuvchi bo‘ladi?

A) $y = x + 8$ B) $y = 3 - x$ C) $y = -\frac{4}{x}$

D) $y = 2x^2$ E) $y = \frac{1}{2}\sqrt{x}$

(1996-10-15) $y = 2sinx + cosx$ funksiyaning eng katta qiymatini toping.

A) 3 B) $\sqrt{5}$ C) 2 D) -1 E) 5

(1996-11-21) $f(x) = x^2 + 2x + 4$ funksiyaning o‘sish oralig‘ini toping.

A) $(-\infty; -1)$ B) $(-1; \infty)$ C) $(1; \infty)$

D) $(0;\infty)$ E) $(-\infty;1)$

(1996-11-29) $x \to 2$ da $F(x) = \frac{x^2-4}{x-2}$ funksiya qanday songa intiladi?

A) -4 B) 4 C) 6 D) 8 E) -8

(1996-12-21) $f(x) = x^2 - 2x + 3$ funksiyaning o‘sish oralig‘ini toping.

A) $(0;\infty)$ B) $(-\infty;1)$ C) $[1;\infty)$
D) $(-\infty;-1)$ E) $(-1;\infty)$

(1996-12-29) $x \to -3$ da $f(x) = \frac{x^2-9}{x-3}$ funksiya qanday songa intiladi?

A) 6 B) 0 C) -3 D) -6 E) 3

(1997-2-20) $y = -\frac{1}{3}x^3 - x^2 + 3x - 5$ funksiyaning o‘sish oralig‘ini toping.

A) $(-\infty;-1]$ va $[3;\infty)$ B) $[-1;3]$ C) $[-3;-1]$
D) $[1;3]$ E) $(-\infty;-3]$ va $[1;\infty)$

(1997-1-21) $y = 1 + cosx$ funksiyaning $[\frac{\pi}{3};\ \frac{\pi}{2}]$ kesmadagi eng kichik qiymatini toping.

A) 0 B) 1 C) $1\frac{1}{2}$ D) $1 + \frac{\sqrt{3}}{2}$ E) $\frac{\sqrt{3}}{2}$

(1997-3-29) $g(x) = 12x - x^3$ funksiyaning minimumini toping.

A) -32 B) -16 C) 0 D) 16 E) mavjud emas

(1997-3-30) $y = \frac{1}{2^{cosx}} + \ln e^2$ funksiyaning eng katta qiymatini toping.

A) 2,5 B) 3 C) $1 + e^2$
D) 4 E) aniqlab bo‘lmaydi

(1997-4-30) $f(x) = x^2 - 3x + 1{,}25$ funksiyaning $[-1; 1]$ oraliqda eng katta qiymatini toping.

A) 0 B) -0,75 C) 5,25 D) 6,25 E) 4

(1997-5-25) $y = x^2 + 1$ funksiyaning o‘sish oralig‘ini ko‘rsating.

A) $(-1; \infty)$ B) $(1; \infty)$ C) $[0; \infty)$

D) $(-\infty; 1)$ E) $(-\infty; 1]$

(1997-5-40) $y = \frac{x^2-2}{x^2+2}$ funksiyaning eng kichik qiymatini toping.

A) 1 B) -1 C) -2 D) 2 E) 0

(1997-1-9) Quyidagilardan qaysi biri $y = \frac{3}{x+1} - 2$ funksiyaga teskari funksiya?

A) $y = \frac{3}{x-2}$ B) $y = \frac{x+1}{3} - 2$ C) $y = \frac{x+1}{3} - \frac{1}{2}$

D) $y = \frac{3}{x-2} + 1$ E) $y = \frac{3}{x+2} - 1$

(1997-8-44) $k$ning qanday qiymatlarida $f(x) = sinx - kx$ funksiya o‘zining aniqlanish sohasida o‘suvchi bo‘ladi?

A) $(-\infty; 1)$ B) $(1; \infty)$ C) $(-1; 0)$

D) $(-\infty; -1]$ E) $(-1; \infty)$

(1997-7-29) $f(x) = -\frac{2}{3}x^3 + 8x$ funksiyaning maksimumini toping.

A) 16 B) 0 C) $10\frac{2}{3}$ D) $-11\frac{1}{3}$ E) mavjud emas

(1997-7-30) $y = 3\ln e + 3^{|sinx|}$ funksiyaning eng kichik qiymatini toping.

A) $3e + 3$ B) 6 C) 4

D) $3\frac{1}{3}$ E) aniqlab bo‘lmaydi

(1997-6-20) $y = \frac{1}{3}x^3 + \frac{7}{2}x^2 + 12x + 1$ funksiyaning aniqlanish sohasini toping.

A) $[-3; 4]$ B) $(-\infty; -4] \cup [3; \infty)$ C) $[3; 4]$
D) $[-4; 3]$ E) $(-\infty; 3] \cup [4; \infty)$

(1997-9-76) x ning qanday qiymatlarida $y = 5^x - 5$ funksiya musbat qiymatlar qabul qiladi?

A) $x < 1$ B) $x > 1$ C) $x \geq 1$ D) $x \leq 2$ E) $x > 3$

(1996-10-10) $y = \sqrt{\frac{x(x+1)}{(x-2)(4-x)}}$ funksiyaning aniqlanish sohasini toping.

A) $[-1; 0) \cup (2; 4)$ B) $(-1; 0) \cup (2; 4]$
C) $(-1; 0] \cup [2; 4)$ D) $(-\infty; -1) \cup (0; 2) \cup (4; \infty)$
E) $(-\infty; -1] \cup [0; 2) \cup (4; \infty)$

(1996-11-17) $F(x) = \frac{x-3}{x^2-4}$ funksiyaning aniqlanish sohasini toping.

A) $(-2; \infty)$ B) $(-\infty; \infty)$ C) $(-\infty - 2)$
D) $(-\infty; -2) \cup (-2; \infty)$ E) $(-\infty; -2) \cup (-2; 2) \cup (2; \infty)$

(1996-12-68) $y = \sqrt{\frac{(x-2)(4-x)}{(x-3)(x-4)}}$ funksiyaning aniqlanish sohasini toping.

A) $(2; 3) \cup (4; 5)$ B) $[2; 3) \cup (4; 5]$ C) $(2; 3] \cup [4; 5)$
D) $(-\infty; 2] \cup (3; 4) \cup [5; \infty)$
E) $(-\infty; 2) \cup [3; 4] \cup [5; \infty)$

(1996-13-10) $y = \sqrt{\frac{(x-2)(4-x)}{x(x+1)}}$ funksiyaning aniqlanish sohasini toping.

A) $(-1;0)\cup[2;4]$ B) $[-1;0]\cup(2;4)$ C) $(-1;0)\cup[2;4)$ D) $(-\infty;-1)\cup(0;2]\cup[4;\infty)$ E) $(-\infty;-1]\cup[0;2)\cup(4;\infty)$

(1996-13-34) $y=\sqrt{1+\log_{\frac{1}{2}} sinx}$ funksiya $x(x\in[0;2\pi])$ ning qanday qiymatlarida aniqlangan?

A) $[\frac{\pi}{6};\frac{5\pi}{6}]$ B) $\left(0;\frac{\pi}{6}\right]\cup\left[\frac{5\pi}{6};\pi\right)$ C) $\left(0;\frac{\pi}{6}\right]$ D) $(0;\ \pi)$ E) $\left[\frac{5\pi}{6};\ \pi\right)$

(1997-4-15) k ning qanday butun qiymatlarida $y=\frac{x^2+3x}{x^2+kx+1}$ funksiya aniqlanish sohasi $(-\infty;1)\cup(1;\infty)$ bo‘ladi?

A) 4 B) -2 C) 2 D) 1 E) -1

(1997-6-47) $y=\sqrt{2sinx-1}$ funksiyaning aniqlanish sohasini toping.

A) $\left(-\frac{\pi}{6}+2\pi n;\ \frac{\pi}{6}+2\pi n\right), n\in Z$

B) $\left[\frac{\pi}{6}+2\pi n;\ \frac{5\pi}{6}+2\pi n\right],\ n\in Z$

C) $\left(\frac{\pi}{6}+2\pi n;\ \frac{5\pi}{6}+2\pi n\right), n\in Z$

D) $\left[-\frac{\pi}{6}+2\pi n;\ \frac{\pi}{6}+2\pi n\right],\ n\in Z$

E) $\left[\frac{\pi}{3}+\pi n;\ \frac{2\pi}{3}+\pi n\right],\ n\in Z$

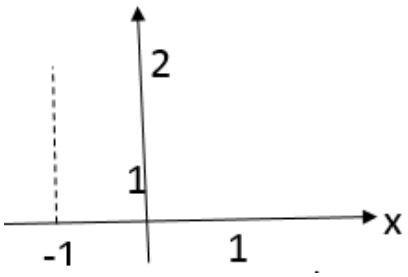
(1997-11-47) $y=\sqrt{tgx+1}$ funksiyaning aniqlanish sohasini toping.

A) $\left[-\frac{\pi}{4}+\pi n;\ \frac{\pi}{2}+\pi n\right], n\epsilon Z$ B) $\left[\frac{\pi}{4}+\pi n;\ \frac{\pi}{2}+\pi n\right], n\epsilon Z$

C) $\left[-\frac{\pi}{4}+\pi n;\frac{\pi}{2}+\pi n\right), n\epsilon Z$ D)$(-\frac{\pi}{2}+\pi n;-\frac{\pi}{4}+\pi n], n\epsilon Z$

E) $(-\frac{\pi}{2}+\pi n;\frac{\pi}{4}+\pi n], n\epsilon Z$

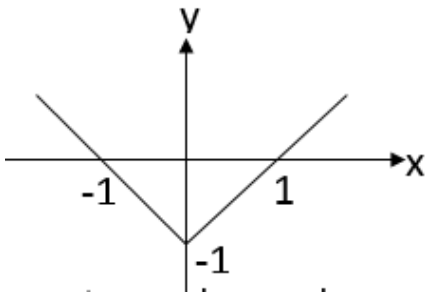
(1996-9-66) Rasmda quyidagi funksiyalardan qaysi birining grafigi keltirilgan?



A) $y=|x-1|$ B) $y=|x+1|$ C) $y=|x|+1$

D) $y=\frac{1}{|x|}$ E) $y=|x|-1$

(1996-10-16) Rasmda quyidagi funksiyalardan qaysi birining grafigi keltirilgan?



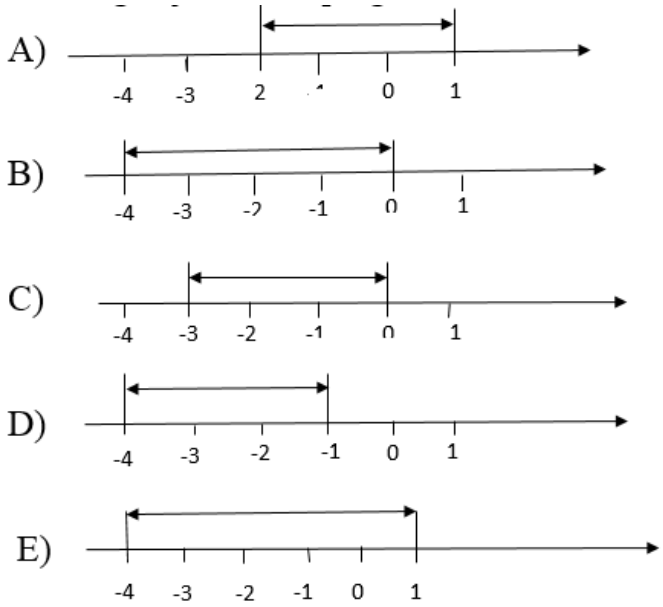
A) $y=|x-1|$ B) $y=|x+1|$

C) $y=|x|-1$ D) $y=1+|x|$ E) $y=2|x|$

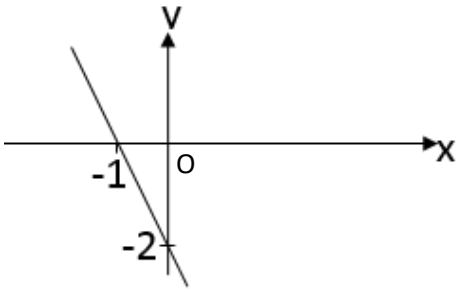
(1996-11-16) Quyidagi nuqtalarning qaysi biri $f(x)=-2x+5$ funksiyaning grafigiga tegishli?

A) $(1;2)$ B) $(2;1)$ C) $(3;1)$ D) $(2;3)$ E) $(1;-3)$

(1996-11-7) Agar $a=-4$ va $b=1$ bo‘lsa, rasmda $|a-b|$ ga mos to‘g‘ri javobni toping.

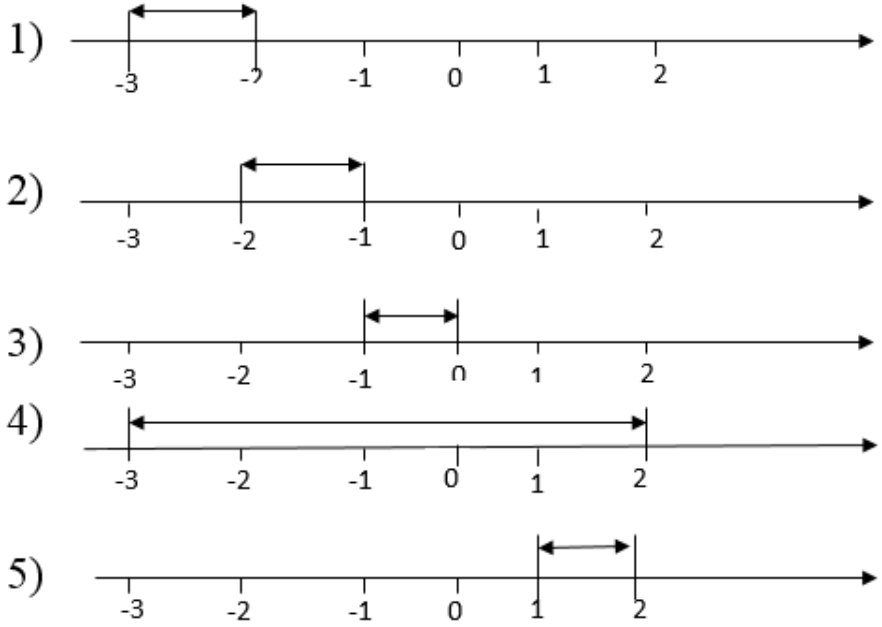


(1996-11-24) Grafigi rasmda tasvirlangan funksiyaning qiymatlari x ning qanday qiymatlarida -2 dan kichik bo‘lmaydi?



A) $x < 0$ B) $x \geq 0$ C) $x > 0$ D) $x \leq 0$ E) $x > -1$

(1996-12-7) Agar $a = -3$ va $b = 2$ bo‘lsa, rasmda $|a - b|$ ga mos.To‘g‘ri javobni ko‘rsating.



A) 1 B) 2 C) 3 D) 4 E) 5

(1996-12-16) Quyidagi nuqtalarning qaysi biri $f(x) = -4x + 3$ funksiyaning grafigiga tegishli?

A) $(-1; 1)$ B) $(2; 5)$ C) $(-5; 2)$
D) $(1; -1)$ E) $(0; -3)$

(1996-12-24) Grafigi rasmda tasvirlangan funksiyaning qiymatlari x ning qanday qiymatlarida -2 dan kichik bo‘ladi?

A) $x \geq 0$ B) $x > 0$ C) $x < 0$ D) $x \leq 0$ E) $x > -1$

(1997-3-16) k ning qanday qiymatlarida $y = kx^2 - 2$ funksiyaning grafigi $A(-1;1)$ nuqtadan o‘tadi?

A) 4 B) -3 C) 3 D) 2 E) -1

(1997-7-16) k ning qanday qiymatlarida $y = \frac{k}{x} - 1$ funksiyaning grafigi $C(-\frac{1}{2};-3)$ nuqtadan o‘tadi?

A) 1 B) -2 C) -1 D) $\frac{1}{2}$ E) 4

(1997-10-16) k ning qanday qiymatida $y = kx^3 + 2$ funksiyaning grafigi $B(-2;10)$ nuqtadan o‘tadi?

A) 2 B) 1 C) -0,5 D) -1 E) -3

(1996-1-37) Ikkita to‘g'ri chiziqning kesishishidan hosil bo‘lgan uchta burchakning yig'indisi $315°$ ga teng. Shu burchaklardan kichigini toping.

A) $60°$ B) $45°$ C) $70°$ D) $85°$ E) $50°$

(1996-6-13) Agar $k < 0$ va $l > 0$ bo‘lsa, $y = kx + l$ funksiyaning grafigi koordinatalar tekisligining qaysi choraklarida joylashgan?

A) $I;\ II$ B) $I;\ II; III$ C) $II;\ I; IV$

D) $I;\ III; IV$ E) $II;\ III; IV$

(1996-6-45) Quyidagi mulohazalarning qaysi biri noto‘g‘ri?

A) agar ikki to‘g‘ri chiziq bitta tekislikka perpendikulyar bo‘lsa, bu to‘g‘ri chiziqlar paraleldir

B) agar tekislikda yotmagan to‘g‘ri chiziq tekislikdagi birorta tog‘ri chiziqqa parallel bo‘lsa, tekislik va to‘g‘ri chiziq o‘zaro paraleldir

C) agar tekislikka tushirilgan og‘ma tekislikda yotuvchi to‘g‘ri chiziqqa perpendikulyar bo‘lsa, uning proeksiyasi ham to‘g‘ri chiziqqa perpendikulyar bo‘ladi

D) tekislikda yotuvchi ikki to‘g‘ri chiziqqa perpendikulyar bo‘lgan to‘g‘ri chiziq tekislikka ham perpendikulyar bo‘ladi

E) ikkita to‘g‘ri chiziqning har biri uchinchi to‘g‘ri chiziqqa parallel bo‘lsa, bu to‘g‘ri chiziqlar paraleldir.

(1996-11-31) $M(2;1)$ nuqtadan $y = x + 2$ to‘g‘ri chiziqqacha eng qisqa masofani toping.

A) 2,25 B) $1{,}5\sqrt{2}$ C) $\frac{1}{4}$ D) $\frac{1}{2}$ E) $\frac{\sqrt{2}}{2}$

(1996-12-31) $M(2;2)$ nuqtadan $y = x + 1$ to‘g‘ri chiziqqacha eng qisqa masofani toping.

A) 1,5 B) $\frac{\sqrt{2}}{2}$ C) $\frac{1}{2}$ D) 2,25 E) $\frac{1}{4}$

(1997-2-13) Agar $k < 0$ va $l > 0$ bo‘lsa, $y = kx + l$ funksiyaning grafigi koordinatalar tekisligining qaysi choraklarida joylashgan?

A) $I;\ II\ va\ III$ B) $I\ va\ II$ C) $I;\ III\ va\ IV$

D) $II;\ III\ va\ IV$ E) $I;\ II\ va\ IV$

(1997-2-45) Quyidagi mulohazalardan qaysi biri noto‘g‘ri?

A) Agar tekislik parallel tekisliklardan biriga perpendikulyar bo‘lsa, u holda bu tekislik ikkinchi tekislikka ham perpendikulyar bo‘ladi

B) tekislikda yotuvchi kesishuvchi ikki tog‘ri chiziqqa perpendikulyar bo‘lga to‘g‘ri chiziq tekislikka ham perpedikulyar bo‘ladi

C) fazoda ikki to‘g‘ri chiziq uchinchi to‘g‘ri chiziqqa perpendikulyar bo‘lsa, ular o‘zaro paraleldir

D) agar tekislikdagi to‘g‘ri chiziq tekislikka tushirilgan og‘maga perpendikulyar bo‘lsa, bu to‘g‘ri chiziq og‘maning proeksiyasiga ham perpendikulyar bo‘ladi

E) ikki parallel tekislikni uchinchi tekislik bilan kesganda, hosil bo‘lgan to‘g‘ri chiziqlar o‘zaro parallel bo‘ladi

(1997-8-13) $y = kx + l$ $(k < 0\ va\ l < 0)$ funksiyaning grafigi qaysi choraklarda joylashgan?

A) $I, II\ va\ III$ B) $I, III\ va\ IV$ C) $II\ va\ IV$

D) $II, III\ va\ IV$ E) $I, II\ va\ IV$

(1997-8-45) Quyidagi mulohazalardan qaysi biri noto‘g‘ri?

A) Agar tekislikda yotgan ikki to‘g‘ri chiziq, ikkichi tekislikda yotgan ikki to‘g‘ri chiziqqa mos ravishda parallel bo‘lsa, bu tekisliklar paraleldir

B) agar ikki to‘g‘ri chiziq, uchichi to‘g‘ri chiziqqa parallel bo‘lsa, ular o‘zaro paraleldir

C) tekislikda yotgan to‘g‘ri chiziq, og‘maning proeksiyasiga perpendikulyar bo‘lsa, og‘maning o‘ziga ham perpendikulyar bo‘ladi

D) to‘g‘ri chiziq tekislikda yotgan ikki kesishuvchi to‘g‘ri chiziqqa perpendikulyar bo‘lsa, bu to‘g‘ri chiziq tekislikka ham perpedikulyar bo‘ladi

E) og‘ma va uning tekislikdagi proeksiyasi orasidagi burchaklardan eng kichigiga og‘ma va tekislik orasidagi burchak deyiladi

(1997-9-117) $A(4; 2)$ va $B(3; 1)$ nuqtalar berilgan. AB to‘g‘ri chiziqqa perpedikulyar va B nuqtadan o‘tuvchi to‘g‘ri chiziqning tenglamasini tuzing.

A) $x + y + 3 = 0$ B) $x + y - 3 = 0$

C) $x - y - 4 = 0$ D) $x + y - 4 = 0$

E) $x + y + 4 = 0$

(1997-12-44) Quyidagi mulohazalardan qaysi biri no‘to‘g‘ri?

A) Agar fazoda ikki to‘g‘ri chiziq uchichinchi to‘g‘ri chiziqqa parallel bo‘lsa, ular o‘zaro paralelldir

B) Tekislikda og‘maning asosidan uning proeksiyasiga perpendikulyar qilib o‘tkazilgan to‘g‘ri chiziq og‘maning o‘ziga ham perpendikulyar bo‘ladi

C) Fazoda 3 ta nuqta orqali faqat bitta tekislik o‘tkazish mumkin

D) To‘g‘ri chiziq yoki parallel to‘g‘ri chiziqlar kesmalarning nisbati parallel proyeksiyalashda o‘zgarmaydi (proyeksiyalanadigan kesmalar proeksiyalash yo‘nalishiga parallel emas)

E) Tekislikdan tashqarida yotgan to‘g‘ri chiziq bu tekislikdagi biror to‘g‘ri chiziqqa parallel bo‘lsa, bu to‘g‘ri chiziq va tekislik o‘zaro paralleldir

(1996-6-46) $y = x^2 - 3x + 2$ parabolaga absissasi $x_0 = 2$ bo‘lgan nuqtada o‘tkazilgan urinmaning burchak koeffisienti nimaga teng.

A) 1 B) 2 C) -3 D) 3 E) -2

(1996-9-23) $y = \frac{x}{1-x}$ funksiyaning grafigiga absissasi $x_0 = 3$ bo‘lgan nuqtadan o‘tkazilgan urinmaning OX o‘qi bilan tashkil etgan burchagi α bo‘lsa, $ctg2\alpha$ ni toping.

A) $\frac{17}{2}$ B) $\frac{17}{6}$ C) $\frac{17}{8}$ D) $\frac{17}{9}$ E) $\frac{17}{10}$

(1996-9-80) $f(x) = -2x^2 - 1$ funksiya grafigiga absissasi $x_0 = 0$ bo‘lgan nuqtadan o‘tkazilgan urinma tenglamasini ko‘rsating.

A) $y = 1$ B) $y = -2x$ C) $y = x - 1$

D) $y = -1$ E) $y = 4x$

(1996-10-31) $f(x) = 1 - 2x^2$ funksiya grafigiga absissasi $x_0 = 0$ bo‘lgan nuqtadan o‘tkazilgan urinma tenglamasini ko‘rsating.

A) $y = 1$ B) $y = -1$ C) $y = -x$
D) $y = 1 - 4x$ E) $y = 2x - 1$

(1996-12-80) $y = \frac{x}{1-x}$ funksiyaning grafigiga absissasi $x_0 = 3$ bo‘lgan nuqtadan o‘tkazilgan urinmaning OX o‘qi bilan tashkil etgan burchagi α bo‘lsa, $sin2\alpha$ ni toping.

A) $\frac{7}{16}$ B) $\frac{17}{7}$ C) $\frac{9}{16}$ D) $\frac{8}{17}$ E) $\frac{9}{17}$

(1996-13-23) $\alpha - y = \frac{x}{1-x}$ funksiyaning grafigiga absissasi $x_0 = 3$ bo‘lgan nuqtadan o‘tkazilgan urinmaning OX o‘qi bilan tashkil etgan burchagi α bo‘lsa, $tg2\alpha$ ni toping.

A) $\frac{7}{15}$ B) $\frac{2}{5}$ C) $\frac{8}{15}$ D) $\frac{3}{5}$ E) $\frac{2}{3}$

(1997-8-46) $f(x) = \frac{1}{3}x^3 - \ln x$ funksiyaning grafigiga $x_0 = 2$ nuqtada o‘tkazilgan urinmaning burchak koiffisentini toping.

A) 4 B) 3 C) 2 D) 1,5 E) 3,5

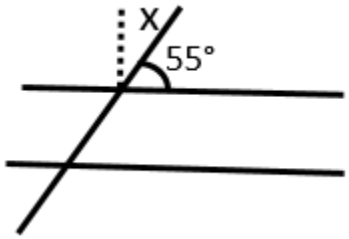
(1997-9-89) $y = x^2 + 3x + 4$ funksiya grafigiga absissasi $x_0 = -2$ nuqtada o‘tkazilgan urima OX o‘qining musbat yo‘nalishi bilan qanday burchak hosil qiladi?

A) $135°$ B) $45°$ C) $70°$ D) $-arctg2$ E) $50°$

(1997-12-45) $y = \frac{1}{2}x^2 - \ln x$ funksiyaning grafigiga $x_0 = 2$ nuqtada o‘tkazilgan urinmaning burchak koiffisentini toping.

A) -2,5 B) 2 C) 1,75 D) 1,25 E) 1,5

(1996-9-26) a||b. x=?

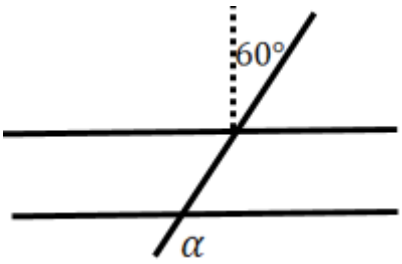


A) 45° B) 40° C) 35°
D) 20° E) 36°

(1996-9-88) Ikkita to‘g‘ri chiziqning kesishidan hosil bo‘lgan uchta burchak yig‘indisi 265°. Shu burchaklardan kattasini toping.

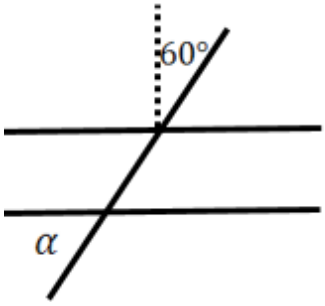
A) 110° B) 95° C) 105° D) 150° E) 120°

(1996-12-92) a||b. $\alpha-$?



A) 120° B) 110°
C) 140° D) 160°
E) 150°

(1996-13-32) a||b. $\alpha-$?



A) 60° B) 45° C) 30°
D) 50° E) 35°

(1996-11-37) Qo‘shni burchaklardan biri ikkinchisidan 20° katta. Shu qo‘shni burchaklarni toping.

A) 160°; 20° B) 28°; 152° C) 20°; 160°
D) 140°; 40° E) 80°; 100°

(1996-11-38) Ikkita to‘g‘ri chiziqning kesishidan hosil bo‘lgan qo‘shni burchaklar 5:7 nisbatda bo‘lsa, shu burchaklarni toping.

A) 36°; 144° B) 75°; 105° C) 42°; 138°
D) 38°; 142° E) 85°; 95°

(1996-12-38) Qo‘shni burchaklardan biri ikkinchisidan $18°$ katta. Shu qo‘shni burchaklarni toping.

A) $82°; 98°$ B) $81°; 99°$ C) $80°; 100°$
D) $162°; 18°$ E) $98°; 82°$

(1996-12-39) Ikkita to‘g‘ri chiziqning kesishidan hosil bo‘lgan qo‘shni burchaklarning gradus o‘lchovlari 3:7 nisbatda bo‘lsa, shu burchaklarni toping.

A) $60°; 120°$ B) $30°; 150°$ C) $54°; 126°$
D) $62°; 118°$ E) $40°; 140°$

(1997-1-27) Ikki qo‘shni burchakning ayirmasi $24°$ ga teng. Shu burchaklardan kichigini toping.

A) $72°$ B) $68°$ C) $82°$ D) $76°$ E) $78°$

(1997-4-43) Qo‘shni burchaklardan biri ikkinchisidan to‘rt marta kichik bo‘lsa, shu burchaklardan kattasini toping.

A) $125°$ B) $130°$ C) $140°$ D) $144°$ E) $120°$

(1997-5-41) Burchakning bissektrissasi uning tomoni bilan $15°$ li burchak tashkil etsa, burchakning o‘zini toping.

A) $45°$ B) $30°$ C) $60°$ D) $90°$ E) $7{,}5°$

(1997-8-30) $216°$ ning radian o‘lchovini toping.

A) $\frac{4\pi}{3}$ B) $\frac{5\pi}{4}$ C) $\frac{3\pi}{2}$ D) $\frac{7\pi}{6}$ E) $\frac{6\pi}{5}$

(1997-12-30) $\frac{4\pi}{3}$ radian necha gradusga teng?

A) $230°$ B) $220°$ C) $250°$ D) $240°$ E) $210°$

(1997-6-27) Ikki to‘g‘ri chiziqning kesishidan hosil bo‘lgan burchaklarning kattaliklari nisbati 7:3 ga teng. Shu burchaklardan kichigini toping.

A) $63°$ B) $51°$ C) $57°$ D) $48°$ E) $54°$

(1997-9-41) Burchakning bissektrissasi uning tomoni bilan $45°$ li burchak tashkil etsa, burchakning o‘zini toping.

A) $22{,}5°$ B) $90°$ C) $60°$ D) $15°$ E) $35°$

(1997-11-27) Qo‘shni burchaklardan biri ikkinchisidan $32°$ ga katta. Shu burchaklardan kattasini toping.

A) $106°$ B) $118°$ C) $116°$ D) $114°$ E) $108°$

(1996-9-27) Qavariq beshburchak ichki burchaklari yig‘indisi necha gradus?

A) $900°$ B) $720°$ C) $540°$ D) $600°$ E) $500°$

(1996-12-48) Har bir ichki burchagi $120°$ bo‘lgan qavariq ko‘pburchakning nechta tomoni bor?

A) 6 B) 8 C) 10 D) 12 E) 15

(1996-12-33) Muntazam beshburchakning ichki burchagi necha gradus?

A) 135 B) 105 C) 102 D) 108 E) 120

(1997-3-42) α muntazam o‘n ikki burchakning ichki burchagi bo‘lsa, $sin\alpha$ ning qiymatini toping.

A) $-\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $-\frac{\sqrt{2}}{2}$ D) $\frac{1}{2}$ E) $\frac{1}{\sqrt{2}}$

(1997-4-32) Muntazam sakkizburchakning ichki burchagining sinusini toping.

A) $-\frac{\sqrt{2}}{2}$ B) $-\frac{1}{2}$ C) $-\frac{\sqrt{3}}{2}$ D) $\frac{1}{2}$ E) $\frac{\sqrt{2}}{2}$

(1997-7-42) β muntazam oltiburchakning ichki burchagi. $tg\beta$ ning qiymatini toping.

A) $\frac{1}{\sqrt{3}}$ B) $-\frac{\sqrt{2}}{2}$ C) $-\sqrt{3}$ D) $-\frac{\sqrt{3}}{3}$ E) $\frac{\sqrt{3}}{2}$

(1997-10-42) α muntazam sakkizburchakning ichki burchagi. $cos\alpha$ ning qiymatini toping.

A) $\frac{1}{2}$ B) $-\frac{\sqrt{3}}{2}$ C) $-\frac{1}{\sqrt{2}}$ D) $\frac{\sqrt{3}}{2}$ E) $-\frac{1}{\sqrt{3}}$

(1996-9-91) To‘g‘ri burchakli uchburchak katetlaridan biri 12 sm, ikkinchisi esa gipotenuzadan 8 sm qisqa. Shu uchburchak gipotenuzasini toping.

A) 15 B) 16 C) 25 D) 13 E) 29

(1996-10-40) To‘g‘ri burchakli uchburchak gipotenuzasi 10 sm, kichik katetning gipotenuzadagi proyeksiyasi esa 3,6 sm. Shu uchburchakning yuzi necha sm²?

A) 48 B) 24 C) 18 D) 32 E) 20,4

(1996-10-51) Tekislikka o‘tkazilgan perpendikulyar bilan og‘ma orasidagi burchak 60°, perpendikulyarning uzunligi esa 20 ga teng. Og‘maning uzunligini toping.

A) $20\sqrt{2}$ B) $10\sqrt{3}$ C) 40 D) $20\sqrt{3}$ E) $\frac{40}{\sqrt{3}}$

(1996-11-39) Bitta nuqtadan tekislikka og‘ma va perpendikulyar o‘tkazilgan. Og‘maning uzunligi 5, perpendikulyarniki 4 sm. Og‘maning tekislikdagi proyeksiyasi necha sm?

A) 2 B) 3 C) 2,5 D) 1 E) 3,5

(1996-12-18) Uchburchakning birinchi tomoni $x(x > 5)$ sm, ikkinchi tomoni undan 2 sm qisqa, uchinchi tomoni esa birinchisidan 3 sm uzun. Shu uchburchakning perimetrini toping.

A) $(3x - 1)\ sm$ B) $(3x + 2)\ sm$ C) $(3x - 2)\ sm$
D) $(3x + 3)\ sm$ E) $(3x + 1)\ sm$

(1996-12-35) Uchburchak ikkita burchagi yig‘indisining kosinusi $\frac{1}{2}$ ga teng. Uchinchi burchagining kosinusini toping.

A)$\frac{2}{3}$ B)$\frac{1}{3}$ C)$-\frac{1}{2}$ D)$\frac{1}{2}$ E)$-\frac{1}{3}$

(1996-12-40) Bitta nuqtadan tekislikka og‘ma va perpendikulyar o‘tkazilgan. Og‘maning uzunligi 5, perpendikulyarniki 3 sm. Og‘maning tekislikdagi proeksiyasini toping.

A) 2 B) $2\frac{1}{3}$ C) 1,5 D) 4 E) 2,5

(1996-12-41) Uchburchakning tomonlari 4; 5 va 6 m li tomonning 6 m li tomondagi proyeksiyasi necha m?

A) $2\frac{1}{5}$ B) $2\frac{1}{3}$ C) $3\frac{1}{2}$ D) $3\frac{3}{4}$ E) $3\frac{1}{4}$

(1996-12-47) Uchlari $A(-1;5), B(3;1)$ va $C(-1;3)$ nuqtalarda boo‘lgan A va B burchaklarini toping.

A)$60°; 30°$ B)$90°; 45°$ C)$30°; 45°$
D)$45°; 45°$ E) $45°; 90°$

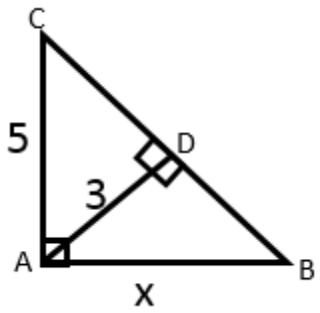
(1996-12-50) ABC uchburchakda $AB = 3\ sm,\ AC = 6\ sm$ va $\angle A = 45°$. Shu uchburchakning yuzi necha sm².

A) $\frac{5\sqrt{2}}{2}$ B)$3\sqrt{2}$ C) $\frac{9\sqrt{2}}{2}$ D) $4\sqrt{2}$ E) $5\sqrt{2}$

(1996-12-51) α tekislik va uni kesib o‘tmaydigan $AB = 11\ sm$ kesma berilgan. Agar kesmaning uchlaridan α tekislikkacha bo‘lgan masofalar $AA_1 = 4\ sm,\quad BB_1 = 7\ sm$ bo‘lsa, AB kesma yotuvchi to‘g‘ri chiziqning α tekislik bilan tashkil qilgan burchak sinusini toping.

A) $\frac{3}{11}$ B)$\frac{4}{11}$ C)$\frac{5}{11}$ D)$\frac{6}{11}$ E)$\frac{7}{11}$

(1996-12-94) $AC = 5\ sm,$
$AD = 3\ sm.$
$AB = ?$



A)$3{,}5sm$ B)$3{,}75sm$ C)$4sm$ D)$3{,}8sm$ E)$3{,}9sm$

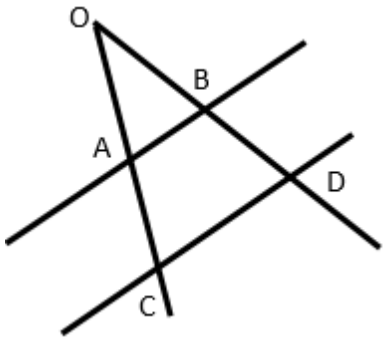
(1996-12-99) a ning qaday qiymatlarida uzuliklari mos ravishda $1+4a, 1-a$ va $2a$ ga teng bo‘lgan kesmalardan uchburchak yasash mumkin?

A) $\left(\frac{1}{2};0\right)$ B)$(0;1)$ C) $\emptyset$ D)$\left(-\frac{1}{2};0\right)$ E)$\left(-\frac{2}{3};0\right)$

(1996-12-100) $(AB)||(CD)$

$OA=5\ sm,\ OB=6\ sm,$

$AC=2\ sm,\ BD-?$



A) 2,4sm B) 2,5sm

C) 2,6sm D) 2,3sm E) 2,25sm

(1996-12-99) a ning qaday qiymatlarida uzuliklari mos ravishda $1+a, 1-a$ va 1,5 ga teng bo‘lgan kesmalardan uchburchak yasash mumkin?

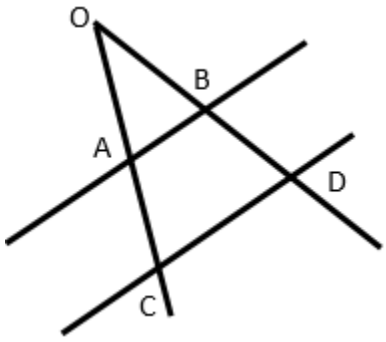
A) $(-0{,}75;0{,}75)$ B)$(-0{,}5;0{,}5)$ C) $\emptyset$

D)$(-0{,}7;0{,}7)$ E)$(-0{,}4;0{,}4)$

(1996-12-100) $(AB)||(CD)$

$OB=6\ sm,\ BD=2{,}4\ sm,$

$AC=2\ sm,\ OA=?$



A) 5,5sm B) 5,2sm

C) 4,8sm D) 5sm E) 4,5sm

(1997-1-32) To‘g'ri urchakli uchburchak katetlari 15 va 20 ga teng.Katta katetning gipotenuzadagi proyeksiyasini toping.

A) 12 B) 14,5 C) 16 D) 16,5 E) 18

(1997-2-15) Quyidagi mulohazalardan qaysi biri to‘g'ri?

A) teng tomonli uchburchakning balandliklari kesisish nuqtasida 4:3 nisbatda bo‘ladi

B) ikkita to‘g'ri burchakli uchburchakning gipotenuzalari va bittadan o‘tkir burchaklari bir-biriga teng bo‘lsa, bunday uchburchaklar tengdir.

C) ikkita paralel to‘g'ri chiziqni uchinchi to‘g'ri chiziq bilan kesganda hosil bo‘lgan ichki bir tomonli burchaklar yig'indisi $180°$ dan kichik

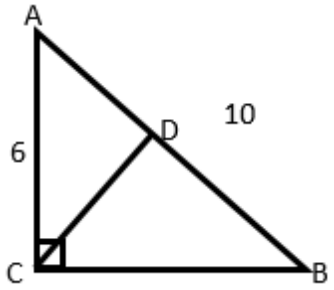
D) ikkitadan tomoni bittadan burchagi o‘zaro teng bo‘lgan burchaklar o‘zaro tengdir

E) teng yonli uchburchakning balandliklari hamda medianalari bir nuqtada kesishadi

(1997-3-49) Bir nuqtadan tengsizlikka uzunliklari 23 va 33 bo‘lganikkita og'ma tushirilgan. Agar og'malar proyeksiyalarining nisbati 2:3 kabi bo‘lsa, berilgan nuqtadan tekislikkacha bo‘lgan masofani toping.

A) 12 B) $6\sqrt{5}$ C) 11 D) 9 E) $6\sqrt{2}$

(1997-2-26) Rasmda $\angle C = 90°, CD \perp AB, CA = 6$ va $AB = 10$. AD ning uzunligini toping.



A) 4 B) 3,6 C) 4,2 D) 3,4 E) 3,8

(1997-2-39) ΔABC ning tomonlari $MN||AC$ to‘g'ri chiziq bilan kesildi. ABC va MBN uchburchaklarning peremetrlari 3:1 nisbatda. ABC uchburchakning yuzi 144 ga teng. MBN uchburchakning yuzini toping.

A) 16 B) 48 C) 32 D) 64 E) 56

(1997-3-46) Peremetrlari 24 va 36 bo‘lgan ikki o‘xshash uchburchakdan birining yuzi ikkinchisidan 10 ga ortiq. Kicik uchburchakning yuzini toping.

A) 20 B) 16 C) 8 D) 12 E) 18

(1996-1-47) Uchburchakning a va b tomonlari orasidagi burchak α ga teng. Uchburchak yuzasi quyidagilarning qaysi biriga teng.

A) $absin\alpha$ B)$\frac{ab}{2sin\alpha}$ C)$\frac{absin\alpha}{2}$

D) $2abcos\alpha$ E) $\frac{1}{2}abcos\alpha$

(1996-1-49) Tekislikka o‘tkazilgan perpendikulyar bilan og‘ma orasidagi burchak $30°$ perpendikulyarning uzunligi esa 10 ga teng. Og‘maning uzunligini toping.

A) 20 B)$10\sqrt{3}$ C) $20\sqrt{3}$ D) $\frac{20}{\sqrt{3}}$ E) $20\sqrt{2}$

(1996-3-17) Uchburchakning birinchi tomoni $x(x > 5)sm$, ikkinchi tomoni undan 3 sm qisqa, uchinchi tomoni esa birinchisidan 2 sm uzun. Shu uchburchakning perimetrini toping.

A) $(3x + 1)\ sm$ B)$(3x + 5)\ sm$ C)$(3x - 1)\ sm$

D)$(3x + 2)\ sm$ E)$(3x - 3)\ sm$

(1996-3-38) Bitta nuqtadan tekislikka og‘ma va perpendikulyar o‘tkazilgan. Og‘maning uzunligi 10, perpendikulyarniki 6 sm. Og‘maning tekislikdagi proeksiyasi necha sm?

A) 4 B) 2 C) 8 D) 5 E) 3

(1996-3-39) Uchburchakning tomonlari 4; 5 va 6 sm. 4 sm li tomonning 6 sm li tomondagi proeksiyasi necha sm?

A) $1\frac{1}{4}$ B) $1\frac{1}{2}$ C) $2\frac{1}{4}$ D) $2\frac{1}{2}$ E) $3\frac{1}{2}$

(1996-3-47) ABC uchburchakda $AB = 5\ sm,\ AC = 10\ sm$ va $\angle A = 45°$. Shu uchburchakning yuzi necha sm^2.

A) $\frac{5\sqrt{2}}{2}$ B) $10\sqrt{2}$ C) $50\sqrt{2}$ D) $25\sqrt{2}$ E) $25\frac{\sqrt{2}}{2}$

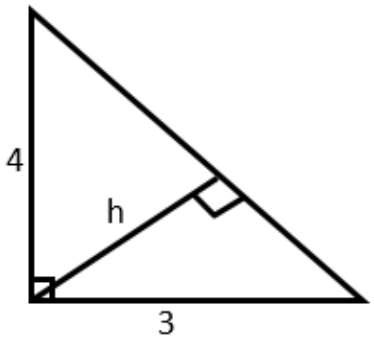
(1996-3-49)) α tekislik va uni kesib o‘tmaydigan $AB = 13\ sm$ kesma berilgan. Agar kesmaning uchlaridan α tekislikkacha bo‘lgan masofalar $AA_1 = 5\ sm, BB_1 = 8sm$ bo‘lsa, AB kesma yotuvchi to‘g‘ri chiziqning α tekislik bilan tashkil qilgan burchak sinusini toping.

A) $\frac{5}{13}$ B)$\frac{8}{13}$ C)$\frac{2}{13}$ D)$\frac{3}{13}$ E)$\frac{4}{13}$

(1996-3-55) Uchburchak ikkita burchagi yig‘indisining kosinusi $\frac{1}{3}$ ga teng. Uchinchi burchagining kosinusini toping.

A) $\frac{2}{3}$ B)$\frac{\pi}{3}$ C)$\frac{1}{3}$ D)$-\frac{2}{3}$ E) $\frac{4}{3}$

(1996-3-94) $h-?$



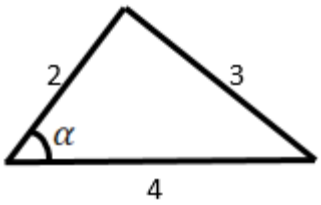
A) 2 B) 3

C)$\frac{7}{5}$ D)$\frac{12}{5}$

E) 2,5

(1996-3-95) $sin\alpha-?$

A) $\frac{\sqrt{135}}{16}$ B)$-\frac{\sqrt{135}}{16}$



C)$\frac{\sqrt{53}}{8}$ D)$-\frac{\sqrt{53}}{8}$ E)$\frac{\sqrt{47}}{8}$

(1996-3-97) a $\left(-1 < a < \frac{1}{2}\right)$ ning qanday qiymatlarida uzunliklari mos ravishda $1 + a,\ 1 - 2a$ va 2 ga teng bo‘lgan kesmalardan uchburchak yasash mumkin.

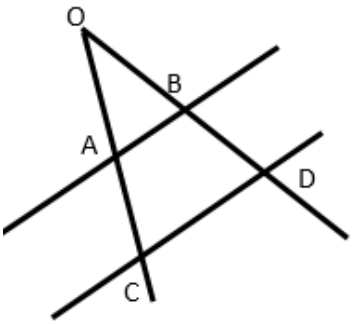
A) $(-1; 0)$ B)$\left(0; \frac{1}{2}\right)$ C)$\left(-\frac{1}{3}; 0\right)$

D)$\left(-\frac{1}{3}; \frac{1}{3}\right)$ E)$\left(-\frac{2}{3}; 0\right)$

(1996-3-98) $(AB)||(CD)$

$OA = 3\ sm,\ OB = 4\ sm,$

$AC = 1{,}5\ sm,\ \ BD - ?$



A) 3 sm B) 2 sm C) 2,5 sm

D) 2,1 sm E) 2,6 sm

(1996-6-40) Uchburchakning tomonlari a, b va c ga teng. Bu uchburchakning tomonlari orasida $a^2 = b^2 + c^2 + bc$ munosabat o‘rinli bo‘lsa, uzunligi a ga teng tomon qarshisidagi burchakni toping.

A) 60° B) 150° C) 120° D) 90° E) 135°

(1996-7-36) Uchburchakning ikkita burchagi qiymatlarining nisbati 1:2 kabi. Uchinchi burchagi shu burchaklarning kichigidan 40° ga katta. Uchburchakning katta burchagini toping.

A) 102° B) 93° C) 75° D) 80° E) 105°

(1996-1-40) To‘g‘ri burchakli uchburchakning gipotenuzasi 25 sm, katetlari esa o‘zaro 3:4 nisbatda. Shu uchburchakning kichik katetini toping.

A) 10 B) 12 C) 9 D) 15 E) 20

(1996-6-15) Quyidagi mulohazalarning qaysi biri to‘g‘ri?

A) ixtiyoriy uchburchakning bissektrissalari kesisish nuqtasida 1:2 nisbatda bo‘linadi.

B) ikkitadan tomoni va bittadan burchagi o‘zaro teng bo‘lgan uchburchaklar tengdir.

C) o‘tmas burchakli uchburchakning o‘tkir burchagi uchidan tushirilgan perpindikulyar uchburchakning ichida yotadi.

D) asosi va uchidagi burchagi o‘zaro teng bo‘lgan teng yonli uchburchaklar tengdir.

E) Qo‘shni burchaklarning yig‘indisi $120°$ dan katta.

(1996-6-30) Tomonlari 10; 8 va 6 bo‘lgan uchburchakning katta tomoniga o‘tkazilgan medianasini toping.

A) 7 B) 6 C) 12 D) 14 E) 8

(1996-7-38) To‘g‘ri burchakli uchburchakning katetlaridan biri 12, gipotenuzasi esa ikkinchi katetdan 6 ga ortiq. Uchburchakning yuzini toping.

A) 36 B) 40 C) 42 D) 54 E) 60

(1997-3-36) Uchburchak ikkita burchagining qiymatlari nisbati 3:4 kabi, uchinchisi esa shu burchaklarning kattasidan $4°$ ga katta. Uchburchakning katta burchagini toping.

A) $84°$ B) $68°$ C) $96°$ D) $64°$ E) $72°$

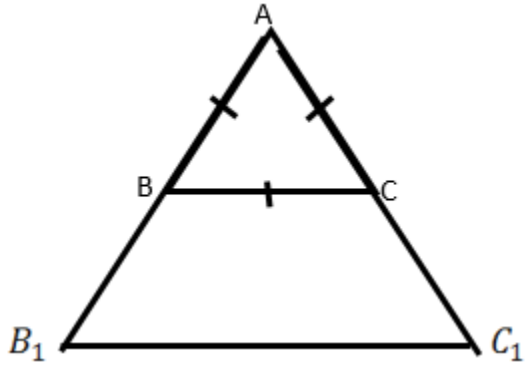
(1997-3-38) Katetlarining nisbati 2:3 kabi bo‘lgan to‘g‘ri burchakli uchburchakning gipotenuzasi 12 ga teng. Uchburchakning yuzini toping.

A) $5\sqrt{13}$ B) 24 C) 39 D) 36 E)$6\sqrt{13}$

(1997-3-39) Teng yonli uchburchakning yon tomoni 3 ga, uchidagi burchagi $120°$ ga teng. Shu uchburchakka tashqi chizilgan aylananing radiusini toping.

A) 1,5 B) $2\sqrt{3}$ C) 3 D) $\frac{\sqrt{3}}{2}$ E) 1

(1997-4-48) Rasmdagi muntazam ABC uchburchakning perimetri 3 ga teng. Agar $AB_1 = 2AB$ va $AC_1 = 2AC$ bo‘lsa, AB_1C_1uchburchakning perimetrini toping.



A) 5 B) 6 C) 7 D) 8 E) 9

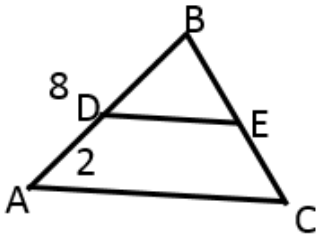
(1997-4-45) To‘g'ri burchakli uchburchak gipotenuzasining shu gipotenuzaga tushirilgan medianaga nisbatini toping.

A) 3 B) 4 C) 2,5 D) 2 E) 1,5

(1997-4-46) Uchburchak ikki burchagi yig'indisining sinusi $\frac{1}{3}$ bo‘lsa, uchinchi burchagining sinusini toping.

A) $\frac{2}{3}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{3}{4}$ E) $\frac{1}{2}$

(1997-4-54) Rasmdagi ABC uchburchakda $AB = 8$ va $AD = 2$ bo‘lsa, ABC va DBE uchburchaklar yuzlarining nisbatini toping.



A) 2 B) $2\frac{1}{5}$ C) $1\frac{5}{7}$ D) $1\frac{7}{9}$ E) $1\frac{8}{9}$

(1997-5-43) Agar uchburchakning A, B va C burchaklari 1;2 va 3 sonlariga proporsional bo‘lsa, B burchakni toping.

A) 30° B) 60° C) 90° D) 45° E) 120°

(1997-5-45) Teng yonli uchburchakning balandligi 4 ga , asosi 6 ga teng. Uning yon tomonini toping.

A) 5,5 B) 7 C) 5 D) 9 E) 4,5

(1997-5-49) To‘g'ri burchakli uchburchakning kateti 2 ga, bu katet qarshisidagi burchak $60°$ ga teng. Shu uchburchakning gipotenuzasini toping.

A) 4 B) $\frac{4\sqrt{3}}{3}$ C) $2\sqrt{3}$ D) $\sqrt{3}$ E) $\frac{\sqrt{3}}{2}$

(1997-5-52) Nuqtadan tekislikka ikkita og'ma o‘tkazilgan. Agar og'malar 1:2 ga teng nisbatda bo‘lib, ularning proeksiyalari 1 va 7 ga teng bo‘lsa, og'malarning uzunligini toping.

A) 2; 4 B) 3;6 C) 4; 8 D) 5; 10 E) 1; 2

(1997-8-38) Ikkita o‘xshash ko‘pburchak yuzlarining nisbati 9:4 ga teng. Kichik ko‘pburchakning perimetri 4 sm. Katta ko‘pburchakning perimetrini toping.

A) 9 B) 8 C) 6 D) 4 E) 10

(1997-8-39) Uchburchak tomonlarining uzunliklari a, b va c tomonlari orasida $a^2 = b^2 + c^2 + \sqrt{3}bc$ tenglikni qanoatlantiradi. Uzunligi a ga teng tomon qarshisidagi burchakni toping.

A) $135°$ B) $140°$ C) $125°$ D) $150°$ E) $120°$

(1997-11-29) Teng yonli uchburchakning yon tomoni 25 ga teng. Asosiga tushirilgan balandligi asosidan 25 ga kam. Shu uchburchakning asosini toping.

A) 44 B) 30 C) 35 D) 40 E) 48

(1997-10-36) Uchburchakning ikkita burchagining kattaliklari nisbati 3:2 ga teng. Uchinchi burchagi shu burchaklarning kattasidan $60°$ ga kichik. Uchburchakning kichik burchagini toping.

A) $50°$ B) $45°$ C) $40°$ D) $30°$ E) $15°$

(1997-10-38) Uchburchakning katetlaridan biri 6 ga teng, ikkinchisi gipotenuzadan 2 ga kam. Uchburchakning yuzini toping.

A) 24 B) 18 C) 15 D) 12 E) 30

(1997-10-29) Bir nuqtadan tekislikka uzunliklari 4 va 8 bo‘lgan ikkita og'ma tushirilgan. Og'malar proeksiyalarining nisbati 1:7 ga teng. Berilgan nuqtadan tekislikkacha bo‘lgan masofani toping.

A) 3 B) $2\sqrt{3}$ B) $\sqrt{15}$ D) 2,5 E) 1,8

(1997-10-45) Katelarining nisbati 2:3 bo‘lgan tog'ri burchakli uchburchak balandligi gipotenuzasini uzunliklaridan biri 2 ga kam bo‘lgan bo‘laklarga ajratadi. Gipotenuzaning bo‘laklarini toping.

A) 2 va 4 B) 5 va 3 C) 0,9 va 3,9 D) 1,6 va 3,6 E) 2,8 va 4,8

(1997-12-39) Uchburchakning a, b va c tomonlari orasida $a^2 = b^2 + c^2 - \sqrt{3}bc$ bog'lanish mavjud. Uzunligi a ga teng tomon qarshisidagi burchakni toping.

A) $60°$ B) $45°$ C) $150°$ D) $135°$ E) $30°$

(1997-12-14) Quyidagi mulohazalardan qaysi biri noto‘g'ri?

A) Agar ikkita uchburchakning balandliklari teng bo‘lsa, bu uchburchaklar tengdir.

B) Agar ikki to‘g'ri chiziqni uchinchi to‘g'ri chiziq kesib o‘tganda bir tomondagi tashqi burchaklar yigindisi $180°$ ga teng bo‘lsa, bu ikki to‘g'ri chiziq paraleldir.

C) To‘g'ri chiziqdan tashqarida yotgan nuqtadan bu to‘g'ri chiziqqa faqat bitta perpendikulyar to‘g'ri chiziq o‘tqazish mumkin.

D) Uchburchakning barcha tashqi burchaklari yig'indisi $180°$ ga teng.

E) Agar ikki uchburchakning uch tomoni ikkinchi uchburchkning uch tomoniga mos ravishda teng bolsa, bu uchburchaklar tengdir.

(1997-8-18) Teng yonli uchburchakning uchidagi burchagi $80°$ ga teng. Yon tomonga o‘tkazilgan balandlik va asosi orasidagi burchakni toping.

A) $35°$ B) $45°$ C) $30°$ D) $40°$ E) $50°$

(1997-8-29) Muntazam uchburchakning bissektrissasi 21 ga teng. Bu uchburchakka ichki chizilgan aylananing radiusini toping.

A) 10 B) 12 C) 7 D) 8 E) 14

(1997-8-15) Quyidagi munosabatlardan qaysi biri noto‘g'ri?

A) Teng tomonli uchburchakning balandliklari kesisish nuqtasida 2:1 nisbatda bo‘ladi

B) Agar ikkita teng yonli uchburchakning asoslari va asoslaridagi burchaklari teng bo‘lsa, bunday uchburchaklar tengdir

C) Qavariq beshburchakning ichki burchaklarining yig'indisi $540°$ ga teng

D) Ikki qo‘shni burchakning yig'indisi $180°$ ga teng

E) Agar bir uchburchakning bir tomoni va shu tomon qarshisidagi burchagi ikkinchi uchburchakning bir tomoni va shu tomon qarshisidagi burchagiga mos ravishda teng bo‘lsa, bu uchburchaklar tengdir

(1997-7-36) Uchburchak ikkita burchagining qiymatlari nisbati 5:9 kabi, uchinchi burchagi shu burchaklarning kichigidan $10°$ ga kichik. Uchburchakning eng kichik burchagini toping.

A) $30°$ B) $40°$ C) $45°$ D) $50°$ E) $20°$

(1997-7-45) Gipotenuzasi 50 ga teng bo‘lgan to‘g'ri burchakli uchburchakning katetlari nisbati 4:3 ga teng. Gipotenuzaga tushirilgan balandlik uni qanday kesmalarga ajratadi?

A) 20 va 30 B) 15 va 35 C) 18 va 32

D) 12 va 38 E) 14 va 36

(1997-7-46) Ikkita o‘xshash uchburchakning perimetrlari 18 va36 ga, yuzlarining yig'indisi 30 ga teng. Katta uchburchakning yuzini toping.

A) 20 B) 24 C) 21 D) 18 E) 25

(1997-7-49) Bir nuqtadan tekislikka ikkita og'ma tushirilgan. Agar og'malar uzunliklarining nisbati 5:6 ga, og'malarga mos proeksiyalarining uzunliklari 4 va $3\sqrt{3}$ ga teng bo‘lsa, berilgan nuqtadan tekislikkacha bo‘lgan masofani toping.

A) 2,5 B) 3 C) $2\sqrt{3}$ D) 1,8 E) $3\sqrt{2}$

(1997-6-73) Uchburchakning burchaklari qiymatlari 1:2:3 nisbatda, katta tomoni $4\sqrt{3}$ ga teng. Uchburchakning perimetrini toping.

A) $8+3\sqrt{3}$ B) $3(2+\sqrt{3})$ C) $11\sqrt{3}$

D) $9+4\sqrt{3}$ E) $6+6\sqrt{3}$

(1997-6-75) Uchburchakning bir tomoni 17 ga unga yopishgan burchaklari $103°$ va $47°$ ga teng. Uchburchakka tashqi chizilgan aylana radiusini toping.

A) 8,5 B) $8{,}5\sqrt{3}$ C) $17\sqrt{2}$ D) 17 E) $17\sqrt{3}$

(1997-6-66) ABC muntazam uchburchakning AC tomoni orqali α tekislik o‘tkazilgan. Uchburchakning BD balandligi tekislik bilan $30°$ li burchak tashkil etadi. AB to‘g'ri chiziq bilan tekislik orasidagi burchak topilsin.

A) $\frac{\sqrt{3}}{2}$ B) $\frac{\sqrt{3}}{4}$ C) $\frac{1}{2}$ D) $\frac{1}{4}$ E) tog'ri javob yo‘q

(1997-6-67) ABC uchburchakning tog'ri burchakli uchi C dan uchburchakka perpendikulyar $''a„$ to‘g'ri chiziq o‘tkazilgan. AC=15, BC=20. a va A to‘g'ri chiziqlar orasidagi masofa topilsin.

A) 10 B) 12 C) 16 D) 20 E) 12,5

(1997-6-29) Balndligi 6 ga teng bo‘lgan teng yonli uchburchakning asosi yon tomonidan 6 ga ortiq. Uchburchakning asosini toping.

A) 16 B) 15 C) 18 D) 24 E) 20

(1997-9-54) To‘g'ri burchakli uchburchak to‘g'ri burchagining bissektrissasi gipotenuzani 1:5 nisbatda bo‘ladi?

A) 25:1 B) 1:25 C) 1:5 D) 5:1 E) 1:6

(1997-9-55) Tomoni 84 bo‘lgan teng tomonli uchburchakka tashqi chizilgan aylananing radiusini toping.

A) $25\sqrt{3}$ B) $28\sqrt{3}$ C) $26\sqrt{3}$ D) $42\sqrt{3}$ E) $24\sqrt{3}$

(1997-6-33) Uchburchak burchaklarning kattaliklari nisbati 2:3:1 kabi, kichik tomoning uzunligi es 5 ga teng. Uchburchakning katta tomoni uzunligini toping.

A) 13 B) 25 C) 10 D) $5\sqrt{2}$ E) $12\sqrt{3}$

(1997-6-34) Teng yonli uchburchakning burchagi β ga, asosiga tushirilgan balandligi m ga teng.Uchburchakning yon tomoniga tushirilgan balandligini toping.

A) $2msin\frac{\beta}{2}$ B) $mcos\frac{\beta}{2}$ C) $2mcos\beta$

D) $mtg\beta$ E) $msin\frac{\beta}{2}$

(1997-9-57) Uchburchakning ikkita tomoni 0,5 va 7,9 ga teng. Uchinchi tomonining uzunligi butun son ekanligini bilgan holda shu tomonni toping.

A) 8 B) 7 C) 6 D) 5 E) 4

(1997-9-51) AB kesmaning A oxiridan tekislik o‘tkazilgan. Shu kesmaning B oxiridan va C nuqtasidan tekislikni B_1 va C_1 nuqtalarda kesuvchi paralel to‘g'ri chiziqlar o‘tkazilgan.

Agar AB=8 $CC_1 : AC = 3:4$ bo‘lsa, BB_1 kesmaning uzunligini toping.

A) 3 B) 5 C) 4 D) 6 E) 8

(1997-9-52) Nuqtadan tekislikka ikkita og'ma o‘tkazilgan. Og'malar 3:5 ga teng nisbatda bo‘lib, ularning proeksiyalari $\sqrt{33}$ va 17 ga teng. Og'malarning uzunligini toping.

A) 2;10 B) 3;5 C) 3;15 D) 5;25 E) 12;20

(1997-9-43) Agar uchburchakning burchaklari 5, 6 va 7 sonlariga proporsional bo‘lsa, uchburchakning katta burchagini toping.

A) $75°$ B) $80°$ C) $50°$ D) $40°$ E) $70°$

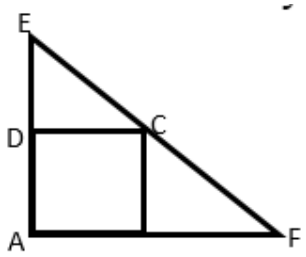
(1997-9-45) Teng yonli uchburchakning asosi 48 ga, unga tushirilgan balandligi 7 ga teng. Uchburchakning yon tomonini toping.

A) 25 B) 27 C) 18 D) 19 E) 15

(1997-9-49) To‘g'ri burchakli uchburchakning bitta kateti 2 ga, bu katet qarshisidagi burchak $60°$ ga teng. Ikkinchi katetni toping.

A) $\sqrt{3}$ B) $2\sqrt{2}$ C) $\frac{2\sqrt{3}}{3}$ D) $\frac{\sqrt{2}}{2}$ E) $\frac{\sqrt{3}}{2}$

(1997-9-108) Rasmdagi ABCD kvadratning A uchidan AE va EF to‘g'ri chiziqlar, Cuchidan esa BD dioganalga paralel bo‘lgan CF to‘g'ri chiziq o‘tkazilgan. Agar kvadrating yuzi 3 ga teng bo‘lsa, AFE uchburchak yuzini toping.



A) 5 B) 6 C) 7 D) 9 E) 8

(1997-9-106) Uchburchak ikki burchagi yig'indisining kotangensi $\frac{1}{6}$ bo‘lsa, uchinchi burchagining kotangensini toping.

A) $\frac{1}{6}$ B)$\frac{1}{4}$ C)$\frac{1}{5}$ D)$-\frac{1}{6}$ E)$-\frac{1}{4}$

(1997-11-34) Teng yonli uchburchakning asosi a ga, uchidagi burchagi α ga teng. Uchburchakning yon tomoniga tushirilgan balandligini toping.

A) $\frac{a}{2sin\frac{\alpha}{2}}$ B) $\frac{acos\frac{\alpha}{2}}{2}$ C) $asin\frac{\alpha}{2}$ D) $\frac{atg\frac{\alpha}{2}}{2}$ E) $acos\frac{\alpha}{2}$

(1997-11-32) To‘g'ri burchakli uchburchakning katetlari 24 va 7 ga teng. Kichik katetning gipotenuzadagi proeksiyasini toping.

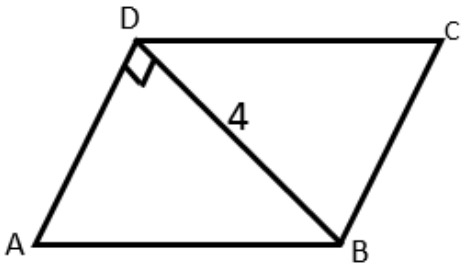
A) $3\frac{2}{7}$ B) 5 C) $2\frac{4}{25}$ D) $1\frac{24}{25}$ E)3

(1996-9-100) Parallelogrammning tomonlari a va b ga, o‘tmas burchagi α ga teng. Parallelogrammning yuzini hisoblash uchun quyidagi ifodalardan qaysi biri to‘g'ri?

A) $abcos\alpha$ B)$\frac{1}{2}abcos\alpha$ C) $absin\alpha$

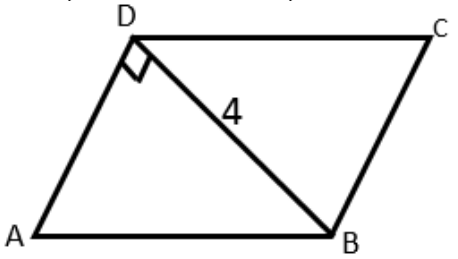
D)$\frac{ab}{2sin\alpha}$ E)$\frac{1}{2}absin\alpha$

(1996-12-106) $ABCD$ parallelogrammda $AD||BC,\ S_{ABCD}=12sm^2$.
$DB=4sm,\ \ AB=?$



A) 6cm B) 7 sm C) 5,5sm D) 5sm E) 6,5sm

(1996-12-106) $ABCD$ parallelogrammda $AD||BC,\ S_{ABCD}=12sm^2$.
$DB=4sm,\ \ AB=?$



A) 6cm B) 7 sm C) 5,5sm D) 5sm E) 6,5sm

(1997-7-48) Ikkita burchagi yig'indisi 100° ga teng bo‘lgan parallelogrammning katta burchagini toping.

A) 100° B) 110° C) 120° D) 130° E) 150°

(1997-3-44) Parallelogrammning burchklaridan biri 150° ga teng. Uning 6 ga teng bo‘lgan diagonali tomoniga perpendikulyar. Parallelogrammning perimetrini toping.

A) 36 B) 48 C)$12(2+\sqrt{3})$ D) 36 E) $36\sqrt{3}$

(1997-11-30) Perimetri 60 ga teng bo‘lgan parallelogrammning tomonlar nisbati 2:3 ga, o‘tkir burchagi esa 30° ga teng. Parallelogrammning yuzini toping.

A) 108 B) 54 C) 96 D) $48\sqrt{3}$ E) $54\sqrt{3}$

(1997-10-44) Burchaklaridan biri 45° bo‘lgan parallelogrammning 4 ga teng diagonali tomoniga perpendikulyar. Parallelogrammning perimetrini toping.

A)32 B)$8(1+\sqrt{2})$ C)$16\sqrt{2}$ D)$4+8\sqrt{2}$ E)24

(1997-5-50) Kvadratni tomoni necha marta kamaytirilsa yuzi 4 marta kichrayadi?

A) 1,5 B) 2 C) 2,5 D) 3 E) 3,5

(1997-9-1) To‘g'ri to‘rtburchakning eni 5 ga teng, bo‘yi undan 7 ga ortiq. To‘g'ri to‘rtburchakning perimetrini toping.

A) 32 B) 34 C) 24 D) 26 E) 30

(1996-10-43) To‘rtburchakning burchaklaridan biri to‘g'ri burchak, qolganlari esa o‘zaro 4: 2: 3 nisbatda. To‘rtburchakning kichik burchagini toping.

A) 30° B) 45° C) 50° D) 60° E) 80°

(1997-9-1) To‘g'ri to‘rtburchakning eni 7 ga teng, bo‘yi undan 3 ga ortiq. To‘g'ri to‘rtburchakning perimetrini toping.

A) 22 B) 20 C) 34 D) 30 E) 32

(1997-7-63) 18 ta gugurt cho‘pidan ularni sindirmay eng katta yuzali to‘g'ri to‘rtburchak yasalgan. Shu to‘g'ri to‘rtburchakning yuzini toping.

A) 16 B) 20 C) 24 D) 28 E) 30

(1996-7-48) Rombning diagonali tomoni bilan $25°$ li burchak tashkil qiladi. Rombning katta burchagini toping.

A) $165°$ B) $150°$ C) $130°$ D) $120°$ E) $115°$

(1996-9-40) Tomoni 4 sm bo‘lgan rombga ichki chizilgan aylananing radiusi 1 sm. Rombning o‘tkir burchagi kosinusini toping.

A) $\frac{1}{4}$ B) $\frac{\sqrt{3}}{3}$ C) $\frac{2}{3}$ D) $\frac{\sqrt{3}}{4}$ E) $\frac{\sqrt{3}}{2}$

(1997-10-48) Romb diagonallarining tomonlari bilan hosil qilgan burchaklari kattaliklarining nisbati 2:7 ga teng. Rombning kichik burchagini toping.

A) $20°$ B) $30°$ C) $40°$ D) $60°$ E) $70°$

(1997-3-47) Rombning yuzi 24 ga, diagonallaridan biri 6 ga teng.Uning tomonini toping.

A) 10 B) 5 C) 8 D) 4,8 E) 6

(1996-9-95) Trapetsiyaig kichik asosi 4 sm. O‘rta chizig'i katta asosidan 4 sm qisqa. Trapetsiyaining o‘rta chizig'ini toping.

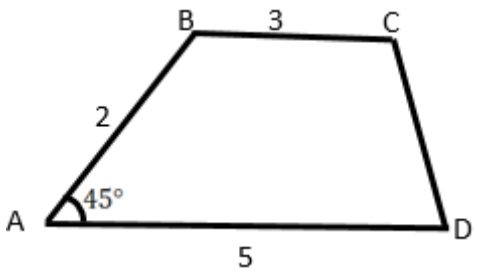
A) 6 B) 10 C) 8 D) 9 E) 12

(1996-10-46) Teng yonli trapetsiyaning asoslari 6 va 18 ga, diagoallarining kesishish nuqtasida diagonal qanday uzunlikdagi kesmalarga ajraladi?

A) 4 va 8 B) 3va 9 C) 2 va 10

D) 5va7 E) 3,5 va8,5

(1996-11-49) Rasmda berilgan trapetsiyaning yuzini toping (AD//BC) .



A) $4\sqrt{2}$ B) $6\sqrt{2}$ C) $5\sqrt{2}$ D) $\frac{5\sqrt{2}}{2}$ E) $2\sqrt{2}$

(19997-3-43) Teng yonli trapetsiyaning asoslari10 va 20 ga, asosidagi burchagi $60°$ ga teng. Shu trapetsiyaning yuzini toping.

A) $500\sqrt{3}$ B) $75\sqrt{3}$ C) $25\sqrt{3}$ D) $\frac{250\sqrt{3}}{3}$ E) 150

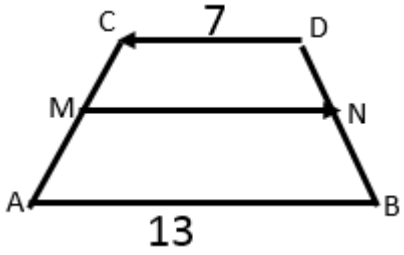
(1997-7-43) Teng yonli trapetsiyaning asoslari 16 va 8 ga, o‘tmas burchagi $150°$ ga teng. Shu trapetsiyaning yuzini toping.

A) $32\sqrt{3}$ B) $\frac{68}{\sqrt{3}}$ C) $16\sqrt{3}$ D) $\frac{34\sqrt{3}}{3}$ E) 34

(1997-6-38) Teng yonli trapetsiyaning asoslari 4,2 va 5,4 ga, kichik asosining burchagi esa $135°$ ga teng. Trapetsiyaning yuzini toping.

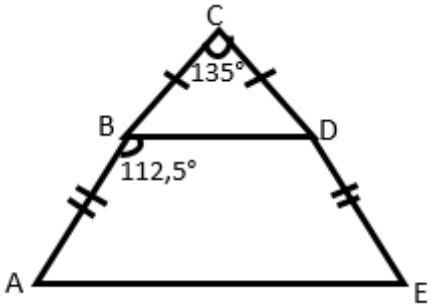
A) 24,8 B) 9,6 C) 16,8 D) 4,8 E) 2,88

(1997-9-47) Trapetsiyada MN o‘rta chiziq, $AB = 13, CD = 7$ va $\overrightarrow{DC} = \gamma\overrightarrow{MN}$ bo‘lsa, γ nimaga teng?



A) 0,6 B) -0,6 C) 0,7 D) -0,7 E) 0,8

(1997-9-11) Rasmdagi BCD teng yonli uchburchakning BCD burchagi $135°$, ABDE teng yonli trapetsiyaning ABD burchagi



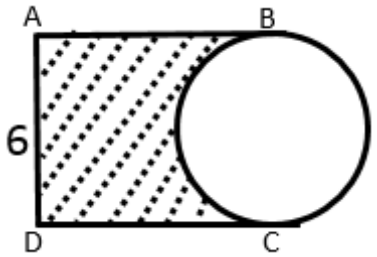
112,5° bo‘lsa, $\frac{AB}{BC}$ nisbaatni hisoblang.

A) 2 B) 3 C) 1,5 D) hisoblab bo‘lmaydi E) 0,5

(1997-10-43) Asoslari 12 va 16 ga, o‘tmas urchagi 120° ga teng bo‘lgan teng yonli trapetsiyaning yuzini toping.

A) $56\sqrt{3}$ B) $\frac{56}{\sqrt{3}}$ C) $28\sqrt{3}$ D) 14 E) 42

(1996-11-12) Rasmda tasvirlangan shaklning shtrixlangan qismini P perimetri va S yuzasini aniqlang. Bunda ABCD kvadratning tomoni 6 sm ga teng. ($\pi = 3$ ga teng deb olinsin.)



A) $P = 33sm,\ S = 22sm^2$ B) $P = 27sm,\ S = 22{,}5sm^2$

C) $P = 27sm, S = 27sm^2$ D) $P = 22{,}5sm, S = 22{,}5sm^2$

E) $P = 22{,}5sm,\ S = 33sm^2$

(1996-9-32) $x^2 + y^2 + 4x - 6y - 3 = 0$ tenglama bilan berilgan aylananing markazini toping.

A) (-2;3) B) (2;-3) C) (4;-3) D) (-4;6) E) (4;-6)

(1996-11-47) Aylananing markaziy burchagi 90°, u tiralgan yoy uzunligi 15 sm bo‘lsa, aylananing radiusi necha sm?

A) $\frac{15}{\pi}$ B) $\frac{18}{\pi}$ C) $\frac{24}{\pi}$ D) $\frac{30}{\pi}$ E) $\frac{36}{\pi}$

(1996-12-36) $x^2 + y^2 - 4x + 6y - 3 = 0$ tenglama bilan berilgan aylananing markazini toping.

A) (-4;-3) B) (4;-4) C) (-4;6) D) (2;-3) E) (-2;3)

(1996-12-102) R radiusli aylanaga tashqi chizilgan muntazam oltiburchakning tomonini toping.

A) $\frac{2\sqrt{2-\sqrt{3}}}{\sqrt{2+\sqrt{3}}}R$ B) $\frac{2\sqrt{3}}{3}R$ C) $1{,}5R$

D) $1{,}2R$ E) $\frac{2\sqrt{2-\sqrt{2}}}{\sqrt{2+\sqrt{2}}}R$

(1996-13-37) $x^2+y^2-4x-6y-3=0$ tenglama bilan berilgan aylananing radiusini toping.

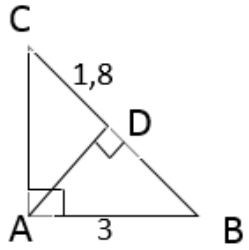
A) 3 B) 5 C) 6 D) 3,5 E) 4

(1996-13-42) R radiusli aylnaga ichki chizilgan muntazam sakkizburchakning tomonini toping.

A) $R\sqrt{2-\sqrt{2}}$ B) $R\sqrt{2-\sqrt{3}}$ C) $R\sqrt{2-\sqrt{2}}$

D) $\frac{R\sqrt{2}}{2}$ E) $R\sqrt{\frac{5-\sqrt{5}}{2}}$

(1996-13-45) AB=3 sm, DB=1,8 sm ABC uchburchakka tashqi chizilgan aylananing radiusini toping.



A) 2 B) 3 C) 2,2 D) 2,5 E) 2,7

(1997-5-3) Soatning minut mili 9 minutda necha gradusga buriladi?

A) 15° B) 30° C) 25° D) 54° E) 60°

(1997-5-46) A(10;6) aylanadagi nuqta C(1;-6) nuqta aylananing markazi bo‘lsa, aylananing radiusini toping.

A) 14 B) 13 C) 16 D) 15 E) 17

(1997-5-42) Markaziy burchakka mos aylananing $\frac{1}{6}$ qismiga teng. Shu markaziy burchakni toping.

A) 45° B) 60° C) 90° D) 30° E) 120°

(1997-5-48) Radiusi 1 ga teng aylana uchta yoyga bo‘lingan. Ularga mos markaziy burchaklar 1;2 va 6 sonlarga proporsional. Yoylardan eng kattasii uzuligini toping.

A) $\frac{4\pi}{3}$ B) $\frac{3\pi}{4}$ C) $\frac{2\pi}{9}$ D) $\frac{5\pi}{9}$ E) $\frac{4\pi}{9}$

(1997-8-19) Aylananing MN vatari $140°$ li yoyni tortib turadi. MN vatar o‘zi tortib turgan yoyning ixtiyoriy nuqtasidan qanday burchak ostida ko‘rinadi?

A) $270°$ B) $70°$ C) $100°$ D) $110°$ E) $120°$

(1997-8-28) Aylananing uzunligi $18\pi\sqrt{2}$ ga teng. Aylanadagi AB vatar $90°$ li yoyni tortib turadi. Vatarning uzunligini toping.

A) 8 B) 18 C) 16 D) 15 E) 8,5

(1996-6-60) Kubning qirrasi 6 ga teng. Kubga ichki chizilgan sharning hajmini toping.

A) 12π B) 36π C) 27π D) 12π E) 26π

(1996-3-108) Kub uchun necha simmetriya tekisligi mavjud?

A) 8 B) 9 C) 7 D) 10 E) 6

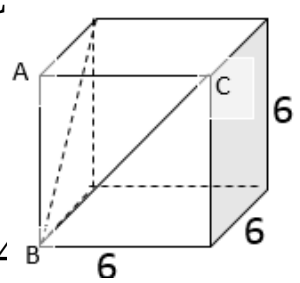
(1996-13-50) Ixtiyoriy to‘g‘ri burchakli paralellepiped uchun kamida nechta simmetriya tekisligi mavjud?

A) 4 B) 2 C) 3 D) 5 E) 1

(1997-2-8) Kuning barcha qirralari yig‘nidisi 48 ga teng. Kub sirtining yuzini toping.

A) 96 B) 24 C) 36 D) 48 E) 56

(1997-9-58) Qirrasi 6 ga teng kub A,B va C nuqtalardan o‘tuvchi tekislik bilan ikki bo‘lakka bo‘ligan. Kichik bo‘lakning hajmi nimaga teng?



A) 25 B) 36 C) 49 D) 64

(1997-12-8) Kub to‘la sirtining yuzi 96 ga teng. Kubnining hajmini toping.

A) 60 B) 62 C) 64 D) 66 E) 68

(1997-3-51) Uchburchakli to‘g‘ri prizmaning asosi tomonlari 29, 25 va 6 ga, yon qirrasi esa asosining katta balandligiga teng. Prizmaning hajmini toping.

A) 1425 B) 878 C) 400 D) 1200 E) 600

Eslatma: Katta balandlik kichik tomonga, kichik balandlik katta tomonga tushadi.

(1997-8-58) Balandliklari $h_1 < h_2 < h_3 < h_4$ shartni qanoatlantiradigan tengdosh prizmalar asoslarining yuzlari S_1, S_2, S_3 va S_4 uchun quyidagi munosabatlardan qaysi biri o‘rinli?

A) $S_1 < S_2 < S_3 < S_4$ B) $S_1 > S_3 > S_2 > S_4$

C) $S_1 > S_2 > S_3 > S_4$ D) $S_1 < S_3 < S_2 < S_4$

E) $S_1 > S_2 > S_4 > S_3$

(1997-7-51) Uchburchakli to‘g‘ri prizma asosining tomonlari 15; 20 va 25 ga , yon qirrasi asosining kichik balandligiga teng. Prizmaning hajmini toping.

A) 600 B) 750 C) 1800 D) 1200 E) 1440

(1997-6-42) Muntazam to‘rtburchakli prizma asosining tomoni $\sqrt{2}$ ga, diagonali bilan yon yog‘ining orasidagi burchak esa $30°$ ga teng. Prizmaning hajmini toping.

A) $8\sqrt{2}$ B) 4 C) 16 D) $4\sqrt{2}$ E) 6

(1997-10-51) Asosining tomonlari 10; 17 va 51 bo‘lgan uchburchakli to‘g‘ri prizmaning yon qirrasi asosining kichik balandligiga teng. Prizmaning hajmini toping.

A) 224 B) 672 C) 840 D) 368 E) 1680

(1996-9-43) Chiziqli o‘lchovlari 3; 4 va $2\sqrt{14}$ sm bo‘lgan to‘g‘ri burchakli paralellepipedning diagonali necha sm?

A) 8 B) 7 C) 10 D) 9 E) 6

(1996-10-53) To‘g‘ri burchakli parallelepiped asosining tomonlari7 va 24 sm, balandligi esa 8 sm. Diagonal kesim yuzini toping.

A) 168 B) 1344 C) 100 D) 200 E) 672

(1996-12-104) Asosi kvadrat bo‘lgan to‘g‘ri burchakli parallelepiped uchun nechta simmetriya tekisligi mavjud?

A) 9 B) 7 C) 3 D) 5 E) 4

(1997-6-39) To‘g‘ri parallelepiped asosining tomonlari 3 va 5 ga teng bo‘lib, $60°$li burchak tashkil etadi.

Parallelepipedning yon qirrasi $7\sqrt{2}$ ga teng bo‘lsa, katta diagonali bilan asos tekisligi orasidagi burchakni toping.

A) $45°$ B) $arctg\sqrt{2}$ C) $30°$ D) $60°$ E) $arctg2$

(1997-11-39) To‘g‘ri parallelepiped asosining tomonlari 6 va $\sqrt{3}$ ga teng bo‘lib, $30°$ li burchak tashkil qiladi.

Parallelepipedning kichik diagonali $\sqrt{42}$ ga teng. Shu diagonalning asos tekisligi bilan hosil qilgan burchagini toping.

A) $arctg\sqrt{2}$ B) $45°$ C) $60°$ D) $30°$ E) $arccos\frac{1}{4}$

(1996-6-58) Piramidaning yon qirralari o‘zaro teng. Quyidagi figuralardan qaysi biri piramidaing asosi bo‘laolmaydi?

A) kvadrat B) to‘g‘ri to‘rtburchak C) uchburchak D) romb E) muntazam ko‘pburchak

(1996-9-44) Muntazam to‘rtburchakli kesik piramida asoslarining tomonlari 3 va 7 sm, diagonali 10 sm. Kesik piramidaning balandligi necha sm?

A) 5 B) $5\sqrt{2}$ C) $4\sqrt{2}$ D) 4 E) $6\sqrt{2}$

(1996-11-53) To‘rtburchakli muntazam piramida asosining tomoni 4 marta kattalashtirildi, balandligi esa 4 marta kichiklashtirildi. Hosil bo‘lgan piramida hajmining dastlabki piramida hajmiga nisbatini toping.

A) 1:16 B) 16:1 C) 1:1 D) 1:4 E) 4:1

(1996-12-55) To‘rtburchakli muntazam piramida asosining tomoni 3 marta kattalashtirildi, balandligi esa 3 marta kichiklashtirildi. Hosil bo‘lgan piramida hajmining dastlabki piramida hajmiga nisbatini toping.

A) 3:1 B) 1:3 C) 9:1 D) 1:9 E) 1:1

(1996-12-83) Muntazam to‘rtburchakli kesik piramida asoslarining tomonlari 4 va 8 sm, diagonali 12 sm. Kesik piramida balandligini toping.

A) 3 B) $6\sqrt{2}$ C) 5 D) 4,5 E) 3,5

(1997-1-43) Quyida keltirilgan parallelogrammning qaysilari barcha yon yoqlari asos tekisligi bilan bir xil burchak tashkil qiladigan piramidaning asosi bo‘lishi mumkin?

A) ixtiyoriy parallelogramm B) faqat kvadrat
C) romb yoki kvadrat D) faqat to‘g‘ri to‘rtburchak
E) kvadrat yoki to‘g‘ri to‘rtburchak

(1997-2-58) Piramidaning yon yoqlari asos bilan bir xil burchak tashkil qiladi. Quyidagi ko‘pburchaklardan qaysi biri piramidaning asosi bo‘lolmaydi?

A) romb B) uchburchak C) kvadrat
D) to‘g‘ri to‘rtburchak E) muntazam oltiburchak

(1997-8-55) Muntazam piramida yon sirtining yuzi 96 ga, asosining perimetri 24 ga teng. Piramida apofemasini toping.

A) 16 B) 10 C) 6 D) 8 E) 12

(1997-8-59) Piramidaning yon qirralari asos tekisligi bilan bir xil burchak tashkil etadi. Quyidagi ko‘pburchaklardan qaysi biri piramidaning asosi bo‘lolmaydi?

A) uchburchak B) muntazam oltiburchak
C) to‘g‘ri to‘rtburchak D) kvadrat E) romb

(1997-7-53) Hajmi 48 bo‘lgan to‘rtburchakli muntazam piramida asosining tomoni 6 ga teng. Piramida yon sirtining yuzini toping.

A) 144 B) 60 C) 72 D) 120 E) 96

(1996-13-52) Muntazam to‘rtburchakli kesik piramida asoslarining tomonlari 3 va 5 sm, diagonali 9 sm. Kesik piramida balandligi echa sm?

A) 6 B) 7 C) 5 D) 8 E) 6,5

(1997-10-53) Hajmi 1296 bo‘lgan to‘rtburchakli muntazam piramida asosining tomoi 18 ga teng. Piramidaning yon sirti yuzini toping.

A) 540 B) 1080 C) 360 D) 900 E) 450

(1997-12-61) Muntazam uchurchakli piramidaning balandligi 4 ga, asosining balandligi esa 4,5 ga teng. Piramidaning yon qirrasini toping.

A) 6 B) 6,5 C) 5 D) 5,5 E) 5,3

(1997-12-56) Piramidaning uchidan yon tomonlariga tushirilgan balandliklari o‘zaro teng. Quyidagi figuralardan qaysi biri piramidaning asosida yota olmaydi?

A) Romb B) muntazam oltiburchak C) uchburchak
D) to‘g‘ri to‘rtburchak E) kvadrat

(1996-12-56) Konus asosining radiusi $\frac{\sqrt{3}}{2}$ ga teng. Konusning yasovchisi bilan uning asos tekisligi orasidagi burchak qanday bo‘lganda konus yon sirtining yuzi $\frac{\pi}{\sqrt{3}}$ ga teng bo‘ladi?

A) $arccos\frac{1}{\sqrt{3}}$ B) $arccos\frac{1}{3}$ C) $45°$ D) $30°$ E) $60°$

(1997-10-52) Yasovchisi 10 ga, asosining radiusi 6 ga teng bo‘lgan konusga ichki chizilgan sharning radiusini toping.

A) 3 B) 4 C) $3\sqrt{3}$ D) $2\sqrt{2}$ E) $3\frac{1}{3}$

(1997-12-59) Sharga tashqi chizilgan kesik konusning yasovchilari o‘rtalaridan o‘tuvchi tekislik ilan shu kesik konus hosil qilgan kesimning yuzi 4π ga teng. Kesik konusning yasovchisini toping.

A) 2 B) 4 C) 3 D) 5 E) 6

(1997-12-60) Yasovchisi 5 ga, balandligi 4 ga teng bo‘lgan konus asosidan 2 ga teng masofada shu asosga paralel tekislik bilan kesildi. Hosil bo‘lgan kesimning yuzini hisoblang.

A) $2{,}25\pi$ B) $3{,}16\pi$ C) $2{,}64\pi$ D) $1{,}81\pi$ E) $3{,}26\pi$

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