Pirnazar DAVRONOV

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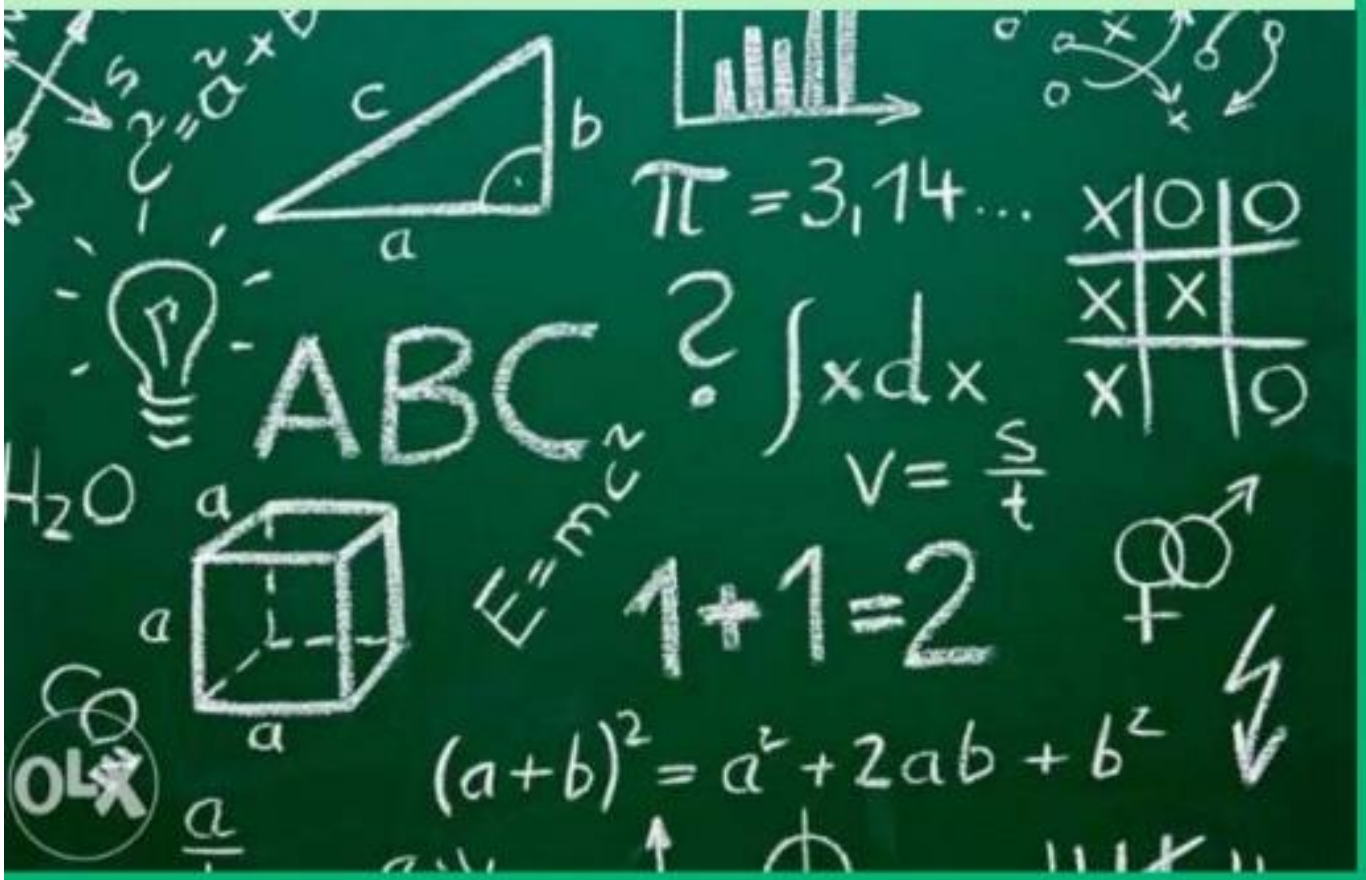
MISOL VA MASALALAR YECHISH

4-KITOB



O‘ZBEKISTON RESPUBLIKASI
MAKTABGACHA VA MAKTAB TA’LIMI VAZIRLIGI

SAMARQAND VILOYATI PEDAGOGLARNI YANGI
METODIKALARGA O‘RGATISH MILLIY MARKAZI

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S**.Jumayev** – Samarqand viloyati Nurobod tumani xalq ta’limi bo‘limiga qarashli 21- umumiy o‘rta ta’lim maktabi matematika fani o‘qituvchisi.

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 kitoblarning foydasi tegsa, o‘zimizni qo‘yilgan maqsadimizga erishgan hisoblardik.

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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 oily 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 pedagoglarni yangi metodikalarga o‘rgatish milliy 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‘qituvchilarning 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 farzahdingiz. 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 karim yod olingan; 2) qonun, ya’ni shariat ilmi; 3) hisob (matematika); 4) falsafa; 5) mantiq; 6) tib; 7) tabbiiy fanlar 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 Prizidenti Shavkat Mirziyoyv 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 mavqeni oshirishga qaratilgan. Jumladan, O‘zbekiston Republikasi Prezidenti Shavkat Mirziyoyv 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.

Biroq, 2022-yilda Respublikamiz oily o‘quv yurtlariga hujjat topshirgan 1 073 821 abituriyintlardan 51,2 foizi, ya‘ni 550 102 nafarining test natijalari o‘ta afsuslanarli, biz pedagoglar uchun esa uyat bo‘ldi. Ular ko‘rsatgan test natijalari 56,7 ballga ham yitmadi.

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, o‘zluksiz 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.

“Matematikadan misol va masalalar yechish” nomli 4-kitob, 2000-yilda davlat test markazi tomonidan e’lon qilingan 10 ta axborotnomalarning 642 ta misol va masalalari, javoblar variantlari, yechimlar, to‘g‘ri javiblar, foydalanilgan adabiyotlar ro‘yxati hamda mundarijadan iborat.

Xulosa qilib aytganda, barchamiz birgalikda Vatanimiz, elimiz manfaati yo‘lida 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.

Pirnazar DAVRONOV

2000-YIL, 1-AXBOROTNOMA

1. $\frac{\frac{5}{11}\cdot 0{,}006\cdot 2\frac{1}{5}+1\frac{1}{8}\cdot 0{,}004\cdot\frac{8}{9}}{0{,}5\cdot 0{,}0009+0.0001\cdot 0{,}5}$ ni hisoblang.

   A) 10 B) 0,4 C) 20 D) 2 E) 0,2

   Yechilishi: $\frac{\frac{5}{11}\cdot 0{,}006\cdot 2\frac{1}{5}+1\frac{1}{8}\cdot 0{,}004\cdot\frac{8}{9}}{0{,}5\cdot 0{,}0009+0.0001\cdot 0{,}5}=\frac{0{,}01}{0{,}5\cdot 0{,}001}=\frac{0{,}01}{0{,}0005}=20.$

   Javobi: C.

2. 1 dan 50 gacha bo‘lgan sonlar ko‘paytmasi nechta nol bilan tugaydi?

   A) 14 B) 10 C) 13 D) 11 E) 12

   Yechilishi: $\left[\frac{50}{5}\right]+\left[\frac{50}{5^2}\right]=10+2=12.$ Javobi: E.

3. Inflyatsiya natijasida maxsulotning narxi 25% ga oshirildi.Lekin maxsulotga talabning kamligi tufayli uning narxi 10% ga kamaytirildi. Maxsulotning oxirgi narxi dastlabkisiga qaraganda necha foiz ortdi?

   A) 12,8 B) 11,5 C) 12 D) 12,5 E) 15

   Yechilishi: 1) $\frac{100+25}{100}\cdot x=1{,}25x;$ 2) $\frac{100-10}{100}\cdot 1{,}25x=$

   $=1{,}125x\Rightarrow 12{,}5\%.$ Javobi: D.

4. Yilning qaysidir oyida uchta shanba kuni oyning juft kunlariga to‘g‘ri kelgan. Shu oyning 25-kuni xaftaning qaysi kuniga mos keladi?

   A) seshanba B) chorshanba C) dushanba

D) payshanba E) juma

Yechilishi: 2, 9, 16, 23, 30: dushanbalar. Javobi: C.

5. Ikkixonali sonning o‘ng tomoniga 0 raqami yozilsa, berilgan sonning yarmi bilan 323 ning yig‘indisi ga teng bo‘lgan son hosil bo‘ladi. Berilgan sonni toping.

A) 54 B) 14 C) 24 D) 44 E) 34

Yechilishi: $\overline{xy0} = \frac{\overline{xy}}{2} + 323 \Rightarrow 100x + 10y =$

$$= \frac{10x + y}{2} + 323 \Rightarrow 100x + 10y = 5x + \frac{1}{2}y + 323 \Rightarrow$$

$$\Rightarrow 95x + 9{,}5y = 323 \Rightarrow \ \ x = 3, \ \ y = 4; \ \ xy = 34.$$

Javobi: E.

6. Sayohat uchun ma’lum miqdorda pul yig‘ish kerak edi. Agar har bir sayohatchi 750 so‘mdan to‘lasa, to‘lovga 1200 so‘m yetmaydi, agar har bir sayohatchi 800 so‘mdan to‘lasa, keragidan 1200 so‘m ortib qoladi. Sayohatda necha kishi qatnashishi kerak?

A) 38 B) 48 C) 45 D) 46 E) 47

Yechilishi: $750x + 1200 = 800x - 1200$

$50x = 2400 \Rightarrow x = 48$. Javobi: B.

7. $\sqrt{\frac{a^{\frac{3}{2}} - b^{\frac{3}{2}}}{a^{\frac{1}{2}} - b^{\frac{1}{2}}} + a^{\frac{1}{2}}b^{\frac{1}{2}}} - \sqrt{\frac{a^{\frac{3}{2}} + b^{\frac{3}{2}}}{a^{\frac{1}{2}} + b^{\frac{1}{2}}} - a^{\frac{1}{2}}b^{\frac{1}{2}}}$ ni soddalashtiring.

Bunda $(b > a > 0)$.

A) $2\sqrt{a}$ B) $2\sqrt{b}$ C) $2(\sqrt{b} - 2\sqrt{a})$

D) $2(\sqrt{a}-2\sqrt{b})$ E) $2\sqrt{b}-\sqrt{a}$

Yechilishi: $\sqrt{\frac{a\sqrt{a}-b\sqrt{b}}{\sqrt{a}-\sqrt{b}}+\sqrt{a}\cdot\sqrt{b}}-\sqrt{\frac{a\sqrt{a}+b\sqrt{b}}{\sqrt{a}+\sqrt{b}}-\sqrt{a}\cdot\sqrt{b}}=$

$$=\sqrt{\frac{a\sqrt{a}-b\sqrt{b}+a\sqrt{b}-b\sqrt{a}}{\sqrt{a}-\sqrt{b}}}-\sqrt{\frac{a\sqrt{a}+b\sqrt{b}-a\sqrt{b}-b\sqrt{a}}{\sqrt{a}+\sqrt{b}}}=$$

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

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

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

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

$$=\left|\sqrt{a}+\sqrt{b}\right|-\left|\sqrt{a}-\sqrt{b}\right|=\sqrt{a}+\sqrt{b}+\sqrt{a}-\sqrt{b}=2\sqrt{a}.$$

Javobi: A.

8. $nx=n^2-12$ tenglamani ildizlari natural son bo‘ladigan $n(n\epsilon N)$ ning barcha qiymatlari yig‘indisini toping.

A) 20 B) 18 C) 22 D) 16 E) 24

Yechilishi: $x=n-\frac{12}{n};\ n=4,6,12\Rightarrow 4+6+12=22.$

Javobi: C.

9. t ning qanday qiymatlarida tenglamasi $y = tx^2 + 16tx + 68t$ bo‘lgan parabola OX o‘qidan yuqorida yotmaydi?

A) $(-\infty; 0)$ B) $(0; 4)$ C) $(-\infty; -4)$

D) $(-\infty; -4) \cup (4; \infty)$; E) $(-4; 0)$

Yechilishi: $Masala\ shartiga\ ko'ra, \begin{cases} t < 0 \\ D < 0 \end{cases} bo'lishi$

$talab\ etiladi. (16t)^2 - 4 \cdot t \cdot 68t < 0 \Rightarrow -16t^2 < 0.$

$Bu\ tengsizlik\ \ t = 0\ dan\ boshqa\ barcha\ qiymatlarda\ o'rinli. Demak, t\epsilon\ (-\infty; 0).$ Javobi: A.

10. $x^2 - \frac{1}{2}kx + k^2 - 11k + 24 = 0\ (k = const)$ tenglamaning ildizlaridan biri 0 ga teng. Shu shartni qanoatlantiruvchi ildizlarning yig‘indisini toping.

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

Yechilishi: $\begin{cases} x_1 = 0 \\ x_1 + x_2 = \frac{1}{2}k \\ x_1 \cdot x_2 = k^2 - 11k + 24 \end{cases} \Rightarrow$

$\begin{cases} x_2 = \frac{k}{2} \\ k^2 - 11k + 24 = 0 \end{cases} \Rightarrow$

$\Rightarrow k_1 = 3;\ \ k_2 = 8.\ U\ holda\ x_2 = 1{,}5\ va\ x_2 = 4.$

$1{,}5 + 4 = 5{,}5$.Javobi: B.

11. Agar $a^2 - 4a + 5 + b^2 - 2b = 0$ bo‘lsa, $(a + b)^3$ ning qiymatini toping.

A) 26 B) 27 C) 28 D) 25 E) 24

Yechilishi: $a^2 - 4a + 5 + b^2 - 2b = 0 \Rightarrow$

$$\Rightarrow a^2 - 4a + 2^2 + b^2 - 2b + 1^2 = 0 \Rightarrow$$

$$\Rightarrow (a-2)^2 + (b-1)^2 = 0 \Rightarrow \begin{cases} a = 2; \\ b = 1. \end{cases}$$

$(a+b)^3 = 3^3 = 27.$ Javobi: B.

12. $2x^2 - 26x + 72 = 0$ tenglama ildizlarining o‘rta proportsionalini toping.

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

Yechilishi: $2x^2 - 26x + 72 = 0 \Rightarrow x^2 - 13x + 36 = 0$

$$x_{1,2} = \frac{13}{2} \pm \sqrt{\frac{169}{4} - 36} = \frac{13}{2} \pm \frac{5}{2} \Rightarrow \begin{cases} x_1 = 4 \\ x_2 = 9 \end{cases} \Rightarrow$$

$\Rightarrow \sqrt{x_1 \cdot x_2} = 6.$ Javobi: D.

13. Agar y_1 va y_2, $y^2 - by + b - 1 = 0$ tenglamaning ildizlari bo‘lsa, b ning qanday qiymatida ${y_1}^2 + {y_2}^2$ ifodaning qiymati eng kichik bo‘ladi?

A) 1,2 B) 0,85 C) 1 D) 1,5 E) 2

Yechilishi: $y^2 - by + b - 1 = 0 \Rightarrow, y_{1,2} =$

$$= \frac{b}{2} \pm \sqrt{\frac{b^2}{4} - b + 1} = \frac{b}{2} \pm \sqrt{\frac{b^2 - 4b + 4}{4}} =$$

$$= \frac{b}{2} \pm \sqrt{\frac{(b-2)^2}{4}} = \frac{b}{2} \pm \frac{|b-2|}{2} \Rightarrow \begin{cases} y_1 = \dfrac{b - |b-2|}{2} \\ y_2 = \dfrac{b + |b-2|}{2} \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} b - 2 \geq 0 \\ b - 2 < 0 \end{cases} \Rightarrow \begin{cases} y_1 = 1 \\ y_2 = b - 1 \end{cases} \Rightarrow$$

$\Rightarrow {y_1}^2 + {y_2}^2 = 1^2 + (b-1)^2 \Rightarrow b = 1.$ Javobi: C.

14. $(m-3)(m-7)$ ifodaning qiymati m ning har qanday qiymatida musbat bo‘lishi uchun unga qanday eng kichik butun sonni qo‘shish kerak?

A) 4 B) 8 C) 3 D) 6 E) 5

Yechilishi: $(m-3)(m-7) = m^2 - 7m - 3m + 21 =$

$= m^2 - 10m + 21 + 4 \Rightarrow (m-5)^2 \geq 0 \Rightarrow 5.$ Javobi: E.

15. Agar $m > 0, n > 0 \text{va} m + n = 16$ bo‘lsa mn ning eng kata qiymatini toping.

A) 62 B) 72 C) 64 D) 60 E) 66

Yechilishi: $m > 0, n > 0;\ m + n = 16.\ n = m$

$bo'lganda, m \cdot n\ ko'paytma\ eng\ katta\ qiymatga$

$ega\ bo'ladi. 2m = 16 \Rightarrow m = n = 8 \Rightarrow m \cdot n = 64.$

$$Jumladan \begin{matrix} m = 1, & 2, & 3, & 4, & 5, & 6, & 7, & 8; \\ n = 15, & 14, & 13, & 12, & 11, & 10, & 9, & 8. \end{matrix} \Rightarrow$$

$\Rightarrow m \cdot n = 64.$ Javobi: C.

16. $(x^4 + x^2 + 1)(x^4 + x^2 + 2) - 12$ ifoda nechta ratsional koeffitsientli ko‘paytuvchilarga ajraladi?

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

Yechilishi: $(x^4 + x^2 + 1)(x^4 + x^2 + 2) - 12;$

$$x^4 + x^2 = t \Rightarrow (t+1)(t+2) - 12 = 0 \Rightarrow$$

$$\begin{cases} t_1 = -5 \\ t_2 = 2 \end{cases} \Rightarrow \begin{cases} x^4 + x^2 \neq -5 \\ x^4 + x^2 = 2 \end{cases} \Rightarrow x^2 = y \Rightarrow$$

$$\Rightarrow y^2+y-2=0 \Rightarrow \begin{cases} y_1=-2 \\ y_2=1 \end{cases} \Rightarrow \begin{cases} x^2\neq -2 \\ x^2=1 \end{cases} \Rightarrow$$

$$\Rightarrow x_1=-1;\ x_2=1. \qquad (x^4+x^2+5).$$

$.(x^2+2)(x-1)(x+1)$. Javobi: A.

17. $2x^2+2xy+2y^2+2x-2y+3$ko‘phad eng kichik qiymatga erishganda, xy ning qiymati qanday bo‘ladi?

A) 1 B) -2 C) 2 D) 1,5 E) -1

Yechilishi: $2x^2+2xy+2y^2+2x-2y+3=$

$$=x^2+2xy+y^2+x^2+2x+1+y^2-2y+1+1=$$

$$=(x+y)^2+(x+1)^2+(y-1)^2+1 \Rightarrow \begin{cases} x=-1 \\ y=1 \end{cases} \Rightarrow$$

$\Rightarrow x\cdot y=-1\cdot 1=-1$. Javobi: E.

18. $\begin{cases} x\geq 3, \\ |x-3|\leq 1 \end{cases}$ tengsizliklar sistemasini yeching.

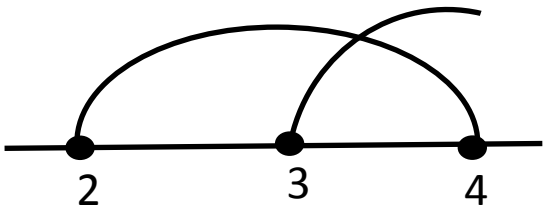
A) $2\leq x\leq 3$ B) $-2\leq x\leq 4$ C) $3\leq x\leq 4$

D) $x\leq 4$ E) $x\leq 2$

Yechilishi: $\begin{cases} x\geq 3, \\ |x-3|\leq 1 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} x\geq 3 \\ -1\leq x-3\leq 1 \end{cases} \Rightarrow$$

$\Rightarrow \begin{cases} x\geq 3; \\ 2\leq x\leq 4. \end{cases}$ Javobi: C.



19. Agar $\sqrt{1-\frac{1}{x}}=\frac{x-1}{x}-6$ bo‘lsa, $6\frac{1}{8}+x$ ning qiymatini toping.

A) -7 B) 6 C) 7 D) -6 E) 8

Yechilishi: $\sqrt{1-\frac{1}{x}}=\frac{x-1}{x}-6;\ \ \frac{x-1}{x}=y$

$\sqrt{y} = y - 6 \Rightarrow y = y^2 - 12y + 36 \Rightarrow$

$\Rightarrow y^2 - 13y + 36 = 0; \quad y_{1,2} = \frac{13}{2} \pm \sqrt{\frac{169}{4} - 36} =$

$= \frac{13}{2} \pm \frac{5}{2} \Rightarrow \begin{cases} y_1 = 4 \ chet\ ildiz \\ y_2 = 9 \ ildiz \end{cases} \Rightarrow \quad \frac{x-1}{x} = 9 \Rightarrow$

$$x - 1 = 9x \Rightarrow 8x = -1 \Rightarrow x = -\frac{1}{8} \Rightarrow$$

$\Rightarrow 6\frac{1}{8} + x = 6 + \frac{1}{8} - \frac{1}{8} = 6.$ Javobi: B.

20. $\left(\frac{1}{\sqrt{a+1}+\sqrt{a}} + \frac{1}{\sqrt{a}-\sqrt{a-1}}\right)\left(\sqrt{a+1} - \sqrt{a-1}\right)$ ni soddalashtiring.

A) 1 B) 2 C)$2\sqrt{a}$ D) $2\sqrt{a-1}$ E) $2\sqrt{a+1}$

Yechilishi: $\left(\frac{1}{\sqrt{a+1}+\sqrt{a}} + \frac{1}{\sqrt{a}-\sqrt{a-1}}\right)\left(\sqrt{a+1} - \sqrt{a-1}\right) =$

$$= \left(\frac{\sqrt{a+1} - \sqrt{a}}{a+1-a} + \frac{\sqrt{a} + \sqrt{a-1}}{a-a+1}\right) \cdot \left(\sqrt{a+1} - \sqrt{a-1}\right) =$$

$$= \left(\sqrt{a+1} + \sqrt{a-1}\right)\left(\sqrt{a+1} - \sqrt{a-1}\right) =$$

$= a + 1 - a + 1 = 2.$ Javobi: B.

21. Arifmetik progressiyaning dastlabki to‘rtta hadi yig‘indisi 124 ga, oxirgi to‘rttasiniki156 gateng. Progressiyaning hadlari yig‘indisi 350 ga teng. Progressiyaning nechta hadi bor?

A) 8 B) 9 C) 11 D) 10 E) 7

Yechilishi: $a_1 + a_2 + a_3 + a_4 = 124;$

$$a_{n-3}+a_{n-2}+a_{n-1}+a_n=156.\ \ S_n=350.$$

$$\begin{cases} a_1+a_4=62 \\ a_{n-3}+a_n=78 \end{cases} \Rightarrow \begin{cases} a_1+a_1+3d=62 \\ a_n-3d+a_n=78 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} 2a_1+3d=62 \\ 2a_n-3d=78 \end{cases} \Rightarrow 2(a_1+a_n)=140 \Rightarrow$$

$\Rightarrow a_1+a_n=70.\quad 350=\frac{70}{2}\cdot n \Rightarrow n=10.$ Javobi: D.

22. Cheksizkamayuvchi geometrik progressiyaning hadlari yig‘indisi 12 ga, maxraji esa $-\frac{1}{2}$ ga teng. Uning birinchi va ikkinchi hadlari ayirmasini toping.

Yechilishi: $S=\frac{b_1}{1-q} \Rightarrow 12=\frac{b_1}{1-\left(-\frac{1}{2}\right)}=\frac{b_1}{\frac{3}{2}}=\frac{2b_1}{3} \Rightarrow$

$\Rightarrow b_1=18;\quad b_2=b_1\cdot q$=$18\cdot\left(-\frac{1}{2}\right)=-9.$

$b_1-b_2=18-(-9)=27.$ Javobi: E.

23. Agar $a-b=1$va$(a^2-b^2)(a-b)=9$ bo‘lsa, ab ning qiymatini toping.

A) 19 B) 22 C) 21 D) 20 E) 24

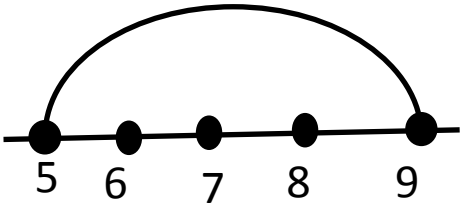
Yechilishi: $\begin{cases} a-b=1 \\ (a-b)(a+b)(a-b)=9 \end{cases} \Rightarrow \begin{cases} a-b=1 \\ a+b=9 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} a=5 \\ b=4 \end{cases} \Rightarrow a\cdot b=20.$ Javobi: D.

24. $\sqrt{9-x}\le 2$tengsizlikning yechimlari OX o‘qida joylashtirilsa, qanday uzunlikdagi kesma hosil boladi?

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

Yeshilishi: $\sqrt{9-x}\le 2 \Rightarrow$



$\Rightarrow \begin{cases} 9-x \geq 0 \\ 9-x \leq 4 \end{cases} \Rightarrow \begin{cases} x \leq 9 \\ x \geq 5 \end{cases}$

$9-5=4$. Javobi: A.

25. Keltirilgan sonlardan eng kattasini toping.

A) $sin1$ B) $cos\left(\frac{\pi}{2}-\frac{1}{2}\right)$ C) $sin4$

D) $cos\left(\frac{\pi}{2}+\frac{1}{4}\right)$ E) $tg\frac{\pi}{4}$

Yechilishi: $sin1 \approx 57°$; $cos\left(\frac{\pi}{2}-\frac{1}{2}\right)=sin\frac{1}{2} \approx sin29°$;

$sin4 \approx sin228° = sin(180°+48°) = -sin58°$;

$\cos\left(\frac{3\pi}{2}+\frac{1}{4}\right)=sin\frac{1}{4} \approx sin15°$; $tg\frac{\pi}{4}=1$. Javobi: E.

26. $\frac{sin\left(\frac{\pi}{2}-\alpha\right)\cos(\pi+\alpha)}{ctg(\pi+\alpha)tg\left(\frac{3\pi}{2}-\alpha\right)}$ni soddalashtiring.

A) $-sin^2\alpha$ B) $-cos^2\alpha$ C) $-sin^2\alpha tg^2\alpha$

D)$cos^2\alpha tg^2\alpha$ E) $sin^2\alpha tg^2\alpha$

Yechilishi: $\frac{sin\left(\frac{\pi}{2}-\alpha\right)\cos(\pi+\alpha)}{ctg(\pi+\alpha)tg\left(\frac{3\pi}{2}-\alpha\right)}=\frac{cos\alpha\cdot(-cos\alpha)}{ctg\alpha\cdot ctg\alpha}=\frac{-cos^2\alpha}{ctg^2\alpha}=$

$=-cos^2\alpha:\frac{cos^2\alpha}{sin^2\alpha}=-sin^2\alpha$. Javobi: A.

27. $\frac{1-cos2\alpha}{1+cos2\alpha}+1$ni soddalashtiring.

A) $cos^{-2}\alpha$ B) $sin^{-2}\alpha$ C) $sin^2\alpha$

D) cos^{-2} E) $-cos^2\alpha$

Yechilishi: $\frac{1-cos2\alpha}{1+cos2\alpha}+1 \Rightarrow tg^2\alpha+1=\frac{1}{cos^2\alpha}=cos^{-2}\alpha$.

Javobi: A.

28. $\frac{sin35°+cos65°}{2cos5°}$ni hisoblang.

A) 0,25 B) 0,75 C) 0,5 D) 0,6 E) 0,3

Yechilishi: $\frac{sin35°+cos65°}{2cos5°} = \frac{\sin(30°+5°)+\cos(60°+5°)}{cos5°} =$

$$= \frac{sin30°cos5° + cos30°sin5° + cos60°cos5° - sin60°sin5°}{2cos5°}$$

$=$

$= \frac{\frac{1}{2}cos5°+\frac{\sqrt{3}}{2}sin5°+\frac{1}{2}cos5°-\frac{\sqrt{3}}{2}sin5°}{2cos5°} = \frac{1}{2}$. Javobi: C.

29. Agar $\alpha = -45°$va$\beta = 15°$ bo‘lsa,

$\cos(\alpha+\beta) + 2sin\alpha sin\beta$ning qiymatini toping.

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

Yechilishi: $\alpha = -45°$, $\beta = 15°$; $\cos(\alpha+\beta) +$
$+2sin\alpha sin\beta = cos\alpha cos\beta - sin\alpha sin\beta + 2sin\alpha sin\beta =$

$=cos\alpha cos\beta + sin\alpha sin\beta = \cos(\alpha-\beta) =$

$= \cos(-45° - 15°) = \cos(-60°) = \frac{1}{2}$. Javobi: E.

30. Agar α o‘zgaruvchi miqdor bo‘lsa, $4\left(\sqrt{3}cos\alpha + sin\alpha\right)$ ning eng katta qiymati qanchaga teng?

A) 9,5 B) 7 C) 8 D) 6,5 E) 7,5

Yechilishi: $4\left(\sqrt{3}cos\alpha + sin\alpha\right)$;

$$-\sqrt{a^2+b^2} \le acos\alpha + bsin\alpha \le \sqrt{a^2+b^2}$$

$formulaga\ asosan$

$$-4\sqrt{3+1} \le 4\left(\sqrt{3}cos\alpha + sin\alpha\right) \le 4\sqrt{a^2+b^2} \Rightarrow$$

$\Rightarrow -8 \le 4\left(\sqrt{3}cos\alpha + sin\alpha\right) \le 8$. Javobi: C.

31. $ctg2\alpha - ctg\alpha$ni soddalashtiring.

A) $\frac{1}{sin2\alpha}$ B)$\frac{1}{cos2\alpha}$ C)$\frac{1}{-sin2\alpha}$ D) $\frac{1}{cos2\alpha}$ E)$-\frac{1}{sin^2\alpha}$

Yechilishi:$ctg2\alpha - ctg\alpha = \frac{ctg^2\alpha - 1}{2ctg\alpha} - ctg\alpha =$

$$= \frac{ctg^2\alpha - 1 - 2ctg^2\alpha}{2ctg\alpha} = \frac{-ctg^2\alpha - 1}{2ctg\alpha} = -\frac{ctg^2\alpha + 1}{2ctg\alpha} =$$

$$= -\frac{\frac{1}{sin^2\alpha}}{\frac{2cos\alpha}{sin\alpha}} = -\frac{1}{sin^2\alpha} : \frac{2cos\alpha}{sin\alpha} = -\frac{1}{sin^2\alpha} \cdot \frac{sin\alpha}{2cos\alpha} =$$

$= -\frac{1}{2sin\alpha cos\alpha} = -\frac{1}{sin2\alpha}$. Javobi: C.

32. Agar $tg\alpha + tg\beta = \frac{5}{6}vatg\alpha \cdot tg\beta = \frac{1}{6}$ bo‘lsa, $\alpha + \beta$ nimaga teng bo‘ladi?

A) $\frac{\pi}{6} + \pi k, k\epsilon Z$ B)$-\frac{\pi}{4} + \pi k, k\epsilon Z$ C)$-\frac{\pi}{6} + \pi k, k\epsilon Z$

D) $\frac{\pi}{4} + \pi k, k\epsilon Z$ E) $\frac{\pi}{3} + \pi k, k\epsilon Z$

Yechilishi: $tg\alpha + tg\beta = \frac{5}{6}$; $tg\alpha \cdot tg\beta = \frac{1}{6}$;

$$tg(\alpha+\beta) = \frac{tg\alpha + tg\beta}{1 - tg\alpha \cdot tg\beta} = \frac{\frac{5}{6}}{1 - \frac{1}{6}} = 1 \Rightarrow$$

$\alpha + \beta = \frac{\pi}{4} + \pi k,\ k\epsilon Z$. Javobi: D.

33. $2(arccosx)^2+\pi^2=3\pi arccosx$ tenglamaning ildizlari yig‘indisini toping.

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

Yechilishi: $2(arccosx)^2+\pi^2=3\pi arccosx$

$$arccosx=y\Rightarrow 2y^2-3\pi y+\pi^2=0\Rightarrow$$

$$\Rightarrow y_{1,2}=\frac{3\pi\pm\sqrt{9\pi^2-4\cdot 2\cdot\pi^2}}{2\cdot 2}=\frac{3\pi\pm\pi}{4}$$

$$\Rightarrow\begin{cases}y_1=\frac{\pi}{2}\\ y_2=\pi\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases}arccosx=\frac{\pi}{2}\\ arccosx=\pi\end{cases}\Rightarrow\begin{cases}cosarccosx=cos\frac{\pi}{2}\\ cosarccosx=cos\pi\end{cases}\Rightarrow$$

$\Rightarrow\begin{cases}x_1=0\\ x_2=-1\end{cases}\Rightarrow x_1+x_2=-1.$ Javobi: B.

34. $y=\left(sin\frac{\pi}{4}\right)^{x^2-2x}$ funksiyaning eng katta qiymatini toping.

A) $-1{,}5\sqrt{2}$ B)$-\sqrt{2}$ C)$1{,}5\sqrt{2}$ D) $\sqrt{2}$ E) $2\sqrt{2}$

Yechilishi: $y=\left(sin\frac{\pi}{4}\right)^{x^2-2x}\Rightarrow y=\left(\frac{\sqrt{2}}{2}\right)^{x^2-2x}$.

$$y'=\left(\frac{\sqrt{2}}{2}\right)^{x^2-2x}ln\frac{\sqrt{2}}{2}\cdot(2x-2)=0\Rightarrow$$

$$\Rightarrow 2x-2=0\Rightarrow x=1\Rightarrow y=\left(\frac{\sqrt{2}}{2}\right)^{1-2}=\left(\frac{\sqrt{2}}{2}\right)^{-1}=$$

$=\frac{2}{\sqrt{2}}=\frac{2\sqrt{2}}{\sqrt{2}\cdot\sqrt{2}}=\sqrt{2}.$ Javobi: D.

35. $100^{2lg5-lg15}$ni hisoblang.

A) $2\frac{4}{9}$ B) 2,4 C) $2\frac{8}{9}$ D) $2\frac{7}{9}$ E) $3\frac{1}{9}$

Yechilishi: $100^{2lg5-lg15} = 100^{lg25-lg15} = 10^{2lg\frac{25}{15}} =$

$= 10^{lg\left(\frac{5}{3}\right)^2} = \frac{25}{9} = 2\frac{7}{9}$. Javobi: D.

36. $\left(\frac{2}{3}\right)^x = \sqrt[4]{1{,}5}$ tenglamaning ildizi 1 dan qancha kam?

A) 1,75 B) 0,75 C) 1,5 D) 2,1 E) 1,25

Yechilishi: $\left(\frac{2}{3}\right)^x = \sqrt[4]{\frac{3}{2}} \Rightarrow \left(\frac{2}{3}\right)^x = \left(\frac{2}{3}\right)^{-\frac{1}{4}} \Rightarrow x = -\frac{1}{4} \Rightarrow$

$\Rightarrow 1 - \left(-\frac{1}{4}\right) = 1{,}25.$ Javobi: E.

37. $\log_8 \log_4 \log_2 x = 0$ tenglamani yeching.

A) 12 B) 13 C) 16 D) 15 E) 18

Yechilishi: $\log_8 \log_4 \log_2 x = 0 \Rightarrow \log_4 \log_2 x = 8^0 \Rightarrow$

$\Rightarrow \log_2 x = 4^1 \Rightarrow x = 2^4 \Rightarrow x = 16$.Javobi: C.

38. Agar $\log_{12} 2 = a$ bo‘lsa, $\log_6 16$ ning qiymatini toping.

A) $\frac{4a}{1+a}$ B)$\frac{2a}{1-a}$ C)$\frac{4a}{1-a}$ D)$\frac{3a}{1+a}$ E)$\frac{3a}{1-a}$

Yechilishi: $\log_{12} 2 = a;$ $\log_6 16 = \frac{\log_{12} 16}{\log_{12} 6} = \frac{4\log_{12} 2}{\log_{12}\frac{12}{2}} =$

$= \frac{4a}{\log_{12} 12 - \log_{12} 2} = \frac{4a}{1-a}$. Javobi: C.

39. Quyida keltirilgan sonlardan kattasini belgilang.

A)$\log_2 18 - \log_2 9$ B)$3^{\log_3 6}$ C)$lg25 + lg4$

D) $\log_{13} 169^2$ E)$\frac{\log_8 4}{\log_8 64}$

Yechilishi: $\log_2 \frac{18}{9} = 1$; $3^{\log_3 6} = 6$; $\lg 25 + \lg 4 = 2$;

$\log_{13} 13^4 = 4$; $\frac{\log_8 4}{4 \log_8 4} = \frac{1}{4}$. Javobi: B.

40. $\frac{2^{2x-1} \cdot 4^{x+1}}{8^{x-1}} = 64$ tenglamani yeching.

A) 3 B) 2 C) 4 D) -2 E) -3

Yechilishi: $\frac{2^{2x-1} \cdot 4^{x+1}}{8^{x-1}} = 64 \Rightarrow \frac{2^{2x-1} \cdot 2^{2x+2}}{2^{3x-3}} = 64 \Rightarrow$

$\Rightarrow \frac{2^{4x+1}}{2^{3x-3}} = 64 \Rightarrow 2^{4x+1-3x+3} = 2^6 \Rightarrow x + 4 = 6 \Rightarrow$

$\Rightarrow x = 2.$ Javobi: B.

41. $\log_2(\log_2 a^8)$ son $\log_2 \log_2 a$dan qanchaga ko‘p?

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

Yechilishi: $\log_2(\log_2 a^8) - \log_2 \log_2 a = \log_2 \frac{\log_2 a^8}{\log_2 a} =$

$= \log_2 8 = \log_2 2^3 = 3 \log_2 2 = 3.$ Javobi: C.

42. $f(x) = \frac{|x-2|}{x-2} + 2$funksiyaningqiymatlarto‘plamini toping.

A) $[1; 3]$ B)$(1; 3)$ C) $[1; 3)$ D) $\{1; 3\}$ E) $(1; 3]$

Yechilishi: $f(x) = \frac{|x-2|}{x-2} + 2$; $1) x - 2 \neq 0 \Rightarrow x \neq 2;$

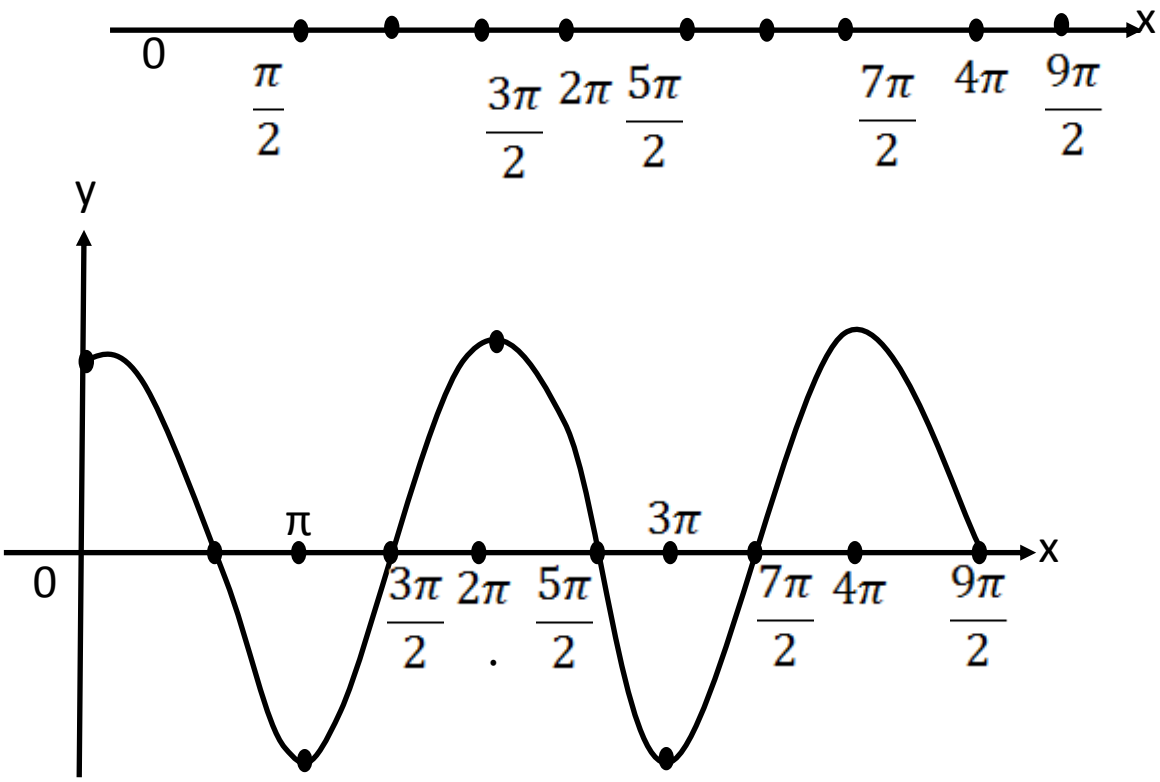
$$2) x - 2 > 0 \Rightarrow f(x) = \frac{x-2}{x-2} + 2 = 3;$$

$$3)\ x - 2 < 0 \Rightarrow f(x) = \frac{-(x-2)}{x-2} + 2 = 1$$

$\{1; 3\}$. Javobi: D.

43. $[0; 4{,}2\pi]$kesmada$f(x) = |cosx|$ funksiya necha marta eng kichik qiymatga erishadi?

A) 3 B) 5 C) 4 D) 6 E) 7Yechilishi:
$[0; 4{,}2\pi]$ =$[0; 756°]$; $f(x) = |const|$



$x = \frac{\pi}{2}; \frac{3\pi}{2}; \frac{5\pi}{2}; \frac{7\pi}{2}$ 4ta. Javobi: C.

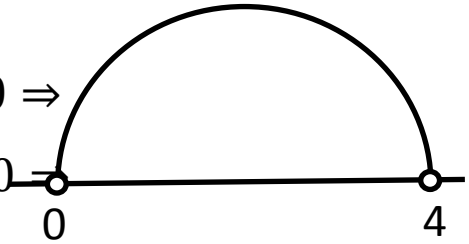
44. Qaysioraliqda$f(x) = \ln(4x - x^2)$ funksiya kamayadi?

A) (0; 2) B) $(-\infty; 0)$ C) (0; 4) D) $(2; \infty)$ E) [2; 4)

Yechilishi: $f(x) = \ln(4x - x^2)$; 1) $4x - x^2 > 0 \Rightarrow$ $x^2 - 4x < 0 \Rightarrow$

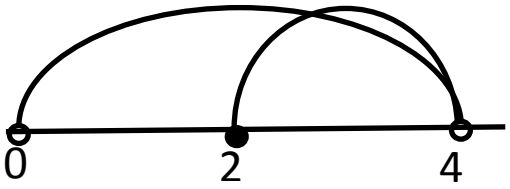
$$\Rightarrow x^2 - 4x = 0 \Rightarrow$$

$$\Rightarrow x(x-4) = 0 \Rightarrow$$



$$\Rightarrow \begin{cases} x = 0; \\ x = 4. \end{cases}$$

2) $f'(x) = \frac{1}{4x-x^2} \cdot (4x - x^2)' = \frac{4-2x}{4x-x^2} \leq 0 \Rightarrow$



$$\Rightarrow \begin{cases} 4 - 2x = 0 \\ 4x - x^2 \neq 0 \end{cases} \Rightarrow$$

$$\Rightarrow x = 2; \qquad [2; 4).$$

Javobi: E.

45. To‘g‘ri chiziq bo‘ylab harakatlanayotgan moddiy nuqtaning tezligi $V(t) = 3t^2 - 2t + 2\,{}^{m}/_{s}$ tenglama bilan ifodalanadi. Harakat boshlangandan 3s o‘tkunga qadar bu nuqta qancha masofani (m) bosib o‘tadi?

A) 24 B) 26 C) 22 D) 20 E) 25

Yechilishi: $V(t) = 3t^2 - 2t + 2\,{}^{m}/_{s}$; $S' = v \Rightarrow$

$$\Rightarrow S = \int v dt = 3\int t^2 dt - 2\int t dt + 2\int dt =$$

$$= 3 \cdot \frac{t^3}{3} - 2 \cdot \frac{t^2}{2} + 2t = t^3 - t^2 + 2t;$$

$t = 3 \Rightarrow S = 3^3 - 3^2 + 2 \cdot 3 = 27 - 9 + 6 = 24.$

Javobi: A.

46. $y = -\frac{1}{2}x^2 + 2x$ funksiya grafigining qaysi nuqtasiga o‘tkazilgan urinma, $y = -2x$ tenglama bilan berilgan to‘g‘ri chiziqqa parallel bo‘ladi?

A) (-4; 0) B) (0; 4) C) (4; 0) D) (0; -4) E) (2: 4)

Yechilishi: $y = -\frac{1}{2}x^2 + 2x; \quad (x_0;\ y_0).$

$$y' = -\frac{1}{2} \cdot 2x + 2 = -x + 2 \Rightarrow y' = -x + 2;$$

$$k = y'(x_0) = -x_0 + 2 \Rightarrow k = -x_0 + 2 \Rightarrow$$

$$\Rightarrow y = -2x \ dan, k = -2. \qquad U\ holda,$$

$$\Rightarrow -2 = -x_0 + 2 \Rightarrow x_0 = 4 \Rightarrow y_0 = -\frac{1}{2} \cdot 4^2 + 2 \cdot 4 =$$

$=-8 + 8=0 \Rightarrow (x_0;\ y_0) = (4; 0).$ Javobi: C.

47. $\log_2^2 x - 2\log_2 x^2 + 3 = 0$ tenglamaning ildizlari yig‘indisini toping.

A) 4 B) -4 C) -10 D) 10 E) 8

Yechilishi: $\log_2^2 x - 2\log_2 x^2 + 3 = 0 \Rightarrow$

$$\Rightarrow \log_2^2 x - 4\log_2 x + 3 = 0 \Rightarrow \log_2 x = y \Rightarrow$$

$$\Rightarrow y^2 - 4y + 3 = 0 \Rightarrow y_{1,2} = 2 \pm \sqrt{4 - 3} = 2 \pm 1 \Rightarrow$$

$$\Rightarrow \begin{cases} y_1 = 1 \\ y_2 = 3 \end{cases} \Rightarrow \begin{cases} \log_2 x_1 = 1 \\ \log_2 x_2 = 3 \end{cases} \Rightarrow \begin{cases} x_1 = 2 \\ x_2 = 8 \end{cases} \Rightarrow$$

$\Rightarrow x_1 + x_2 = 10.$ Javobi: D.

48. $\sqrt{7+2\sqrt{10}} \cdot \sqrt{7-2\sqrt{10}}$ni hisoblang.

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

Yechilishi: $\sqrt{7+\sqrt{40}} = \sqrt{\frac{7+\sqrt{49-40}}{2}} + \sqrt{\frac{7-\sqrt{49-40}}{2}} =$

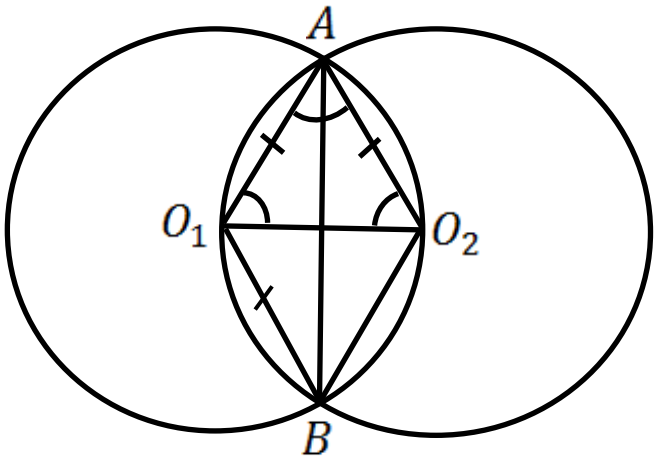
$= \sqrt{\mathbf{5}} + \sqrt{\mathbf{2}}$; $\sqrt{\mathbf{7}+\sqrt{40}} \cdot \sqrt{\mathbf{7}-\sqrt{40}} == (\sqrt{5}+\sqrt{2})(\sqrt{5}-\sqrt{2}) = 3.$ Javobi: C.

49. Ikkita aylana shunday joylashtirilganki, ularning har biri ikkinchisining markazidan o‘tadi. Shu aylanalarga o‘tkazilgan umumiy vatar ularning markazlaridan qanday burchak ostida ko‘rinadi?

A) 170° B) 160° C) 145° D) 120° E) 90°

Yechilishi: $AO_1 = AO_2 = OO_1 = R$;

$\angle AO_1O_2 = 60°$; $\angle AO_1B = 120°$. Javobi. D.



50. $ABCD$trapetsiyaning kichik asosi 6 ga teng. Agar ABE uchburchakning $(BE \parallel CD)$ perimetri 36 ga teng bo‘lsa, trapetsiyaning perimetrini toping.

A) 45 B) 48 C) 42 D) 50 E) 52

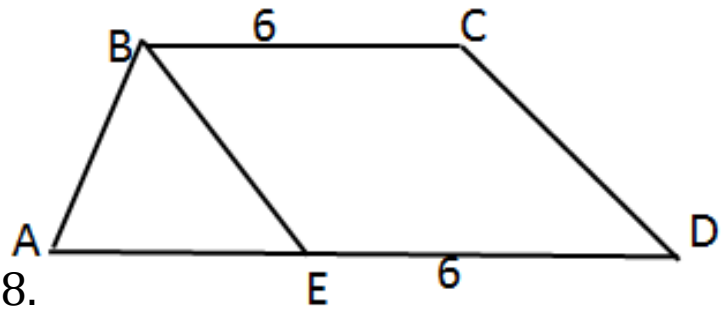
Yechilishi: $BE = CD$; $P_{\Delta} = AB + AE + BE \Rightarrow$

$\Rightarrow AB + AE = 36 - BE;$

$\Rightarrow P_t = AB + AE +$

$+6 + 6 + CD =$

$=36 - BE + 12 + BE = 48.$



Javobi: B.

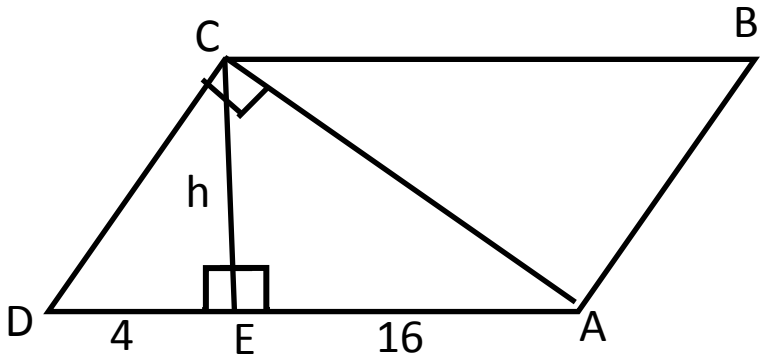
51. $ABCD$paralellogrammda $AC \perp CD$, $CE \perp AD$, $AE = 16$ va $ED = 4$. Paralellogrammning yuzini toping.

A) 150 B) 145 C) 155 D) 148 E) 160

Yechilishi:$h^2 = 4 \cdot 16 \Rightarrow$

$$\Rightarrow h = \sqrt{4 \cdot 16} = 8;$$

$\Rightarrow S = a \cdot h = 20 \cdot 8 = 160.$ Javobi:E.

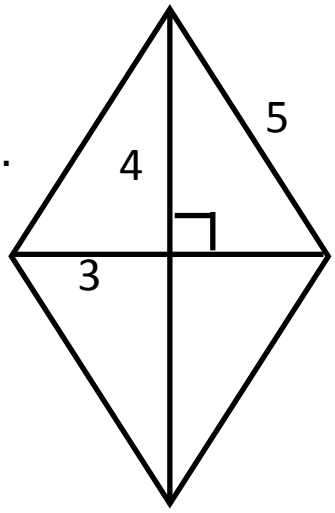


52. Rombning tomoni 5 ga diagonallaridan biri 6 gateng. Rombning yuzini toping.

A) 24 B) 28 C) 30 D) 20 E) 22

Yechilishi: $S_{\Delta} = \frac{1}{2} \cdot 3 \cdot 4 = 6$

$S_{\Diamond} = 4 \cdot S_{\Delta} = 24.$



Javobi: A.

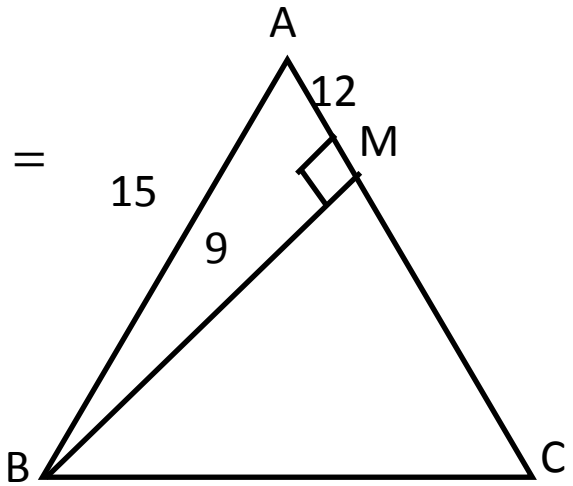
53. ABCuchburchakda$AB = AC, BM \perp AC,\ BM = 9$ va $MA = 12.\ \Delta ABC$ uchburchakning yuzini toping.

A) 63,5 B) 64,5 C) 65,5 D) 67,5 E) 66,5

Yechilishi: $AB = AC$;

$S_{\Delta} = \frac{1}{2} AC \cdot BM = \frac{1}{2} \cdot 15 \cdot 9 =$

$= \frac{135}{2} = 67{,}5.$



Javobi: D.

54. $\vec{a} = \{8; 6\}$vektor$\vec{b}$ va $\vec{c}$ vektorlarga yoyilgan. Agar $\vec{a} = \mu\vec{b} + \gamma\vec{c},\ \vec{c} = \{10; -3\}\ va\vec{b} = \{-2; 1\}\ b$o‘lsa, $\mu\gamma$ ning qiymatini toping.

A) 120 B) 115 C) 110 D) 100 E) 105

Yechilishi: $\vec{a} = \mu\vec{b} + \gamma\vec{c}$; $\{8; 6\} = \mu\{-2; 1\} + \gamma\{10; -3\}$;

$$\{8; 6\} = \{-2\mu; \mu\} + \{10\gamma; -3\gamma\} = \{-2\mu + 10\gamma; \mu - 3\gamma\} \Rightarrow$$

$$\Rightarrow \begin{cases} 10\gamma - 2\mu = 8 \\ \mu - 3\gamma = 6 \end{cases} \Rightarrow \begin{cases} 10\gamma - 2(3\gamma + 6) = 8 \\ \mu = 3\gamma + 6 \end{cases} \Rightarrow$$

$$10\gamma - 6\gamma - 12 = 8 \Rightarrow 4\gamma = 20 \Rightarrow \gamma = 5 \Rightarrow$$

$\mu = 3 \cdot 5 + 6 = 21 \Rightarrow \mu \cdot \gamma = 105$. Javobi: E.

55. Agar $m > n > 0$ bo‘lib, $a = m^2 + n^2$; $b = m^2 - n^2$ va$c = 2mn$ uchburchak tomonlarining uzunliklari bo‘lsa, quyidagi tasdiqlardan qaysi biri to‘g‘ri?

A) *uchburchak o′tkir burchakli*

B) *uchburchak o′tmas burchakli*

C) *uchburchak to′g′ri burchakli*

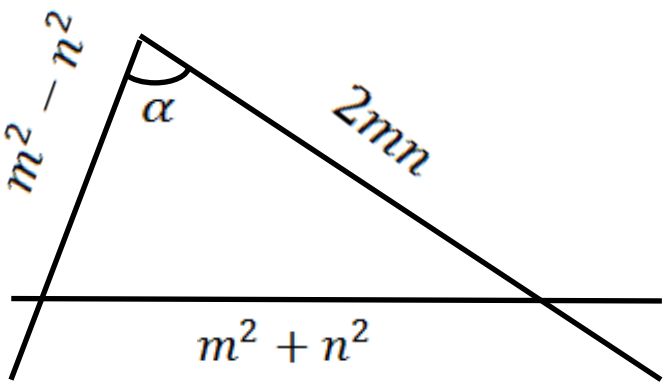
D) *Asosidagi burchaklari* $45°$ *ga teng bo′lmagan teng yonli uchburchak*

E) *muntazam uchburchak*

Yechilishi: $a = m^2 + n^2$; $b = m^2 - n^2$; $c = 2mn$; $m > n > 0$.

$(m^2 + n^2)^2 =$

$=(m^2 - n^2)^2 +$



$+(2mn)^2 - 2(m^2 - n^2) \cdot (2mn) \cdot cos\alpha \Rightarrow cos\alpha = 0 \Rightarrow$
$\alpha = 90°$.Javobi: C.

56. Muntazam uchburchakli piramidaga konus ichki chizilgan. Agar piramidaning yon yoqlari bilan asosi 60° li burchak hosil qilib, piramidaning asosiga ichki chizilgan aylananing radiusi 16 ga teng bo‘lsa, konusning yon sirtini toping.

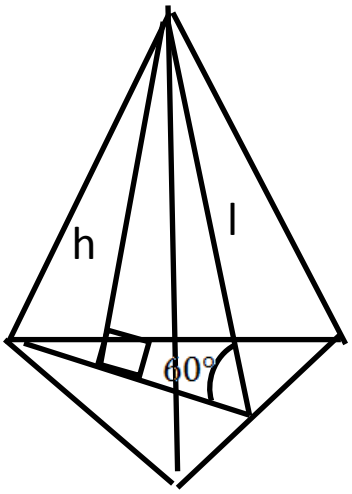
A) 524π B) 512π C) 536π D) 514π E) 518π

Yechilishi: $S_{yon} = \pi R l;\quad R = 16;$

$\frac{R}{l} = cos60° \Rightarrow \frac{16}{l} = \frac{1}{2} \Rightarrow l = 32;$

$S_{yon} = 16 \cdot 32\pi = 512\pi.$

Javobi: B.



57. Muntazam to‘rtburchakli prizmaga silindr ichki chizilgan. Silindr hajmining prizma hajmiga nisbatini toping.

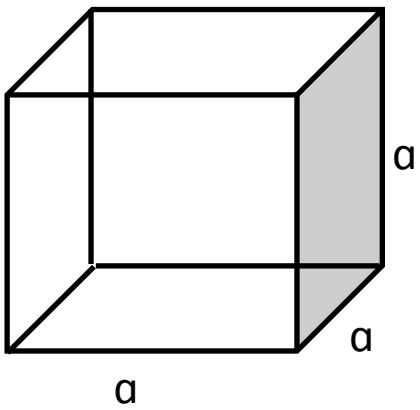
A) $\frac{\pi}{3}$ B) $\frac{\pi}{5}$ C) $\frac{\pi}{4}$ D) $\frac{2\pi}{3}$ E) $\frac{3\pi}{4}$

Yechilishi: $V_p = a^3$

$V_s = S_{asos} \cdot H = \pi R^2 \cdot H =$

$\pi \cdot \left(\frac{a}{2}\right)^2 \cdot a = \frac{a^3\pi}{4}$

$\frac{V_s}{V_p} = \frac{a^3\pi}{4} : a^3 = \frac{\pi}{4}.$ Javobi: C.



58. Shardan tashqari M nuqtadan uning sirtiga MN urinma o‘tkazildi. M nuqtadan sharning sirtigacha bo‘lgan eng qisqa masofa 6 ga, sharning markazigacha bo‘lgan masofa 15 gateng. MN ning uzunligini toping.

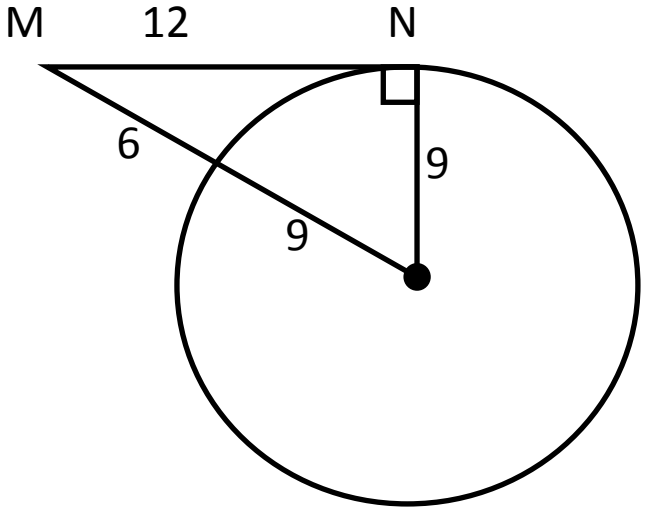
A) 10 B) 16 C) 14 D) 12 E) 18

Yechilishi: $6 + R = 15 \Rightarrow R = 9$

$(MN)^2 = 15^2 - 9^2 =$

$= 144 \Rightarrow MN = 12.$

Javobi: D.



59. Kubning ostki asosining bir tomoni va ustki asosining unga qarama- qarshi tomoni orqali o‘tkazilgan tekislik uni ikkita uchburchakli prizmaga ajratadi. Shu prizmalardan birining hajmi 256 gateng.Kubning to‘la sirtini toping.

A) 364 B) 374 C) 372 D) 380 E) 384

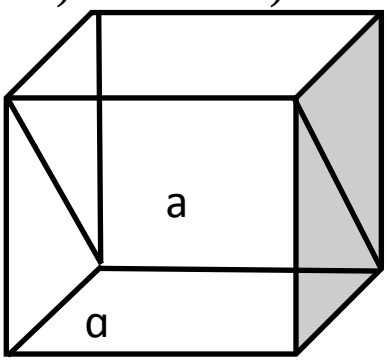
Yechilishi: $V_p = 256$

$V_{kub} = 2V_p = 512$

$a^3 = 512 \Rightarrow a = 8$

$S_t = 6a^2 = 384.$

Javobi: E.



Pirnazar DAVRONOV

2000-YIL, 2-AXBOROTNOMA

1. $12{,}7 \cdot 64 + 173 \cdot 3{,}6 + 12{,}7 \cdot 36 + 17{,}3 \cdot 64$ ning qiymatini toping.
   A)3000 B)1800 C)2000 D)3600 E)2200

   Yechilishi: $12{,}7 \cdot 64 + 173 \cdot 3{,}6 + 12{,}7 \cdot 36 + 17{,}3 \cdot 64 =$
   $= 64 \cdot (12{,}7 + 17{,}3) + 17{,}3 \cdot 36 + 12{,}7 \cdot 36 =$
   $= 64 \cdot 30 + 36 \cdot (12{,}7 + 17{,}3) = 3000.$ Javobi: A.

2. $32 < a < 92$ shartni qanoatlantiruvchi ikki xonali a sonning birinchi raqami o‘chirilganda, u 31 martaga kamaydi. O‘chirilgan raqam nechaga teng?

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

   Yechilishi: $32 < a < 92 \Rightarrow a = xy \Rightarrow xy = 10x + y \Rightarrow$
   $\Rightarrow 31y = 10x + y \Rightarrow 30y = 10x \Rightarrow \begin{cases} y = 1, 2, 3. \\ x = 3, 6, 9. \end{cases} \Rightarrow xy =$
   $= 62 \Rightarrow x = 6.$ Javobi: C.

3. $[\sqrt{1}] + [\sqrt{2}] + [\sqrt{3}] + \cdots + [10]$ ni hisoblang. Bunda $[a] - a$ sonning butun qismi.

   A)15 B) 19 C)18 D)17 E) 21.

   Yechilishi: $[\sqrt{1}] + [\sqrt{2}] + [\sqrt{3}] + \cdots + [10] =$
   $= 1 + 1 + 1 + 2 + 2 + 2 + 2 + 2 + 3 + 3 = 19.$ Javobi: B.

4. $\frac{1}{15} + \frac{1}{35} + \frac{1}{63} + \frac{1}{99} + \frac{1}{143} + \frac{1}{195}$ ni hisoblang.

   A) $\frac{4}{15}$ B)$\frac{7}{15}$ C)$\frac{17}{45}$ D)$\frac{11}{15}$ E)$\frac{2}{15}$

Yechilishi: $\frac{1}{15}+\frac{1}{35}+\frac{1}{63}+\frac{1}{99}+\frac{1}{143}+\frac{1}{195}=$

$=\frac{1}{2}\left(\frac{1}{3}-\frac{1}{5}\right)+\frac{1}{2}\left(\frac{1}{5}-\frac{1}{7}\right)+\frac{1}{2}\left(\frac{1}{7}-\frac{1}{9}\right)+\frac{1}{2}\left(\frac{1}{9}-\frac{1}{11}\right)+$

$+\frac{1}{2}\left(\frac{1}{11}-\frac{1}{13}\right)+\frac{1}{2}\left(\frac{1}{13}-\frac{1}{15}\right)=\frac{1}{2}\left(\frac{1}{3}-\frac{1}{5}+\frac{1}{5}-\frac{1}{7}+\frac{1}{7}-\frac{1}{9}+\right.$

$\left.+\frac{1}{9}-\frac{1}{11}+\frac{1}{11}-\frac{1}{13}+\frac{1}{13}-\frac{1}{15}\right)=\frac{1}{2}\left(\frac{1}{3}-\frac{1}{15}\right)=\frac{1}{2}\cdot\frac{4}{15}=\frac{2}{15}.$

Javobi: E.

5. Natural sonlar qatori har biri natural sonning kvadrati bilan tugaydigan quyidagicha qismlarga ajratilgan. $1,(2,3,4),(5,6,7,8,9),(10,11,12,13,14,15,16),\ldots$

10- qismdagi sonlar yig‘indisini toping.

A)1758 B)1800 C)1626 D)1729 E)1913.

Yeshilishi: $1,(2,3,4),(5,6,7,8,9),(10,11,12,13,14,15,16),\ldots$

1, 2, 3, 4, 5, 6, 7, 8, 9, 10

1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Bulardan quydagilarga kelamiz.

$$(82,83,\ldots,100)\Rightarrow a_n=a_1+d(n-1)\Rightarrow$$

$$\Rightarrow 100=82+1(n-1)\Rightarrow n=19\Rightarrow$$

$\Rightarrow S_{19}=\frac{82+100}{2}\cdot 19=1729.$ Javobi: D.

6. $\frac{11}{25}$ va $4\frac{6}{11}$ sonlariga teskari sonlar ko‘paytmasi nechaga teng?

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

Yechilishi: $\begin{cases}\frac{11}{25}\Rightarrow\frac{25}{11}\\ 4\frac{6}{11}=\frac{50}{11}\Rightarrow\frac{11}{50}\end{cases}\Rightarrow\frac{25}{11}\cdot\frac{11}{50}=\frac{1}{2}.$ Javobi: A.

7. $4a^2+9b^2+16c^2-4a-6b-8c+3=0$ bo‘lsa, abc ko‘paytmaga teskari sonni toping.

A)$\frac{1}{24}$ B)12 C)48 D)24 E)$\frac{1}{12}$.

Yeshilishi: $4a^2+9b^2+16c^2-4a-6b-8c+3=0 \Rightarrow$

$$\Rightarrow 4a^2-4a+1+9b^2-6b+1+16c^2-8c+1=0 \Rightarrow$$
$$\Rightarrow (2a-1)^2+(3b-1)^2+(4c-1)^2=0$$
$$\Rightarrow$$
$$\Rightarrow \begin{cases} a=\frac{1}{2} \\ b=\frac{1}{3} \\ c=\frac{1}{4} \end{cases} \Rightarrow a\cdot b\cdot c=\frac{1}{2}\cdot\frac{1}{3}\cdot\frac{1}{4}=\frac{1}{24} \Rightarrow 24.$$

Javobi: D.

8. Agar $f(x)=x^2-8x+7$ bo‘lsa, $f(4-\sqrt{11})$ ni hisoblang.

A)2 B)$2-\sqrt{2}$ C)$2+\sqrt{11}$ D)3 E)$5-\sqrt{11}$

Yechilishi: $f(x)=x^2-8x+7=(x-1)(x-7)$.

$$f\left(4-\sqrt{11}\right)=\left(4-\sqrt{11}-1\right)\left(4-\sqrt{11}-7\right)=$$
$$=\left(3-\sqrt{11}\right)\left(-3-\sqrt{11}\right)=-\left(3-\sqrt{11}\right)\left(3+\sqrt{11}\right)=$$
$$=-(3^2-\left(\sqrt{11}\right)^2)=-(9-11)=2.$$ Javobi: A.

9. $1\cdot 2\cdot 3\cdot \ldots \cdot 50$ ko‘paytma nechta nol bilan tugaydi?

A)8 B)10 C)9 D)14 E)12

Yechilishi:$\left[\frac{50}{5}\right]+\left[\frac{50}{5^2}\right]=10+2=12.$ Javobi:12.

10. 3 ga bo‘linmaydigan natural sonning kubini 9 ga bo‘lganda, qoldiq qanday sonlar bo‘lishi mumkin?

A)1yoki 8 B)0yoki 1 C)0yoki 8 D)3yoki 6 E)0,1, 8

Yechilishi:3 $ga\ bo'linmaydigan\ sonlar\ a = 3k - 2\ va$ $b = 3k - 1\ (k\epsilon N)\ ko'rinishidayozib\ olinadi. Bularni$ $a = 3(k-1) + 1\ va\ b = 3(k-1) + 2\ ko'rinishida$ $yozib, ularni\ kubga\ ko'taramiz$:

$a^3 = 9k + 1,\ b^3 = 9k + 8\ bo'ladi.$ Javobi: A.

11. 25 ta ketma-ket natural sonning yig‘indisi 1000 ga teng. Bu sonlarning kichigi nechaga teng bo‘ladi?

A)30 B)28 C)26 D)27 E)32

Yechilishi: $x_1, x_2, \dots, x_{25}; S_{25} = 1000.$

$$1000 = \frac{x_1 + x_{25}}{2} \cdot 25 \Rightarrow x_1 + x_{25} = 80 \Rightarrow$$

$\Rightarrow x_1 + x_1 + 24d = 80 \Rightarrow 2x_1 = 80 - 24 \Rightarrow 2x_1 = 56 \Rightarrow$ $\Rightarrow x_1 = 28.$ Javobi: B.

12. 100 soni shunday ikki musbat songa ajratilganki, ulardan biri 7 ga, ikkinchisi 11 ga bo‘linadi. Bu sonlar ayirmasining moduli nimaga teng?

A) 8 B) 14 C) 10 D) 12 E) 16.

Yechilishi: $7x + 11y = 100 \Rightarrow \begin{cases} x = 8 \\ y = 4 \end{cases} \Rightarrow |56 - 44| = 12.$

Javobi: D.

13. Agar $a^2 + 6a + 9 = 0 \quad bo'lsa, \quad a^3 + 3a^2 - 9a - 27$ ning qiymatini toping.

A) 0 B) 3 C) 1 D) 4 E) -1.

Yechilishi: $a^2 + 6a + 9 = 0 \Rightarrow (a+3)^2 = 0 \Rightarrow a = -3.$

$a^3+3a^2-9a-27=(-3)^3+3(-3)^2-9\cdot(-3)-27=$
$=-27+27+27-27=0.$ Javobi: A.

14. Ikkita toq sonning yig‘indisi 5 ga bo‘linadi. Bu sonlar kublarining yig‘indisi qanday raqam bilan tugaydi?

A)6 B) 5 C) 4 D) 0 E) 8.

Yechilishi: $Yig'indisi\ 5\ ga\ bo'linadigan\ ikkita\ toq\ son$ $2n+1\ va\ 8n-1\ ko'rinishida\ yozib\ olinadi.Bu\ sonlar$ $kublarining\ yig'indisining\ oxirgi\ raqami\ 0\ bo'ladi.$

$Masalan: 1+9=10\Rightarrow 1+729=730;$

$3+7=10\Rightarrow 27+343=370.$ Javobi: D.

15. $\frac{\sqrt{x+5}}{1-x}<1$ tengsizlikning eng kichik butun musbat yechimini toping.

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

Yechilishi: 1)$\frac{\sqrt{x+5}}{1-x}<1\Rightarrow\begin{cases}x+5\geq 0\\1-x\neq 0\end{cases}\begin{cases}x\geq -5;\\x\neq 1.\end{cases}$

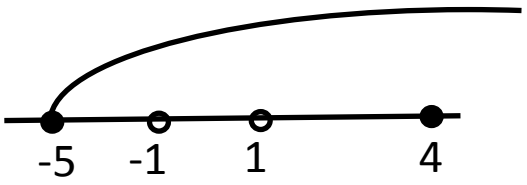
$$2)\ \frac{\sqrt{x+5}}{1-x}-1<0\Rightarrow\frac{\sqrt{x+5}-1+x}{1-x}<0.$$

$$\sqrt{x+5}=1-x\Rightarrow|x+5|=(1-x)^2\Rightarrow$$

$$\begin{cases}-x-5=1-2x+x^2\\x+5=1-2x+x^2\end{cases}\Rightarrow\begin{cases}x^2-x+6=0\\x^2-3x-4=0\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases}D<0;\\x_1=-1;\ x_2=4.\end{cases}$$

$U\ holda$



Javobi: $x=2.$ E.

16. $\frac{2kx+3}{3} = \frac{k-2+x}{2}$ tenglama k ning qanday qiymatlarida yechimga ega emas?

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

Yechilishi: $\frac{2kx+3}{3} = \frac{k-2+x}{2} \Rightarrow 4xk + 6 = 3k - 6 + 3x \Rightarrow$
$\Rightarrow 4kx - 3x = 3k - 12 \Rightarrow x(4k - 3) = 3k - 12 \Rightarrow$
$\Rightarrow x = \frac{3k-12}{4k-3} \Rightarrow 4k - 3 = 0 \Rightarrow k = \frac{3}{4}$. Javobi: A.

17. Agar bo‘luvchi $x - 2$ ga, bo‘linma $x + 3$ ga, qoldiq 5 ga teng bo‘lsa, bo‘linuvchi nimaga teng?

A)$x^2 - 3x - 6$ B)$x^2 - 5x - 6$

C)$x^2 + x - 1$ D)$x^2 - 5$ E)$x^2 - 6$

Yechilishi: $n = (x - 2)(x + 3) + 5 = x^2 - 3x - 6 + 5 =$
$= x^2 + x - 1$. Javobi: C.

18. x ning qanday qiymatida $P(x) = x^3 + 4x^2 - 12x + 17$ ko‘phadning qiymatini biror sonning kvadrati shaklida tasvirlash mumkin?

A) -2 B) 2 C) 1 D) 3 E) -3

Yechilishi:$P(x) = x^3 + 4x^2 - 12x + 17$; $Bu\ uchinchi\ darajali\ ko'phad\ bo'lgani\ uchun\ P(x)\ ni\ biror\ ko'phadning\ kvadrati\ ko'rinishida\ ifodalab\ bo'lmaydi. Shuning\ uchun\ javoblardan\ foydalani-ladi.$ $x = -2 \Rightarrow P(-2) = (-2)^3 + 4 \cdot (-2)^2 -$
$-12 \cdot (-2) + 17 = 49. Bu\ son\ 7\ ning\ kvadrati.$

Javobi: A.

19. $\sqrt{(2x-1)^2(3-x)} = (2x-1)\sqrt{3-x}$ tenglik x ning qanday qiymatlarida to‘g‘ri bo‘ladi?

A)$[0{,}5; 3]$ B)$[0; 3]$ C)$[1; 3]$

D)$(-\infty; 0{,}5]$ E)$(-\infty; 0{,}3]$

Yechilishi: $\sqrt{(2x-1)^2(3-x)} = (2x-1)\sqrt{3-x}$

$$|2x-1|\sqrt{3-x} = (2x-1)\sqrt{3-x}$$

1)$3-x \geq 0 \Rightarrow x \leq 3$; 2)$|2x-1| = 2x-1 \Rightarrow$

$\Rightarrow \begin{cases} 2x-1 = 2x-1 - ayniyat; \\ -2x+1 = 2x-1 \Rightarrow x = \frac{1}{2}. \end{cases}$ 1) va 2) lardan

$\frac{1}{2} \leq x \leq 3$. Javobi: A.

20. $\sqrt{a^{\frac{2}{3}} - 2a^{-\frac{1}{3}} + a^{-\frac{4}{3}}} \div a^{-\frac{2}{3}}$ ni soddalashtiring. $(a \geq 1)$

A) $a-2$ B) a^2-1 C) $a-1$

D)$\sqrt{a-1}$ E)$\sqrt{a^2-1}$

Yechilishi: $\sqrt{a^{\frac{2}{3}} - 2a^{-\frac{1}{3}} + a^{-\frac{4}{3}}} : a^{-\frac{2}{3}} =$

$$= \sqrt{\left(a^{\frac{1}{3}}\right)^2 - 2a^{-\frac{1}{3}} + \left(a^{-\frac{2}{3}}\right)^2} \cdot a^{\frac{2}{3}} = \sqrt{(a^{\frac{1}{3}} - a^{-\frac{2}{3}})^2} \cdot a^{\frac{2}{3}}$$

$$= \left(a^{\frac{1}{3}} - a^{-\frac{2}{3}}\right) \cdot a^{\frac{2}{3}} = a^{\frac{1}{3}+\frac{2}{3}} - 1 = a - 1.$$ Javobi: C.

21. Nechanchi haddan boshlab, $-8;\ 4;\ -2;$ ... geometrik Progressiyaning hadlarining absalyut qiymati 0,001 dan kichik bo‘ladi?

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

Yechilishi: $-8; 4; -2; \ldots \Rightarrow q = \frac{4}{-8} = -\frac{1}{2};$

$-8, 4, -2, 1, -\frac{1}{2}, \frac{1}{4}, -\frac{1}{8}, \frac{1}{16}, -\frac{1}{32}, \frac{1}{64},$

$-\frac{1}{128}, \frac{1}{256}, -\frac{1}{512}, \frac{1}{1024}.$

$$1) -\frac{1}{512} = -0{,}0019 \Rightarrow |-0{,}0019| > 0.001$$

2) $\frac{1}{1024} = 0{,}009 < 0{,}001 \Rightarrow 14.$ Javobi: D.

22. Agar $\begin{cases} 3^x \cdot 2^y = 972 \\ \log_{\sqrt{3}}(x-y) = 2 \end{cases}$ bo‘lsa, xy ning qiymatini toping.

A)14 B)12 C)10 D)8 E)-8

Yechilishi: $\begin{cases} 3^x \cdot 2^y = 972 \\ \log_{\sqrt{3}}(x-y) = 2 \end{cases} \Rightarrow 972 \ tub$

$ko'paytuvchilarga\ ajratilib, 972 = 3^5 \cdot 2^2\ topiladi.$

$U\ holda\ 3^x \cdot 2^y = 3^5 \cdot 2^2 \Rightarrow \begin{cases} x = 5 \\ y = 2 \end{cases} \Rightarrow x \cdot y = 10$

Tekshirish: $\log_{3^{\frac{1}{2}}}(5-2) = 2 \Rightarrow 2\log_3 3 = 2 \Rightarrow 2 = 2.$

Javobi: C.

23. $\frac{1}{\sqrt{1}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{7}} + \cdots + \frac{1}{\sqrt{79}+\sqrt{81}}$ yig‘indisini hisoblang.

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

Yechilishi: $\frac{1}{\sqrt{1}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{7}} + \cdots + \frac{1}{\sqrt{79}+\sqrt{81}} =$

$$= \frac{\sqrt{1}-\sqrt{3}}{(\sqrt{1}+\sqrt{3})(\sqrt{1}-\sqrt{3})} + \frac{\sqrt{3}-\sqrt{5}}{3-5} + \frac{\sqrt{5}-\sqrt{7}}{5-7} +$$

$$+\ldots+\frac{\sqrt{79}-\sqrt{81}}{79-81} = \frac{\sqrt{1}-\sqrt{3}}{-2} + \frac{\sqrt{3}-\sqrt{5}}{-2} + \frac{\sqrt{5}-\sqrt{7}}{-2} + \cdots + \frac{\sqrt{79}-\sqrt{81}}{-2} =$$

$$= -\frac{1}{2}(\sqrt{1}-\sqrt{3}+\sqrt{3}-\sqrt{5}+\sqrt{5}-\sqrt{7}+\cdots+\sqrt{79}-\sqrt{81}) =$$

$$= -\frac{1}{2}(\sqrt{1}-\sqrt{81}) = -\frac{1}{2}(1-9) = 4.$$

Javobi: E.

24. $\log_5 x = 2\log_5 3 + 4\log_{25} 7$ bo‘lsa, x ni aniqlang.

A)441 B)125 C)256 D)400 E)421

Yechilishi: $\log_5 x = 2\log_5 3 + 4\log_{25} 7 = 2\log_5 3 +$
$+4\log_{5^2} 7 = \log_5 3^2 + 4\cdot\frac{1}{2}\log_5 7 = \log_5 9 +$
$+\log_5 49 = \log_5 9\cdot 49 = \log_5 441 \Rightarrow x = 441$.

Javobi: A.

25. $\sqrt{13^2-12^2} = \sqrt[x]{625}$ tenglamani yeching.

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

$$\sqrt{13^2-12^2} = \sqrt[x]{625} \Rightarrow \sqrt{169-144} = \sqrt[x]{625} \Rightarrow$$

$$\Rightarrow \sqrt{25} = \sqrt[x]{25^2} \Rightarrow 25^{\frac{1}{2}} = 25^{\frac{2}{x}} \Rightarrow \frac{1}{2} = \frac{2}{x} \Rightarrow x = 4.$$

Javobi: C.

26. $A(1;9)$ nuqta $y = -x^2 + ax + 4$ parabola grafigiga tegishli. Parabola uchuning ordinatasini toping.

A)13 B)6 C)4 D)2 E)7

Yechilishi: $A(1;9) \in y = -x^2 + ax + 4 \Rightarrow 9 = -1^2 +$
$a\cdot 1 + 4 \Rightarrow 9 = -1 + a + 4 \Rightarrow a = 6 \Rightarrow$

$$\Rightarrow y = -x^2 + 6x + 4; a = -1; b = 6; c = 4.$$

$y = -\frac{b^2-4ac}{4a} = -\frac{36-4\cdot(-1)\cdot 4}{4\cdot(-1)} = \frac{36+16}{4} = 13$. Javobi: A.

27. Agar $f(x) = 5\sin(2x + \frac{2}{x})$ bo‘lsa, $f'(1)$ ni aniqlang.

A) 5 B) 0 C) 2,5 D) $-\frac{1}{5}$ E) mavjud emas.

Yechilishi: $f'(x) = 5\cos\left(2x + \frac{2}{x}\right)\cdot\left(2x + \frac{2}{x}\right)' =$

$$= 5\cos\left(2x + \frac{2}{x}\right)\cdot\left(2 - \frac{2}{x^2}\right)$$

$f'(1) = 5\cos\left(2\cdot 1 + \frac{2}{1}\right)\left(2 - \frac{2}{1^2}\right) = 0$. Javobi: B.

28. $y = x^2$ parabolani $\vec{a} = \{-3; 2\}$ vektor bo‘yicha parallel ko‘chirilganda, uning tenglamasi qanday bo‘ladi?

A) $y = x^2 + 6x + 11$ B) $y = x^2 + 5$ C) $y = x^2 - 1$

D) $y = x^2 + 9$ E) $y = x^2 + 6x - 9$

Yechilishi: $y = x^2$; $\vec{a}\{-3; 2\}$

$$O(0\,;0), \qquad O'(-3; 2)$$

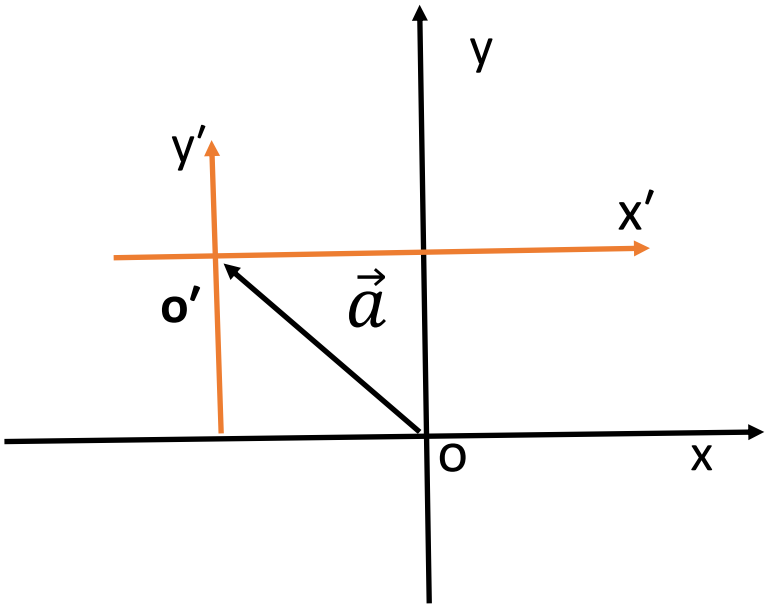
$$\begin{cases} x' = x + a \\ y' = y + b \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} -3 = 0 + a \\ 2 = 0 + b \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} a = -3 \\ b = 2 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x' = x - 3 \\ y' = y + 2 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x = x' + 3 \\ y = y' - 2 \end{cases} \Rightarrow$$



$$\Rightarrow y = x^2 \Rightarrow y' - 2 = (x' + 3)^2 \Rightarrow$$

$\Rightarrow y' = x'^2 + 6x' + 11$. Javobi: A.

29. $\int_0^{2\pi} cos2xcos7xdx$ ni hisoblang.

A)0,5 B)1 C)2 D)1,5 E)0

Yechilishi: $\int_0^{2\pi} cos2xcos7xdx =$

$$= \int_0^{2\pi} \frac{1}{2}[\cos(2x - 7x) + \cos(2x + 7x)]dx =$$

$$= \frac{1}{2}\int_0^{2\pi} (\cos(-5x) + cos9x)dx = \frac{1}{2}\int_0^{2\pi} cos5xdx +$$

$+\frac{1}{2}\int_0^{2\pi} cos9xdx = \frac{1}{2}\cdot\frac{1}{5}sin5x|_0^{2\pi} + \frac{1}{2}\cdot\frac{1}{9}sin9x|_0^{2\pi} = 0.$

Javobi: E.

30. Qaysifunksiya$x \in (-\frac{\pi}{6}; \frac{5\pi}{6})$ oraliqda faqat musbat qiymatlarni qabul qiladi?

A)$y = \sin(x + \frac{\pi}{6})$ B) $y = \sin(x + \frac{5\pi}{6})$

C) $y = \sin(x - \frac{5\pi}{6})$ D) $y = \sin(x - \frac{\pi}{6})$

D) $y = \cos(x + \frac{\pi}{6})$

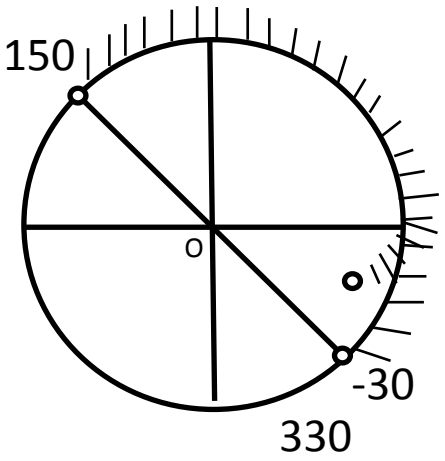
Yechilishi: $x \in \left(-\frac{\pi}{6};\ \frac{5\pi}{6}\right) =$

$= (-30°; 150°);$

$y = sin\left(x + \frac{\pi}{6}\right) > 0 \Rightarrow$

$\Rightarrow 0 < x + \frac{\pi}{6} < \pi \Rightarrow$

$\Rightarrow -\frac{\pi}{6} < x < \frac{5\pi}{6}$. Javobi: A.



31. Quyidagilardan qaysi funksiya$x = \frac{2\pi k}{3}\,(k \epsilon Z)$ sonlarda eng kichik qiymatga ega bo‘ladi?

A)$y = \cos(3x + \pi)$ B) $y = 8\sin 6x$

C) $y = \cos 3x$ D) $y = \cos 6x$ E) $y = \sin 3x$

Yechilishi: $x = \frac{2\pi k}{3},\ k \epsilon Z.$

$k = 0 \Rightarrow x = 0 \Rightarrow y = \cos(3 \cdot 0 + \pi) = -1.$ Javobi: A.

32. Quyidagilardan qaysi biri musbat?

A)$cos3$ B) $sin4$C) $sin2$ D) $tg2$ E) $cos9$

Yechilishi: $cos3 = cos3 \cdot 57° = cos171° < 0;$

$sin2 = sin2 \cdot 57° = sin114° > 0; 1rad = \frac{180°}{\pi} \approx 57°.$

Javobi: C.

33. $\vec{\imath},\ \vec{j}\ va\ \vec{k}$ koordinata o‘qlari bo‘ylab yo‘nalgan vektorlar va $\vec{a} = 5\vec{\imath} + 2\vec{j} - 3\vec{k}$ bo‘lsa $\vec{a}\ va\ \vec{\imath}$ vektorlar orasidagi burchakning kosinusini toping.

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

Yeshilishi: $\vec{a} = 5\vec{\imath} + 2\vec{\jmath} - 3\vec{k} \Rightarrow \vec{a} = \{5;\ \sqrt{2};\ -3\} \Rightarrow$

$\overrightarrow{|a|} = \sqrt{25 + 2 + 9} = \sqrt{36} = 6; \quad \vec{\imath} = \{1; 0; 0\} \Rightarrow \overrightarrow{|\imath|} = 1.$

$\text{Cos}(\vec{a}\text{^}\vec{\imath}) = \frac{\vec{a}\cdot\vec{\imath}}{|\vec{a}|\cdot|\vec{\imath}|} = \frac{\{5;\sqrt{2};-3\}\cdot\{1;0;0\}}{6\cdot 1} = \frac{5}{6}$. Javobi: A.

34. Agar $\vec{a} \neq \vec{0}$ bo‘lsa, $|(x-1)\vec{a}| < |2\vec{a}|$ tengsizlik x ning qanday qiymatlarida o‘rinli bo‘ladi?

A)$(-1; 3)$ B) $(0; 2)$ C)$(1; 2)$

D)$(-3; -1)$ E)$(-1; 3)$

Yechilishi: $\vec{a} \neq \vec{0}$, $|(x-1)\vec{a}| < |2\vec{a}| \Rightarrow$

$$(|(x-1)\vec{a}|)^2 < (|2\vec{a}|)^2 \Rightarrow (x-1)^2\vec{a}^2 < 4\vec{a}^2 \Rightarrow$$

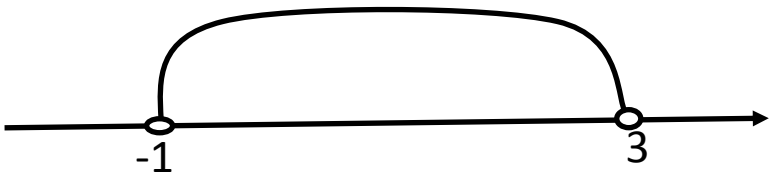
$$\Rightarrow (x-1)^2 < 4 \Rightarrow x^2 - 2x + 1 < 4$$

$$\Rightarrow x^2 - 2x - 3 < 0$$

$$\Rightarrow \begin{cases} x_1 = -1 \\ x_2 = 3 \end{cases} \Rightarrow$$

$\Rightarrow (-1; 3)$.

Javobi: A.



35. Uchburchak ikki tomonining nisbati $2:3$ kabi. Uchinchi tomonning uzunligi 40 ga teng. Uchinchi tomon qarshisidagi burchak bissektrissasi shu tomondan ajratgan katta qismining uzunligini toping.

A) 25 B) 22 C) 26 D) 28 E) 24

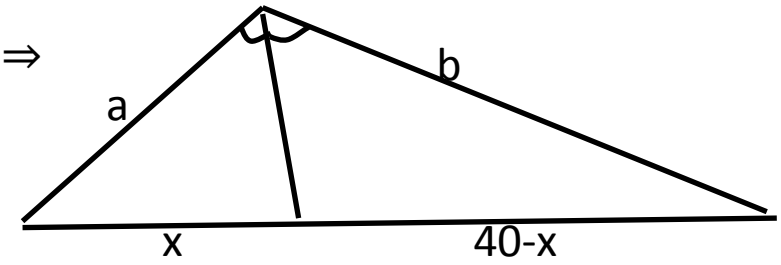
Yechilishi: 1) $\frac{a}{b}=\frac{2}{3}\Rightarrow a=\frac{2}{3}b$ 2)$\frac{a}{x}=\frac{b}{40-x}\Rightarrow$

$\Rightarrow a\cdot(40-x)=b\cdot x\Rightarrow$

$\Rightarrow 80-2x=3x\Rightarrow$

$\Rightarrow 5x=80\Rightarrow$

$\Rightarrow x=16\Rightarrow$



$\Rightarrow 40-x=24.$ Javobi: E.

36. Aylananing A nuqtasidan o‘tkazilgan AB va AC vatarlarning uzunliklari mos ravishda 5 va 12 ga teng. Agar ularning ikkinchi uchlari tutashtirilsa, yuzi 15 ga teng uchburchak hosil bo‘ladi. AB va AC vatarlar orasidagi o‘tkir burchakni toping.

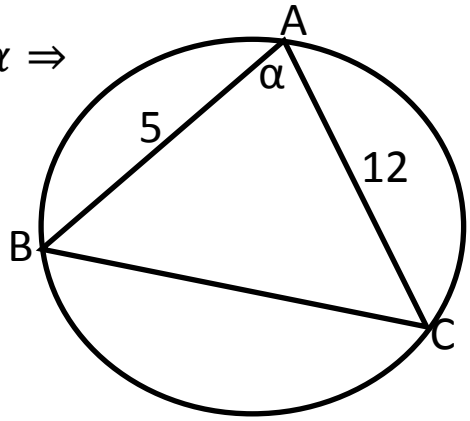
A)30° B) 15° C) 45° D) 60° E) 20°

Yechilishi: $S_{\triangle}=\frac{1}{2}a\cdot b\cdot sin\alpha\Rightarrow$

$\Rightarrow 15=\frac{1}{2}\cdot 5\cdot 12\cdot sin\alpha\Rightarrow$

$\Rightarrow sin\alpha=\frac{1}{2}\Rightarrow\alpha=30°.$

Javobi: A.



37. $3x+y=10$ va $2x-3y-36=0$ to‘g‘ri chiziqlarning kesishish nuqtasi markazi koordinatalar boshida bo‘lgan aylanaga tegishli. Aylananing radiusini toping.

A) 6 B) 8 C) 10 D) 12 E) 13

Yechilishi: $\begin{cases}3x+y=10\\2x-3y=36\end{cases}\Rightarrow+\begin{matrix}9x+3y=30\\2x-3y=36\end{matrix}\Rightarrow 11x=66\Rightarrow$

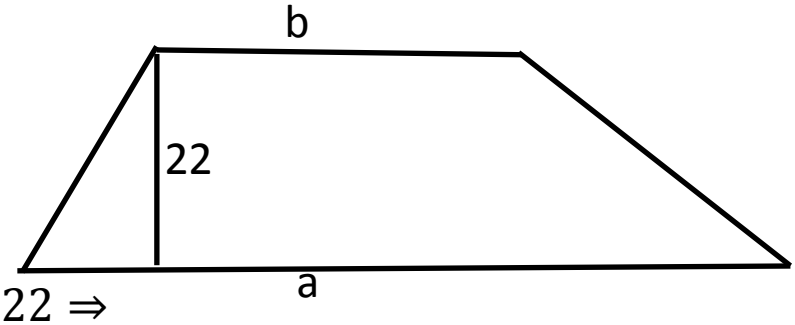
$\Rightarrow x=6,\quad y=10-3x=10-18=-8\Rightarrow A(6;-8).$

$R = \sqrt{x^2 - y^2} = \sqrt{36 + 64} = 10$. Javobi: C.

38. Trapetsiyaning yuzi 594 ga, balandligi 22 ga, asoslari ayirmasi 6 ga teng. Trapetsiya katta asosining uzunligini toping.

A) 34 B) 32 C) 28 D) 30 E) 36

Yechilishi:



$a - b = 6 \Rightarrow$

$\Rightarrow a = 6 + b$

$$594 = \frac{6 + b + b}{2} \cdot 22 \Rightarrow$$

$\Rightarrow 2b + 6 = 54 \Rightarrow b = 24 \Rightarrow a = 6 + 24 = 30$. Javobi: D.

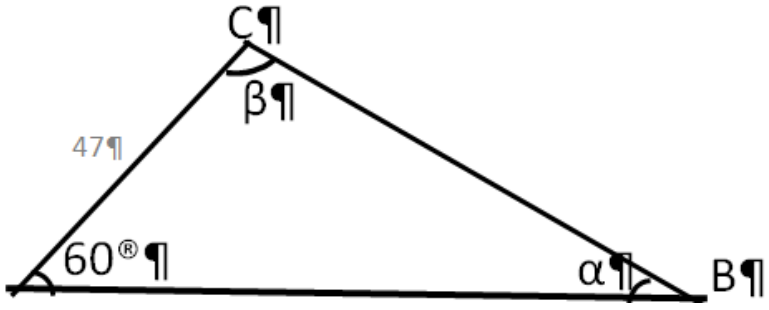
39. ABC uchburchakda $\angle A = 60°$ va $AB > BC$ bo‘lsa, $\angle B$ ning mumkin bo‘lgan x qiymatlari qaysi javobda to‘g‘ri ko‘rsatilgan?

A)$0° < x < 60°$B) $30° < x < 60°$

C) $0° < x < 30°$ D)6 $0° < x < 120°$

E)6 $0° < x < 90°$

Yechilishi:



$$\begin{cases} \alpha + 60° > \beta \\ 60° + \beta > \alpha \\ \alpha + \beta > 60 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} \alpha > \beta - 60° \\ \alpha < \beta + 60° \\ \alpha > 60° - \beta \end{cases} \Rightarrow 1) + \begin{matrix} \alpha > \beta - 60° \\ \alpha > 60° - \beta \end{matrix} \Rightarrow 2\alpha > 0 \Rightarrow \alpha > 0;$$

$$2) \begin{cases} \alpha > \beta - 60° \\ \alpha < \beta + 60° \end{cases} \Rightarrow \begin{cases} -\alpha < -\beta + 60° \\ -\alpha < \beta + 60° \end{cases} \Rightarrow 2\alpha < 2\beta \Rightarrow$$

$\Rightarrow \alpha < \beta \Rightarrow \alpha < 60°;$

3) $\begin{cases} \alpha < \beta + 60° \\ -\alpha < \beta - 60° \end{cases} \Rightarrow 2\alpha < 120 \Rightarrow \alpha < 60°$

$0° < \alpha < 60°$. Javobi: A.

40. To‘g‘ri burchakli uchburchakka ichki chizilgan aylananing urinish nuqtasi gipotenuzani uzunliklari 3 va 10 ga teng kesmalarga ajratdi. Uchburchakning yuzini toping.

A) 15 B) 12 C) 30 D) 21 E) 18

Yechilishi: $(3+x)^2 + (10+x)^2 = 13^2 \Rightarrow$

$\Rightarrow 9 + 6x + x^2 + 100 + 20x + x^2 = 169 \Rightarrow$

$\Rightarrow 2x^2 + 26x - 60 = 0 \quad \Rightarrow \quad x^2 + 13x - 30 = 0 \Rightarrow$

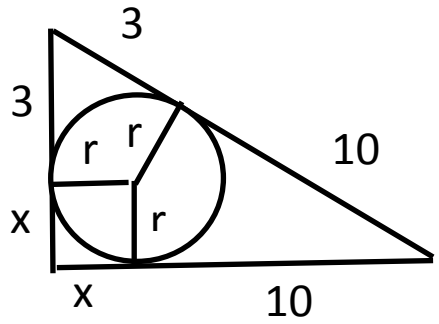
$$\Rightarrow x_{1,2} = -\frac{13}{2} \pm \sqrt{\frac{169}{4} + 30} = -\frac{13}{2} \pm \frac{17}{2} \Rightarrow x = 2;$$

$b = 3 + x = 5.$

$a = 10 + x = 12;$

$S = \frac{1}{2} \cdot a \cdot b = 30.$

Javobi: C.



41. Ikkita to‘g‘ri burchakli parallelepipedning o‘lchovlari mos ravishda $5; 8; a$ va $10; 3; (2a - 4)$ ga teng. a ning qanday qiymatida bu parallelepipedlar tengdosh bo‘ladi?

A) 12 B) 10 C) 6

D) 4 E) 8

Yechilishi:

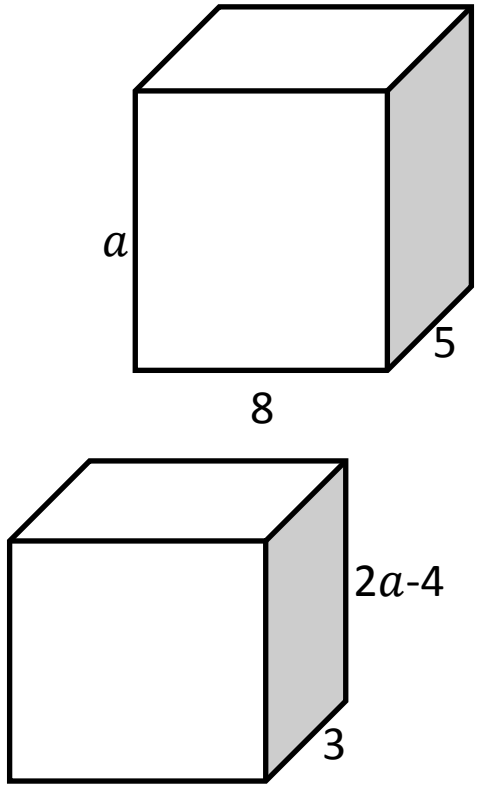
1)$V_1 = 5 \cdot 8 \cdot a = 40a;$

2)$V_2 = 10 \cdot 3 \cdot (2a - 4) =$

$= 60a - 120;$ $V_1 = V_2 \Rightarrow$

$\Rightarrow 40a = 60a - 120 \Rightarrow$

$\Rightarrow a = 6.$ Javobi: C.



42. Qirrasi 4 ga teng bo‘lgan muntazam tetraedrning to‘la sirti qanday yuzaga ega bo‘ladi?

A)$16\sqrt{3}$ B) $8\sqrt{3}$ C) $24\sqrt{2}$ D) $16\sqrt{2}$ E) $18\sqrt{3}$

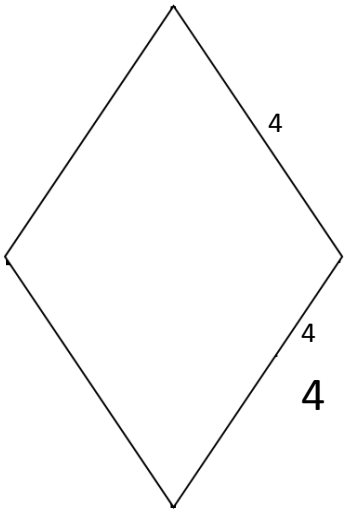
Yechilishi:$h^2 = 4^2 - 2^2 =$

$= 16 - 4 = 12 \Rightarrow a = 2\sqrt{3};$

$S_{\Delta} = \frac{a^2\sqrt{3}}{4} = 4\sqrt{3};$

$S_{to'la\ sirt} = 4 \cdot S_{\Delta} = 16\sqrt{3}.$

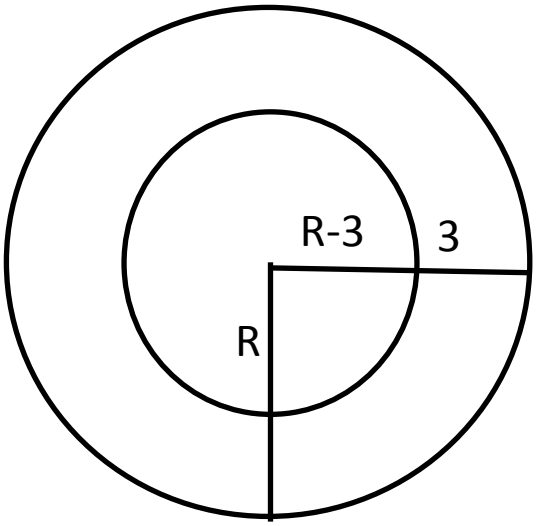
Javobi: A.



43. Kovak shar devorining hajmi 252π ga,devorining qalinliga 3 ga teng.Tashqi sharning radiusini toping.

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

Yechilishi:$V_1 = \frac{4}{3}\pi R^3$;



$V_2 = \frac{4}{3}\pi(R-3)^3$;

$V_1 - V_2 = 252\pi \Rightarrow 252\pi =$

$= \frac{4}{3}\pi(R^3 - (R-3)^3) \Rightarrow$

$\Rightarrow 189 = R^3 - R^3 + 9R^2 -$

$-27R + 27 \Rightarrow$

$$\Rightarrow R^2 - 3R - 18 = 0 \Rightarrow$$

$\Rightarrow \begin{cases} R_1 \neq -3 \\ R_2 = 6 \end{cases} \Rightarrow R = 6.$ Javobi: B.

44. b ning qanday qiymatida $\int_{-1}^{1}(4x+b)dx$ integralning qiymati 1 ga teng bo‘ladi?

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

Yechilishi: $\int_{-1}^{1}(4x+b)dx = 4\int_{-1}^{1} xdx + b\int_{-1}^{1} dx =$

$$= 4 \cdot \frac{x^2}{2}|_{-1}^{1} + bx|_{-1}^{1} = 2x^2|_{-1}^{1} + bx|_{-1}^{1} =$$

$= 2[1^2 - (-1)^2] + b[1-(-1)] = 2b \Rightarrow 2b = 1 \Rightarrow$

$\Rightarrow b = \frac{1}{2}$. Javobi: A.

45. Agar $ctg\alpha = \frac{13}{4}$ bo‘lsa, $\frac{2cos\alpha + sin\alpha}{cos\alpha - 2sin\alpha}$ kasrning qiymatini toping.

A) 6 B) 5 C) 6,2 D) 4,8 E) 6,4

Yechilishi: $ctg\alpha = \frac{13}{4}$; $\frac{2cos\alpha+sin\alpha}{cos\alpha-2sin\alpha} = \frac{2ctg\alpha+1}{ctg\alpha-2} = \frac{2\cdot\frac{13}{4}+1}{\frac{13}{4}-2} =$

$= \frac{15}{2}\cdot\frac{4}{5} = 6.$ Javobi: A.

46. Uchburchakli piramida asoslarining tomonlari 9; 10 va 17 ga teng. Piramidaning barcha yon yoqlari asos tekisligi bilan $45°$ li burchak tashkil etsa, uning hajmini toping.

A) 24 B) 36 C) 32 D) 21 E) 33

Yechilishi: Geron formulasiga asosan

$P = \frac{9+10+17}{2} = 18;$

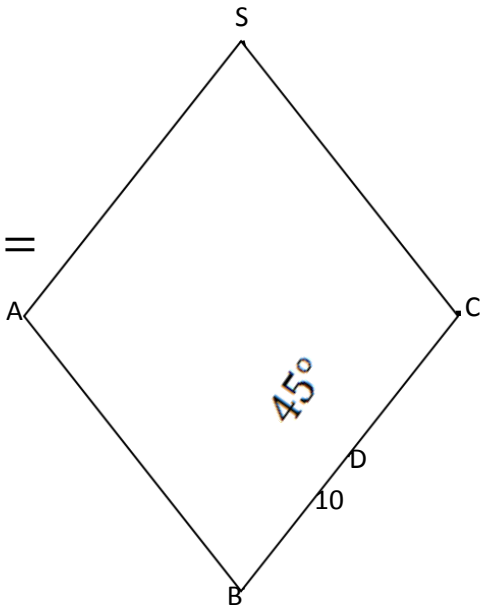
$S_{asos} = \sqrt{18\cdot 9\cdot 8} = 36;$

$OD = SO = r = \frac{2S}{a+b+c} =$

$= \frac{2\cdot 36}{9+10+17} = 2;$

$V = \frac{1}{3}\cdot S_{asos}\cdot H =$

$= \frac{1}{3}\cdot 36\cdot 2 = 24.$



Javobi: A.

47. Agar $|a| = 1$ bo‘lsa, $actgx - 1 = cos2x$ tenglama $[0; 2\pi]$ kesmada nechta ildizga ega bo‘ladi?

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

Yechilishi: $|a| = 1 \Rightarrow a = \pm 1; actgx = cos2x + 1 =$

$= cos^2x - sin^2x + sin^2x + cos^2x = 2cos^2x \Rightarrow$

$\Rightarrow a\cdot\frac{cosx}{sinx} = 2cos^2x \Rightarrow a\cdot\frac{cosx}{sinx} - 2cos^2x = 0.$

$$1)\begin{cases} a=1; \\ cosx=0 \\ sinx\neq 0 \end{cases} \Rightarrow \begin{cases} cosx-2sinxcos^2x=0 \\ x=\frac{\pi}{2}+\pi k,\ \ k\epsilon Z \\ x\neq \pi k,\ \ k\epsilon Z \end{cases} \Rightarrow$$

$$\Rightarrow cosx(1-sin2x)=0 \Rightarrow$$

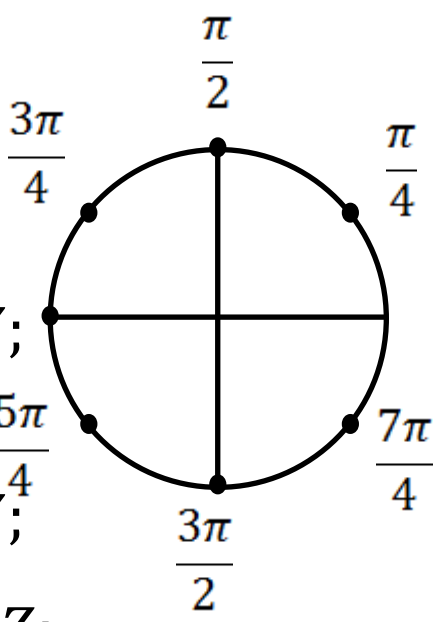
$$\Rightarrow sin2x=1 \Rightarrow 2x=\frac{\pi}{2}+\pi k, k\epsilon Z \Rightarrow x=\frac{\pi}{4}+\pi k, k\epsilon Z.$$

$$2)\ a=-1 \Rightarrow -cosx-2cos^2x\cdot sinx=0 \Rightarrow$$

$$\Rightarrow -cosx(1+sin2x)=0 \Rightarrow sin2x=-1 \Rightarrow$$

$$\Rightarrow 2x=-\frac{\pi}{2}+2\pi k, k\epsilon Z \Rightarrow$$

$$\Rightarrow x=-\frac{\pi}{4}+\pi k, k\epsilon Z.$$



Demak, 1) va 2) dan

$$\begin{cases} x=\frac{\pi}{2}+\pi k,\ \ k\epsilon Z; \\ x\neq \pi k,\ \ k\epsilon Z; \\ x=\frac{\pi}{4}+\pi k,\ \ k\epsilon Z; \\ x=-\frac{\pi}{4}+\pi k,\ \ k\epsilon Z; \end{cases}$$

$$3)\begin{cases} -ctgx-1=cos2x \\ ctgx-1=cos2x \end{cases} (*)$$

$$k=0 \Rightarrow \begin{cases} x\neq 0 \\ x=\frac{\pi}{2} \\ x=-\frac{\pi}{4}, \\ x=\frac{\pi}{4} \end{cases} \ k=1 \Rightarrow \begin{cases} x\neq \pi \\ x=\frac{3\pi}{2} \\ x=\frac{3\pi}{4}, \\ x=\frac{5\pi}{4} \end{cases} \ k=2 \Rightarrow \begin{cases} x\neq 2\pi \\ x=\frac{5\pi}{2} \\ x=\frac{7\pi}{4} \\ x=\frac{9\pi}{4} \end{cases}$$

Ildizlar $(*)$ ga qo‘yib tekshiriladi.

$$x=\frac{\pi}{2}\Rightarrow\begin{cases}-ctg\frac{\pi}{2}-1=cos2\cdot\frac{\pi}{2}\\ ctg\frac{\pi}{2}-1=cos2\cdot\frac{\pi}{2}\end{cases}\Rightarrow\begin{cases}-1=-1\\-1=-1\end{cases}$$

$$x=\frac{\pi}{4}\Rightarrow\begin{cases}-1-1\neq 0\\1-1=0\end{cases}\quad x=\frac{3\pi}{4}\Rightarrow\begin{cases}1-1=0\\-1-1\neq 0\end{cases}$$

$$x=-\frac{\pi}{4}\Rightarrow\begin{cases}1-1=0\\-1-1\neq 0\end{cases}\Rightarrow x=\frac{5\pi}{4}\Rightarrow\begin{cases}-1-1\neq 0\\1-1=0\end{cases}$$

$x=\frac{3\pi}{2}\Rightarrow\begin{cases}-1=-1\\-1=-1\end{cases}$ Demak $x=\frac{\pi}{2}\ va\ x=\frac{3\pi}{2}$.

Javobi: B.

48. $(cos3x+cosx)^2+(sin3x+sinx)^2$ ni soddalashtiring.

A)$4cos^2x$ B) $2cos^2x$ C) $3sin^2x$

D) $4sin^2x$ E) $4cos^2x+1$

Yechilishi: $(cos3x+cosx)^2+(sin3x+sinx)^2=$

$$=(2cos\frac{3x+x}{2}cos\frac{3x-x}{2})^2+(2sin\frac{3x+x}{2}cos\frac{3x-x}{2})^2=$$

$=4cos^2 2x\cdot cos^2x+4sin^2 2x\cdot cos^2x=4cos^2x(cos^2 2x+sin^2 2x)=4cos^2x\cdot 1=4cos^2x.$

Javobi: A.

2000-YIL, 3-AXBOROTNOMA

1. $\frac{1\frac{2}{13}\cdot 0{,}4(3)+2:1{,}3}{\frac{3}{8}+0{,}125}-\sqrt{\sqrt{256}}$ni hisoblang.

   A) -2 B) 0 C) 2 D) $\frac{1}{13}$ E) -1

   Yechilishi: $\frac{1\frac{2}{13}\cdot 0{,}4(3)+2:1{,}3}{\frac{3}{8}+0{,}125}-\sqrt{\sqrt{256}}=$

   $$=\frac{\frac{15}{13}\cdot\frac{43-4}{90}+2\cdot\frac{10}{13}}{0{,}375+0{,}125}-4=\frac{\frac{1}{2}+\frac{20}{13}}{\frac{1}{2}}-4=\frac{\frac{13+40}{26}}{\frac{1}{2}}-4=$$

   $=\frac{53}{13}-4=\frac{53-52}{13}=\frac{1}{13}$. Javobi: D.

2. $\sqrt[3]{216\cdot 512}+\sqrt[5]{32\cdot 243}$ni hisoblang.

   A) 45 B) 48 C) 49 D) 50 E) 54

   Yechilishi: $\sqrt[3]{216\cdot 512}+\sqrt[5]{32\cdot 243}=\sqrt[3]{6^3\cdot 8^3}+$

   $+\sqrt[5]{2^5\cdot 3^5}=6\cdot 8+2\cdot 3=48+6=54$. Javob: E.

3. Quyidagi tasdiqlardan qaysilari to‘g‘ri?

   1) Toq va juftsonlar doim o‘zaro tub.

   2) Ikkita juft son o‘zaro tub bo‘la olmaydi.

   3) Ikkita turli tub sonlar doimo‘zaro tub.

   4) Ikkita ketma-ket natural sonlar doim o‘zaro tub.

   5) 39 va 91 sonlari o‘zaro tub.

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

Yechilishi: Faqat 1 ga bo‘linadigan sonlar o‘zaro tub sonlardir. 2), 3), 4). Javob: D.

4. $4\sqrt{7\frac{1}{2}}-\frac{2\sqrt{10}}{2\sqrt{3}-\sqrt{10}}$ ni soddalashtiring.

A)$2-3\sqrt{10}$. B)10. C)$3\sqrt{10}-2$. D)-10. E)$4\sqrt{10}$

Yechilishi: $4\sqrt{7\frac{1}{2}}-\frac{2\sqrt{10}}{2\sqrt{3}-\sqrt{10}}=\sqrt{16\cdot\frac{15}{2}}-\frac{2\sqrt{10}}{\sqrt{12}-\sqrt{10}}=$

$$=\sqrt{8\cdot 15}-\frac{2\sqrt{10}}{\sqrt{12}-\sqrt{10}}=\sqrt{10\cdot 12}-\frac{2\sqrt{10}}{\sqrt{12}-\sqrt{10}}=$$

$$=\frac{12\sqrt{10}-10\sqrt{12}-2\sqrt{10}}{\sqrt{12}-\sqrt{10}}=\frac{10\sqrt{10}-10\sqrt{12}}{\sqrt{12}-\sqrt{10}}$$

$$=\frac{-10\left(\sqrt{12}-\sqrt{10}\right)}{\sqrt{12}-\sqrt{10}}=-10.$$

Javob: D.

5. 72 va 96 sonlarining eng kichik umumiy karralisining eng katta umumiy bo‘luvchisiga nisbatini toping.

A) 10 B) 0,1 C) 9 D) 12 E) $\frac{1}{12}$

Yechilishi:

72	2
36	2
18	2
9	3
3	3
1	

96	2
48	2
24	2
12	2
6	2
3	3
1	

$72=2^3\cdot 3^2;96=2^5\cdot 3.$

$K(72;96)=2^5\cdot 3^2=288;$

$D(72;96)=2^3\cdot 3=24;$

$\frac{K}{D}=\frac{288}{24}=12.$

Javobi: D.

6. $0{,}027^{-\frac{1}{3}}-\left(-\frac{1}{6}\right)^{-2}+256^{\frac{3}{4}}-3^{-1}+5{,}5^0$ni hisoblang.

A)33 B)32,97 C)31 D)32 E)31,99

Yechilishi: $0{,}027^{-\frac{1}{3}} - \left(-\frac{1}{6}\right)^{-2} + 256^{\frac{3}{4}} - 3^{-1} + 5{,}5^{0} =$

$$= (0{,}3^{3})^{-\frac{1}{3}} - (-6^{-1})^{-2} + (4^{4})^{\frac{3}{4}} - \frac{1}{3} + 1 =$$

$$= \frac{10}{3} - 36 + 64 - \frac{1}{3} + 1 = \frac{10}{3} - \frac{1}{3} + 29 = \frac{9}{3} + 29 = 32.$$

Javob: D.

7. Zavod tomonidan bolalar bog‘chasiga 36 ta uch g‘ildirakli va ikkig‘ildirakli velosipedlar sovg‘a qilindi. Agar hamma velosipedlarning g‘ildiraklari 93 ta bo‘lsa, uchg‘ildirakli velosipedlar nechta?

A) 15 B) 18 C) 20 D) 21 E) 22

Yechilishi: x—ikki g‘ildiraklilar soni, y—uch g‘ildiraklilar soni $\begin{cases} x + y = 36 \Rightarrow x = 36 - y \\ 2x + 3y = 93 \Rightarrow 2(36 - y) + 3y = 93 \end{cases} \Rightarrow$

$\Rightarrow 72 - 2y + 3y = 93 \Rightarrow y = 21$ Javob: D.

8. $1 \cdot 2 \cdot 3 \cdot 4 \cdot \ldots \cdot 26 \cdot 27 - 1 \cdot 3 \cdot 5 \cdot 7 \cdot \ldots \cdot 25 \cdot 27$ ayirmaning oxirgi raqamini toping.

A) 4 B) 3 + C) 5 D) 6 E) 8

Yechilishi: $1 \cdot 2 \cdot 3 \cdot 4 \cdot \ldots \cdot 26 \cdot 27 - 1 \cdot 3 \cdot 5 \cdot 7 \cdot \ldots \cdot 25 \cdot 27$

$= 1 \cdot 3 \cdot 5 \cdot 7 \cdot \ldots \cdot 25 \cdot 27 \cdot (2 \cdot 4 \cdot 6 \cdot 8 \cdot \ldots \cdot 24 \cdot 26 - 1) =$

$= \left| \begin{matrix} Bu\ misolda\ 5\ qatnashgan\ toq\ sonlar\ ko'paytmasi \\ 5\ raqami\ bilan,\ \ juft\ sonlar\ ko'paytmasi\ nol\ bilan \\ tugaydi. \end{matrix} \right| =$

$\cdots 5 \cdot (\ldots 0 - 1) = \cdots 5 \cdot \ldots 9 = \cdots 5.$ Javobi: C.

9. Xalq banki yiliga qo‘yilgan pulning 5% ini to‘laydi. Agar 680 so‘m qo‘yilgan bo‘lsa, u bir yildan keyin necha so‘m bo‘ladi?

A) 706 B) 708 C) 714 D) 718 E) 722

Yechilishi: $680 \cdot 1{,}05 = 714$ Javobi: C.

10. $3\sqrt{2x} - 5\sqrt{8x} + 7\sqrt{18x} = 28$ tenglamani yeching.

A) 1 B) 2 C) 3 D) 4 E) 6

Yechilishi: $3\sqrt{2x} - 5\sqrt{8x} + 7\sqrt{18x} = 28;$

$$3\sqrt{2x} - 10\sqrt{2x} + 21\sqrt{2x} = 28;$$

$14\sqrt{2x} = 28 \Rightarrow \sqrt{2x} = 2 \Rightarrow x = 2.$ Javobi: B.

11. k ning qanday qiymatida $k(k+6)x = k + 7(x+1)$ tenglama yechimga ega bo‘lmaydi?

A) 1 va 7 B) 1 C) 7 D) 1 va -7 E) -7

Yechilishi: $k(k+6)x = k + 7x + 7 \Rightarrow$

$$\Rightarrow k(k+6)x - 7x = k + 7 \Rightarrow x(k^2 + 6k - 7) =$$

$$= k + 7 \Rightarrow x = \frac{k+7}{k^2+6k-7} \Rightarrow k^2 + 6k - 7 \neq 0 \Rightarrow$$

$$\Rightarrow \begin{cases} k_1 = -7; \\ k_2 \neq 1. \end{cases}$$ Javobi: B.

12. $a$ning qanday qiymatida $\begin{cases} (6+a)x - 6y = 2 \\ -2ax + 3y = a - 3 \end{cases}$ tenglamalar sistemasi cheksiz ko‘p yechimga ega b’ladi?

A) 2 B) -2 C) -6 D) 4 E) -13

Yechilishi: $\begin{cases} (6+a)x - 6y = 2 \\ -2ax + 3y = a - 3 \end{cases} \Rightarrow \frac{6+a}{-2a} = \frac{-6}{3} = \frac{2}{a-3} \Rightarrow$

$\Rightarrow \frac{6+a}{-2a} = -2 \Rightarrow 6 + a = 4a \Rightarrow a = 2.$ Javobi: A.

13. $k$ning qanday qiymatlarida $\frac{4x-1}{x-1} = k + 3$tenglama manfiy yechimga ega?

A) $(-\infty; -2)$ B) $(-\infty; 2) \cup (1; \infty)$ C) $(1; \infty)$

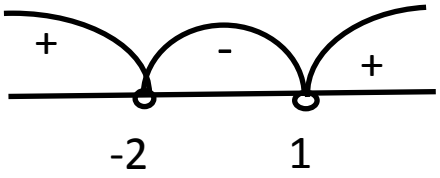
D) (-2; 1) E) $)(-\infty; 2) \cup (2; \infty)$

Yechilishi: $1) x - 1 \neq 0 x \neq 1$ $2) 4x - 1 =$

$=(k + 3)(x - 1) \Rightarrow 4x - 1 = kx - k + 3x - 3 \Rightarrow$

$\Rightarrow 4x - kx - 3x = -k - 2 \Rightarrow -kx + x = -(k + 2) \Rightarrow$

$\Rightarrow x = \frac{k+2}{k-1} \Rightarrow x < 0 \Rightarrow$



$\Rightarrow \frac{k+2}{k-1} < 0 \Rightarrow \begin{cases} k + 2 \neq 0 \\ k - 1 \neq 0 \end{cases} \Rightarrow \begin{matrix} k \neq -2 \\ k \neq 1 \end{matrix}$

$\Rightarrow (-2; 1)$.Javobi: D.

14. a va b ning qanday qiymatlarida quyidagi munosabat ayniyat bo‘ladi? $\frac{1}{4x^2-1} = \frac{a}{2x-1} - \frac{b}{2x+1}$

A) $a = -\frac{1}{2}, b = \frac{1}{2}$ B) $a = 1, b = -1$ C) $a = -1, b = 1$

D) $a = \frac{1}{2},\ b = -\frac{1}{2}$ E) $a = \frac{1}{2},\ b = \frac{1}{2}$

Yechilishi: $\frac{1}{4x^2-1} = \frac{a}{2x-1} - \frac{b}{2x+1}$;

$$1) 4x^2 - 1 = 2x^2 - 1^2 = (2x - 1)(2x + 1);$$

$$2) 1 = a(2x + 1) - b(2x - 1) \Rightarrow 2ax + a - 2bx + b = 1 \Rightarrow$$

$$\Rightarrow (2a - 2b)x + (a + b) = 0 \cdot x + 1 \Rightarrow \begin{cases} 2a - 2b = 0 \\ a + b = 1 \end{cases} \Rightarrow$$

$\Rightarrow \begin{cases} a = b; \\ a = \frac{1}{2}. \end{cases}$ Javobi: E.

15. $\frac{1}{1\cdot 3} + \frac{1}{3\cdot 5} + \frac{1}{5\cdot 7} + \cdots + \frac{1}{13\cdot 15}$ni hisoblang.

A)$\frac{11}{50}$ B)$\frac{7}{30}$ C)$\frac{8}{15}$ D)$\frac{7}{15}$ E)$\frac{2}{5}$

Yechilishi: $\frac{1}{1\cdot 3} + \frac{1}{3\cdot 5} + \frac{1}{5\cdot 7} + \cdots + \frac{1}{13\cdot 15} =$

$$= \frac{1}{2}\left[\frac{1}{1} - \frac{1}{3} + \frac{1}{3} - \frac{1}{5} + \frac{1}{5} - \frac{1}{7} + \cdots + \frac{1}{13} - \frac{1}{15}\right] =$$

$= \frac{1}{2}\left[1 - \frac{1}{15}\right] = \frac{1}{2}\cdot\frac{14}{15} = \frac{7}{15}$. Javobi: D.

16. $\frac{(a^2-4)^2}{(a^2+4)^2} + (\frac{4a}{a^2+4})^2$ ni soddalashtiring.

A)$a - 4$ B)2 C)$\frac{a^2-4}{a^2+4}$ D)$\frac{a-4}{a+4}$ E)1

Yeshilishi:$\frac{(a^2-4)^2}{(a^2+4)^2} + \left(\frac{4a}{a^2+4}\right)^2 = \frac{a^4-8a^2+16}{(a^2+4)^2} + \frac{16a^2}{(a^2+4)^2} =$

$\frac{a^4-8a^2+16+16a^2}{(a^2+4)^2} = \frac{(a^2+4)^2}{(a^2+4)^2} = 1$. Javobi: E.

17. $\frac{a-a\sqrt{a}}{\sqrt[3]{a^2}+\sqrt[6]{a^5}+a} + \frac{\sqrt[3]{a^2}-a}{\sqrt[3]{a}+\sqrt{a}} + 2\sqrt{a}$ ni soddalashtiring.

A)$2\sqrt[3]{a}$ B)$2\sqrt{a}$ C)$\sqrt[3]{a} + 2\sqrt{a}$ D)0 E)$\frac{1}{\sqrt[3]{a}}$

Yechilishi:$\frac{a-a\sqrt{a}}{\sqrt[3]{a^2}+\sqrt[6]{a^5}+a} + \frac{\sqrt[3]{a^2}-a}{\sqrt[3]{a}+\sqrt{a}} + 2\sqrt{a} =$

$$= \frac{\left(\sqrt[3]{a}\right)^3 - \left(\sqrt{a}\right)^3}{\sqrt[3]{a^2} + \sqrt[6]{a^5} + a} + \frac{\sqrt[3]{a^2} - a + 2\sqrt[3]{a}\cdot\sqrt{a} + 2\sqrt{a}\cdot\sqrt{a}}{\sqrt[3]{a} + \sqrt{a}} =$$

$$= \frac{(\sqrt[3]{a}-\sqrt{a})(\sqrt[3]{a^2}+\sqrt[6]{a^5}+a)}{\sqrt[3]{a^2}+\sqrt[6]{a^5}+a} + \frac{\left(\sqrt[3]{a}+\sqrt{a}\right)^2}{\sqrt[3]{a}+\sqrt{a}} =$$

$= \sqrt[3]{a} - \sqrt{a} + \sqrt[3]{a} + \sqrt{a} = 2\sqrt[3]{a}.$ Javobi: A.

18. Agar $x^2 - 3x - 6 = 0$ tenglamaning ildizlari $x_1$va$x_2$bo‘lsa, $\frac{1}{{x_1}^3} + \frac{1}{{x_2}^3}$ ni toping.

A)$\frac{1}{3}$ B)0,5 C)-0,5 D)0,375 E)-0,375

Yechilishi: $x^2 - 3x - 6 = 0 \Rightarrow \begin{cases} x_1 + x_2 = 3; \\ x_1 \cdot x_2 = -6. \end{cases}$

$$\left(\frac{1}{x_1}+\frac{1}{x_2}\right)^3 = \frac{1}{{x_1}^3} + \frac{1}{{x_2}^3} + 3\cdot\frac{1}{{x_1}^2}\cdot\frac{1}{{x_2}^2} + 3\cdot\frac{1}{x_1}\cdot\frac{1}{{x_2}^2} \Rightarrow$$

$$\Rightarrow \left(\frac{x_1+x_2}{x_1\cdot x_2}\right)^3 = \frac{1}{{x_1}^3} + \frac{1}{{x_2}^3} + 3\cdot\frac{1}{x_1\cdot x_2}\left(\frac{1}{x_1}+\frac{1}{x_2}\right) \Rightarrow$$

$$\Rightarrow \left(\frac{1}{x_1}+\frac{1}{x_2}\right)^3 = \frac{1}{{x_1}^3} + \frac{1}{{x_2}^3} + \frac{3}{x_1\cdot x_2}\cdot\frac{x_1+x_2}{x_1\cdot x_2} \Rightarrow$$

$$\Rightarrow \left(\frac{3}{-6}\right)^3 = \frac{1}{{x_1}^3} + \frac{1}{{x_2}^3} + \frac{3}{-6}\cdot\frac{3}{-6} \Rightarrow \frac{1}{{x_1}^3} + \frac{1}{{x_2}^3} = -\frac{1}{8} - \frac{1}{4} =$$

$= -0{,}375.$ Javobi: E.

19. k ning qanday eng kichik butun qiymatida $x^2 - 2(k+2)x + 6 + k^2 = 0$ tenglama ikkita turli haqiqiy ildizga ega?

A) -2 B) -1 C) 2 D) 1 E) 3

Yechilishi: $x^2 - 2(k+2)x + 6 + k^2 = 0$

$$a = 1;\ \ b = -2k - 4;\ \ c = 6 + k^2;\ \ \ b^2 - 4ac > 0$$

$$(-2k-4)^2-4\cdot 1\cdot(6+k^2)>0$$

$(2k+4)^2-24-4k^2>0;\ \ 4k^2+16k+16-24-$
$-4k^2>0\Rightarrow 16k>8\Rightarrow k>\frac{1}{2}\Rightarrow k=1.$ Javobi: D.

20. $p=a^2+b^2+c^2$va$q=ab+ac+bc$ ifodalarni taqqoslang.

A)$p<q$ B)$p=q$ C)$p>q$ D)$p\le q$ E)$p\ge q$

Yechilishi: $p=a^2+b^2+c^2;\quad q=ab+ac+bc$

$\begin{cases} a=b=c\ da\ p=q \\ boshqa\ hollarda\ p>q \end{cases}\Rightarrow p\ge q.$ Javobi: E.

21. $\sqrt{3x+10}>\sqrt{6-x}$ tengsizlikni yeching.

A)$[-1;6]$B)$\left[-\frac{10}{3};6\right]$ C)$(-1;6]$

D)$\left[-\frac{10}{3};-1\right)\cup(-1;6]$ E)$(-\frac{10}{3};6]$

Yechilishi: $\sqrt{3x+10}>\sqrt{6-x};$

1)$3x+10\ge 0\Rightarrow x\ge-\frac{10}{3};\ \ 6-x\ge 0\Rightarrow x\le 6;$

2)$3x+10>6-x\Rightarrow 4x>-4\Rightarrow x>-1\Rightarrow(-1;6].$

Javobi: C.

22. $\sqrt{x+1}+\sqrt{2x+3}=1$tenglama ildizlarining yig‘indisini toping.

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

Yechilishi: $\sqrt{x+1}+\sqrt{2x+3}=1\Rightarrow\begin{cases} x\ge-1; \\ x\ge-1{,}5. \end{cases}$

$\sqrt{2x+3}=1-\sqrt{x+1}\Rightarrow 2x+3=1-2\sqrt{x+1}+x+1;$

$$x+1=-2\sqrt{x+1}\Rightarrow x^2+2x+1=4x+4\Rightarrow$$

$$\Rightarrow x^2-2x-3=0\Rightarrow x_{1,2}=1\pm\sqrt{1+3}=1\pm 2\Rightarrow$$

$$\Rightarrow\begin{cases}x_1=-1\\ x_2=3\end{cases}\Rightarrow x_2=3\ chet\ ildiz.$$ Javobi: E.

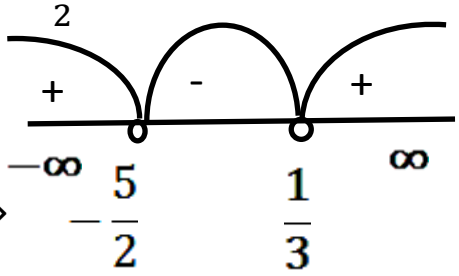
23. $0<\frac{3x-1}{2x+5}<1$ qo‘sh tengsizlikni yeching.

A) $\left(-\frac{5}{2};6\right)$ B)$\left(\frac{1}{3};\infty\right)$ C)$\left(-\infty;-\frac{5}{2}\right)\cup\left(\frac{1}{3};6\right)$

D)$\left(\frac{1}{3};6\right)$ E)$\left(-\frac{5}{2};\infty\right)$

Yechilishi:1)$\frac{3x-1}{2x+5}>0\Rightarrow\begin{cases}x\neq\frac{1}{3}\\ x\neq-\frac{5}{2}\end{cases}\Rightarrow$

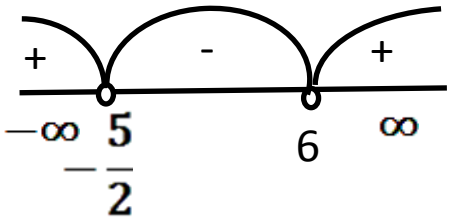
$\Rightarrow\left(-\infty;-\frac{5}{2}\right)\cup\left(\frac{1}{3};+\infty\right);$



$\Rightarrow 2)\frac{3x-1}{2x+5}<1\Rightarrow\frac{3x-1}{2x+5}-1<0\Rightarrow$

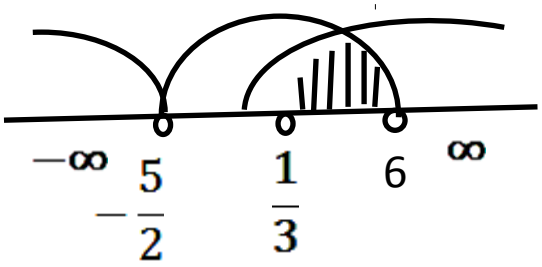
$\Rightarrow\frac{3x-1-2x-5}{2x+5}<0\Rightarrow$

$\Rightarrow\frac{x-6}{2x+5}<0\Rightarrow\begin{cases}x\neq 6\\ x\neq-\frac{5}{2}\end{cases}\Rightarrow$



$\left(-\frac{5}{2};6\right)$.1) va 2) dan

$\left(\frac{1}{3};6\right)$.Javobi: D.



24. $|x-3|\leq 6-x$ tengsizlik nechta yechimga ega?

A) 0 B) 1 C) 2 D) 4 E) cheksizko‘p

Yechilishi: $|x-3| \le 6-x \Rightarrow \begin{cases} x-3 \ge 0 \\ 5-x \ge 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x-3 \le 6-x \\ x \le 3 \end{cases} \Rightarrow \begin{cases} x \le \frac{9}{2}; \\ x \le 6. \end{cases}$ Javobi: E.

25. Poroxod oqim bo‘yicha A dan B ga 9 sutkada borib, B dan A ga15 sutkada qaytadi. A dan B ga sol necha sutkada boradi?

A) 45 B) 15 C) 22,5 D) 18 E) 30

Yechilishi: $\begin{cases} (v_p + v_0) \cdot 9 = (v_p - v_0) \cdot 15 \\ (v_p + v_0) \cdot 9 = v_0 \cdot x \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 9v_p + 9v_0 = 15v_p - 15v_0 \\ 9v_p + 9v_0 = v_0 x \end{cases} \Rightarrow \begin{cases} 6v_p = 24v_0 \\ 9v_p + 9v_0 = v_0 x \end{cases} \Rightarrow$

$\Rightarrow v_p = 4v_0 \Rightarrow 9 \cdot 4v_0 + 9v_0 = v_0 x \Rightarrow$

$\Rightarrow 45v_0 = v_0 x \Rightarrow x = 45.$ Javobi: A.

26. $(x^2+5x+4)(x^2+5x+6) = 120$ tenglamaning haqiqiy ildizlari yig‘indisini toping.

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

Yechilishi: $(x^2+5x+4)(x^2+5x+6) = 120;$

$(x^2+5x+4)[(x^2+5x+4)+2] = 120;$

$(x^2+5x+4)^2 + 2(x^2+5x+4) = 120 \Rightarrow$

$\Rightarrow (x^2+5x+4) = y \Rightarrow y^2 + 2y - 120 = 0 \Rightarrow$

$\Rightarrow \begin{cases} y_1 = -12; \\ y_2 = 10. \end{cases}$

1)$x^2+5x+4 = -12 \Rightarrow x^2+5x+16 = 0 \Rightarrow D < 0;$

2) $x^2+5x+4=10 \Rightarrow x^2+5x-6=0 \Rightarrow x_{1,2}=-\frac{5}{2}\pm$

$\pm\sqrt{\frac{25}{4}+6}=-\frac{5}{2}\pm\frac{7}{2}\Rightarrow\begin{cases}x_1=-6\\x_2=1\end{cases}\Rightarrow x_1+x_2=-5.$

Javobi: D.

27. $4^x-3^{x-0,5}=3^{x+0,5}-2^{2x-1}$ tenglamani yeching.

A) 1 B) -1 C) 2 D) -2 E) 1,5

Yechilishi: $4^x-3^{x-0,5}=3^{x+0,5}-2^{2x-1}\Rightarrow$

$$\Rightarrow 4^x-3^x\cdot 3^{-\frac{1}{2}}=3^x\cdot 3^{\frac{1}{2}}-2^{2x}\cdot 2^{-1}\Rightarrow 4^x+4^x\cdot\frac{1}{2}$$

$$==3^x\cdot\sqrt{3}+3^x\cdot\frac{1}{\sqrt{3}}\Rightarrow 4^x\left(1+\frac{1}{2}\right)$$

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

$$\Rightarrow\frac{3}{2}\cdot 4^x=\frac{4}{\sqrt{3}}\cdot 3^x\Rightarrow\frac{4^x}{3^x}=\frac{4}{\sqrt{3}}\cdot\frac{2}{3}\Rightarrow(\frac{4}{3})^x=\frac{8}{\sqrt{27}}\Rightarrow$$

$$\Rightarrow\left(\frac{4}{3}\right)^x=\sqrt{\frac{64}{27}}=\sqrt{\frac{4^3}{3^3}}=\sqrt{\left(\frac{4}{3}\right)^3}=\left(\frac{4}{3}\right)^{\frac{3}{2}}\Rightarrow x=\frac{3}{2}\Rightarrow$$

$\Rightarrow x=1,5.$ Javobi: E.

28. $\left(\frac{4}{9}\right)^x\left(\frac{27}{8}\right)^{x-1}=\frac{lg4}{lg8}$ tenglamani yeching.

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

Yechilishi: $\left(\frac{4}{9}\right)^x\left(\frac{27}{8}\right)^{x-1}=\frac{lg4}{lg8}\Rightarrow\left(\frac{2}{3}\right)^{2x}\left(\frac{2}{3}\right)^{-3x+3}=\frac{2lg2}{3lg2}\Rightarrow$

$\Rightarrow\left(\frac{2}{3}\right)^{2x-3x+3}=\frac{2}{3}\Rightarrow -x+3=1\Rightarrow x=2.$ Javobi: C.

29. $3\sqrt[x]{81}-10\sqrt[x]{9}+3=0$ tenglama ildizlarining yig‘indisini toping.

A) 0 B) 3 C) 4 D) 5 E) 7

Yechilishi: $3\sqrt[x]{81}-10\sqrt[x]{9}+3=0 \Rightarrow 3\cdot 81^{\frac{1}{x}}-10\cdot 9^{\frac{1}{x}}+$

$+3=0 \Rightarrow 3\cdot 9^{2\cdot\frac{1}{x}}-10\cdot 9^{\frac{1}{x}}+3 \Rightarrow y=9^{\frac{1}{x}} \Rightarrow$

$$\Rightarrow 3\cdot y^2-10y+3=0 \Rightarrow y_{1,2}=\frac{10\pm\sqrt{100-4\cdot 3\cdot 3}}{2\cdot 3}$$

$$=\frac{10\pm 8}{6} \Rightarrow$$

$$\Rightarrow \begin{cases} y_1=\frac{1}{3}; \\ y_2=3 \end{cases} \quad \begin{cases} 3^{\frac{2}{x}}=3^{-1} \\ 3^{\frac{2}{x}}=3 \end{cases} \Rightarrow \begin{cases} \frac{2}{x}=-1 \\ \frac{2}{x}=1 \end{cases} \Rightarrow \begin{cases} x_1=-2 \\ x_2=2 \end{cases} \Rightarrow$$

$\Rightarrow x_1+x_2=0.$ Javobi: A.

30. $\begin{cases} 9^{x+y}=729, \\ 3^{x-y-1}=1. \end{cases} x^2-y^2=?$

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

Yechilishi: $\begin{cases} 9^{x+y}=729 \\ 3^{x-y-1}=1 \end{cases} \Rightarrow \begin{cases} 9^{x+y}=9^3 \\ 3^{x-y-1}=3^0 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} x+y=3 \\ x-y-1=0 \end{cases} \Rightarrow \begin{cases} x+y=3 \\ x-y=1 \end{cases} \Rightarrow 2x=4 \Rightarrow x$$

$$=2; \begin{cases} x+y=3 \\ x-y-1=0 \end{cases} \Rightarrow \begin{cases} x+y=3 \\ x-y=1 \end{cases} \Rightarrow 2x=4$$

$\Rightarrow x=2;$

$y=1 \Rightarrow x^2-y^2=3.$ Javobi: C.

31. $x^2 5^x-5^{2+x}<0$ tengsizlikni yeching.

A)$(-\infty;-5)$ B)$(5;\infty)$ C)$(-\infty;-5)\cup(5;\infty)$

D)$(-5;5)$ E)$(-\infty;+\infty)$

Yechilishi: $x^2 5^x - 5^{2+x} < 0 \Rightarrow x^2 \cdot 5^x - 5^2 \cdot 5^x < 0 \Rightarrow$

$\Rightarrow 5^x(x^2-25)<0 \Rightarrow \begin{cases} 5^x > 0 \\ x^2-25<0 \end{cases} \Rightarrow x^2 < 25 \Rightarrow$

$\Rightarrow |x| < 5 \Rightarrow -5 < x < 5 \Rightarrow (-5;5)$. Javobi: D.

32. $0.125 \cdot 4^{2x-3} = \left(\frac{\sqrt{2}}{8}\right)^{-x}$ tenglamani yeching.

A) 2 B) -2 C) 4 D) -6 E) 6

Yechilishi: $0{,}125 \cdot 4^{2x-3} = \left(\frac{\sqrt{2}}{8}\right)^{-x} \Rightarrow \frac{1}{8} \cdot 2^{4x} \cdot 2^{-6} =$

$$= \left(\sqrt{\frac{2}{64}}\right)^{-x} \Rightarrow 2^{-3} \cdot 2^{4x} \cdot 2^{-6} = \left(\sqrt{2^{-5}}\right)^{-x} \Rightarrow$$

$$\Rightarrow 2^{4x-9} = 2^{\frac{5x}{2}} \Rightarrow 4x - 9 = \frac{5x}{2} \Rightarrow 8x - 18 = 5x \Rightarrow$$

$\Rightarrow 3x = 18 \Rightarrow x = 6$. Javobi: E.

33. Agar $\log_a x = 2$, $\log_b x = 3$valog$_c x = 6$ bo‘lsa, $\log_{abc} x$ ni toping.

A) $\frac{2}{3}$ B) $\frac{5}{6}$ C) 1 D) $\frac{4}{3}$ E) $-\frac{2}{3}$

Yechilishi: $\log_a x = 2$, $\log_b x, \log_c x = 6$;

$$\begin{cases} x = a^2 \\ x = b^3 \\ x = c^6 \end{cases} \Rightarrow \begin{cases} a = \sqrt{x} \\ b = \sqrt[3]{x} \\ c = \sqrt[6]{x} \end{cases} \Rightarrow a \cdot b \cdot c = \sqrt{x} \cdot \sqrt[3]{x} \cdot \sqrt[6]{x} =$$

$$= \sqrt[6]{x^3} \cdot \sqrt[6]{x^2} \cdot \sqrt[6]{x} = x \Rightarrow \log_{abc} x = \log_x x = 1.$$

Javobi: C.

34. $343^{\log_{49} 4}$ni hisoblang.

A) 8 B) 4 C) 7 D) 6 C) 2

Yechilishi: $343^{\log_{49} 4} = 7^{3\log_{7^2} 4} = 7^{\frac{3}{2}\log_7 4} = 7^{\log_7 4^{\frac{3}{2}}} =$

$= \sqrt{4^3} = 8.$ Javobi: A.

35. Agar $\log_{14} 7 = a$valog$_{14} 5 = b$ bo‘lsa, $\log_{35} 28$ ni a va b orqali ifodalang.

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

Yecilishi: $\log_{35} 28 = \frac{\log_{14} 28}{\log_{14} 35} = \frac{\log_{14} 4+\log_{14} 7}{\log_{14} 5+\log_{14} 7} =$

$= \frac{a+2\log_{14} 2}{a+b}$; $\log_{14} 2 = \log_{14} \frac{14}{7} = \log_{14} 14 -$

$\log_{14} 7 = = 1 - a$; $\log_{35} 28 = \frac{a+2(1-a)}{a+b} = \frac{a+2-2a}{a+b} = \frac{2-a}{a+b}$.

Javobi: A.

36. $\log_2 \log_3 \log_4 \sqrt{x^3} = 0$tenglamani yeching.

A) 4 B) 16 C) 2 D) 8 E) 1

Yechilishi: $\log_2 \log_3 \log_4 \sqrt{x^3} = 0 \Rightarrow \log_3 \log_4 \sqrt{x^3} =$

$= 2^0 \Rightarrow \log_4 \sqrt{x^3} = 3^1 \Rightarrow \sqrt{x^3} = 4^3 \Rightarrow x^3 = 4^6 \Rightarrow$

$\Rightarrow x = 4^2 \Rightarrow x = 16.$ Javobi: B.

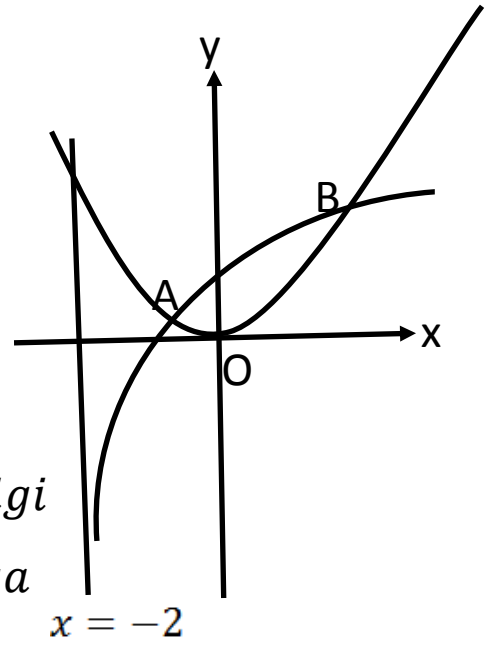
37. $\log_2(2+x)=\frac{x^2}{2}$ tenglama nechta ildizga ega?

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

Yechilishi: $\log_2(2+x)=\frac{x^2}{2}\Rightarrow$

$$\Rightarrow\begin{cases}y=\log_2(2+x);\\ y=\frac{1}{2}x^2.\end{cases}$$

$2+x>0\Rightarrow x>-2.$



*Funksiyalarning grafiklari ikkita nuqtalarda kesishganligi uchun tenglama ikkita ildizga ega.*Javobi: A.

x	-1,5	-1	0	2	6
$y=\log_2(2+x)$	-1	0	1	2	-3

x	-2	-1	0	1	2
$y=\frac{1}{2}x^2$	2	$\frac{1}{2}$	0	$\frac{1}{2}$	2

38. $\lg\left(\frac{1}{2}+x\right)=\lg\frac{1}{2}-\lg x$tenglamani yeching.

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

Yechilishi: $\lg\left(\frac{1}{2}+x\right)=\lg\frac{1}{2}-\lg x\Rightarrow 1)x>0;\ x>-\frac{1}{2}.$

$$2)\ \lg\left(\frac{1}{2}+x\right)=\lg\left(\frac{1}{2}:x\right)\Rightarrow\frac{1}{2}+x=\frac{1}{2x}\Rightarrow$$

$\Rightarrow 2x^2+x-1=0 \Rightarrow \begin{cases} x_1=-1 \\ x_2=\frac{1}{2} \end{cases} \Rightarrow x=\frac{1}{2}$. Javobi: B.

39. $x^{lgx-1}=100$ tenglama ildizlarining ko‘paytmasini toping.

A) 10 B) 20 C) 100 D) 1 E) 2

Yechilishi: $x^{lgx-1}=100$; 1)$x>0, x\neq 1$;

2) $(lgx-1)lgx=lg10^2 \Rightarrow lg^2x-lgx-2=0$;

$$lgx=y \Rightarrow y^2-y-2=0 \Rightarrow y_{1,2}=\frac{1}{2}\pm\sqrt{\frac{1}{4}+2}=$$

$$=\frac{1}{2}\pm\frac{3}{2} \Rightarrow \begin{cases} y_1=-1 \\ y_2=2 \end{cases} \Rightarrow \begin{cases} lgx_1=-1 \\ lgx_2=2 \end{cases} \Rightarrow \begin{cases} x_1=10^{-1} \\ x_2=10^2 \end{cases} \Rightarrow$$

$\Rightarrow x_1\cdot x_2=10^{-1}\cdot 10^2=10^{-1+2}=10$. Javobi: A.

40. $\log_4(x+1)\leq \log_4(5-x)$ tengsizlikni yeching.

A)$(-1;5)$ B)$[2;\infty)$ C)$(-1;2)\cup(2;5)$

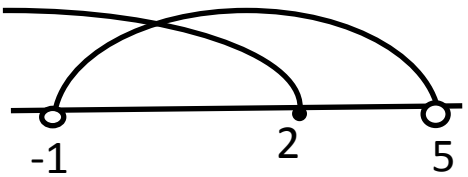
D)$(-\infty;2]$ E)$(-1;2]$

Yechilishi: $\log_4(x+1)\leq \log_4(5-x)$; 1) $\begin{cases} x+1>0 \\ 5-x>0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x>-1 \\ x<5 \end{cases} \Rightarrow (-1;5)$; 2)$4>1 \Rightarrow x+1\leq 5-x \Rightarrow$

$2x\leq 4 \Rightarrow x\leq 2$

$(-1;2]$. Javobi: E.



41. $\begin{cases} x^{y+1}=27 \\ x^{2y-5}=\frac{1}{3} \end{cases}$ tenglamalar sistemasini yeching.

A)$(2;3)$ B)$(2;4)$ C)$(2;3)$ D)$(2;3)$ E)$(2;3)$

Yechilishi: $\begin{cases} x^{y+1} = 27 \\ x^{2y-5} = \frac{1}{3} \end{cases} \Rightarrow \begin{cases} (y+1)\log_3 x = \log_3 3^3 \\ (2y-5)\log_3 x = \log_3 3^{-1} \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} (y+1)\log_3 x = 3 \\ (2y-5)\log_3 x = -1 \end{cases} \Rightarrow \begin{cases} \log_3 x = \dfrac{3}{y+1} \\ \log_3 x = -\dfrac{1}{2y-5} \end{cases} \Rightarrow$$

$$\Rightarrow \frac{3}{y+1} = -\frac{1}{2y-5} \Rightarrow 6y - 15 = -y - 1 \Rightarrow y = 2 \Rightarrow$$

$\Rightarrow x^{2+1} = 3^3 \Rightarrow x^3 = 3^3 \Rightarrow x = 3.$ Javobi: D.

42. $\log_3(3^x - 8) = 2 - x$tenglamani yeching.

A) 2 va 3 B) 3 C) 2 D) 2 va -1 E) 4

Yechilishi:$\log_3(3^x - 8) = 2 - x$; $3^x - 8 > 0$

$$3^x - 8 = 3^{2-x} \Rightarrow 3^x - 8 = \frac{9}{3^x} \Rightarrow 3^{2x} - 8 \cdot 3^x - 9 = 0$$

$$3^x = y \Rightarrow y^2 - 8y - 9 = 0 \Rightarrow y_{1,2} = 4 \pm \sqrt{16+9} =$$

$= 4 \pm 5 \Rightarrow \begin{cases} y_1 = -1 \\ y_2 = 9 \end{cases} \Rightarrow \begin{cases} 3^x \neq -1 \\ 3^x = 9 \end{cases} \Rightarrow x = 2.$ Javobi: C.

43. $a = \log_{0.2} 8$, $b = \log_3 0{,}8$, $c = \log_{0,9} 2$, $d = \log_4 2$

va $l = \log_{0,9} 0{,}6$ sonlaridan qaysilari musbat?

A) $b\ va\ d$ B) $a\ va\ d$ C) $c\ va\ d$

D) $a, c\ va\ d$ E) $l\ va\ d$

Yechilishi:$Logarifmning\ xossalariga\ muvofiq\ d\ va\ l.$

Javobi: E.

44. Arifmetik progressiyaning dastlabki 13 ta hadi yig‘indisi

104 ga teng.Yettinchi hadining kvadratini toping.

A) 25 B) 36 C) 49 D) 64 E) 81

Yechilishi: $S_{13} = 104.$ $a_1, a_2, \dots, a_7, \dots, a_{12}, a_{13}$

$$a_7 = \frac{a_1 + a_{13}}{2}; \quad S_{13} = \frac{a_1 + a_{13}}{2} \cdot 13 \Rightarrow a_7 = \frac{a_1 + a_{13}}{2} =$$

$= \frac{S_{13}}{13} = \frac{104}{13} = 8 \Rightarrow {a_7}^2 = 64.$ Javobi: D.

45. Arifmetik progressiyaning dastlabki nechta hadini olmaylik ularning yig‘indisi hadlar soni kvadratining uchlanganiga teng. Shu progressiyaning yettinchi hadini toping.

A) 25 B) 27 C) 31 D) 39 E) 42

Yechilishi: $\begin{cases} a_1 + a_2 + a_3 = 3 \cdot 3^2 \\ a_1 + a_2 = 3 \cdot 2^2 \end{cases} \Rightarrow$

$$\begin{cases} a_1 + a_1 + d + a_1 + 2d = 27 \\ a_1 + a_1 + d = 12 \end{cases} \Rightarrow \begin{cases} 3a_1 + 3d = 27 \\ 2a_1 + d = 12 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} a_1 + d = 9 \\ 2a_1 + d = 12 \end{cases} \Rightarrow \begin{cases} a_1 = 3 \\ d = 6 \end{cases} \Rightarrow a_7 = a_1 + 6d =$$

$= 3 + 6 \cdot 6 = 39.$ Javobi: D.

46. Geometrik progressiyada uchinchi va yettinchi hadlarning ko‘paytmasi 144 ga teng. Uning beshinchi hadini toping.

A) 6 B) ± 12 C) -8 D) -12 E) 12

Yechilishi: $b_3 \cdot b_7 = 144 \Rightarrow b_1q^2 \cdot b_1q^6 = 144 \Rightarrow$

$\Rightarrow {b_1}^2 \cdot q^8 = 144 \Rightarrow (b_1q^4)^2 = 12^2 \Rightarrow b_1q^4 = \pm 12 \Rightarrow$

$\Rightarrow b_5 = \pm 12.$ Javobi: B.

47. $\frac{1}{3}$ va $\frac{1}{48}$ sonlar orasiga shunday uchta musbat sonni joylashtiringki, natijada geometrik progressiya hosil bo‘lsin.O‘sha qo‘yilgan uchta sonning yig‘indisini toping.

A) 0,5 B) $\frac{7}{12}$ C)0,375 D)$\frac{5}{24}$ E) $\frac{7}{24}$

Yechilishi: $\frac{1}{3}; \frac{1}{48} \Rightarrow b_5 = b_1q^4 \Rightarrow \frac{1}{48} = \frac{1}{3} \cdot q^4 \Rightarrow q^4 = \frac{1}{16} \Rightarrow$

$$\Rightarrow q = \pm\frac{1}{2} \Rightarrow q = \frac{1}{2} \Rightarrow \frac{1}{3};\ \frac{1}{6};\ \frac{1}{12};\ \frac{1}{24};\ \frac{1}{48};$$

$\frac{1}{6} + \frac{1}{12} + \frac{1}{24} = \frac{7}{24}$. Javobi: E.

48. Cheksiz kamayuvchi geometric progressiyaning yig‘indisi 9 ga, maxraji esa$\frac{1}{3}$ ga teng. Uning birinchi hamda uchinchi hadlarining ayirmasini toping.

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

Yechilishi: $S = 9;\ q = \frac{1}{3};\ S = \frac{b_1}{1-q} \Rightarrow 9 = \frac{b_1}{1-\frac{1}{3}} \Rightarrow$

$$\Rightarrow 9 = \frac{b_1}{\frac{2}{3}} \Rightarrow b_1 = 6;\quad b_2 = 6 \cdot \frac{1}{3} = 2;\quad b_3 = 2 \cdot \frac{1}{3} = \frac{2}{3}$$

$b_1 - b_3 = 6 - \frac{2}{3} = \frac{16}{3} = 5\frac{1}{3}$. Javobi: A.

49. $\sqrt[3]{3\sqrt[3]{3\sqrt[3]{3\sqrt[3]{3}}}}$...ni hisoblang.

A) $\sqrt[3]{3}$ B) $\sqrt[6]{3}$ C) 1 D) $\sqrt{3}$ E) 3

Yechilishi: $\sqrt[3]{3\sqrt[3]{3\sqrt[3]{3\sqrt[3]{3}}}} = t \Rightarrow \sqrt[3]{3 \cdot t} = t \Rightarrow$

$\Rightarrow 3t = t^3 \Rightarrow t^2 = 3 \Rightarrow t = \sqrt{3}.$ $yoki$ $\sqrt[n]{a\sqrt[n]{a\sqrt[n]{a}}} =$

$= \sqrt[n-1]{a}$ $formulaga$ $asosan$

$\sqrt[3]{3\sqrt[3]{3\sqrt[3]{3\sqrt[3]{3}}}} = \sqrt{3}$Javobi: D.

50. $sin112{,}5°$ni hisoblang.

A) $\frac{1}{2}\sqrt{2-\sqrt{2}}$ B) $\frac{1}{2}\sqrt{1+\sqrt{2}}$ C) $\frac{1}{2}\sqrt{2+\sqrt{2}}$

D) $\frac{1}{2}\sqrt{\sqrt{2}-1}$ E) $\frac{\sqrt{2}}{2}$

Yechilishi: $sin112{,}5° = \sqrt{\frac{1}{2}(1-cos225°)} =$

$= \sqrt{\frac{1}{2}[1-\cos(180+45)]} = \sqrt{\frac{1}{2}(1+cos45°)} =$

$= \sqrt{\frac{1}{2}(1+\frac{\sqrt{2}}{2})} = \sqrt{\frac{1}{2}\cdot\frac{2+\sqrt{2}}{2}} = \frac{\sqrt{2+\sqrt{2}}}{2}$. Javobi: C.

51. $4sin^2 2x = 3$ tenglamani yeching.

A)$(-1)^n\frac{\pi}{6}+\frac{\pi n}{2},\ n\epsilon Z$ B) $(-1)^n\frac{\pi}{6}+\pi n,\ n\epsilon Z$

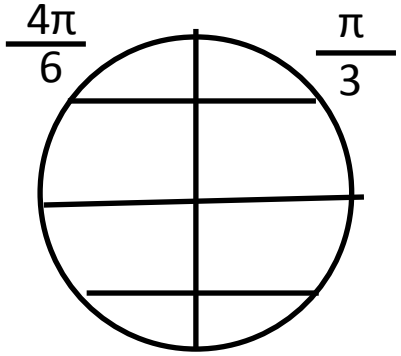
C) $\pm\frac{\pi}{6}+\frac{\pi n}{2},\ n\epsilon Z$ D)$(-1)^n\frac{\pi}{3}+\frac{\pi n}{2},\ n\epsilon Z$

E) $\pm\frac{\pi}{3}+\frac{\pi n}{3},\ n\epsilon Z$

Yechilishi: $4sin^2 2x=3\Rightarrow sin^2 2x=\frac{3}{4}\Rightarrow |sin2x|=\frac{\sqrt{3}}{2}\Rightarrow$

$$\Rightarrow\begin{cases} sin2x=-\frac{\sqrt{3}}{2} \\ sin2x=\frac{\sqrt{3}}{2}\end{cases}\Rightarrow\begin{cases} 2x=(-1)^{n+1}\frac{\pi}{3}+\pi n, n\epsilon Z \\ 2x=(-1)^n\frac{\pi}{3}+\pi n, n\epsilon Z\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases} x=(-1)^{n+1}\frac{\pi}{6}+\frac{\pi n}{2}, n\epsilon Z \\ x=(-1)^n\frac{\pi}{6}+\frac{\pi n}{2}, n\epsilon Z\end{cases}\Rightarrow$$



$$\Rightarrow\begin{cases} x=-\frac{\pi}{6}+\frac{\pi n}{2}, n\epsilon Z \\ x=\frac{\pi}{6}+\frac{\pi n}{2}, n\epsilon Z\end{cases}\Rightarrow$$

$\Rightarrow x=\pm\frac{\pi}{6}+\frac{\pi n}{2}, n\epsilon Z.$ Javobi: C.

52. $cos^2 x-\frac{1}{2}sin2x=0$ tenglamaning$[0;2\pi]$ kesmadagi eng katta va eng kichik ildizlari ayirmasini toping.

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

Yechilishi: $cos^2 x-\frac{1}{2}sin2x=0\Rightarrow$

$$\Rightarrow cos^2 x-\frac{1}{2}\cdot 2sinx\cdot cosx=0\Rightarrow$$

$$\Rightarrow cosx(cosx - sinx) = 0 \Rightarrow \begin{cases} cosx = 0 \\ cosx - sinx = 0 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x = \frac{\pi}{2} + \pi k, k\epsilon Z \\ \sqrt{2}\sin\left(\frac{\pi}{4} - x\right) = 0 \end{cases} \Rightarrow -\sin\left(x - \frac{\pi}{4}\right) = 0 \Rightarrow$$

$$\Rightarrow \sin\left(x - \frac{\pi}{4}\right) = 0 \Rightarrow x - \frac{\pi}{4} = \pi k \Rightarrow x = \frac{\pi}{4} + \pi k \Rightarrow$$

$$\Rightarrow \begin{cases} x = \frac{\pi}{2} + \pi k, & k\epsilon Z \\ x = \frac{\pi}{4} + \pi k, & k\epsilon Z \end{cases} k = 0 \Rightarrow \begin{cases} x = \frac{\pi}{2}, \\ x = \frac{\pi}{4}, \end{cases}$$

$$k = 1 \Rightarrow \begin{cases} x = \frac{\pi}{2} + \pi = \frac{3\pi}{2} \\ x = \frac{\pi}{4} + \pi = \frac{5\pi}{4} \end{cases} \Rightarrow \frac{5\pi}{4} - \frac{\pi}{4} = \pi.$$Javobi: C.

53. Qaysiα o‘tkir burchak uchun $cos\alpha = \frac{1}{2}\sqrt{2 + \sqrt{3}}$ tenglik to‘g‘ri?

A) 7,5° B) 22,5° C) 75° D) 67,5° E) 15°

Yechilishi:$cos\alpha = \sqrt{\frac{1}{2}(1 + cos2\alpha)} =$

$$= \sqrt{\frac{1}{2}(1 + cos2 \cdot 15°)} = \sqrt{\frac{1}{2}\left(1 + \frac{\sqrt{3}}{2}\right)} = \sqrt{\frac{1}{2} \cdot \frac{2 + \sqrt{3}}{2}} =$$

$$= \sqrt{\frac{1}{4}(2 + \sqrt{3})} = \frac{1}{2}\sqrt{2 + \sqrt{3}}.$$ Javobi: E.

54. $arcctg(tg(-37°))$ necha gradus?

A) $-37°$ B) 37° C) 127° D) 67,5° E) 53°

Yechilishi: $arcctg\big(tg(-37°)\big) =$

$= arcctg\left[ctg\left(\frac{\pi}{2}+37°\right)\right] = arcctg(ctg127°) = 127°.$

Javobi: C.

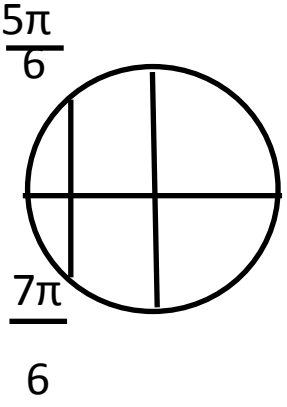
55. $-1-\frac{2}{\sqrt{3}}cosx > 0$tengsizlik$[-\pi;\ \pi]$ kesmada nechta butun yechimga ega?

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

Yechilishi:$-1-\frac{2}{\sqrt{3}}cosx > 0 \Rightarrow$

$\frac{2}{\sqrt{3}}cosx < -1 \Rightarrow\Rightarrow cosx < -\frac{\sqrt{3}}{2},$

$\frac{5\pi}{6} < x < \frac{7\pi}{6}, \quad x = -\pi;\ \pi$



Javobi: E.

56. $\cos(2arcsin\frac{1}{3})$ ni hisoblang.

A) $\frac{5}{9}$ B) 0,5 C) $\frac{2}{3}$ D) 0,8 E) $\frac{7}{9}$

Yechilishi: $\cos\left(2arcsin\frac{1}{3}\right) = \left(cosarcsin\frac{1}{3}\right)^2 -$

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

$=\left[\sqrt{\frac{8}{9}}\right]^2 - \frac{1}{9} = \left[\frac{2\sqrt{2}}{3}\right]^2 - \frac{1}{9} = \frac{7}{9}.$ Javob: E.

57. $y = 6sin2x + 8cos2x$ funksiyaning qiymatlar to‘plamini toping.

A) $[-10;10]$ B)$[-14;14]$ C)$(-\infty;\ \infty)$

D)$[0;6]$ E)$[0;8]$

Yechilishi: $y = 6sin2x + 8cos2x;\ y' =$
$12cos2x — 16sin2x \Rightarrow\Rightarrow 12cos2x - 16sin2x = 0 \Rightarrow$
$12cos2x = 16sin2x \Rightarrow tg2x = \frac{12}{16} \Rightarrow tg2x = \frac{3}{4} \Rightarrow 2x =$
$arctg\frac{3}{4}$.

$$y = 6 \cdot sinarctg\frac{3}{4} + 8cosarctg\frac{3}{4} =$$

$$= 6 \cdot \frac{\frac{3}{4}}{\sqrt{1+\frac{9}{16}}} + 8 \cdot \frac{1}{\sqrt{1+\frac{9}{16}}} = 6 \cdot \frac{\frac{3}{4}}{\frac{5}{4}} + 8 \cdot \frac{1}{\frac{5}{4}} = \frac{18}{5} + \frac{32}{5}$$

$$= 10 \Rightarrow$$

$\Rightarrow [-10;10]$. Javobi: A.

58. $y = arcsin\frac{x-3}{2} - \lg(4-x)$ funksiyaning aniqlanish sohasini toping.

A)$(-\infty;4)$ B)$[1;4)$ C) $[1;4]$

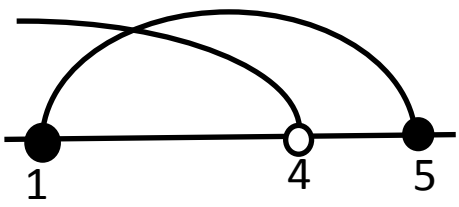
D) $(-\infty;\ \infty) \cup (1;4)$ E) $[-1;5]$

Yechilishi: $y = arcsin\frac{x-3}{2} - \lg(4-x)1)4 - x > 0 \Rightarrow$

$$\Rightarrow x < 4; \quad 2) -\frac{\pi}{2} \le arcsin\frac{x-3}{2} \le \frac{\pi}{2} \Rightarrow$$

$\Rightarrow -1 \le \frac{x-3}{2} \le 1 \Rightarrow$

$\Rightarrow -2 \le x - 3 \le 2 \Rightarrow 1 \le x \le 5$



1) va2) dan$[1;4)$. Javobi: B.

59. Agar $f(x+1) = x^2 - 3x + 2$ bo‘lsa, $f(x)$ni toping.

A)$x^2 - 3x - 1$ B)$x^2 - 5x + 1$

C)x^2-5x+6 D)x^2-4 E)$4-x^2$

Yechilishi: $f(x+1)=x^2-3x+2;\ \ x+1=t\Rightarrow$

$\Rightarrow x=t-1;\ \ f(x)=(t-1)^2-3(t-1)+2=$

$=t^2-5t+6.$ Javobi; C.

60. Argumentning qaysi qiymatida $y=\frac{5x}{2|x+1|-5}$ funksiya 2 ga teng?

A)$-\frac{4}{3}$ B))$-\frac{5}{3}$ C) -2 D))$-\frac{14}{9}$ E) 1

Yechilishi: $y=\frac{5x}{2|x+1|-5}\Rightarrow 1)\frac{5x}{2|x+1|-5}=2\Rightarrow$

$5x=4|x+1|-10\Rightarrow 4|x+1|-5x-10=0\Rightarrow$

$\Rightarrow a)x+1\geq 0\Rightarrow x\geq -1\Rightarrow 4(x+1)-5x-10=0\Rightarrow$

$\Rightarrow 4x+4-5x-10=0\Rightarrow -x-6=0\Rightarrow x=-6;$

b)$x+1<0\Rightarrow x<-1\Rightarrow 4[-(x+1)]-5x-10=0\Rightarrow$

$\Rightarrow -4x-4-5x-10=0\Rightarrow 9x=-14\Rightarrow x=-\frac{14}{9}.$

Javobi: D.

61. $y=x^2-4x+7$ funksiyaga $(-\infty;2]$ oraliqda teskari funksiyani toping.

A)$2\pm\sqrt{x-3}$ B) $2-\sqrt{x-3}$ C) $2+\sqrt{x-3}$

D) $2+\sqrt{3-x}$ E) $2\pm\sqrt{3-x}$

Yechilishi: $y=x^2-4x+7;\quad (-\infty;2]$

$y=(x-2)^2+3\Rightarrow (x-2)^2=y-3$

$\Rightarrow\sqrt{(x-2)^2}=\sqrt{y-3}\Rightarrow |x-2|=\sqrt{y-3}\Rightarrow$

$$\Rightarrow x-2=\pm\sqrt{y-3}\Rightarrow x=\pm\sqrt{y-3}+2\Rightarrow$$

$\Rightarrow y=\pm\sqrt{x-3}+2\Rightarrow y=-\sqrt{x-3}+2$. Javobi: B.

62. $f(x)=sin2x+lncos2x$ funksiya uchun $f'\left(\frac{\pi}{6}\right)$ ni toping.

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

D)$\frac{3}{2}$ E)$1-\frac{\sqrt{3}}{2}$

Yechilishi: $f(x)=sin2x+lncos2x;\ \ f'=2cos2x+$

$$+\frac{1}{cos2x}\cdot 2(-sin2x)=2(cos2x-tg2x);$$

$$f'\left(\frac{\pi}{6}\right)=2\left(cos\frac{\pi}{3}-tg\frac{\pi}{3}\right)=2\cdot\left(\frac{1}{2}-\sqrt{3}\right)=1-2\sqrt{3}.$$

Javobi: B.

63. $y=lnx$ funksiyaning grafigiga absissasi $x_0=1$ bo‘lgan nuqtada urinma o‘tkazilgan. Urinmaning absissasi 15 ga teng nuqtasi ordinatasini toping.

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

Yechilishi: $y=lnx;\ \ x_0=1;\ \ y-y_0=f'(x_0)(x-x_0)$

1)$x_0=1\Rightarrow y_0=ln1=0\Rightarrow y_0=0;$

2) $f'(x_0)=\frac{1}{x_0}=\frac{1}{1}=1\Rightarrow f'(1)=1;$

3) $y-0=1\cdot(x-1)\Rightarrow y=x-1\Rightarrow y=15-1=14.$

Javobi: C.

64. $y = 2 - 3x$to‘g‘ri chiziq $y = x^2 + bx + c$ parabolaga absissasi $x = 0$ bo‘lgan nuqtada o‘tkazilgan urinma bo‘lsa, $b + c$ ni toping.

A) 2 B) -2 C) 3 D) -3 E) -1

Yechilishi: $y - y_0 = f'(x_0)(x - x_0);\quad x_0 = 0$

$1) y_0 = 0^2 + b \cdot 0 + c = c;\quad 2) y' = 2x + b \Rightarrow$

$$\Rightarrow y'(x_0) = 2x_0 + b \Rightarrow y'(0) = 2 \cdot 0 + b \Rightarrow y'(0) = b$$

$$3) y - c = b(x - 0) \Rightarrow y - c = bx$$

$$4)\begin{cases} y = bx + c \\ y = -3x + 2 \end{cases} \Rightarrow \begin{cases} b = -3 \\ c = 2 \end{cases} \Rightarrow b + c = -3 + 2 = -1.$$

Javobi: E.

65. To‘g‘ri chiziq bo‘ylab $s = \frac{t^2}{t^2+3}$ qonuniyat asosida harakatlanayotgan jismning $t = 1$ bo‘lgan ondagi tezligini toping.

A) 0,4 B) 0,5 C) 0,225 D) 0,375 E) 0,45

Yechilishi: $S = \frac{t^2}{t^2+3};\ S' = \frac{2t\cdot(t^2+3)-t^2(2t)}{(t^2+3)^2} =$

$$= \frac{2t^3 + 6t - 2t^3}{(t^2+3)^2} = \frac{6t}{(t^2+3)^2} \Rightarrow v = \frac{6t}{(t^2+3)^2} \Rightarrow$$

$\Rightarrow v(1) = \frac{6\cdot 1}{(1^2+3)^2} = \frac{6}{16} = 0{,}375.$ Javobi: D.

66. $f(x) = 3x - x^3$funksiyaning$[-2; 3]$ kesmadagi eng kata va eng kichik qiymatlarining ayirmasini toping.

A) 20 B) 18 C) 16 D) 12 E) 14

Yechilishi: $f(x) = 3x - x^3;\ [-2;3];\ f'(x) = 3 - 3x^2 \Rightarrow$
$\Rightarrow 3 - 3x^2 = 0 \Rightarrow 3x^2 = 3 \Rightarrow x = \pm 1;$

$$x = -2; x = -1;\ x = 1; x = 3;$$

$$f(-2) = 3 \cdot (-2) - (-2)^3 = -6 + 8 = 2;$$

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

$$f(1) = 3 \cdot 1 - 1 = 2;\ f(3) = 3 \cdot 3 - 3^3 9 - 27 = -18;$$

$2 - (-18) = 20$. Javobi: A.

67. Birtomondan imorat bilan chegaralangan, qolgan tomonlari uzunligi 120 m panjaradan iborat to‘g‘ri to‘rtburchak shaklidagi yermaydonining eng katta yuzini toping.

A) 1600 B) 1500 C) 1800 D) 2000 E) 1750

Yechilishi: $x + 2y = 120 \Rightarrow x = 120 - 2y$ yuzi eng kata bo‘lishi uchun bu kvadrat bo‘lishi kerak, ya’ni $x = y$ bo‘lishi lozim. Bunda $y + 2y = 120 \Rightarrow y = 40$:

$S = 40^2 \Rightarrow S = 1800$. Javobi: C.

68. $\int_{-3}^{6} x|x|dx]$ ni hisoblang.

A) 81 B) 63 C) 60 D) 84 E) 80

Yechilishi: $\int_{-3}^{6} x|x|dx]$; $\begin{cases} -3 < x < 0 \\ 0 < x < 6 \end{cases} \Rightarrow -\int_{-3}^{0} x^2 d\,x +$

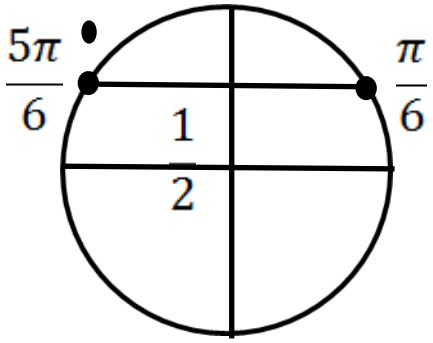
$$+\int_0^6 x^2 dx = -\frac{1}{3}x^3|_{-3}^0 + \frac{1}{3}x^3|_0^6 = -\frac{1}{3}[0^3 - (-3)^3] +$$
$$+\frac{1}{3}[6^3 - 0^3] = -9 + \frac{1}{3} \cdot 216 = 63.$$ Javobi: B.

69. $[0;\pi]$ oraliqda $y = sinx$ va $y = \frac{1}{2}$ chiziqlar bilan chegaralangan figuraning yuzini toping.

A)$\sqrt{3}-\frac{\pi}{3}$ B) 2 C)$\frac{2+\pi}{4}$ D)$\frac{4-\pi}{2}$ E)$\frac{4-\pi}{4}$

Yechilishi: $\begin{cases} y = sinx \\ y = \frac{1}{2} \end{cases} \Rightarrow sinx = \frac{1}{2} \Rightarrow x = (-1)^k \frac{\pi}{6} + \pi k, k \epsilon Z.$ $k = 0 \Rightarrow x = \frac{\pi}{6}; n = 1 \Rightarrow x = \frac{5\pi}{6}.$

$$S = \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} \left[sinx - \frac{1}{2}\right] dx =$$



$$= \int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} sinxdx - \frac{1}{2}\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} dx =$$

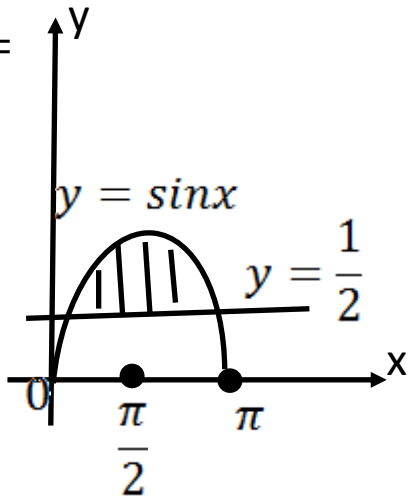
$$= -cosx\Big|_{\frac{\pi}{6}}^{\frac{5\pi}{6}} - \frac{1}{2}x\Big|_{\frac{\pi}{6}}^{\frac{5\pi}{6}} =$$

$$= -\left[cos\frac{5\pi}{6} - cos\frac{\pi}{6}\right] - \frac{1}{2}\left[\frac{5\pi}{6} - \frac{\pi}{6}\right] =$$

$$= -\left[\cos\left(\frac{\pi}{2}+\frac{\pi}{3}\right) - \frac{\sqrt{3}}{2}\right] - \frac{1}{2}\cdot\frac{4\pi}{6} =$$

$$= -\left[-sin\frac{\pi}{3} - \frac{\pi}{3}\right] - \frac{\pi}{3} =$$

$$-\left[-\frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2}\right] - \frac{\pi}{3} = \sqrt{3} - \frac{\pi}{3}.$$



Javobi: A.

70. $f(x) = 2x - \frac{1}{x^2} - cos2x$ funksiyaning boshlang‘ich funksiyasini toping.

A)$x^2 + \frac{1}{x} + \frac{1}{2}sin2x + C$ B)$x^2 - \frac{1}{x} + \frac{1}{2}sin2x + C$

C)$x^2 + \frac{1}{x} - \frac{1}{2}sin2x + C$ D)$x^2 + \frac{1}{x} - sin2x + C$

E)$x^2 - \frac{1}{x} - sin2x + C$

Yechilishi: $f(x) = 2x - \frac{1}{x^2} - cos2x;\ \ F(x) = 2\int xdx -$

$$- \int x^{-2}dx - \int cos2xdx = 2 \cdot \frac{x^2}{2} - \frac{x^{-2+1}}{-2+1} -$$

$-\frac{1}{2}sin2x + C = x^2 + \frac{1}{x} - \frac{1}{2}sin2x + C$. Javobi: C.

71. $\int_{-\frac{\pi}{2}}^{-\frac{\pi}{4}} \frac{dx}{cos^2\left(\frac{\pi}{2}+x\right)}$ ni hisoblang.

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

Yechilishi:$\int_{-\frac{\pi}{2}}^{-\frac{\pi}{4}} \frac{dx}{cos^2\left(\frac{\pi}{2}+x\right)} = \int_{-\frac{\pi}{2}}^{-\frac{\pi}{4}} \frac{dx}{\left[\cos\left(\frac{\pi}{2}+x\right)\right]^2} = \int_{-\frac{\pi}{2}}^{-\frac{\pi}{4}} \frac{dx}{[-sinx]^2} =$

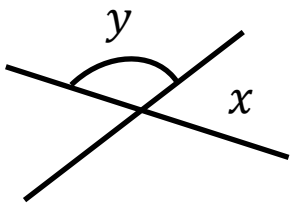
$$= \int_{-\frac{\pi}{2}}^{-\frac{\pi}{4}} \frac{dx}{sin^2x} = -ctgx|_{-\frac{\pi}{2}}^{-\frac{\pi}{4}} = -\left[ctg\left(-\frac{\pi}{4}\right) - ctg\left(-\frac{\pi}{2}\right)\right] =$$

$-[-1 + 0] = 1.$ Javobi: D.

72. Berilgan burchak va unga qo‘shni bo‘lgan ikkita burchaklar yig‘indisi$\frac{19\pi}{16}$ga teng. Berilgan burchakning kattaligini toping.

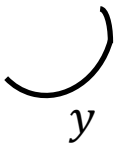
A) $\frac{16\pi}{16}$ B) $\frac{5\pi}{8}$ C) $\frac{3\pi}{4}$ D) $\frac{7\pi}{8}$ E) $\frac{13\pi}{16}$

Yechilishi: $-\begin{matrix} x+2y=\frac{19\pi}{16} \\ x+y=\pi \end{matrix} \Rightarrow y = \frac{19\pi}{16} - \pi =$



$= \frac{3\pi}{16}$; $x = \pi - y \Rightarrow$

$\Rightarrow x = \pi - \frac{3\pi}{16} \Rightarrow x = \frac{13\pi}{16}$.

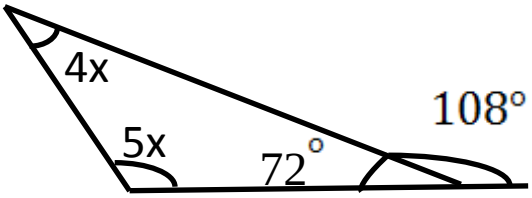


Javobi: E.

73. Uchburchakning$108°$ li tashqi burchagiga qo‘shni bo‘lmagan ichki burchaklarining nisbati 5:4 kabi.Shu ichki burchaklarning kichigini toping.

A)$45°$ B) $40°$ C) $72°$ D) $48°$ E) $30°$

Yechilishi: $4x + 5x = 108 \Rightarrow 9x = 108 \Rightarrow$

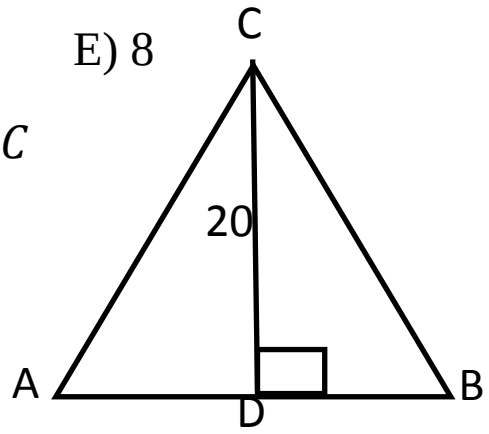


$\Rightarrow x = 12 \Rightarrow$

$\Rightarrow 4 \cdot x = 48°$. Javobi: D.

74. Teng yonli uchburchakning balandligi 20, asosining yon tomoniga nisbati esa 4:3 kabi. Shu uchburchakka ichki chizilgan aylananing radiusini toping.

A) 4 B) 10 C) 12 D) 6 E) 8



Yechilishi: $\frac{AB}{BC} = \frac{4}{3} \Rightarrow AB = \frac{4}{3}BC$

$\left(\frac{AB}{2}\right)^2 = BC^2 - 20^2 \Rightarrow$

$AB^2 = 4BC^2 - 400 \cdot 4 \Rightarrow$

$$\Rightarrow \frac{16}{9}BC^2 = 4BC^2 - 1600 \Rightarrow$$

$\Rightarrow 16BC^2 = 36BC^2 - 400 \cdot 4 \cdot 9 \Rightarrow 20BC^2 = 400 \cdot 4 \cdot 9 \Rightarrow$

$\Rightarrow BC^2 = 20 \cdot 4 \cdot 9 \Rightarrow BC = 12\sqrt{5};$

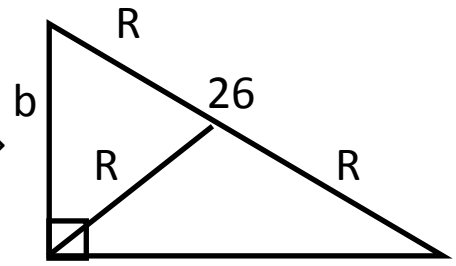
$AB = \frac{4}{3} \cdot 12\sqrt{5} = 16\sqrt{5}.$ $S_{\Delta} = \frac{1}{2} \cdot 16\sqrt{5} \cdot 20 = 160\sqrt{5}.$

$r = \frac{2 \cdot S}{a+b+c} = \frac{2 \cdot 160 \cdot \sqrt{5}}{2 \cdot 12\sqrt{5} + 16\sqrt{5}} = \frac{2 \cdot 160\sqrt{5}}{40\sqrt{5}} = 8.$ Javobi: E.

75. Radiusi 4 ga teng bo‘lgan doiraga gipotenuzasi 26 ga teng to‘g‘ri burchakli uchburchak tashqi chizilgan. Shu uchburchakning peremetrini toping.

A) 60 B) 64 C) 52 D) 56 E) 58

Yechilishi: $r = \frac{a+b-c}{2}$;



$R = 13;\ r = 4;\ a + b = 2(r + R) \Rightarrow$

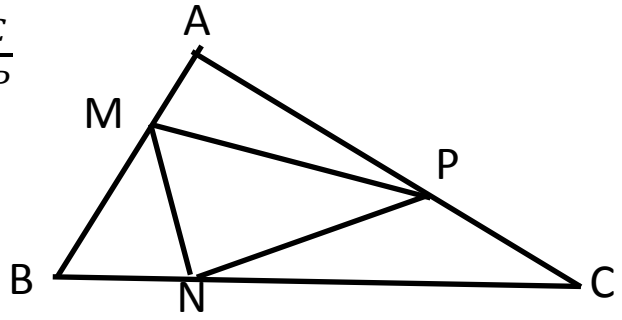
$\Rightarrow a + b = 2(4 + 13) = 34;$

$P = a + b + c = 60.$ Javobi: A.

76. ABC uchburchakning AB, BC va CA tomonlaridaolingan M, N va P nuqtalar shu tomonlarni 1:2 nisbatdabo‘ladi. Agar ABC uchburchakning yuzi S ga teng bo‘lsa, MNP uchburchakning yuzini toping.

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

Yechilishi: $\frac{S_{\Delta ABC}}{S_{\Delta AMP}} = \frac{AB \cdot AC}{AM \cdot AP}$



$$\begin{cases} MB = 2 \cdot MA \\ NC = 2 \cdot BN \\ AP = 2 \cdot PC \end{cases}$$

$$\begin{cases} AB = 3AM \\ BC = 3BN; \\ AC = 3PC \end{cases} \frac{S}{S_{\Delta AMP}} = \frac{AB \cdot AC}{AM \cdot AP} = \frac{3 \cdot AM \cdot 3 \cdot PC}{AM \cdot 2 \cdot PC} = \frac{9}{2};\ S_{\Delta AMP} = \frac{2S}{9}$$

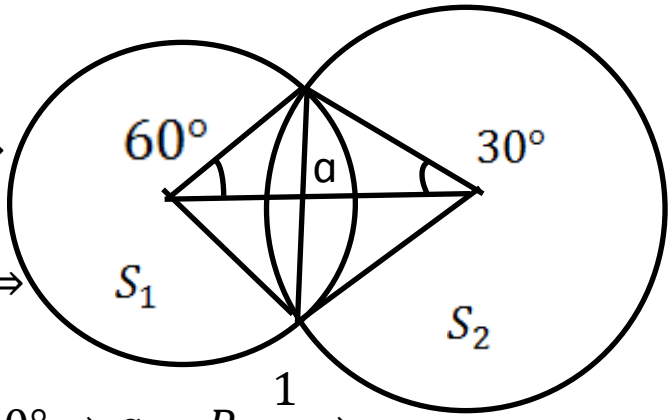
$$S_{\Delta BNM} = \frac{2S}{9};\ S_{\Delta CNP} = \frac{2S}{9};\ S_{\Delta MNP} = S - 3 \cdot S_{\Delta AMP} =$$

$$= S - 3 \cdot \frac{2S}{9} = S - \frac{2S}{3} = \frac{S}{3}.$$ Javobi: B.

77. Ikkita doiraning umumiy vatari 60° va 120° li yoylarni tortib turadi. Kichik doira yuzining katta doira yuziga nisbatini toping.

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

Yechilishi: $\frac{a}{r} = sin60°$



$$\frac{a}{r} = \frac{\sqrt{3}}{2} \Rightarrow 2a = \sqrt{3}r \Rightarrow$$

$$r = \frac{2a}{\sqrt{3}} \Rightarrow S_1 = \frac{4a^2}{3}\pi \Rightarrow$$

$$\frac{a}{R} = sin30° \Rightarrow a = R \cdot \frac{1}{2} \Rightarrow$$

$$\Rightarrow R = 2a \Rightarrow S_2 = 4a^2\pi;\ \frac{S_1}{S_2} = \frac{4a^2\pi}{3} : 4a^2\pi = 1:3.$$

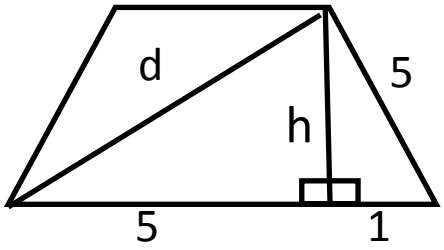
Javobi: B.

78. Teng yonli trapetsiyaning asoslari 4 va 6 ga, yon tomon iesa 5 ga teng trapetsiya dioganallari uzunliklarini toping.

A) 10 B) 12 C) 14 D) 15 E) 18

Yechilishi: $h^2 = 5^2 - 1^2 = 24 \Rightarrow$ 4

$\Rightarrow h = 2\sqrt{6};$



$d^2 = 5^2 + h^2 = 49 \Rightarrow$

$\Rightarrow d = 7 \Rightarrow$

$\Rightarrow 2 \cdot d = 14.$ Javobi: C.

79. To‘g‘ri burchakli trapetsiyaning dioganali uni tomoni 20 ga teng bo‘lgan teng tomonli uchburchakka va to‘g‘ri burchakli uchburchakka bo‘ladi. Trapetsiyaning o‘rtachizig‘ini toping.

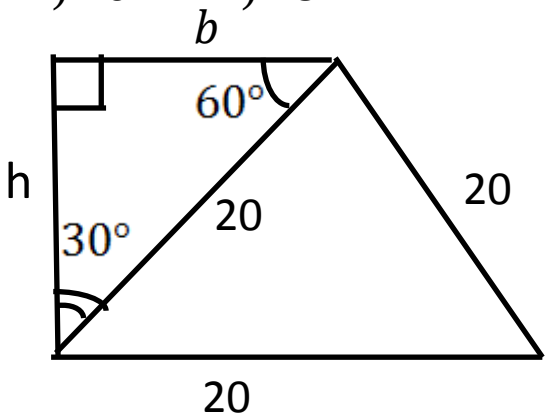
A) 10 B) 12 C) 15 D) 16 E) 18

Yechilishi: $\frac{b}{20} = sin30° \Rightarrow$

$\Rightarrow b = 10$

$MN = \frac{a+b}{2} = \frac{20+10}{2} = 15.$

Javobi: C.

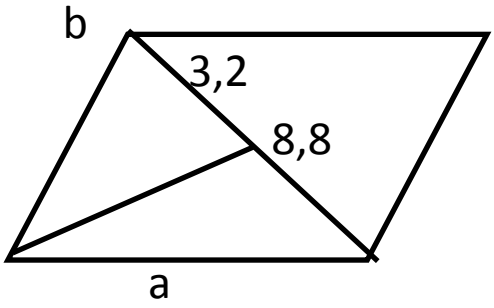


80. Parallelogramm o‘tkir burchagining bissektrissasi uning diagonalini uzunliklari 3,2 va 8,8 bo‘lgan kesmalarga ajratadi. Agar parallelogramning perimetri 30 ga teng bo‘lsa, uning katta tomonini toping.

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

Yechilishi: $Bissektrissa\ xossasi\ e'tiborga\ olinadi$.

$$\begin{cases} \frac{a}{8,8} = \frac{b}{3,2} \\ a + b = 15 \end{cases} \Rightarrow \begin{cases} 3,2a = 8,8b \\ a + b = 15 \end{cases} \Rightarrow$$



$$\Rightarrow \begin{cases} a = \frac{8,8b}{3,2} \\ \frac{8,8b}{3,2} + b = 15 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} a = \frac{88b}{32} \\ 8,8b + 3,2b = 15 \cdot 3,2 \end{cases} \Rightarrow \begin{cases} a = \frac{11}{4}b \\ 12b = 48 \end{cases} \Rightarrow$$

$\Rightarrow \begin{cases} a = 11; \\ b = 4. \end{cases}$ Javobi: D.

81. Agar qavariq ko‘pburchak ichki burchaklarining yig‘indisi tashqi burchaklar yig‘indisidan 4 marta katta bo‘lsa, uning tomonlari nechta?

A) 5 B) 6 C) 10 D) 8 E) 12

Yechilishi: $360 \cdot 4 = 1440;$ $180(n-2) = 1440 \Rightarrow$

$\Rightarrow n - 2 = 8 \Rightarrow n = 10$.Javobi: C.

82. Parallelogrammning tomonlari 11va 23 ga, diagonallarining nisbati 2:3 gateng. Uning katta diagonalini toping.

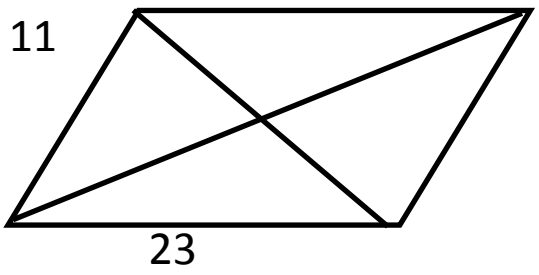
A) 18 B) 20 C) 24 D) 25 E) 30

Yechilishi: $\frac{d_1}{d_2} = \frac{2}{3} \Rightarrow d_1 = \frac{2}{3}d_2;$

$d_1{}^2 + d_2{}^2 = 2(a^2 + b^2) \Rightarrow$

$\Rightarrow \left(\frac{2}{3}d_2\right)^2 + d_2{}^2 =$

$= 2(11^2 + 23^2) \Rightarrow$

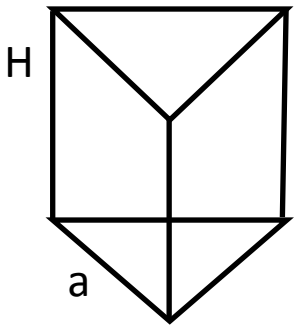


$$\Rightarrow \frac{4}{9}{d_2}^2 + {d_2}^2 = 2(121 + 529) \Rightarrow$$

$\Rightarrow 4{d_2}^2 + 9{d_2}^2 = 18 \cdot 650 \Rightarrow 13{d_2}^2 = 18 \cdot 650 \Rightarrow$
$\Rightarrow {d_2}^2 = 2 \cdot 9 \cdot 25 \cdot 2 \Rightarrow d_2 = 30.$ Javobi: E.

83. Muntazamu chburchakli prizmaning hajmi $27\sqrt{3}$ ga, asosidagi tashqi chizilgan aylananing radiusi esa 2 ga teng. Prizmaning balandligini toping.

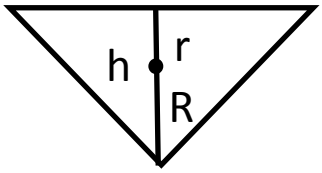
A) 12 B) 8 C) 6 D) 15 E) 9



Yechilishi: $V = 27\sqrt{3};\ R = \frac{a}{\sqrt{3}} \Rightarrow$

$\Rightarrow 2 = \frac{a\sqrt{3}}{3} \Rightarrow a = \frac{6}{\sqrt{3}}.$

$S_\Delta = \frac{\sqrt{3}}{4}a^2 =$



$$= \frac{\sqrt{3}}{4} \cdot \frac{36}{3} = 3\sqrt{3}.$$

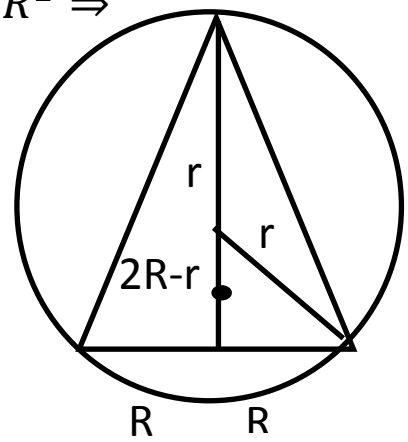
$$V = S_{asos} \cdot H \Rightarrow 27\sqrt{3} = 3\sqrt{3} \cdot H \Rightarrow$$

$\Rightarrow H = 9.$ Javobi: E.

84. Sharga balandligi asosining diametriga teng bo‘lgan konus ichki chizilgan. Agar konus asosining yuzi 2,4 ga teng bo‘lsa, shar sirtining yuzini toping.

A) 9π B) 6 C) 12,5 D) 15 E) 9π

Yechilishi: $S_{k.asos} = 2{,}4;\ \ 2{,}4 = \pi R^2 \Rightarrow$



$$\Rightarrow R = \sqrt{\frac{2{,}4}{\pi}};\ \ 2R - r = 2\sqrt{\frac{2{,}4}{\pi}} - r;$$

$$r^2 = \left[2\sqrt{\tfrac{2{,}4}{\pi}} - r\right]^2 + \left(\sqrt{\tfrac{2{,}4}{\pi}}\right)^2 =$$

$$= 4 \cdot \frac{2{,}4}{\pi} - 4 \cdot r\sqrt{\frac{2{,}4}{\pi}} + r^2 + \frac{2.4}{\pi} \Rightarrow$$

$$\Rightarrow r^2 = 5 \cdot \frac{2{,}4}{\pi} - 4 \cdot r\sqrt{\frac{2{,}4}{\pi}} + r^2 \Rightarrow 4r\frac{\sqrt{2{,}4}}{\sqrt{\pi}} = \frac{12}{\pi} \Rightarrow$$

$$\Rightarrow r = \tfrac{12}{\pi} \cdot \tfrac{\sqrt{\pi}}{4\cdot\sqrt{2{,}4}} = \tfrac{3\sqrt{\pi}}{\pi\sqrt{2{,}4}};\ \ S_{shar} = 4\pi r^2 =$$

$$= 4\pi \cdot \tfrac{9\pi}{\pi^2\cdot 2{,}4} = \tfrac{36}{2{,}4} = 15.$$ Javobi: D.

Pirnazar DAVRONOV

2000-YIL, 4-AXBOROTNOMA

1. $sin^4 x + cos^4 x = a$ tenglama a ning qanday qiymatlarida yechimga ega?

A) $\frac{1}{2} \le a \le 1$ B) $0 \le a \le \frac{1}{2}$ C) $a \ge \frac{1}{2}$

D) $a \le 1$ E) $0 \le a \le 1$

Yechilishi: $sin^4 x + cos^4 x = a;\quad (sin^2 x)^2 + (cos^2 x)^2 =$

$$= \left[\frac{1}{2}(1 - cos2x)\right]^2 + \left[\frac{1}{2}(1 + cos2x)\right]^2 =$$

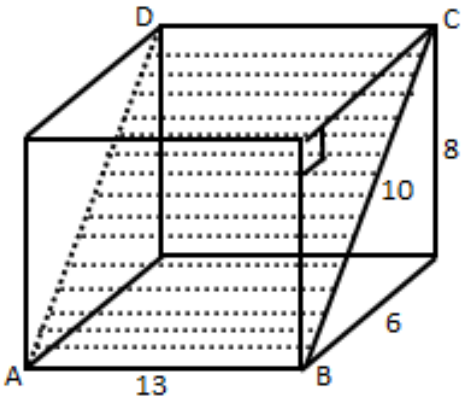
$$= \frac{1}{2}(1 + cos^2 2x) \Rightarrow \frac{1}{2}(1 + cos^2 2x) = a \Rightarrow$$

$$\Rightarrow 1 + cos^2 2x = 2a \Rightarrow cos^2 2x = 2a - 1 \Rightarrow$$

$$\Rightarrow 0 \le 2a - 1 \le 1 \Rightarrow \begin{cases} 2a - 1 \ge 0 \\ 2a - 1 \le 1 \end{cases} \Rightarrow \begin{cases} a \le \frac{1}{2} \\ a \le 1 \end{cases} \Rightarrow$$

$\Rightarrow \frac{1}{2} \le a \le 1$. Javobi: A.

2. To‘g‘ri burchakli parallelepiped asoslarining tomonlari 6 va 13 ga, balandligi 8 ga teng. Asosining katta tomoni va parallelepipedning diagonallari kesishgan nuqtasi orqali o‘tuvchi tekislik hosil qilgan kesimning yuzini toping.



A) 136 B) 124 C) 140 D) 128 E) 130

Yechilishi:$S_{ABCD} = 13 \cdot 10 = 130$. Javobi: E.

3. Agar $\vec{a} = \{-4; 2; 4\}$va $\vec{b} = \{\sqrt{2}; -\sqrt{2}; 0\}$ vektorlar berilgan bo‘lsa, $2\vec{a}$ va $\frac{\vec{b}}{2}$ vektorlar orasidagi burchakni toping.

A) $arccos\frac{2}{3}$ B) $\frac{3}{4}\pi$ C)$arccos\frac{5}{6}$ D) $\frac{\pi}{3}$ E) $\frac{\pi}{2}$

Yechilishi: $\vec{a} = \{-4; 2; 4\}$; $\vec{b} = \{\sqrt{2}; -\sqrt{2}; 0\}$;

$$2\vec{a} = \{-8; 4; 8\};\ \frac{\vec{b}}{2} = \left\{\frac{\sqrt{2}}{2}; -\frac{\sqrt{2}}{2}; 0\right\};\ 2\vec{a} \cdot \frac{\vec{b}}{2} = \vec{a} \cdot \vec{b} \Rightarrow$$

$$\Rightarrow \vec{a} \cdot \vec{b} = |\vec{a}| \cdot |\vec{b}| cos\alpha \Rightarrow -4\sqrt{2} - 2\sqrt{2} + 0 =$$

$$= \sqrt{16 + 4 + 16} \cdot \sqrt{2 + 2 + 0} cos\alpha \Rightarrow$$

$\Rightarrow -6\sqrt{2} = 6 \cdot 2cos\alpha \Rightarrow \alpha = \frac{3\pi}{4}$. Javobi: B.

4. m ning qanday qiymatida $\vec{a} = \{1; m; -2\}$ va $\vec{b} = \{m; -6; 8\}$ vektorlar perpendikulyar bo‘ladi?

A) 2 B) -2 C) 4 D) -4 E) 3

Yechilishi: $\vec{a} \cdot \vec{b} = 0 \Rightarrow 1 \cdot m + m \cdot 3 + (-2) \cdot (-4) = 0$

$\Rightarrow 4m = -8 \Rightarrow m = -2$. Javobi: B.

5. $m$ning qanday qiymatida $\vec{a} = \{2; 3; -4\}$ va $\vec{b} = \{m; -6; 8\}$ vektorlar parallel bo‘ladi?

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

Yechilishi: $\vec{a} \parallel \vec{b} \Rightarrow \frac{2}{m} = \frac{3}{-6} = \frac{-4}{8} \Rightarrow \frac{2}{m} = -\frac{1}{2} \Rightarrow m = -4$.

Javobi: C.

6. $\frac{3\frac{1}{3}\cdot 1{,}9+19{,}5:4\frac{1}{2}}{\frac{62}{75}-0{,}16}$ ni hisoblang.

A) $4\frac{1}{2}$ B) 16 C) 7,45 D) 12 E) $9\frac{3}{4}$

Yechilishi: 1) $\frac{10}{3}\cdot\frac{19}{10}+19\frac{1}{2}:\frac{9}{2}=\frac{19}{3}+\frac{39}{2}\cdot\frac{2}{9}=\frac{19}{3}+\frac{13}{3}=\frac{32}{3}$;

2) $\frac{62}{75}-\frac{4}{25}=\frac{62-12}{75}=\frac{50}{75}=\frac{2}{3}$; 3) $\frac{32}{3}:\frac{2}{3}=\frac{32}{2}=16$.

Javobi: B.

7. $\frac{2\sqrt{x}-\sqrt{2x}}{2}+3=\sqrt{x}+1$tenglamani yeching.

A) 8 B) 4 C) 9 D) 1 E) 16

Yechilishi:$\frac{2\sqrt{x}-\sqrt{2x}}{2}+3=\sqrt{x}+1\Rightarrow\begin{cases}x\geq 0;\\2\sqrt{x}-\sqrt{2}\cdot\sqrt{x}+6\end{cases}=$

$=2\sqrt{x}+2\Rightarrow\sqrt{2}\cdot\sqrt{x}=4\Rightarrow 2x=16\Rightarrow x=8.$

Javobi: A.

8. $\begin{cases}\frac{2x+5y}{y}=31\\ \frac{x-2y}{y}=11\end{cases}$ sistema nechta yechimga ega?

A) $\emptyset$ B) 1 C) 2 D) 3 E) $cheksiz\ ko'p$

Yechilishi: $\begin{cases}\frac{2x+5y}{y}=31\\ \frac{x-2y}{y}=11\end{cases}\Rightarrow\begin{cases}2x+5y=31y\\ x-2y=11y\\ y\neq 0\end{cases}\Rightarrow$

$\begin{cases}2x=26y\\ x=13y\end{cases}\Rightarrow\begin{cases}x=13y\\ x=13y\end{cases}$. Javobi: E.

9. $x^2-5x+a=0$tenglamaning ildizlaridan biri ikkinchisidan 9 marta kata bo‘lsa, a ning qiymatini toping.

A) 2,5 B) 2,4 C) 2,25 D) 3,5 E) 4,5

Yechilishi: $x^2 - 5x + a = 0$; $\begin{cases} x_1 + x_2 = 5 \\ x_1 \cdot x_2 = a \end{cases} \Rightarrow$

$\begin{cases} x + 9x = 5 \\ x \cdot 9x = a \end{cases} \Rightarrow \begin{cases} x = \frac{1}{2} \\ a = \frac{9}{4} \end{cases} \Rightarrow a = 2{,}25$. Javobi: C.

10. $x$ning qanday qiymatlarida $|x^{13}| = |x|^{13}$ tenglik o‘rinli bo‘ladi?

A) $x > 0$ B) 0 C) $x < 0$ D) $x \epsilon R$ E) $\emptyset$

Yechilishi: $|x^{13}| = |x|^{13}$;

$\begin{cases} x \geq 0 \Rightarrow x^{13} = x^{13} \\ x < 0 \Rightarrow -x^{13} = -x^{13} \end{cases} \Rightarrow x \epsilon R$. Javobi: D.

11. $x^2 - 3|x| - 40 = 0$ tenglamaning ildizlari ko‘paytmasini toping.

A) -40 B) 40 C) -32 D) -64 E) -56

Yechilishi: $x^2 - 3|x| - 40 = 0$;

$1) x > 3 \Rightarrow x^2 - 3x - 40 = 0 \Rightarrow x_{1,2} = \frac{3}{2} \pm \sqrt{\frac{9}{4} + 40} =$

$$= \frac{3}{2} \pm \frac{13}{2} \Rightarrow \begin{cases} x_1 = -5, & chet\ ildiz. \\ x_2 = 8, & ildiz. \end{cases}$$

$2) x < 0 \Rightarrow x^2 + 3x - 40 = 0 \Rightarrow x_{3,4} = -\frac{3}{2} \pm \frac{13}{2} \Rightarrow$

$\Rightarrow \begin{cases} x_3 = -8, ildiz. \\ x_4 = 5, \ chet\ ildiz. \end{cases} \Rightarrow x_2 \cdot x_3 = -64$. Javobi: D.

12. Ikki sutka necha sekunddan iborat?

A)136000 B)232400 C)126600 D)168800 E)172800

Yechilishi: $Ikki\ sutka = 48\ soat = 48 \cdot 1soat =$

$$= 48 \cdot 60minut = 48 \cdot 60 \cdot 1minut =$$

$= 48 \cdot 60 \cdot 60sekund = 172800sekund.$ Javobi: E.

13. Agar avtomobil tekis harakatda 3 soatda 324 km ni bosib o‘tsa, 20 sekundda necha metr masofani bosib o‘tadi?

A) 200 B) 300 C) 600 D) 1000 E) 1200

Yechilishi: $324km = 324 \cdot 1km = 324 \cdot 1000 =$

$$= 324000m; \quad 3s = 3 \cdot 1s = 3 \cdot 60minut =$$

$= 3 \cdot 60 \cdot 1minut = 3 \cdot 60 \cdot 60sekund = 10800sekund.$

$\frac{324000m}{10800s} = 30\frac{m}{s} \Rightarrow 30\frac{m}{s} \cdot 20s = 600m.$ Javobi: C.

14. Agar a, b, c va d turli raqamlar bo‘lib, $a + b + c = 7,$

$(a + b)^2 = d$va$a \cdot b \cdot c \neq 0$ bo‘lsa, $\frac{c^2 - c}{a+b}$ ning qiymatini toping.

A) $aniqlab\ bo'lmaydi$ B) 1 C) 2 D) 3 E) 4

Yechilishi: $\begin{cases} a + b + c = 7 \\ (a + b)^2 = d \end{cases}; \quad a \cdot b \cdot c \neq 0.$

$a = 1, \quad b = 2, \quad c = 4 \Rightarrow (1 + 2)^2 = 9\ raqam.$

$\frac{4^2 - 4}{1+2} = \frac{12}{3} = 4.$ Javobi: E.

15. Biror sonni 2 ga bo‘lsak, bo‘linma berilgan sondan 4 ta ga katta chiqadi. Berilgan sonni toping.

A) 4 B) 6 C) 8 D) -8 E) -10

Yechilishi: $\frac{x}{2} = x + 4 \Rightarrow x = 2x + 8 \Rightarrow x = -8.$

Javobi: D.

16. Kamayuvchi, ayriluvchi va ayirmaning yig‘indisi 624 ga teng. Kamayuvchini toping.

A) 244 B) 194 C) 312 D) 240 E) 188

Yechilishi: $a - b = c;\quad a = ?;\quad a = b + c.$

$a + b + c = 624; \Rightarrow a + a = 624 \Rightarrow 2a = 624 \Rightarrow$

$\Rightarrow a = 312.$ Javobi: C.

17. Anvarbir son o‘yladi, bu songa birni qo‘shib, so‘ngra uni 2 ga ko‘paytirdi, ko‘paytmani 3 ga bo‘ldi va bo‘linmadan 4 ni ayirdi, natijada 5 hosil bo‘ldi. Anvar qanday son o‘ylagan?

A) 7 B) 8 C) 9 D) 6,5 E) 12,5

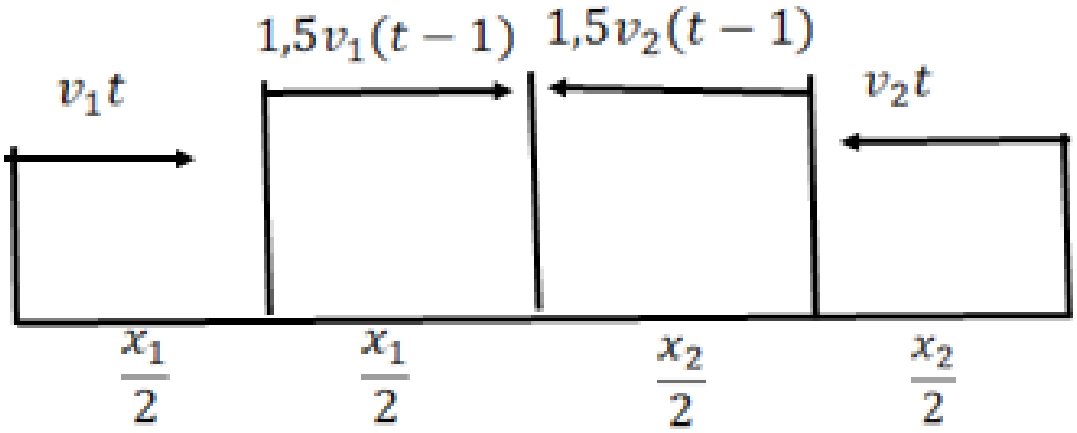
Yechilishi: $\frac{(x+1)\cdot 2}{3} - 4 = 5 \Rightarrow x = 12{,}5.$ Javobi: E.

18. Ikki shahardan bir vaqtning o‘zida turli tezlik bilan ikkita avtomobil bir-biriga qarab yo‘lga chiqdi. Avtomobillarning har biri uchrashish joyigacha bo‘lgan masofaning yarmini bosib o‘tgandan keyin, haydovchilar tezlikni 1,5 barobar oshirishdi, natijada avtomobillar belgilangan muddatdan 1 soat oldin uchrashishdi. Harakat boshlangandan necha soat keyin avtomobillar uchrashishdi?

A) 3 B) 4 C) 5 D) 6 E) $aniqlab\ bo'lmaydi$

Yechilishi: $v_1 t = 1{,}5 v_1 (t - 1) \Rightarrow t = 3;$

$2 \cdot t - 1 = 5$. Javobi: C



19. Usta muayyan ishni 12 kunda, uning shogirdi esa 30 kunda bajaradi. Agar 3 ta ustava 5 ta shogird birga ishlasalar, o‘sha ishni necha kunda bajarishadi?

A) 2,4 B) 3,6 C) 2,5 D) 1,2 E) 2,8

Yechilishi: $\left(\frac{3}{12}+\frac{5}{30}\right)x = 1 \Rightarrow \left(\frac{1}{4}+\frac{1}{6}\right)x = 1 \Rightarrow$

$\frac{5x}{12} = 1 \Rightarrow x = \frac{12}{5} \Rightarrow 2{,}4$. Javobi: A.

20. Agar $x > y$ va $z > t$ bo‘lsa, quyidagi tengsizliklardan qaysi biri har doim o‘rinli bo‘ladi?

A) $x \cdot z > y \cdot t$ B) $\frac{x}{z} > \frac{y}{t}$ C) $(x+y)^4 > (z+t)^4$

D) $7t - 13x < 7z - 13y$ E) $x - z > y - t$

Yechilishi: *Tengsizliklarni mos ravishda* 13 *va* 7 *ga ko′paytirib, so′ngra ayiramiz*:

$$\begin{cases} x > y \\ z > t \end{cases} \Rightarrow \begin{cases} 13x > 13y \\ 7z > 7t \end{cases} \Rightarrow -\begin{matrix} 7z > 7t \\ 13y > 13x \end{matrix} \Rightarrow$$

$\Rightarrow 7z - 13y > 7t - 13x$. Javobi: D.

21. Ota o‘zining kata o‘g‘lidan 3 marta kata, kichiko‘g‘lidanesa 40 yoshgakatta. Kattao‘g‘ilukasidan3 marta kata bo‘lsa, kattao‘g‘ilningyoshinechada?

A) 8 B) 10 C) 12 D) 15 E) 18

Yechilishi: $\begin{cases} katta\ o'g'il — x \\ kichik\ o'g'il — y \\ otasi: \end{cases} \Rightarrow \begin{cases} x = 3y \\ 3x = y + 40 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = 3y \\ 9y = y + 40 \end{cases} \Rightarrow \begin{cases} x = 15 \\ y = 5 \end{cases}$. Javobi: D.

22. Arifmetik progressiyaning beshinchi hadi 6 ga teng. Uning dastlabki to‘qqizta hadi yig‘indisini toping.

A) 36 B) 48 C) 54 D) 45 E) 63

Yechilishi: $\begin{cases} a_5 = 6 \\ a_9 = a_1 + 8d \end{cases} \Rightarrow \begin{cases} 6 = a_1 + 4d \\ a_9 = a_1 + 2 \cdot 4d \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 4d = 6 - a_1 \\ a_9 = a_1 + 2(6 - a_1) = a_1 + 12 - 2a_1 = 12 - a_1 \end{cases}$;

$S_9 = \frac{a_1 + a_9}{2} \cdot 9 = \frac{a_1 + 12 - a_1}{2} \cdot 9 = 54$. Javobi: C.

23. Kommersant a ta kostyumni b so‘mdan sotib oldi va ularning har birini bir xil bahoda sotdi. Natijada u c so‘m foyda qildi. Kommersant kostyumlarni necha so‘mdan sotgan?

A) $\frac{ab+c}{a}$ B) $\frac{a(b+c)}{c}$ C) $\frac{c}{a}$ D) $ab + c$ E) $\frac{ab-c}{b}$

Yechilishi: $Kostyumning\ donasi\ x\ so'mdan\ sotilgan$

$bo'lsa, jami\ ax\ so'm\ bo'ladi. U\ holda\ ax - ab = c \Rightarrow$

$\Rightarrow ax = ab + c \Rightarrow \frac{ab+c}{a}$. Javobi: A.

24. 48 ta chet tili o‘qituvchisidan 30 tasi ingliz tili, 29 tasi nemis tili o‘qituvchilari. Shu o‘qituvchilardan nechtasi faqat bitta tilde dars beradi?

A) 1 B) 28 C) 29 D) 30 E) 37

Yechilishi: $48 = 30 + 29 - x \Rightarrow x = 11 \Rightarrow$

$\Rightarrow 48 - 11 = 37$. Javobi: E.

25. Agar A, B, C va$D$ sonlarning nisbati 2:3:4:5 kabi bo‘lsa, $\frac{A+B}{C+D}$ningqiymatinianiqlang.

A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{9}$ D) $\frac{9}{5}$ E)$aniqlab\ bo'lmaydi$

Yechilishi: $A = 2x;\ B = 3x;\ C = 4x;\ D = 5x;$

$\frac{2x+3x}{4x+5x} = \frac{5}{9}$. Javobi: C.

26. Imtihon o‘tkazilayotgan xonadagi abiturientlarning 56% i qizlar, qolganlari o‘g‘il bolalar. Xonadagi abiturientlarning soni quyidagi sonlardan qaysi biriga teng bo‘lishi mumkin?

A) 44 B) 60 C) 80 D) 99 E) 50

Yechilishi: $\begin{cases} 50 \cdot 0{,}56 = 28 \\ 60 \cdot 0{,}56 = 33{,}6\ mumkin\ emas \end{cases}$. Javobi: E.

27. Agar kubning qirrasi 10% ga kamaytirilsa, uning hajmi necha foizga kamayadi?

A) 10 B) 30 C) 33 D) 33,3 E) 27,1

Yechilishi: $V_1 = a^3;\ a - 10\% \Rightarrow 0{,}9a \Rightarrow V_2 = (0{,}9)^3 =$

$= 0{,}729a^3 \Rightarrow 1{,}000 - 0{,}729 = 0{,}271 \Rightarrow 27{,}1\%.$

Javobi: E.

28. Yig‘ilgan 1 t mevaning 82% i suvdan iborat. Ma’lum vaqtdan keyin bu mevadagi suvning miqdori 70% ga tushdi. Endi bu meaning og‘irligi necha kg ga chiqadi?

A) 810 B) 820 C) 700 D) 780 E) 600

Yechilishi: $\begin{matrix} x---100\% \\ 180---30\% \end{matrix} \Rightarrow 30x = 180 \cdot 100 \Rightarrow x = 600.$

Javobi: E.

29. Yog‘liligi 2% bo‘lgan 80 l sut bilan yog‘liligi 5% bo‘lgan necha l sut aralashtirilsa, yog‘liligi 3% bo‘lgan sut olish mumkin?

A) 20 B) 30 C) 40 D) 50 E) 60

Yechilishi: $0{,}02 \cdot 80 + 0{,}05x = 0{,}03(80 + x) \Rightarrow$

$\Rightarrow 1{,}6 + 0{,}05x = 2{,}4 + 0{,}03x \Rightarrow x = 40.$ Javobi: C.

30. Uchta sonning o‘rta arifmetigi10 ga, boshqa ikkita sonning o‘rta arifmetigi esa 15 ga teng. Shu 5 ta sonning o‘rta arifmetigini toping.

A) 10 B) 11 C) 12 D) 13 E) 14

Yechilishi: $\begin{cases} \frac{a+b+c}{3} = 10 \\ \frac{m+n}{2} = 15 \end{cases} \Rightarrow \begin{cases} a+b+c = 30 \\ m+n = 30 \end{cases} \Rightarrow$

$\Rightarrow \frac{a+b+c+m+n}{5} = \frac{30+30}{5} = 12.$ Javobi: C.

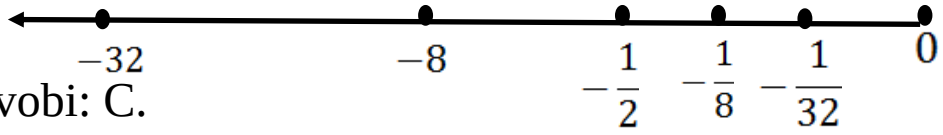
31. Agar $a < -1$ bo‘lsa, quyida keltirilgan ifodalardan qaysi birining qiymati eng katta bo‘ladi?

A) a^{-1} B) a^{-3} C) a^{-5} D) a^3 E) a^5

Yechilishi: $a=-2;\ \ a^{-1}=(-2)^{-1}=-\frac{1}{2}=-0{,}5;$

$$(-2)^{-3}=-\frac{1}{8};\ \ (-2)^{-5}=-\frac{1}{32};\ \ \ (-2)^{3}=-8;$$

$$(-2)^{5}=-32.$$



Javobi: C.

32. $1-\frac{6}{x}>\frac{2}{1-x}$ tengsizlikni yeching.

A)$(0;1)\cup(2;3)$ B)$(-\infty;0)\cup(1;2)\cup(3;\infty)$

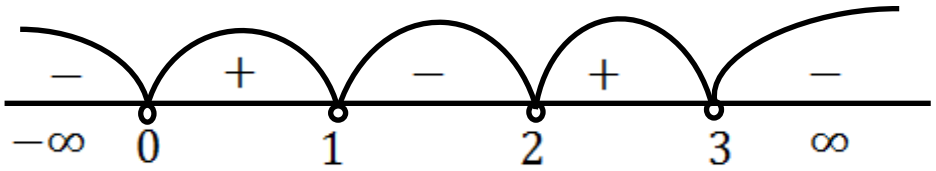
C) $(0;1)\cup(3;\infty)$ D) $(-\infty;1)\cup(2;3)\cup(5;\infty)$

E) $(-\infty;2)\cup(3;\infty)$

Yechilishi: $1-\frac{6}{x}>\frac{2}{1-x}\Rightarrow\frac{2}{1-x}+\frac{6}{x}-1<0\Rightarrow$

$$\Rightarrow 2x+6-6x-x+x^2<0\Rightarrow\frac{x^2-5x+6}{x(1-x)}<0\Rightarrow$$

$$\Rightarrow x^2-5x+6\neq 0\Rightarrow\begin{cases}x_1\neq 2;\\ x_2\neq 3;\end{cases}\begin{cases}x\neq 0\\ 1-x\neq 0\end{cases}\Rightarrow\begin{cases}x\neq 0\\ x\neq 1\end{cases}$$



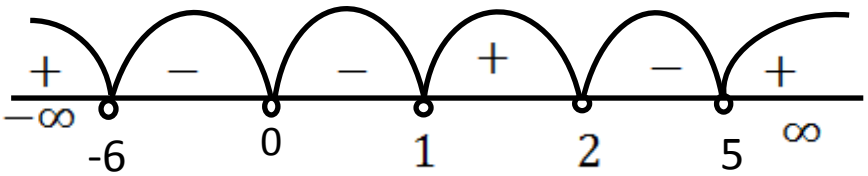
$(-\infty;0)\cup(1;2)\cup(3;\infty)$. Javobi: B.

33. $\frac{x^4-3x^3+2x^2}{30-x^2-x}<0$ tengsizlikning eng katta butun manfiy va eng kichik butun musbat yechimlari ko‘paytmasini toping.

A) -30 B) -35 C) -36 D) -42 E) -48

Yechilishi: $\frac{x^4-3x^3+2x^2}{30-x^2-x} < 0 \Rightarrow \frac{x^2(x^2-3x+2)}{-(x^2+x-30)} < 0 \Rightarrow x \neq 0 \Rightarrow$

$$\Rightarrow \frac{x^2-3x+2}{x^2+x-30} > 0 \Rightarrow \begin{cases} x^2-3x+2=0 \Rightarrow \begin{cases} x_1=1 \\ x_2=2 \end{cases} \\ x^2+x-30=0 \Rightarrow \begin{cases} x_3=-6 \\ x_4=5 \end{cases} \end{cases}$$



$(-\infty;-6) \cup (1;2) \cup (5;\infty) \Rightarrow \begin{cases} x_1=-7 \\ x_2=6 \end{cases} \Rightarrow x_1 \cdot x_2 =$

$= -7 \cdot 6 = -42.$ Javobi: D.

34. $(16-x^2)\sqrt{3-x}=0$ tenglamaning ildizlari yig‘indisini toping.

A) 7 B) 3 C) 0 D) -2 E) -1

Yechilishi: $(16-x)\sqrt{3-x}=0 \Rightarrow \begin{cases} x^2=16 \\ 3-x \geq 0 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} x=\pm 4 \\ x \leq 3 \end{cases} \Rightarrow \begin{cases} x_1=-4 \\ x_2 \neq 4 \\ x_3=3 \end{cases} \Rightarrow x_1+x_3=-1.$$

Javobi: E.

35. $\sqrt{x+1-\sqrt{x+7}}+\sqrt{8+2\sqrt{x+7}+x}=4$ tenglamaning nechta ildizi bor?

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

Yechilishi: $\sqrt{x+1-\sqrt{x+7}}+\sqrt{8+2\sqrt{x+7}+x}=4 \Rightarrow$

$$\Rightarrow \sqrt{x+1-\sqrt{x+7}}+\sqrt{\left(1+\sqrt{x+7}\right)^2}=4 \Rightarrow$$

$$\Rightarrow \sqrt{x+1-\sqrt{x+7}}+\left|1+\sqrt{x+7}\right|=4;$$

$$1)\sqrt{x+1-\sqrt{x+7}}-1-\sqrt{x+7}=4 \Rightarrow$$

$$\Rightarrow \sqrt{x+1-\sqrt{x+7}}=5+\sqrt{x+7} \Rightarrow x+1-\sqrt{x+7}=$$

$$=25+10\sqrt{x+7}+x+7 \Rightarrow 11\sqrt{x+7}=-31 \Rightarrow$$

$$\Rightarrow 121(x+7)=961 \Rightarrow x+7=\frac{961}{121} \Rightarrow$$

$$\Rightarrow x=\frac{961}{121}-7=\frac{961-847}{121}=\frac{114}{121} \ \ chet\ ildiz.$$

$$2)\ \sqrt{x+1-\sqrt{x+7}}+1+\sqrt{x+7}=4 \Rightarrow$$

$$\Rightarrow \sqrt{x+1-\sqrt{x+7}}=3-\sqrt{x+7} \Rightarrow x+1-\sqrt{x+7}=$$

$$=9-6\sqrt{x+7}+x+7 \Rightarrow 5\sqrt{x+7}=15 \Rightarrow$$

$$\Rightarrow \sqrt{x+7}=3 \Rightarrow x+7=9 \Rightarrow x=2 \ \ ildiz.$$ Javobi: B.

36. Agar $\frac{ab}{a+b}=1$; $\frac{ac}{a+c}=2$ va $\frac{bc}{b+c}=3$ bo‘lsa, $\frac{ab}{c}$ ning qiymatini toping.

A) $\frac{6}{25}$ B) $-\frac{15}{58}$ C) $\frac{21}{40}$ D) $-\frac{12}{35}$ E) $\frac{18}{65}$

Yechilishi: $\frac{a\cdot b}{a+b}=1 \Rightarrow a\cdot b=a+b \Rightarrow a(b-1)=b \Rightarrow$

$$\Rightarrow a=\frac{b}{b-1};\quad \frac{ac}{a+c}=2 \Rightarrow ac=2a+2c \Rightarrow a(c-2)=$$

$$= 2c \Rightarrow a = \frac{2c}{c-2};\quad \frac{bc}{b+c} = 3 \Rightarrow bc = 3b + 3c \Rightarrow$$

$$\Rightarrow b = \frac{3c}{c-3}.\quad \frac{b}{b-1} = \frac{2c}{c-2} \Rightarrow b(c-2) = 2c(b-1)$$

$$\Rightarrow$$

$$\Rightarrow \frac{3c}{c-3}(c-2) = 2c\left(\frac{3c}{c-3} - 1\right) \Rightarrow \frac{3c(c-2)}{c-3}$$

$$= \frac{2c(3c - c + 3)}{c-3} \Rightarrow$$

$$\Rightarrow 3(c-2) = 2(2c+3) \Rightarrow 3c - 6 = 4c + 6 \Rightarrow c = -12;$$

$$b = \frac{3c}{c-3} = \frac{3\cdot(-12)}{-12-3} = \frac{-36}{-15} = \frac{12}{5};\quad a = \frac{2c}{c-2}$$

$$= \frac{2\cdot(-12)}{-12-2} = \frac{12}{7};$$

$$\frac{ab}{c} = a\cdot b : c = \frac{12}{5}\cdot\frac{12}{7} : (-12) = \frac{12}{5}\cdot\frac{12}{7}\cdot\frac{1}{12} = -\frac{12}{35}.$$

Javobi: D.

37. Agar $\frac{1}{a} < -1$ bo‘lsa, quyidagi ifodalardan qaysi birining qiymati eng kata bo‘ladi?

A) $(a-1)^2$ B) $(a-1)^3$ C) $a^3 - 1$

D) $a^2 - 1$ E) $1 - a$

Yechilishi: $\frac{1}{a} < -1 \Rightarrow a = -\frac{1}{2};\ -\frac{1}{5};$

$\left(-\frac{1}{2} - 1\right)^2 = \left(-\frac{3}{2}\right)^2 = \frac{9}{4} = 2{,}25.$ Javobi: A.

38. Agar $a \epsilon N$ bo‘lsa, quyidagi ifodalardan qaysi birining qiymati har doim butun son bo‘ladi?

A) $\frac{a^2+1}{4}$ B) $\frac{a^2+a}{6}$ C) $\frac{a(a^2-1)}{6}$ D) $\frac{a-5}{5}$ E) $\frac{a^2-2}{3}$

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

1) $a = 2k \Rightarrow 2k(2k-1)(2k+1)$;
2) $a = 2k+1 \Rightarrow 2k(2k+1)(2k+2)$.
1) va 2) lar 2 va 3 ga $qoldiqsiz$ $bo'linadi$. $Demak$, $\frac{a(a^2-1)}{6}$. Javobi: C.

39. Agar $3a+4b=16$ va $2c-b=1$ bo‘lsa, $3a+8c$ ning qiymatini toping.

A) 18 B) 4 C) 20 D)23 E) $aniqlab$ $bo'lmaydi$

Yechilishi: $\begin{cases} 3a+4b=16 \\ 2c-b=1 \end{cases} \Rightarrow \begin{cases} + \\ \end{cases} \begin{matrix} 3a+4b=16 \\ 8c-4b=4 \end{matrix} \Rightarrow$

$\Rightarrow 3a+8c=20$.Javobi: C.

40. $lg^2x - lg^2(10x) = 6 - lg^2(100x)$ tenglamaning ildizlar ko‘paytmasini toping.

A) 1 B) 10 C) 0,1 D) 0,01 E) 0,001

Yechilishi: $lg^2x - lg^2(10x) = 6 - lg^2(100x)$ $x > 0$.

$$lg^2x - [\lg(10x)]^2 = 6 - [\lg(100x)]^2 \Rightarrow$$

$$\Rightarrow lg^2x - (1g10 + lgx)^2 = 6 - (lg100 + 1gx)^2 \Rightarrow$$

$$\Rightarrow lg^2x - (1 + 2lgx + lg^2x) = 6 - (2 + lgx)^2 \Rightarrow$$

$$\Rightarrow lg^2x - 1 - 2lgx - lg^2x = 6 - 4 - 4lgx - lg^2x \Rightarrow$$

$$\Rightarrow lg^2x + 2lgx - 3 = 0;$$

$$lg_{1,2}x = -1 \pm \sqrt{1+3} = -1 \pm 2 \Rightarrow \begin{cases} lgx_1 = -3 \\ lgx_2 = 1 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x_1 = 10^{-3} \\ x_2 = 10 \end{cases} \Rightarrow x_1 \cdot x_2 = 10^{-2} = 0{,}01.$$ Javobi: D.

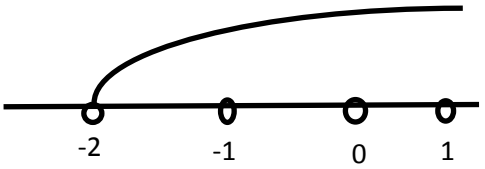
41. $\log_{x^2}(x+2) \leq 1$tengsizlikniyeching.

A) $(-\infty; -1] \cup [2; \infty)$ B) $(-\infty; -1) \cup [2; \infty)$

C) $(-2; -1) \cup (-1; 0) \cup (0; 1) \cup [2; \infty)$

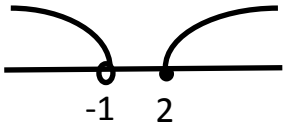
D) $(-1; 2]$ E) $(-\infty; -1) \cup (-1; \infty)$

Yechilishi: $\log_{x^2}(x+2) \leq 1$.



1) $x \neq 0;\ x^2 \neq 1 \Rightarrow x \neq \pm 1;$
$x + 2 > 0 \Rightarrow x > -2.$

2) $x > 1 \Rightarrow x + 2 \leq x^2 \Rightarrow$

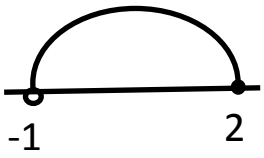


$$\Rightarrow x^2 - x - 2 \geq 0 \Rightarrow \begin{cases} x_1 = -1; \\ x_2 = 2. \end{cases}$$

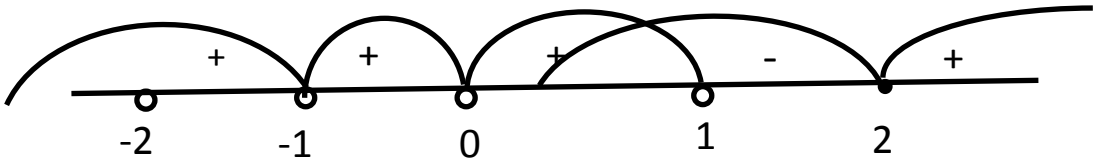
3) $0 < x < 1 \Rightarrow x + 2 \geq x^2 \Rightarrow$

$$\Rightarrow x^2 - x - 2 \leq 0 \Rightarrow$$

$$\Rightarrow \begin{cases} x_1 = -1; \\ x_2 = 2. \end{cases}$$



1), 2) va 3) dan yechim tekshirish orqali aniqlanadi:



$(-2; -1) \cup (-1; 0) \cup (0; 1) \cup [2; \infty)$. Javobi: C.

42. $x = 2{,}25 \quad \log_c(3 - x^2 + 2x) < \log_c(x^2 - x - 2)$ tengsizlikni qanoatlantirishi ma'lum. Shu tengsizlikni yeching.

A)(1,5; 3) B) (2; 3) C)(2; 2,5)

D)(1,5; 3,5) E) (1;3)∪(3; 5)

Yechilishi: $\log_c(3 - x^2 + 2x) < \log_c(x^2 - x - 2)$;

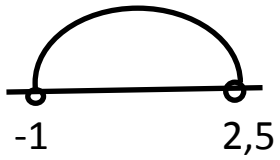
1)$\log_c(3 - (2{,}25)^2 + 2 \cdot 2{,}25) < \log_c(2{,}15^2 - 2{,}25 - 2) \Rightarrow$

$\Rightarrow \log_c(3 - 5{,}0625 + 4{,}5) < \log_c(5{,}0625 - 4{,}25) \Rightarrow$

$\Rightarrow \log_c 2{,}4375 < \log_c 0{,}825 \Rightarrow 0 < c < 1.$

$3 - x^2 + 2x > x^2 - x - 2 \Rightarrow$

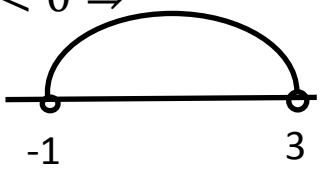
$\Rightarrow 2x^2 - 3x - 5 < 0 \Rightarrow$



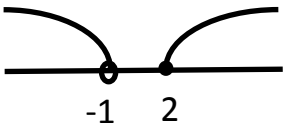
$\Rightarrow x_{1,2} = \frac{3 \pm \sqrt{9+4 \cdot 2 \cdot 5}}{2 \cdot 2} = \frac{3 \pm 7}{4} \Rightarrow \begin{cases} x_1 = -1 \\ x_2 = 2{,}5. \end{cases}$;

2)$3 - x^2 + 2x > 0 \Rightarrow x^2 - 2x - 3 < 0 \Rightarrow$

$\Rightarrow \begin{cases} x_1 = -1 \\ x_2 = 3 \end{cases}$;



3) $x^2 - x - 2 > 0 \Rightarrow \begin{cases} x_1 = -1 \\ x_2 = 2. \end{cases}$;



4) yuqoridagi 1) va 2) dan quyidagiga kelamiz: $(-1; 2{,}5)$

5) yuqoridagi 3) va 4) dan quyidagiga kelamiz: $(2; 2{,}5)$.

Javobi: C.

43. $\frac{\left(7^{x^2-5x+7} - 7\right) \cdot \sqrt{x^2+x-12} \cdot \lg(2x-7)}{\ln(3x-5) \cdot \left(\sqrt{2x-1} - \sqrt{8-x}\right)} = 0$ tenglama nechta ildizga ega?

A) ∅ B) 1 C) 2 D) 3 E) 4

Yechilishi: $\frac{\left(7^{x^2-5x+7}-7\right)\cdot\sqrt{x^2+x-12}\cdot\lg(2x-7)}{\ln(3x-5)\cdot\left(\sqrt{2x-1}-\sqrt{8-x}\right)}=0;$

$$1)\begin{cases}7^{x^2-5x+7}-7=0\\ \sqrt{x^2+x-12}=0\\ \lg(2x-7)=0\end{cases}\Rightarrow\begin{cases}x^2-5x+7=0\\ x^2+x-12=0\\ 2x-7>1\\ 2x-7=1\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases}\begin{cases}x_1=2\\ x_2=3\end{cases}\\ \begin{cases}x_3=-4\\ x_4=3\end{cases}\Rightarrow x=4.\\ x>3{,}5\\ x=4\end{cases}\quad 2)\begin{cases}\ln(3x-5)\neq 0\\ \sqrt{2x-1}-\sqrt{8-x}\neq 0\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases}3x-5>0\\ 3x-5\neq 0\\ 2x-1\neq 8-x\end{cases}\Rightarrow\begin{cases}x>\frac{5}{3};\\ x\neq 2;\\ x\neq 3.\end{cases}\quad x=4.$$ Javobi: B.

44. $0\le\beta\le\frac{\pi}{4}$ bo‘lsa, $tg\beta=\left|\frac{a^2-5a+4}{a^2-4}\right|$ o‘rinli bo‘ladigan a ning barcha qiymatlarini toping.

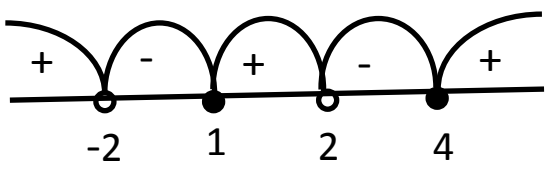
A) $[2{,}5;\ \infty)$ B) $[4;\ \infty)$ C) $[0;1{,}6]\cup[2{,}5;\ \infty)$

D) $[0;1{,}5]\cup[3{,}6;\ \infty)$ E) $[-3;1{,}6]\cup[2{,}5;\ \infty)$

Yechilishi: $tg0\le tg\beta\le tg\frac{\pi}{4}\Rightarrow 0\le tg\beta\le 1.$

$$0\le\left|\frac{a^2-5a+4}{a^2-4}\right|\le 1:\quad 1)\left|\frac{a^2-5a+4}{a^2-4}\right|\ge 0\ \Rightarrow\ \frac{a^2-5a+4}{a^2-4}\ge 0\Rightarrow$$

$$\Rightarrow\frac{(a-1)(a-4)}{(a-2)(a+2)}\ge 0\Rightarrow\begin{cases}a=1\\ a=4\\ a\neq 2\\ a\neq -2\end{cases}$$



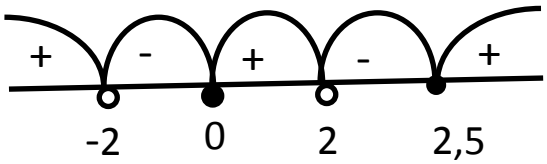
$$(-\infty;\ -2)\cup[1;2)\cup[4;+\infty).$$

2) $\left|\frac{a^2-5a+4}{a^2-4}\right| \le 1 \Rightarrow -1 \le \frac{a^2-5a+4}{a^2-4} \le 1$:

a) $\frac{a^2-5a+4}{a^2-4} \ge -1 \Rightarrow \frac{a^2-5a+4}{a^2-4}+1 \ge 0 \Rightarrow$

$\Rightarrow \frac{a^2-5a+4+a^2-4}{a^2-4} \ge 0 \Rightarrow \frac{2a^2-5a}{a^2-4} \ge 0 \Rightarrow$

$\Rightarrow \frac{a(2a-5)}{(a-2)(a+2)} \ge 0 \Rightarrow \begin{cases} a=0 \\ a=2{,}5 \\ a \ne 2 \\ a \ne -2 \end{cases}$

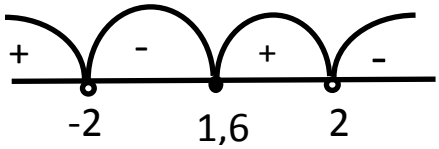


$(-\infty;\ -2) \cup [0;2) \cup [2{,}5;\ +\infty)$;

b) $\frac{a^2-5a+4}{a^2-4} \le 1 \Rightarrow \frac{a^2-5a+4}{a^2-4}-1 \le 0 \Rightarrow$

$\Rightarrow \frac{a^2-5a+4-a^2+4}{a^2-4} \le 0 \Rightarrow \frac{8-5a}{(a-2)(a+2)} \le 0 \Rightarrow$

$\Rightarrow \begin{cases} a=1{,}6 \\ a \ne 2 \\ a \ne -2 \end{cases}$



$(-2;\ 1{,}6] \cup (2;\ \infty)$;

Yuqoridagilardan $[4;\ \infty)$ kelib chiqadi. Javobi: B.

45. Agar $tg\alpha = 2$ bo‘lsa, $\frac{2-5cos2\alpha}{6+10sin\alpha} - \frac{13+13tg2\alpha}{10cos2\alpha-15sin2\alpha}$ ning qiymatini hisoblang.

A) $\frac{3}{4}$ B) $\frac{4}{5}$ C) $\frac{6}{7}$ D) $\frac{7}{8}$ E) $\frac{8}{9}$

Yechilishi: $\frac{2-5cos2\alpha}{6+10sin\alpha} - \frac{13+13tg2\alpha}{10cos2\alpha-15sin2\alpha} =$

$$= \frac{2-5\cdot\left(\frac{1-tg^2\alpha}{1+tg^2\alpha}\right)}{6+10\cdot\left(\frac{2tg\alpha}{1+tg^2a}\right)} - \frac{13+3\cdot\left(\frac{2tg\alpha}{1+tg^2\alpha}\right)}{10\cdot\left(\frac{1-tg^2\alpha}{1+tg^2\alpha}\right)-15\cdot\left(\frac{2tg\alpha}{1+tg^2\alpha}\right)} =$$

$$= \frac{2-5\cdot\left(\frac{1-4}{1+4}\right)}{6+10\cdot\left(\frac{4}{1+4}\right)} - \frac{13+3\cdot\left(\frac{4}{1-4}\right)}{10\cdot\left(\frac{1-4}{1+4}\right)-15\cdot\left(\frac{4}{1+4}\right)}$$

$$= \frac{2+3}{6+8} - \frac{13-4}{-6-12} =$$

$= \frac{5}{14} + \frac{9}{18} = \frac{5}{14} + \frac{1}{2} = \frac{12}{14} = \frac{6}{7}$. Javobi: C.

46. $\sin(2arctg3)$ ning qiymatini toping.

A) 0,6 B) 0,8 C) 0,75 D) 0,36 E) 0,9

Yechilishi: $\sin(2arctg3) = 2sinarctg3 \cdot cosarctg3 =$

$= 2\cdot\frac{3}{\sqrt{1+3^2}}\cdot\frac{1}{\sqrt{1+3^2}} = \frac{6}{1+9} = \frac{3}{5} = 0{,}6$. Javobi: A.

47. $\sqrt{1-cosx} = sinx$ $(x\epsilon[\pi;3\pi])$tenglamaning ildizlar yig‘indisini toping.

A) 2π B) 5π C) 6π D) $3{,}5\pi$ E) $4{,}5\pi$

Yechilishi: $\sqrt{1-cosx} = sinx \Rightarrow 1-cosx = sin^2x \Rightarrow$

$$\Rightarrow 1-cosx = 1-cos^2x \Rightarrow cos^2x - cosx = 0 \Rightarrow$$

$$\Rightarrow cosx(cosx-1) = 0 \Rightarrow \begin{cases} cosx = 0 \\ cosx = 1 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x = \frac{\pi}{2} + \pi k, \ \ k\epsilon Z; \\ x = 2\pi k, \ \ k\epsilon Z. \end{cases} \quad k=1 \Rightarrow \begin{cases} x = \frac{3\pi}{2}; \\ x = 2\pi. \end{cases}$$

$k = 2 \Rightarrow \begin{cases} x = \frac{5\pi}{2}; \frac{3\pi}{2} + 2\pi + \frac{5\pi}{2} = 6\pi. \\ x = 4\pi. \end{cases}$ Javobi: C.

48. Muntazam uchburchakning yuzi 64 ga teng. Uning perimetrini toping.

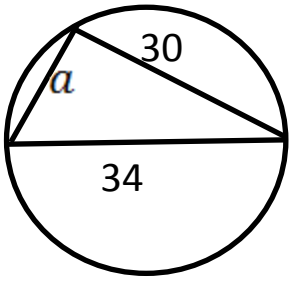
A) $16\sqrt[4]{27}$ B) $\frac{64}{\sqrt[3]{3}}$ C) 64 D) $64\sqrt{3}$ E) $\frac{40\sqrt{3}}{3}$

Yechilishi: $S_\Delta = \frac{a^2\sqrt{3}}{4} \Rightarrow 64 = \frac{a^2\sqrt{3}}{4} \Rightarrow a^2 = \frac{64 \cdot 4}{\sqrt{3}} \Rightarrow$

$\Rightarrow a = \frac{16}{\sqrt[4]{3}};\ P = 3a = \frac{3 \cdot 16}{\sqrt[4]{3}} = \frac{\sqrt[4]{3^4} \cdot 16}{\sqrt[4]{3}} = 16\sqrt[4]{27}$.Javobi: A.

49. Doiraga ichki chizilgan uchburchakning bir tomoni uning diametriga teng. Doiraning yuzi 289π ga, uchburchak tomonlaridan birining uzunligi 30 ga teng. Shu uchburchakka ichki chizilgan doiraning yuzini toping.

A) 16π B) 36π C) 64π D) 20π E) 25π



Yechilishi: $S = \pi R^2$

$289\pi = \pi R^2 \Rightarrow R = 17.$

$a^2 = 34^2 - 30^2 = 1156 - 900 =$

$=256 \Rightarrow a = 16.$ $r = \frac{30+16-34}{2} = 6 \Rightarrow$

$\Rightarrow S = \pi r^2 = 36\pi.$ Javobi: B.

50. To‘g‘ri to‘rtburchakning bir tomoni uzunligi 25% ga orttirildi. Uning yuzi o‘zgarmasligi uchun ikkinchi tomonini necha foizga kamaytirish kerak?

A) 20 B) 16 C) 25 D) 18 E) 19,2

Yechilishi: a $\boxed{S = a \cdot b}$ $a + 0{,}25a$ $\boxed{S = 1{,}25ab(1-x)}$

b $b - xb$

$$S = 1{,}25a \cdot b(1-x); \quad a \cdot b = 1{,}25 \cdot (1-x) \cdot ab \Rightarrow$$
$$\Rightarrow 1 = 1{,}25 - 1{,}25x \Rightarrow 1{,}25x = 0{,}25 \Rightarrow x = 0{,}2 \Rightarrow 20\%.$$

Javobi: A.

51. Kub yog‘ining yuzi 2 marta orttirilsa, uning hajmi necha marta ko‘payadi?

A) 2 B) 8 C) 4 D) $\sqrt{8}$ E) $\sqrt[3]{4}$

Yechilishi: $V_1 = a^3$; $x^2 = 2a^2 \Rightarrow x = 2a^2\sqrt{2}$;

$V_2 = \left(a\sqrt{2}\right)^3 \Rightarrow V_2 = a^3\sqrt{8} = 2\sqrt{2}a^3$. Javobi: D.

Pirnazar DAVRONOV

2000-YIL, 5 –AXBOROTNOMA

1. 1 dan 75 gacha bo‘lgan toqsonlar yig‘indisi qanday raqam bilan tugaydi?

   A) 0 B) 2 C) 3 D) 4 E) 8

   Yechilishi: $1, 3, 5, \dots, 75 \Rightarrow 75 = 1 + 2(n-1) \Rightarrow n = 38.$

   $S_{38} = \frac{1+73}{2} \cdot 38 = \cdots 4$. Javobi: D.

2. 3^{2000} soni qanday raqam bilan tugaydi?

   A) 0 B) 1 C) 2 D) 3 E) 7

   Yechilishi:

   1) $3, 9, 7, 1$ *takrorlanish soni* 4 *ta ekanligi topiladi*:

   2) *daraja ko′rsatkich* 2000, *takrorlanish soni* 4 *ga bo′linadi*; 3) *qoldiq nol izlanayotgan oxirgi raqam* 1 *ni aniqlaydi*: $3^{2000} \Rightarrow 3,9,7,1 \Rightarrow 2000:4 = 500.$

   Javobi: B.

3. $\frac{(25^2-21^2)(25^2+21\cdot25+21^2)}{25^3-21^3}$ ni hisoblang.

   A) 4 B) 46 C) 36 D) 54 E) 84

   Yechilishi: $\frac{(25^2-21^2)(25^2+21\cdot25+21^2)}{25^3-21^3} =$

   $= \frac{(25-21)(25+21)\cdot(25^2+21\cdot25+21^2)}{(25-21)(25^2+21\cdot25+21^2)} = 25 + 21 = 46$. Javobi: B.

4. $139 \cdot 15 + 18 \cdot 139 + 15 \cdot 261 + 18 \cdot 261$ ni hisoblang.

   A) 13200 B) 14500 C) 15100 D) 16200 E) 17500

Yechilishi: $139 \cdot 15 + 18 \cdot 139 + 15 \cdot 261 + 18 \cdot 261 =$

$= 139(15 + 18) + 261(15 + 18) = 33(139 + 261) =$

$= 33 \cdot 400 = 13200.$ Javobi: A.

5. 35 ta natural sonni ketma-ket yozish natijasida hosil bo‘lgan 123…3435 sonini 25 ga bo‘lish natijasida hosil bo‘lgan qoldiq necha ga teng?

A) 15 B) 20 C) 5 D) 10 E) 0

Yechilishi: $\frac{12345\ldots32333435}{25} = \frac{12\ldots3400+35}{25} = \cdots + \frac{35}{25} = 10.$

Javobi: D.

6. 48 sonini barcha natural bo‘luvchilari yig'indisini toping.

A) 123 B) 100 C) 108 D) 124 E) 128

Yechilishi: $Tub\ ko'paytuvchilarga\ ajratilgan\ a = 2^m \cdot 3^n \cdot \ldots \cdot p^k\ sonining\ barcha\ natural\ bo'luvchilarining\ yig'indisi$:

48	2
24	2
12	2
6	2
3	3

$Y(a) = \frac{2^{m+1}-1}{2-1} \cdot \frac{3^{n+1}-1}{3-1} \cdot \ldots \cdot \frac{p^{k+1}-1}{p-1}$ $formulasidan\ foydalanib,$

$48 = 2^4 \cdot 3^1;\ \frac{2^{4+1}-1}{2-1} \cdot \frac{3^{1+1}-1}{3-1} = \frac{31}{1} \cdot \frac{8}{2} = 124.$

Javobi: D.

7. $\frac{1}{30}$va $\frac{1}{45}$ kasr umumiy maxrajining barcha natural bo‘luvchilari soni nechta?

A) 11 B) 7 C) 12 D) 11 E) 8

Yechilishi: $EKUK\left(\frac{1}{30};\frac{1}{45}\right) \Rightarrow 90\ ning$ $bo'luvchilarini\ quyid$ $formula\ orqali\ topam$ $(m+1)(n+1)\dots(k+1,$,

90	2
45	3
15	3
5	5

$90 = 2^1 \cdot 3^2 \cdot 5^1$; $(1+1)(2+1)(1+1) = 12$. Javobi: C.

8. $\left(1+\frac{1}{2}\right)\left(1+\frac{1}{2^2}\right)\left(1+\frac{1}{4^4}\right)\dots\left(1+\frac{1}{2^{16}}\right)\left(1+\frac{1}{2^{32}}\right)$ni hisoblang.

A) $1-\frac{1}{2^{64}}$ B) $2\left(1-\frac{1}{2^{64}}\right)$

C) $4\left(1-\frac{1}{32}\right)$ D) $4\left(1+\frac{1}{2^{32}}\right)$ E)$\frac{1}{2^{64}}$

Yechilishi: $\left(1+\frac{1}{2}\right)\left(1+\frac{1}{2^2}\right)\left(1+\frac{1}{4^4}\right)\dots\left(1+\frac{1}{2^{16}}\right)\left(1+\frac{1}{2^{32}}\right) =$

$$= \frac{1}{1-\frac{1}{2}} \cdot \left(1-\frac{1}{2}\right)\left(1+\frac{1}{2}\right)\left(1+\frac{1}{2^2}\right)\dots\left(1+\frac{1}{2^{16}}\right)\left(1+\frac{1}{2^{32}}\right) =$$

$= \frac{1}{\frac{2-1}{2}} \cdot \left(1-\frac{1}{2^{64}}\right) = 2\left(1-\frac{1}{2^{64}}\right)$. Javobi: B.

9. $\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\left(1-\frac{1}{6}\right)$ ko‘paytmani hisoblang.

A) $\frac{1}{3}$ B) $\frac{1}{4}$ C) $\frac{1}{5}$ D) $\frac{1}{6}$ E) $\frac{1}{7}$

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

$= \frac{1}{2} \cdot \frac{2}{3} \cdot \frac{3}{4} \cdot \frac{4}{5} \cdot \frac{5}{6} = \frac{1}{6}$. Javobi: D.

10. $1\frac{1}{12}x : 2\frac{1}{12} = 2\frac{3}{5}$ tengamani yeching.

A) 5 B) 3 C) $1\frac{5}{12}$ D) 4 E) $3\frac{2}{5}$

Yechilishi: $1\frac{1}{12}x : 2\frac{1}{12} = 2\frac{3}{5} : 1;$

$\frac{13}{12}x = \frac{13}{5} \cdot \frac{25}{12} \Rightarrow x = 5.$ Javobi: A.

11. Xaritada 3,6 sm uzunlikdagi kesmaga 72 km masofa mos keladi. Agar xaritada ikki shahar orasidagi masofa 12,6 sm bo‘lsa, ular orasidagi masofa necha km?

A) 240 B) 244 C) 246 D) 250 E) 252

Yechilishi: $72 : 3{,}6 = 20;$ $12{,}6 \cdot 20 = 252.$ Javobi: E.

12. Sexda 120 ta samovar va 20 ta patnis yasalgan. Sarf qilingan hamma materialning 0,96 qismi samovarga ketgan. Agar har bir samovarning og'irligi 3,2 kg dan bo‘lsa, har bir patnis necha kg bo‘lgan?

A) 0,8 B) 0,04 C) 7,68 D) 0,768 E) 0,4

Yechilishi: $0{,}96 \cdot x = 120 \cdot 3{,}2 \Rightarrow x = 400;$

$$120 \cdot 3.2 = 384 \Rightarrow 400 - 384 = 16;$$

$16 : 20 = 0{,}8.$ Javobi: A.

13. $3{,}8 \cdot (2{,}01 - 3{,}81)$ifodani hisoblang.

A) 6,84 B) 5,82 C) -6,84 D) -5,82 E) 5,84

Yechilishi: $3{,}8 \cdot (2{,}01 - 3{,}81) = 3{,}8 \cdot (-1{,}8) = -6{,}84.$

Javobi: C.

14. Birinchi son 60 ga teng. Ikkinchi son birinchi sonning 80% ini, uchinchisi esa birinchi va ikkinchi son yig'indisining 50% ini tashkil qiladi. Bu sonlarning o‘rta arifmetigini toping.

A) 60 B) 48 C) 54 D) 50 E) 81

Yechilishi: $\frac{60+60\cdot0,8+(60+60\cdot0,8)\cdot0,5}{3}=\frac{60\cdot1,8\cdot1,5}{3}=54.$

Javobi: C.

15. 140 g suvga 60 g tuz qo‘shish natijasida hosil bo‘lgan tuzli eritmada necha protsent tuz bor?

A) 20 B) 30 C) 25 D) 35 E) 45

Yechilishi: $\begin{matrix}140+60----100\%\\60-----x\%\end{matrix}\Rightarrow x=30.$ Javobi: B.

16. 1750 kg un elanganda, 105 kg kepak chiqdi. Necha protsent un qoldi?

A) 88 B) 94 C) 90 D) 92 E) 96

Yechilishi: $\begin{matrix}1750----100\%\\1645-----x\%\end{matrix}\Rightarrow 94\%$. Javobi: B.

17. $-2,4+3\frac{1}{3}-(-2,6)$ifodaning qiymatini toping.

A) -10,6 B) 12,5 C) $3\frac{8}{15}$ D) -12,5 E) $-3\frac{8}{15}$

Yechilishi: $-2,4+3\frac{1}{3}-(-2,6)=-\frac{24}{10}+\frac{10}{3}+\frac{26}{10}=$

$=-\frac{12}{5}+\frac{10}{3}+\frac{13}{5}=\frac{-36+50+39}{15}=\frac{53}{15}=3\frac{8}{15}.$ Javobi: C.

18. $\left(-\frac{3}{8}\right)\cdot(-32)+0,5\cdot(-8)$ni hisoblang.

A) 8 B) 4 C) 6 D) 7 E) 10

Yechilishi: $\left(-\frac{3}{8}\right)\cdot(-32)+0,5\cdot(-8)=12-4=8.$

Javobi: A.

19. Fermer dehqon 4 va 5 sonlariga proportsional yerga bug'doy va paxta ekdi. Agar 15 ga yerga paxta ekilgan bo‘lsa, necha ga yerga bug‘doy ekilgan?

A)16 B) 10 C) 8 D) 14 E) 12

Yechilishi: $\frac{4}{5} = \frac{x}{15} \Rightarrow x = 12$. Javobi: E.

20. Bir idishda 40% li, ikkinchi idishda 35% li eritma bor. Ularni aralashtirib, 37% 1 l eritma olish uchun har bir eritmadan necha litrdan olish kerak?

A) 0,3va 0,5 B) 0,2 va 0,8 C) 0,4 va 0,6

D) 0,1va 0,9 E) 0,55 va 0,45

Yechilishi: $x + y = 1 \Rightarrow x = 1 - y$; $\begin{cases} x + y - - - - - 100\% \\ 0{,}4x + 0{,}3y - - - - 37\% \end{cases} \Rightarrow$

$$(x + y) \cdot 37 = (0{,}4x + 0{,}35y) \cdot 100;$$

$$(1 - y + y) \cdot 37 = [0{,}4(1 - y) + 0{,}35y] \cdot 100;$$

$$37 = (0{,}4 - 0{,}4y + 0{,}35y) \cdot 100 = (0{,}4 - 0{,}05y) \cdot 100;$$

$$37 = 40 - 5y \Rightarrow 5y = 3 \Rightarrow y = 0{,}6 \Rightarrow x = 1 - y =$$

$= 1 - 0{,}6 = 0{,}4$. Javobi: C.

21. $(2a + 3b)(4a^2 - 6ab + 9b^2)$ifodaning $a = 2$ va $b = 1$ dagi qiymatini toping.

A) 91 B) 93 C) 96 D) 99 E) 101

Yechilishi: $(2a)^3 + (3b)^3 = (2 \cdot 2)^3 + (3 \cdot 1)^3 = 91$.

Javobi: A.

22. $|2x - 3| = 3 - 2x$ tenglamani yeching.

A) $\frac{3}{2}$ B) $(-\infty; \frac{3}{2}]$ C) $\left(-\infty; \frac{3}{2}\right)$ D) $(-\infty; \infty)$ E) $(0; \frac{3}{2}]$

Yechilishi: $|2x - 3| = 3 - 2x \Rightarrow \begin{cases} 2x - 3 = 3 - 2x \\ -2x + 3 = 3 - 2x \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = \frac{3}{2} \\ ayniyat \end{cases} \Rightarrow (-\infty; \frac{3}{2}]$. Javobi: B.

23. $(x+3)\cdot(x^2-3x+9)$ifodaning. $x=\frac{1}{2}$ dagi qiymatini hisoblang.

A) -26,875 B) $\frac{343}{27}$ C) $27\frac{1}{2}$ D) $-26\frac{1}{2}$ E) 27,125

Yechilishi: $x^3+3^3=\left(\frac{1}{2}\right)^3+27=\frac{1}{8}+27=\frac{217}{8}=$

$=27{,}125$. Javobi: E.

24. 1 l dengiz suvida o‘rtacha 0,00001 mg oltin bor. 1 km^3 dengiz suvida necha kg oltin bor?

A) 0,1 B) 0,01 C) 1 D) 10 E) 100

Yechilishi: $1\,m^3=1000kg\ suv;\ \ 1gr=1000mg$

$$1\,km^3=1\cdot(1000m)^3=1000000000m^3=$$

$$=1000000000000kg;\ 0{,}00001mg=0{,}00000001g=$$

$$=0{,}00000000001kg.\quad 1km^3\cdot 0{,}00001mg=$$

$$=1000000000000kg\cdot 0{,}00000000001kg=10kg.$$

Javobi: D.

25. $a^3+9a^2+27a+19$ni ko‘paytuvchilarga ajrating.

A) $(a+1)(a^2-3a+19)$ B) $(a+1)(a^2+3a+19)$

C) $(a+1)(a^2+8a+19)$ D) $(a-1)(a^2+3a+19)$

E) $(a-1)(a^2-8a+19)$

Yechilishi:

$$\begin{array}{r|l} a^3+9a^2+27a+19 & a+1 \\ \hline -\,a^3+a^2 & a^2+8a+19 \\ \hline -\,8a^2+27a+19 & \\ -\,8a^2+8a & \\ \hline 9a+19 & \\ -\,9a+19 & \\ \hline 0 & \end{array}$$

Javobi: C.

26. $\frac{x^3-2x^2}{3x+3} : \frac{x^2-4}{3x^2+6x+3}$ni soddalashtiring.

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

D) $\frac{x^2(x-2)}{x+2}$ E) $\frac{x^2(x+1)}{x-2}$

Yechilishi: $\frac{x^3-2x^2}{3x+3} : \frac{x^2-4}{3x^2+6x+3} = \frac{x^2(x-2)}{3(x+1)} \cdot \frac{3(x+1)^2}{(x-2)(x+2)} =$

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

27. k ning qanday qiymatida $\begin{cases} kx+4y=4 \\ 3x+y=1 \end{cases}$ tenglamalar sistemasi yagona yechimga ega?

A) $k \neq 12$ B) $k = 9$ C) $k \neq 19$ D) $k = 12$ E) $k = 1$

Yechilishi: $\begin{cases} kx+4y=4 \\ 3x+y=1 \end{cases} \Rightarrow \frac{k}{3} \neq \frac{4}{1} \Rightarrow k \neq 12$. Javobi: A.

28. 0,0000087 sonini standart koʻrinishda yozing.

A) $8{,}7 \cdot 10^{-5}$ B) $8{,}7 \cdot 10^{7}$ C) $8{,}7 \cdot 10^{-6}$

D) $8{,}7 \cdot 10^{-7}$ E) $8{,}7 \cdot 10^{-4}$

Yechilishi: $0{,}0000087 = 8{,}7 \cdot 10^{-6}$.Javobi: C.

29. $\sqrt{x^2-x-2}=x-3$ tenglamani yeching.

A) 5 B) $tenglama\ cheksiz\ ko'p\ yechimga\ ega$

C) 4 D) $\emptyset$ E) 2,2

Yechilishi: $\sqrt{x^2-x-2}=x-3;\ \sqrt{x^2-x-2}\geq 0\Rightarrow$

$\Rightarrow x-3\geq 0\Rightarrow x\geq 3;\ x^2-x-2=x^2-6x+9\Rightarrow$

$\Rightarrow 5x=11\Rightarrow x=2{,}2<3.$ Javobi: D.

30. $cos\frac{2\pi}{7}+cos\frac{4\pi}{7}+cos\frac{6\pi}{7}$ ni hisoblang.

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

Yechilishi: $cos\frac{2\pi}{7}+cos\frac{4\pi}{7}+cos\frac{6\pi}{7}=$

$$=\left|\begin{array}{c} cos\alpha+cos2\alpha+cos3\alpha+\cdots+cosn\alpha= \\ =\dfrac{sin\frac{(2n+1)\alpha}{2}-sin\frac{\alpha}{2}}{2sin\frac{\alpha}{2}}. \end{array}\right|=$$

$=\frac{sin\frac{(2\cdot 3+1)\cdot\frac{2\pi}{7}}{2}-sin\frac{\frac{2\pi}{7}}{2}}{2sin\frac{\frac{2\pi}{7}}{2}}=\frac{sin\pi-sin\frac{\pi}{7}}{2sin\frac{\pi}{7}}=-\frac{1}{2}.$ Javobi: A.

31. $sin210°$ ni hisoblang.

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

Yechilishi: $sin210°=\sin(\pi+30°)=-sin30°=-\frac{1}{2}.$

Javobi: A.

32. Arifmetik progressiyada $a_2=9$ va$a_{26}=105$ bo‘lsa,

Shu progressiyaning birinchi hadi va ayirmasining o‘rta proportsionalini toping.

A) 20 B) 4,5 C) $2\sqrt{5}$ D) 9 E) 4

Yechilishi: $\begin{cases} a_2 = 9 \\ a_{26} = 105 \end{cases} \Rightarrow \begin{cases} 9 = a_1 + d \\ 105 = a_1 + 25d \end{cases} \Rightarrow$

$\Rightarrow 96 = 24d \Rightarrow d = 4;\ a_1 = 5;\ \sqrt{4 \cdot 5} = 2\sqrt{5}$.Javobi: C.

33. a ning qanday qiymatida $a(x-1) > x - 2$ tengsizlik x ning barcha qiymatlarida o‘rinli bo‘ladi?

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

Yechilishi: $a(x-1) > x - 2;\ \ a = 1 \Rightarrow x - 1 > x - 2.$

Javobi: B.

34. $a < 0$ da $ax > \frac{1}{x}$ tengsizlikni yeching.

A) $(-\infty; 0)$ B) $\left(-\frac{1}{\sqrt{-a}}; \infty\right)$ C)$\left(\frac{1}{\sqrt{-a}}; \infty\right)$

D) $\left(-\frac{1}{\sqrt{a}}; 0\right)$ E) $\left(0; \frac{1}{\sqrt{a}}\right)$

Yechilishi: $a < 0;\ \ ax > \frac{1}{x} \Rightarrow x < 0.$ Javobi: A.

35. $\frac{1}{1+\sqrt{2}-\sqrt{3}}$ kasrning maxrajini irratsionallikdan qutqaring.

A) $\frac{2+\sqrt{2}+\sqrt{6}}{2}$ B) $\frac{2-\sqrt{2}+\sqrt{6}}{4}$ C) $\frac{2+\sqrt{2}-\sqrt{6}}{2}$

D) $\frac{2-\sqrt{2}-\sqrt{6}}{2}$ E) $\frac{2+\sqrt{2}+\sqrt{6}}{4}$

Yechilishi: $\frac{1}{(1+\sqrt{2})-\sqrt{3}} = \frac{1+\sqrt{2}+\sqrt{3}}{[(1+\sqrt{2})-\sqrt{3}]\cdot[(1+\sqrt{2})+\sqrt{3}]} =$

$= \frac{1+\sqrt{2}+\sqrt{3}}{(1+\sqrt{2})^2-3} = \frac{1+\sqrt{2}+\sqrt{3}}{1+2\sqrt{2}+2-3} = \frac{1+\sqrt{2}+\sqrt{3}}{2\sqrt{2}} = \frac{2+\sqrt{2}+\sqrt{6}}{4}$. Javobi: E.

36. $\frac{x^2-x-2}{x^2+x}=0$ tenglamaning ildizlari nechta?

A) 2 B) 4 C) 1 D) 3 E) ∅

Yechilishi: $\frac{x^2-x-2}{x^2+x}=0;\ \begin{cases}x^2-x-2=0\\ x(x+1)\neq 0\end{cases}\Rightarrow\begin{cases}x_1=-1\\ x_2=2\\ x_3\neq 0\\ x_4\neq -1\end{cases}\Rightarrow$

$\Rightarrow x=2$. Javobi: C.

37. $y=-6x^2+7x-2$ kvadrat funksiyani nollari yig'indisini toping.

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

Yechilishi: $y=-6x^2+7x+2\Rightarrow 6x^2-7x+2=0;$

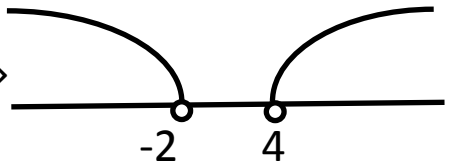
$$x_{1,2}=\frac{7\pm\sqrt{49-4\cdot 6\cdot 2}}{2\cdot 6}=\frac{7\pm 1}{12}\Rightarrow\begin{cases}x_1=\frac{1}{2}\\ x_2=\frac{2}{3}\end{cases};$$

$x_1+x_2=\frac{1}{2}+\frac{2}{3}=\frac{7}{6}=1\frac{1}{6}$. Javobi: D.

38. $\frac{x^2-2x-8}{\sqrt{x^2+1}}>0$ tengsizlikning eng kichik butun musbat va eng katta butun manfiy yechimlari ayirmasini toping.

A) 3 B) 2 C) 8 D) 5 E) 6

Yechilishi: $\begin{cases}x^2-2x-8>0\\ \sqrt{x^2+1}>0\end{cases}\Rightarrow$



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

eng kichik butun musbat yechimi 5 *ga teng*. *Eng*

$katta\ butun\ manfiy\ yechimi\ esa -3\ ga\ teng.$

$Shuning\ uchun\ 5-(-3)=8.$ Javobi: C.

39. $x^2-x+1>0$ tengsizlikni yeching.

A) $\emptyset$ B)$[0;\infty)$ C)$(-\infty;\infty)$ D)$(-\infty;0)$ E)$(0;\infty)$

Yechilishi: $x^2-x+1>0 \Rightarrow D<0 \Rightarrow (-\infty;\infty)$.

Javobi: C.

40. $\left(\sqrt{2+\sqrt{3}}\right)^x+\left(\sqrt{2-\sqrt{3}}\right)^x=4$ tenglamaning ildizlari nisbatini toping.

A) -1 B) -2 C) -3 D) 1 E) 3

Yechilishi: $\left(\sqrt{2+\sqrt{3}}\right)^x+\left(\sqrt{2-\sqrt{3}}\right)^x=4 \Rightarrow$

$\Rightarrow \begin{cases} x_1=-2 \\ x_2=2 \end{cases} \Rightarrow \frac{x_1}{x_2}=-1.$ Javobi: A.

41. $cos2x-5sinx-3=0$ tenglamani yeching.

A) $(-1)^n\frac{\pi}{6}+\pi n, n\epsilon Z$ B) $(-1)^{n+1}\frac{\pi}{6}+\pi n, n\epsilon Z$

C) $(-1)^n\frac{\pi}{6}+2\pi n, n\epsilon Z$ D) $(-1)^{n+1}\frac{\pi}{6}+2\pi n, n\epsilon Z$

E) $(-1)^n\frac{\pi}{3}+\pi n, n\epsilon Z$

Yechilishi: $cos2x-5sinx-3=0 \Rightarrow$

$$\Rightarrow cos^2x-sin^2x-5sinx-3=0 \Rightarrow$$

$$\Rightarrow 2sin^2x+5sinx+2=0; \qquad sinx=y;$$

$$2y^2+5y+2=0 \Rightarrow x_{1,2}=\frac{-5\pm\sqrt{25-4\cdot2\cdot2}}{2\cdot2}$$

$$=\frac{-5\pm3}{4} \Rightarrow$$

$$\Rightarrow \begin{cases} y_1 = -2 \\ y_2 = -\frac{1}{2} \end{cases} \Rightarrow sinx = -\frac{1}{2} \Rightarrow x = (-1)^{n+1}\frac{\pi}{6} + \pi n, n\epsilon Z.$$

Javobi: B.

42. $sin5x - 3cos2x = 4$ tenglamani yeching.

A) $-\frac{\pi}{2} + 2\pi n, n\epsilon Z$ B) $\frac{\pi}{2} + \pi n, n\epsilon Z$ C) $\pi + \pi n, n\epsilon Z$

D) $\frac{\pi}{2} + 2\pi n, n\epsilon Z$ E) $2\pi n, n\epsilon Z$

Yechilishi: $sin5x - 3cos2x = 4 \Rightarrow \begin{cases} sin5x = 1 \\ cos2x = -1 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} 5x = \frac{\pi}{2} + 2\pi n, n\epsilon Z \\ 2x = \pi + 2\pi n, \ \ n\epsilon Z \end{cases} \Rightarrow \begin{cases} x = \frac{\pi}{10} + \frac{2\pi n}{5}, k\epsilon Z \\ x = \frac{\pi}{2} + 2\pi n, n\epsilon Z \end{cases} \Rightarrow$$

$x = \frac{\pi}{2} + 2\pi n, n\epsilon Z.$ Javobi: D.

43. $y = |sinx|$ funksiyaning eng kichik davrini toping.

A) 2π B) π C) $davriy\ emas$ D) $\frac{\pi}{2}$ E) 3π

Yechilishi: $|sinx| = |sin(\pi + x)|$. Javobi: B.

44. $tg\left(2arcsin\frac{3}{4}\right)$ ni hisoblang.

A) $3\sqrt{7}$ B) $\sqrt{7}$ C) $-\sqrt{7}$ D) $2\sqrt{7}$ E) $-3\sqrt{7}$

Yechilishi: $tg\left(2arcsin\frac{3}{4}\right); \alpha = arcsin\frac{3}{4} \Rightarrow$

$$\Rightarrow sin\alpha = sinarcsin\frac{3}{4} \Rightarrow sin\alpha = \frac{3}{4};$$

$$tg\alpha = \frac{sin\alpha}{cos\alpha} = \frac{sin\alpha}{\sqrt{1 - sin^2\alpha}} \frac{\frac{3}{4}}{\sqrt{1 - \left(\frac{3}{4}\right)^2}} = \frac{\frac{3}{4}}{\frac{\sqrt{7}}{4}} = \frac{3}{\sqrt{7}};$$

$$tg2\alpha = \frac{2tg\alpha}{1-tg^2\alpha} = \frac{2\cdot\frac{3}{\sqrt{7}}}{1-\frac{9}{7}} = \frac{6}{\sqrt{7}}:\frac{(-2)}{7} = -\frac{42}{2\sqrt{7}} =$$

$= -\frac{21\sqrt{7}}{7} = -3\sqrt{7}$. Javobi: E.

45. $y = x + |x|$ funksiyaning hosilasini toping.

A) 0 B) 2 C) $\begin{cases} 0, agar\ x < 0 \\ 2, agar\ x \geq 0 \end{cases}$

D) $\begin{cases} 0, agar\ x < 0 \\ mavjud\ emas, agar\ x = 0 \\ 2, agar\ x > 0 \end{cases}$ E) *hosila mavjud emas*

Yechilishi: $y = x + |x| \Rightarrow y = x + |x| \Rightarrow \begin{cases} x < 0 \\ x = 0 \Rightarrow \\ x > 0 \end{cases}$

$$\Rightarrow \begin{cases} y = x - x \\ y = 0 + 0 \\ y = x + x \end{cases} \Rightarrow \begin{cases} y = 0 \\ y = 0 \\ y = 2x \end{cases} \Rightarrow \begin{cases} y'\ mavjud\ emas; \\ y'\ mavjud\ emas; \\ y' = 2. \end{cases}$$

Javobi: D.

46. $y = (x-3)(x^2+3x+9)$ funksiyani $x = 3$ nuqtadagi hosilasini aniqlang.

A) 0 B) 3 C) 27 D) -27 E) 9

Yechilishi: $(x-3)(x^2+3x+9) = x^3 - 27;$

$y' = 3x^2 - 0 \Rightarrow y'(3) = 27$. Javobi: C.

47. $y = x\ln x - x\ln 5$funksiyaning $[1;5]$ kesmadagi eng kichik qiymatini toping.

A) $-\ln 5$ B) $-\frac{5}{e}$ C) $\frac{5}{e}$ D) 0 E) $\ln\frac{5}{e}$

Yechilishi: $y = x\ln x - x\ln 5; \quad x > 0$

$$y' = \ln x + x\cdot\frac{1}{x} - \ln 5 = \ln x + 1 - \ln 5 \Rightarrow$$

$$\Rightarrow \ln x = \ln 5 - 1 \Rightarrow x = e^{\ln 5 - 1} = \frac{5}{e};$$

$$1)\ y\left(\frac{5}{e}\right) = \frac{5}{e}\ln\frac{5}{e} - \frac{5}{e}ln5 = \frac{5}{e}(\ln 5 - \ln e - \ln 5) =$$

$$= -\frac{5}{e} \approx -1{,}8; \quad 2) y(1) = 1\cdot\ln 1 - 1\cdot\ln 5 = -\ln 5;$$

$$3)\ y(5) = 5\ln 5 - 5\ln 5 = 0;$$

$\ln 5 = \frac{\lg 5}{\lg e} = \frac{0{,}6990}{0{,}4342} \approx 1{,}61$. Javobi: B.

48. $y = 4 - x^2$ parabolaga absissasi $x_0 = 1$ nuqtada urinma o‘tkazilgan. Bu urinmaning OY o‘qi bilan kesishadigan nuqtasining koordinatalarini toping.

A) $(0;5)$ B) $(0;1)$ C) $(0;-5)$ D) $(0;-1)$ E) $(0;2)$

Yechilishi: $y = 4 - x^2 \Rightarrow y_0 = 4 - 1^2 = 3; \quad y' = -2x \Rightarrow$

$$\Rightarrow k = y'(1) = -2\cdot 1 = -2; \ \ y - y_0 = k(x - x_0) \Rightarrow$$

$$\Rightarrow y - 3 = -2(x-1) \Rightarrow y - 3 = -2x + 2 \Rightarrow$$

$$\Rightarrow y + 2x - 5 = 0; \ \begin{cases} y + 2x - 5 = 0 \\ Oy: \ x = 0 \end{cases} \Rightarrow \begin{cases} y = 5 \\ x = 0 \end{cases} \Rightarrow$$

$\Rightarrow (0;5)$. Javobi: A.

49. $\left(\frac{sin2x - 2sin^2x}{1 - tgx}\right)^2$ funksiyaning boshlang'ichini toping.

A) $\frac{1}{2}x + \frac{1}{8}sin4x + c$ B) $\frac{x^2}{2} - \frac{1}{8}sin4x + c$

C) $\frac{x^2}{2}+\frac{1}{8}sin4x+c$ D) $\frac{1}{2}x-\frac{1}{8}sin4x+c$

E) $-\frac{1}{2}-\frac{1}{8}sin4x+c$

echilishi: $f(x)=\left(\frac{sin2x-2sin^2x}{1-tgx}\right)^2=\left[\frac{2sinxcosx-2sin^2x}{\frac{cosx-sinx}{cosx}}\right]^2=$

$$\left[\frac{2sinxcosx(cosx-sinx)}{cosx-sinx}\right]^2=sin^2 2x=\frac{1}{2}(1-cos4x);$$

$F(x)=\int\frac{1}{2}(1-cos4x)dx=\frac{1}{2}x-\frac{1}{8}sin4x+c$. Javobi: D.

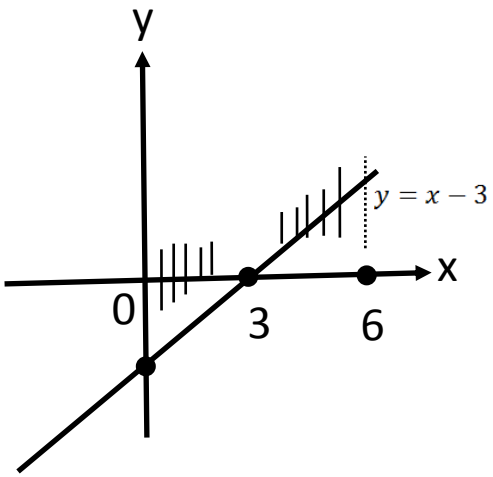
50. $\int_0^6|x-3|dx$nihisoblang.

A) 4,5 B) 18 C) 3 D) 12 E) 9

Yechilishi: $y=x-3$

$\int_0^6|x-3|dx=-\int_0^3(x-3)dx+$

$+\int_3^6(x-3)dx=$



$=\left[\frac{1}{2}x^2-3x\right]\Big|_0^3+\left[\frac{1}{2}x^2-3x\right]\Big|_3^6=$

$=-\frac{1}{2}x^2\Big|_0^3+3x\Big|_0^3+\frac{1}{2}x^2\Big|_3^6-$

$-3x\Big|_3^6=-\frac{1}{2}\cdot 3^2+3\cdot 3+\frac{1}{2}[6^2-3^2]-3[6-3]=9.$

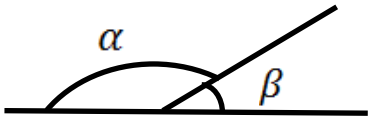
Javobi: E.

51. α va β qo‘shni burchaklar. Agar $\alpha:\beta=2:7$ bo‘lsa, β va α burchaklar ayirmasini toping.

A) 70° B) 60° C) 100° D) 90° E) 80°

Yechilishi: $\beta = 180° - \alpha;\ \frac{\alpha}{\beta} = \frac{2}{7} \Rightarrow \frac{2}{7} = \frac{\alpha}{180°-\alpha} \Rightarrow$

$\Rightarrow 360° - 2\alpha = 7\alpha \Rightarrow \alpha = 140°;$



$\beta = 40°;\ \alpha - \beta = 100°.$

Javobi: C.

52. Uchburchak o‘tkir burchakli bo‘lishi uchun uning α, β va γ burchaklar orasida qanday munosabatlar o‘rinli bo‘lishi kerak?

A) $\gamma \geq \alpha + \beta$ B) $\gamma \leq \alpha + \beta$ C) $\beta \geq \alpha + \gamma$

D) $\gamma < \alpha + \beta$ E) $\alpha < \gamma + \beta,\ \beta < \alpha + \gamma,\ \gamma < \beta + \alpha$

Yechilishi: Javobi: E.

53. Katetlari 20 va 21 ga teng bo‘lgan to‘g‘ri burchakli uchburchakka tashqi chizilgan aylananing radiusini toping.

A) 7,25 B) 14,5 C) 10 D) 20,5 E) 15

Yechilishi: $c^2 = 21^2 + 20^2 = 841 \Rightarrow c = 29 \Rightarrow R = \frac{c}{2} == 14{,}5.$ Javobi: B.

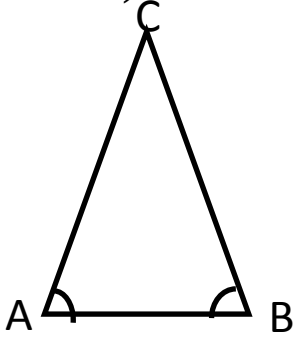
54. Teng yonli ABC uchburchakda $\angle A = \angle C, AB : AC = 5:3$ va $AB - AC = 3$ ga teng. Uchburchakning perimetrini toping.

A) 19,5 B) 18,5 C) 17,5 D) 16 E) 15

Yechilishi: $\frac{AB}{AC} = \frac{5}{3};\ AB = 3 + AC$

$AB = \frac{5}{3}AC;\ \frac{5}{3}AC = 3 + AC \Rightarrow$

$\Rightarrow 5AC = 9 + 3AC \Rightarrow AC = 4{,}5 \Rightarrow$

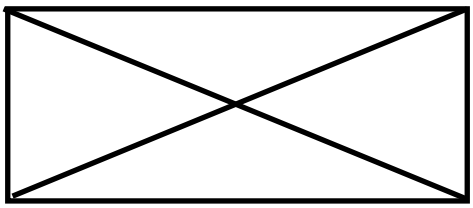


$\Rightarrow AB = 7{,}5;\ \ P = 2AB + AC = 15 + 4{,}5 = 19{,}5.$

Javobi: A.

55. Qavariq to‘rtburchakning diagonallari uni nechta uchburchakka ajratadi?

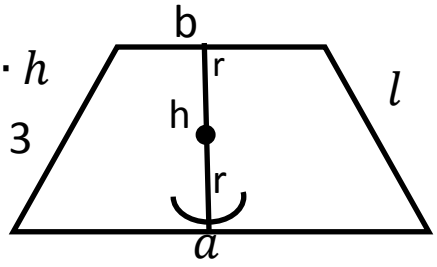
A) 4 B) 5 C) 6 D) 7 E) 8

Yechilishi:  8 ta. Javobi: E.

56. Yon tomoni 3ga teng bo‘lgan teng yonli trapetsiyaga doira ichki chizilgan. Agar trapetsiyaning yuzi 6 ga teng bo‘lsa, bu doiraning yuzini toping.

A) 2π B) 3π C) π D) $\frac{\pi}{2}$ E) 36π

Yechilishi: $\frac{a+b}{2} = l \Rightarrow S = \frac{a+b}{2} \cdot h$



$\Rightarrow 6 = 3 \cdot h \Rightarrow h = 2 \Rightarrow$

$\Rightarrow r = 1 \Rightarrow S_d = \pi r^2 = \pi.$

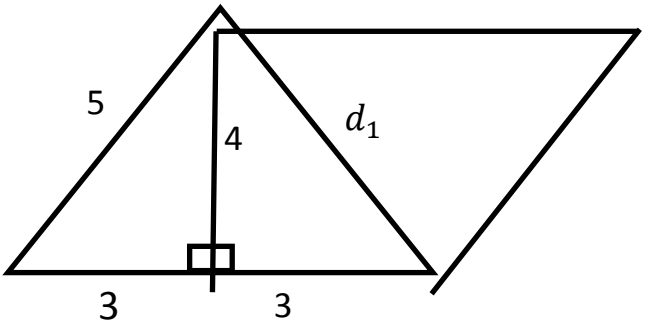
Javobi: C.

57. Tomonlari 5 sm va 6 sm bo‘lgan paralellogrammning yuzi 24 sm^2 ga teng. Paralelogrammning kichik diagonalini toping.

A) $\sqrt{97}$ B) 5 C) 4,5 D) 4 E) 6

Yechilishi: $S_{\Delta} = \frac{1}{2}a \cdot h \Rightarrow 12 = \frac{1}{2} \cdot 6 \cdot h \Rightarrow$

$\Rightarrow h = 4 \Rightarrow d_1 = 5.$



Javobi: B.

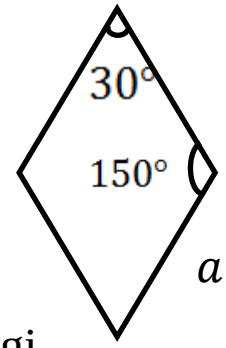
58. Agar rombning tomoni 10 ga, burchaklaridan biri esa $150°$ ga teng bo‘lsa, uning yuzi qanchaga teng bo‘ladi?

A) 100 B) 80 C) 90 D) 50 E) 60

Yechilishi:

$S = a^2 sin\alpha = 10^2 \cdot sin30° = 50.$

Javobi: D.



59. Radiusi 5 ga teng bo‘lgan sharga balandligi 8 ga teng to‘rtburchakli muntazam prizma ichki chizilgan. Prizmaning hajmini toping.

A) 136 B) 144 C) 169 D) 172 E) 184

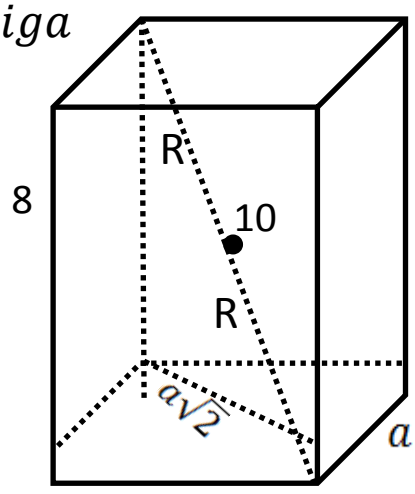
Yechilishi: $Misr\ uchburchagiga$

$asosan: a\sqrt{2} = 6 \Rightarrow$

$\Rightarrow a = \frac{6}{\sqrt{2}} = 3\sqrt{2} \Rightarrow$

$\Rightarrow V = \left(3\sqrt{2}\right)^2 \cdot 8 = 144.$

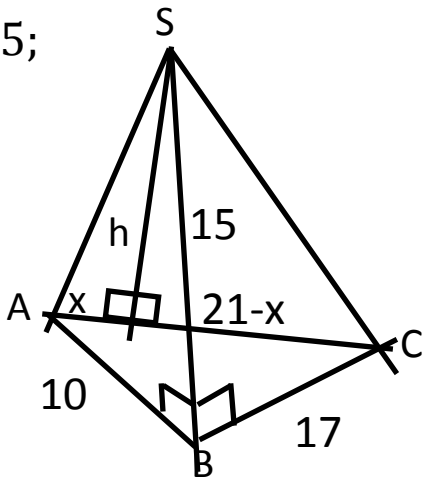
Javobi: B.



60. Uchburchakning tomonlari 10, 17 va 21 ga teng. Uchburchakning katta burchagi uchidan uchburchak tekisligiga perpendikulyar o‘tkazuilgan bo‘lib, uning uzunligi 15 ga teng. Bu perpendikulyarning tekislik bilan kesishmagan uchidan uchburchakning katta tomonigacha bo‘lgan masofani aniqlang.

A) 17 B) 16 C) 18 D) 20 E) 19

Yechilishi: $SA^2 = 15^2 + 10^2 = 325;$



$SC^2 = 15^2 + 17^2 = 514;$

$$\begin{cases} h^2 = 514 - (21 - x)^2 \\ h^2 = 325 - x^2 \end{cases} \Rightarrow$$

$\Rightarrow 514 - (441 - 42x + x^2) =$

$= 325 - x^2 \Rightarrow x = 6;$

$h^2 = 325 - 6^2 = 289 \Rightarrow h = 17.$ Javobi: A.

61. Ikkita sfera yuzlarining nisbati 2 ga teng. Bu sfera diametrlarining nisbatini toping.

A) 2 B) 4 C) 8 D) $\sqrt{2}$ E) $2\sqrt{2}$

Yechilishi: $\frac{S_1}{S_2} = 2 \Rightarrow S_1 = 2S_2 \Rightarrow 4\pi R^2 = 2 \cdot 4\pi {R_2}^2 \Rightarrow$

$${R_1}^2 = 2{R_2}^2 \Rightarrow R_1 = R_2\sqrt{2};\ d_1 = 2R_1;\ d_2 = 2R_2;$$

$\frac{d_1}{d_2} = \frac{R_1}{R_2} = \frac{R_2\sqrt{2}}{R_2} = \sqrt{2}.$ Javobi: D.

62. Qavariq 12 burchakli ko‘pburchakning diagonallari nechta?

A) 42 B) 36 C) 54 D) 52 E) 62

Yechilishi: $\frac{n(n-3)}{2} \Rightarrow \frac{12(12-3)}{2} = 54$. Javobi: C.

63. To‘g‘ri to‘rtburchakni uning biror tomoni atrofida aylantirish natijasida silindr hosil qilingan. Silindr hajmini shu to‘rtburchak yuzi S va asos aylanasining uzunligi C orqali ifodalang.

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

Yechilishi: $V_s = \pi R^2 H = \pi a^2 \cdot b;\ \ S = a \cdot b;$

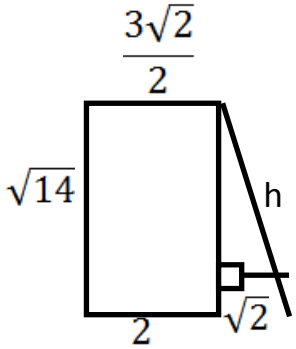
$$C = 2\pi R = 2\pi a;\ \ a = \frac{c}{2\pi} \Rightarrow S = \frac{c}{2\pi} \cdot b \Rightarrow b = \frac{2\pi \cdot S}{c};$$

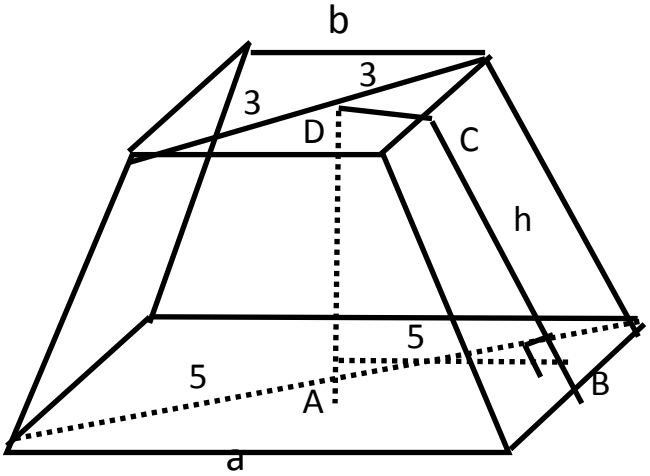
$V_s = \pi \cdot \frac{c^2}{(2\pi)^2} \cdot \frac{2\pi \cdot S}{c} = \frac{1}{2} \cdot S \cdot C$. Javobi: B.

64. Muntazam to‘rtburchakli kesik piramida asoslarining diagonallari 6 va 10 ga, balandligi $\sqrt{14}$ ga teng. Piramidaning apofemasini toping.

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

Yechilishi: $h^2 = 14 + 2 = 16 \Rightarrow h = 4$. Javobi: E.





65. a ning qanday qiymatida $A(2;1)$, $B(3;-2)$, va $C(0;a)$ nuqtalar bitta to‘g‘ri chiziqda yotadi?

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

Yechilishi: $\frac{x-2}{3-2}=\frac{y-1}{-2-1}\Rightarrow x-2=\frac{y-1}{-3}\Rightarrow$

$$\Rightarrow -3x+6=y-1\Rightarrow y=-3x+7\Rightarrow$$

$\Rightarrow a=-3\cdot 0+7=7.$ Javobi: E.

66. $\log_3 2\cdot\log_4 3\cdot\log_5 4\cdot\log_6 5\cdot\log_7 6\cdot\log_8 7$ ni hisoblang.

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

Yechilishi: $\log_3 2\cdot\log_4 3\cdot\log_5 4\cdot\log_6 5\cdot\log_7 6\cdot\log_8 7=$

$$=\frac{\log_4 2}{\log_4 3}\cdot\log_3 4\cdot\log_4 5\cdot\ldots\cdot\log_7 6\cdot\log_8 7=$$

$$=\cdots\frac{\log_7 2}{\log_7 6}\cdot\log_7 6\cdot\log_8 7=\frac{\log_8 2}{\log_8 7}\cdot\log_8 7=\log_{2^3} 2=$$

$=\frac{1}{3}\log_2 2=\frac{1}{3}.$ Javobi: B.

67. a ning qanday qiymatida istalgan ABC uchburchak uchun $cosA+cosB+cosC\le a$ tengsizlik hamisha o‘rinli bo‘ladi?

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

Yechilishi: $cos\alpha+cos\beta+cos\gamma\le\frac{3}{2}$ $formulaga\ asosan, a\le\frac{3}{2}$.

Javobi: B.

68. $A(-2;5)$ nuqtadan $5x-7y-4=0$ to‘g‘ri chiziqqa parallel ravishda o‘tuvchi to‘g‘ri chiziqning tenglamasini ko‘rsating.

A) $3x-4y+35=0$ B) $3x+4y-35=0$

C) $5x-7y-45=0$ D) $5x-7y+45=0$

E) $4x-5y+45=0$

Yechilishi: C) $5\cdot(-2)-7\cdot 5-45=0\Rightarrow$

$\Rightarrow -10-35-45\neq 0$ D) $5\cdot(-2)-7\cdot 5+45=0\Rightarrow$

$\Rightarrow -10-35+45=0$. Javobi: D.

69. $\vec{a}=\{-2;6;3\}$ vektorga yo‘nalishdosh bo‘lgan birlik vektorning koordinatalarini toping.

A) $\left(\frac{2}{7};\frac{6}{7};\frac{3}{7}\right)$ B) $(-1;-3;-1)$ C) $\left(-\frac{1}{3};1;\frac{1}{2}\right)$

D) $\left(-\frac{2}{3};2;1\right)$ E) $\left(-\frac{2}{7};\frac{6}{7};\frac{3}{7}\right)$

Yechilishi: $\vec{a}_0=\frac{\vec{a}}{|\vec{a}|}\Rightarrow|\vec{a}|=\sqrt{(-2)^2+6^2+3^2}=7\Rightarrow$

$\Rightarrow \vec{a}_0=\left\{-\frac{2}{7};\frac{6}{7};\frac{3}{7}\right\}$. Javobi. A.

70. $sin(3x-45°)=$

$=sin14°sin76°-cos12°sin16°+\frac{1}{2}cos86°$ tenglamaning $[0°;180°]$ kesmadagi ildizlari yig‘indisini toping.

A) $135°$ B) $150°$ C) $210°$ D) $215°$ E) $225°$

Yechilishi: $sin(3x-45°)=$

$$= sin14°sin76° - cos12°sin16° + \frac{1}{2}cos86° =$$

$$= sin14°cos14° - sin16°cos12° + \frac{1}{2}sin4° =$$

$$= \frac{1}{2}sin28° - \frac{1}{2}[sin28° + sin4°] + \frac{1}{2}sin4° = 0;$$

$$= sin(3x - 45°) = 0 \Rightarrow 3x - 45° = \pi k, k\epsilon Z;$$

$$= 3x = \frac{\pi}{4} + \pi k, k\epsilon Z \Rightarrow x = \frac{\pi}{12} + \frac{\pi k}{3}, k\epsilon Z; \ \ [0°; 180°]$$

$$k = 0 \Rightarrow x_1 = \frac{\pi}{12}; \quad k = 1 \Rightarrow x_2 = \frac{\pi}{12} + \frac{\pi}{3} = \frac{5\pi}{12};$$

$$k = 2 \Rightarrow x_3 = \frac{\pi}{12} + \frac{2\pi}{3} = \frac{3\pi}{4}; k = 3 \Rightarrow x_4 = \frac{\pi}{12} + \frac{3\pi}{3} = \frac{13\pi}{3};$$

$x_1 + x_2 + x_3 = \frac{\pi}{12} + \frac{5\pi}{12} + \frac{3\pi}{4} = \frac{15\pi}{12} = 225°$. Javobi: E.

71. $y = ctgx \cdot ctg\left(\frac{\pi}{2} + x\right) + \frac{tgx(1+cos2x)}{2cosx}$ funksiyaning qiymatlar sohasini toping.

A) $[-2; 0]$ B) $(-2; -1) \cup (-1; 0)$ C) $(-2; 0)$

D) $[-2; 1) \cup (-1; 0]$ E) $[0; 2]$

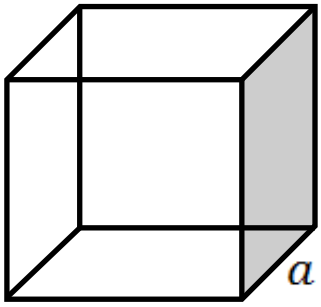
Yechilishi: $y = ctgx \cdot ctg\left(\frac{\pi}{2} + x\right) + \frac{tgx(1+cos2x)}{2cosx} =$

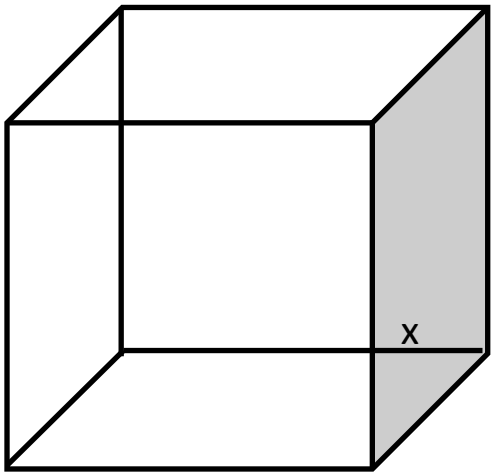
$$= -ctgx \cdot tgx + \frac{sinx(1 + cos2x)}{2cos^2x}$$

$$= -1 + \frac{sinx(1 + cos^2x - sin^2x)}{2cos^2x} =$$

$$= -1 + \frac{sinx(1 + cos^2x - 1 + cos^2x)}{2cos^2x} = sinx - 1.$$

$-1 \leq sinx \leq 1$. Javobi: A.





72. $y = 4x^2 + \frac{1}{x}$ funksiyaning $[0{,}25; 1]$ kesmadagi eng kata qiymatini toping.

A) 3 B) 4,25 C) 4,5 D) 5 E) 5,25

Yechilishi: $y = 4x^2 + \frac{1}{x}$; $[0{,}25; 1]$;

$$1)\ x \neq 0;\ \ 2)\ y' = 8x - \frac{1}{x^2} \Rightarrow \begin{cases} y' = 0 \\ 8x - \frac{1}{x^2} = 0 \end{cases} \Rightarrow$$

$$\Rightarrow 8x^3 = 1 \Rightarrow x^3 = \frac{1}{2^3} \Rightarrow x = \frac{1}{2};$$

$$3)\ y\left(\frac{1}{4}\right) = 4 \cdot \left(\frac{1}{4}\right)^2 + \frac{1}{\frac{1}{4}\sqrt{2}} = 4 \cdot \frac{1}{16} + 4 = 4{,}25;$$

$$y\left(\frac{1}{2}\right) = 4 \cdot \left(\frac{1}{2}\right)^2 + \frac{1}{\frac{1}{2}} = 4 \cdot \frac{1}{4} + 2 = 3;$$

$y(1) = 4 \cdot 1^2 + \frac{1}{1} = 5$. Javobi: D.

73. $y = \frac{sin3x}{\sqrt{3}}$ funksiyaning grafigi absissalar o‘qini koordinatalar boshida qanday burchak ostida kesib o‘tadi?

A) 30° B) 60° C) 75° D) 80° E) 50°

Yechilishi: $y' = \frac{1}{\sqrt{3}} \cdot 3cos3x = \frac{3\sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} cos3x = \sqrt{3}cos3x.$

$$x_0 = 0 \Rightarrow y'(0) = \sqrt{3}cox3 \cdot 0 = \sqrt{3};$$

$tg\alpha = \sqrt{3} \Rightarrow \alpha = 60°.$ Javobi: B.

74. $\frac{1}{16}\int_0^{\pi} \frac{dx}{cos^2\left(\frac{x}{4}\right)}$nihisoblang.

A) 1 B) 0,5 C) 0,25 D) 2 E) 4

Yechilishi: $\frac{1}{16}\int_0^{\pi} \frac{dx}{cos^2\left(\frac{x}{4}\right)} = \frac{1}{16} \cdot 4tg\left(\frac{x}{4}\right)\Big|_0^{\pi} = \frac{1}{4}tg\left(\frac{1}{4}x\right)\Big|_0^{\pi} =$

$= \frac{1}{4}\left[tg\left(\frac{1}{4}\right) - tg\left(\frac{1}{4} \cdot 0\right)\right] = \frac{1}{4} = 0{,}25.$ Javobi: C.

Pirnazar DAVRONOV

2000-YIL, 6-AXBOROTNOMA

1. 10 dan boshlab 75 dan katta bo‘lmagan barcha natural sonlarni ko‘paytirish natijasida hosil bo‘lgan sonning oxirida nechta nol qatnashadi?

A) 15 B) 16 C) 17 D) 18 E) 14

Yechilishi: 1) $1 \cdot 2 \cdot 3 \cdot \ldots \cdot 74 \cdot 75 \Rightarrow \left[\frac{75}{5}\right] + \left[\frac{75}{5^2}\right] =$

$= 15 + 3 = 18;$ 2) $1 \cdot 2 \cdot \ldots \cdot 9 \Rightarrow \left[\frac{9}{5}\right] = 1;$

3) $10 \cdot 11 \cdot \ldots \cdot 74 \cdot 75 \Rightarrow 18 - 1 = 17.$ Javobi: C.

2. $(0{,}2 \cdot 0{,}1 - 0{,}1) : 0{,}25 + 0{,}75$ ni hisoblang.

A) 1,07 B) -2,45 C) 3,95 D) 0,43 E) 0,97

Yechilishi: $(0{,}2 \cdot 0{,}1 - 0{,}1) : 0{,}25 + 0{,}75 = 0{,}43.$

Javobi: D.

3. $\left(1\frac{2}{3} \cdot 2{,}2 + 1\right) : 2\frac{1}{5} - \frac{5}{11}$ ning qiymatini toping.

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

Yechilishi: $\left(1\frac{2}{3} \cdot 2{,}2 + 1\right) : 2\frac{1}{5} - \frac{5}{11} =$

$= \left(\frac{5}{3} \cdot \frac{22}{10} + 1\right) \cdot \frac{5}{11} - \frac{5}{11} = \left(\frac{11}{3} + 1\right) \cdot \frac{5}{11} - \frac{5}{11} =$

$= \frac{5}{11} \cdot \left(\frac{14}{3} - 1\right) = \frac{5}{3} = 1\frac{2}{3}.$ Javobi: E.

4. Raqamlarining o‘rinlarini almashtirilganda, qiymati 9 ga ortadigan nechta ikki xonali natural son bor?

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

Yechilishi: $xy \Rightarrow yx = xy + 9 \Rightarrow$

$$\Rightarrow 10y + x = 10x + y + 9 \Rightarrow y - x = 1 \Rightarrow$$

$\Rightarrow \begin{cases} y: 2, 3, 4, 5, 6, 7, 8, 9; \\ x: 1, 2, 3, 4, 5, 6, 7, 8. \end{cases}$ Javobi: D.

5. $\frac{1{,}6^2 - 1{,}6 \cdot 0{,}8 + 0{,}4^2}{1{,}4^2 - 0{,}2^2}$ ni soddalashtiring.

A) 1,6 B) 0,375 C) 1,2 D) 0,6 E) 0,75

Yechilishi: $\frac{1{,}6^2 - 1{,}6 \cdot 0{,}8 + 0{,}4^2}{(1{,}4 - 0{,}2)(1{,}4 + 0{,}2)} = \frac{(1{,}6 - 0{,}4)^2}{1{,}2 \cdot 1{,}6} = \frac{3}{4} = 0{,}75.$

Javobi: E.

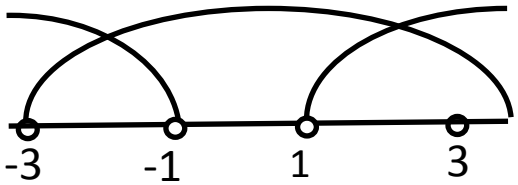
6. $|x^2 - 5| < 4$ tengsizlikni yeching.

A) $(-3; 3)$ B) $(-3; 0) \cup (0; 3)$

C) $(-3; -1) \cup (1; 3)$ D) $-3; -1$ E) $(1; 3)$

Yechilishi: $|x^2 - 5| < 4 \Rightarrow -4 < x^2 - 5 < 4 \Rightarrow$

$\Rightarrow 1 < x^2 < 9 \Rightarrow \begin{cases} x^2 > 1 \\ x^2 < 9 \end{cases} \Rightarrow$



$$\Rightarrow \begin{cases} |x| > 1 \\ |x| < 3 \end{cases} \Rightarrow \begin{cases} x > 1; \\ x < -1; \\ -3 < x < 3. \end{cases}$$

$(-3; -1) \cup (3; 1)$. Javobi: C.

7. Agar $a - \frac{1}{a} = \frac{2}{3}$ bo‘lsa, $\frac{a^4 + 1}{a^2}$ ning qiymatini toping.

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

Yechilishi: $\left(a - \frac{1}{a}\right)^2 = \frac{4}{9} \Rightarrow a^2 + \frac{1}{a^2} - 2 = \frac{4}{9} \Rightarrow$

$\Rightarrow a^2+\frac{1}{a^2}=\frac{4}{9}+2=\frac{22}{9}=2\frac{4}{9}$. Javobi: A.

8. $\frac{0{,}04^{-2}\cdot 125^4\cdot 0{,}2^{-1}}{4\cdot 25^8}$ ni hisoblang.

A) 0,5 B) 1,25 C) $\frac{1}{4}$ D) 0,2 E) $1\frac{1}{2}$

Yechilishi: $\frac{0{,}04^{-2}\cdot 125^4\cdot 0{,}2^{-1}}{4\cdot 25^8}=\frac{0{,}2^{-4}\cdot 5^{12}\cdot 0{,}2^{-1}}{4\cdot 5^{16}}=\frac{0{,}2^{-5}}{4\cdot 5^4}=$

$=\frac{\left(\frac{1}{5}\right)^{-5}}{4\cdot 5^4}=\frac{5}{4}=1{,}25.$ Javobi: B.

9. $b^2+ab-2a^2-b+a$ ni ko‘paytuvchilarga ajrating.

A) $(a-b)(2a-b)$ B) $(a+b)(2a-b-1)$

C) $(a-b)(2a-b-1)$ D) $(b-2a)(a-b+1)$

E) $(b-a)(2a+b-1)$

Yechilishi:

$$\begin{array}{l|l} b^2+ab-2a^2-b+a & b-a \\ \underline{-\,b^2-ab} & \\ 2ab-2a^2-b+a & b+2a-1 \\ \underline{-\,2ab-2a^2} & \\ -b+a & \\ \underline{-\,-b+a} & \\ 0 & \end{array}$$

Demak, $b^2+ab-2a^2-b+a=(b-a)(b+2a-1)$.

Javobi: E.

10. $1-\frac{17-3x}{2}>1{,}5x$ tengsizlikni yeching.

A) $(-2{,}5;0)$ B) $(-\infty;-2{,}5)$ C) $(-\infty;0)$
D) $x\epsilon R$ E) $\emptyset$

Yechilishi: $2-17+3x>3x\Rightarrow\emptyset$. Javobi: E.

11. a ning qanday qiymatlarida $y = ax^2 + 4x + c$ parabola koordinat o‘qlarini $A(1;0)$ va $B(0;4)$ nuqtalarda kesib o‘tadi?

A) -8 B) 4 C) -4 D) 1 E) $\emptyset$

Yechilishi: $y = ax^2 + 4x + c;$

$\begin{cases} A(1;0) \Rightarrow 0 = a \cdot 1^2 + 4 \cdot 1 + c \\ B(0;4) \Rightarrow 4 = a \cdot 0^2 + 4 \cdot 0 + c \end{cases} \Rightarrow \begin{cases} a = -8; \\ c = 4. \end{cases}$ Javobi: A.

12. $\left|1 - |1 - x|\right| = 0{,}5$ tenglamaning ildizlari yig‘indisini toping.

A) 0 B) 4 C) 3 D) 1 E) 2,5

Yechilishi: $\left|1 - |1 - x|\right| = 0{,}5 \Rightarrow \begin{cases} 1 - |1 - x| = 0{,}5 \\ 1 - |1 - x| = -0{,}5 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} |1 - x| = 0{,}5 \\ |1 - x| = 1{,}5 \end{cases} \Rightarrow \begin{cases} 1 - x = 0{,}5 \\ 1 - x = -0{,}5 \\ 1 - x = 1{,}5 \\ 1 - x = -1{,}5 \end{cases} \Rightarrow \begin{cases} x_1 = 0{,}5 \\ x_2 = 1{,}5 \\ x_3 = -0{,}5 \\ x_4 = 2{,}5 \end{cases} \Rightarrow$$

$\Rightarrow x_1 + x_2 + x_3 + x_4 = 4.$ Javobi: B.

13. $\frac{-3x^2+4x-5}{2x+3} > 0$ tengsizlikni yeching.

A) $(-\infty; -1{,}5)$ B) $(-1{,}5; 2)$ C) $(-4; -1{,}5)$

D) $(-1{,}5; -1{,}2)$ E) $(-\infty; -2{,}5)$

Yechilishi: $\frac{-3x^2+4x-5}{2x+3} > 0 \Rightarrow \begin{cases} 3x^2 - 4x + 5 = 0 \\ 2x + 3 \neq 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} D < 0 \\ x < -1{,}5 \end{cases} \Rightarrow x < -1{,}5 \Rightarrow (-\infty; -1{,}5).$ Javobi: A.

14. $\begin{cases} y = x^2 + 7x + 11 \\ y = y^2 + 3x + 15 \end{cases}$ tenglamalar sistemasi nechta yechimga ega?

A) 4 B) 3 C) 2 D) 1 E) $\emptyset$

Yechilishi: $\begin{cases} y = y \\ x^2 + 7x + 11 = y^2 + 3x + 15 \end{cases} \Rightarrow$

$$\Rightarrow x^2 + 10x + y^2 - 2y + 26 = 0 \Rightarrow$$

$$\Rightarrow x^2 + 10x + 5^2 + y^2 - 2y + 1^2 = 0 \Rightarrow$$

$\Rightarrow (x+5)^2 + (y-1)^2 = 0 \Rightarrow \begin{cases} x = -5; \\ y = 1. \end{cases}$ Javobi: D.

15. $\left(\frac{1}{m^2-m} - \frac{1}{m-1}\right) \cdot \frac{m}{m+2} + \frac{m}{m^2-4}$ ni soddalashtiring.

A) $\frac{2m-2}{m^2-4}$ B) $\frac{m}{m-2}$ C) $\frac{2}{m^2-4}$ D) $\frac{1}{m+2}$ E) $\frac{2m+1}{4-m^2}$

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

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

$= \frac{1-m}{m(m-1)} \cdot \frac{m}{m+2} + \frac{m}{(m-2)(m+2)} = -\frac{1}{m+2} + \frac{m}{(m-2)(m+2)} =$

$= \frac{-m+2+m}{(m-2)(m+2)} = \frac{2}{m^2-4}$. Javobi: C.

16. $\frac{1}{2\cdot5} + \frac{1}{5\cdot8} + \frac{1}{8\cdot11} + \frac{1}{11\cdot14} + \frac{1}{14\cdot17}$ ni hisoblang.

A) $\frac{15}{34}$ B) $\frac{5}{17}$ C) $\frac{5}{34}$ D) $\frac{16}{133}$ E) $\frac{15}{136}$

Yechilishi: $\frac{1}{2\cdot5} + \frac{1}{5\cdot8} + \frac{1}{8\cdot11} + \frac{1}{11\cdot14} + \frac{1}{14\cdot17} =$

$$= \frac{1}{3}\left(\frac{1}{2} - \frac{1}{5}\right) + \frac{1}{3}\left(\frac{1}{5} - \frac{1}{8}\right) + \cdots + \frac{1}{3}\left(\frac{1}{14} - \frac{1}{17}\right) =$$

$$= \frac{1}{3}\left(\frac{1}{2} - \frac{1}{5} + \frac{1}{5} - \frac{1}{8} + \frac{1}{8} - \frac{1}{11} + \frac{1}{11} - \frac{1}{14} + \frac{1}{14} - \frac{1}{17}\right) =$$

$= \frac{1}{3}\left(\frac{1}{2} - \frac{1}{17}\right) = \frac{1}{3} \cdot \frac{15}{34} = \frac{5}{34}$. Javobi: C.

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

A) $2b$ B) $2a-2b$ C) $2a$ D) $2a^2+2b^2$ E) $2b^2-2a$

Yechilishi: $(a+b)(a-b+1) - (a-b)(a+b-1) =$

$= a^2 - ab + a + ab - b^2 + b - a^2 - ab + a + ab + +b^2 - b = 2a$. Javobi: C.

18. $4y(5x-y) - (5x-2)(5x+2)$ ning eng katta qiymatini toping.

A) 10 B) 5 C) 4 D) 2 E) *mavjud emas*

Yechilishi: $4y(5x-y) - (5x-2)(5x+2) =$

$$= 20xy - 4y^2 - 25x^2 + 4 =$$

$$= -(25x^2 - 20xy + 4y^2) + 4 = -(5x-2y)^2 + 4.$$

Javobi: C.

19. Agar $a+b=7$ va $ab=2$ bo‘lsa, $a^2b^4 + a^4b^2$ ning qiymatini toping.

A) 196 B) 180 C) 112 D) 98

E) *To′g′ri javob keltirilmagan*

Yechilishi: $a^2 + b^2 + 2ab = 49 \Rightarrow a^2 + b^2 = 45$;

$a^2 \cdot b^2 = 4$. $a^2 \cdot b^2(a^2+b^2) = 4 \cdot 45 = 180$. Javobi: B.

20. a ning qanday qiymatlarida $\begin{cases} 3-7x<3x-7 \\ 1+2x<a+x \end{cases}$ tengsizliklar sistemasi yechimga ega emas?

A) $a<4$ B) $a\le 1$ C) $a<2$ D) $a>1$ E) $a\le 2$

Yeshilishi: $\begin{cases} 3-7x<3x-7 \\ 1+2x<a+x \end{cases} \Rightarrow \begin{cases} 10x>10 \\ x<a-1 \end{cases} \Rightarrow$

$\begin{cases} x>1 \\ x<a-1 \end{cases}$

$bo'lganda\ sistema\ yechimga\ ega.\ Demak,$

$\begin{cases} x\le 1 \\ x\ge a-1 \end{cases}$ $bo'lsa, sistema\ yechimga\ ega\ emas. Uholda,$

$\Rightarrow 1\ge a-1 \Rightarrow a\le 2$. Javobi: E.

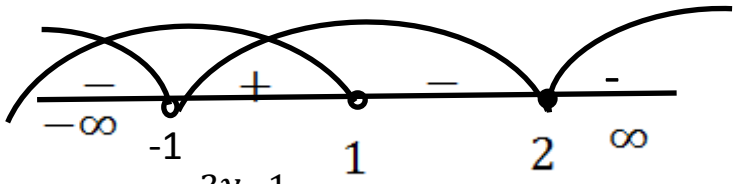
21. $y=\sqrt{\frac{x^2-4x+4}{1-x^2}}$ funksiyaning aniqlanish sohasini toping.

A) $(-1;1)$ B) $(-1;1)\cup\{2\}$ C) $(-1;2)$

D) $(-\infty;-1)\cup\{2\}$ E) $(-\infty;-1)\cup(1;\infty)$

Yechilishi: $y=\sqrt{\frac{x^2-4x+4}{1-x^2}} \Rightarrow \frac{(x-2)^2}{1-x^2}\ge 0 \Rightarrow \begin{cases} x=2 \\ x\ne\pm 1 \end{cases}$

$(-1;1)\cup\{2\}$.



Javobi: B.

22. y ning qanday qiymatida $\frac{2y-1}{3}$ kasrning qiymati $(-1;1)$ oraliqqa tegishli?

A) $(-1;2)$ B) $(0;2)$ C) $\left(-\frac{1}{2};1\right)$ D) $(-2;2)$

E) $To'g'ri\ javob\ keltirilmagan$

Yechilishi: $\begin{cases} \frac{2y-1}{3} > -1 \\ \frac{2y-1}{3} < 1 \end{cases} \Rightarrow \begin{cases} y > -1; \\ y < 2. \end{cases} y\epsilon(-1;2)$. Javobi: A.

23. O‘zidan oldingi barcha natural sonlar yig‘indisining $\frac{1}{10}$ qismiga teng bo‘lgan natural sonni toping.

A) 21 B) 10 C) 25 D) 20

E) $To'g'ri\ \ javob\ \ keltirilmagan$

Yechilishi: $Izlanayotgan\ \ natural\ sonni\ n\ desak$

$$\frac{1}{10} \cdot (1 + 2 + \cdots + n - 1) = n\ bo'ladi.$$

$$\frac{1}{10} \cdot S_{n-1} = n \Rightarrow \frac{1}{10} \cdot \frac{1+n-1}{2}(n-1) = n \Rightarrow$$

$$\Rightarrow n^2 - n - 20n = 0 \Rightarrow n^2 - 21n = 0 \Rightarrow \begin{cases} n \neq 0; \\ n = 21. \end{cases}$$

Javobi: A.

24. Arifmetik progressiyaning dastlabki sakkizta hadi yig‘indisi 32 ga, dastlabki yigirmata hadining yig‘indisi 200 ga teng. Progressiyaning dastlabki yigirma sakkizta hadining yig‘indisini toping.

A) 232 B) 342 C) 406 D) 280 E) 392

Yechilishi: $S_8 = 32 \Rightarrow 32 = \frac{a_1+a_8}{2} \cdot 8 \Rightarrow a_1 + a_8 = 8;\ (1)$

$S_{20} = 200 \Rightarrow 200 = \frac{a_1+a_{20}}{2} \cdot 20 \Rightarrow a_1 + a_{20} = 20;\ (2)$

$$(1)\ va\ \ (2)\ ni\ hadlab\ ayrilsa \begin{cases} a_1 + a_1 + 7d = 8 \\ a_1 + a_1 + 19d = 20 \end{cases} \Rightarrow d = 1;\quad 2a_1 + 7 \cdot 1 = 8 \Rightarrow a_1 = \frac{1}{2};$$

$$a_{28} = a_1 + 27d = \frac{1}{2} + 27 = \frac{55}{2};$$

$S_{28} = \frac{\frac{1}{2}+\frac{55}{2}}{2} \cdot 28 = 392.$ Javobi: E.

25. O‘suvchi geometrik progressiyaning dastlabki to‘rtta hadi yig‘indisi 15 ga, undan keyingi to‘rttasiniki esa 240 ga teng. Shu progressiyaning dastlabki oltita hadi yig‘indisini toping.

A) 31 B) 48 C) 63 D) 127 E) 144

Yechilishi: $\begin{cases} S_4 = 15 \Rightarrow S_4 = \frac{b_1(q^4-1)}{q-1} \\ S_8 = 255 \Rightarrow S_8 = \frac{b_1(q^8-1)}{q-1} \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} 15(q-1) = b_1(q^4-1) \\ 255(q-1) = b_1(q^8-1) \end{cases}$$

$$\Rightarrow \begin{matrix} q-1 = \frac{1}{15} b_1(q^4-1) \\ 255 \cdot \frac{1}{15} \cdot b_1(q^4-1) = b_1(q^8-1) \end{matrix} \Rightarrow$$

$$\Rightarrow 17(q^4-1) = (q^4-1)(q^4+1) \Rightarrow q^4 = 16 \Rightarrow q = 2;$$

$$15(2-1) = b_1(16-1) \Rightarrow b_1 = 1.$$

$S_6 = \frac{b_1(q^6-1)}{q-1} = \frac{1\cdot(2^6-1)}{2-1} = 63.$ Javobi: C.

26. Agar $f(x) = 3x^2 \cdot e^{sinx} - 8$ bo‘lsa, $f'(\pi)$ ning qiymatini toping.

A) $3\pi(2+\pi)$ B) $3\pi^2(3-\pi)$ C) $2\pi(2+\pi)$

D) 6π E) $3\pi(2-\pi)$

Yechilishi: $f'(x) = 3 \cdot 2 \cdot x \cdot e^{sinx} + 3 \cdot x^2 \cdot e^{sinx} \cdot cosx;$

$$f'(\pi) = 6 \cdot \pi \cdot e^{sin\pi} + 3 \cdot \pi^2 \cdot e^{sin\pi} cos\pi =$$

$$6\pi \cdot e^0 + 3\pi^2 \cdot e^0 \cdot (-1) = 6\pi - 3\pi^2 = 3\pi(2-\pi).$$

Javobi: E.

27. Agar $f(x) = -4x^3 - 11x^2 - 8x + 7$ bo‘lsa, $f'(x) \geq 0$ tengsizlikning nechta butun yechimi bor?

A) 4 B) 3 C) 2 D) 1 E) $\emptyset$

Yechilishi: $f(x) = -4x^3 - 11x^2 - 8x + 7 \Rightarrow$

$$\Rightarrow f'(x) = -12x^2 - 22x - 8 \Rightarrow$$

$$\Rightarrow -12x^2 - 22x - 8 \geq 0 \Rightarrow 6x^2 + 11x + 4 \leq 0$$

$$x_{1,2} = \frac{-11 \pm \sqrt{121 - 4 \cdot 6 \cdot 4}}{2 \cdot 6} = \frac{-11 \pm 5}{12} \Rightarrow \begin{cases} x_1 = -1{,}3 \\ x_2 = -0{,}5 \end{cases}$$

$$\Rightarrow x = -1.$$

Javobi: D.

28. $y = 3\ln x - 0{,}5x$ funksiyaning grafigiga absissasi $x_0 = 3$ nuqtada o‘tkazilgan urinmaning tenglamasini tuzing.

A) $y = 0{,}5x - 1{,}5$ B) $y = 3x - \ln 3$ C) $y = x - 3\ln 3$

D) $y = 3x - 0{,}5$ E) $0{,}5x + 3\ln 3 - 3$

Yechilishi: $y = 3\ln x - 0{,}5x; \quad x_0 = 3.$

$$y_0 = 3\ln 3 - 0{,}5 \cdot 3 = 3\ln 3 - 1{,}5$$

$$y' = \frac{3}{x} - 0{,}5 \Rightarrow k = \frac{3}{3} - 0{,}5 = 0{,}5;$$

$$y - y_0 = k(x - x_0) \Rightarrow y - 3\ln 3 + 1{,}5 = 0{,}5(x - 3) \Rightarrow$$
$$y = 3\ln 3 - 1{,}5 + 0{,}5x - 1{,}5 = 0{,}5x + 3\ln 3 - 3.$$

Javobi: E.

29. a va b ning qanday qiymatlarida $f(x) = a\cos\frac{\pi x}{2} + b$ funksiya uchun $f'(1) = 1{,}5$ va $\int_0^2 f(x)dx = 3$ tengliklar o‘rinli bo‘ladi?

A) $a = 3; b = 1{,}5$ B) $a = -3; b = 1{,}5$

C) $a = -\frac{3}{\pi}; b = 1{,}5$ D) $a = \frac{3\pi}{2}; b = 1$

E) $a = \frac{3}{\pi}; b = -1{,}5$

Yechilishi: $f(x) = a\cos\frac{\pi x}{2} + b;$

$$f'(x) = -a\sin\frac{\pi x}{2} \cdot \frac{\pi}{2} = -\frac{a\pi}{2}\sin\frac{\pi x}{2};$$

$$f'(1) = -\frac{a\pi}{2}\sin\frac{\pi \cdot 1}{2} = -\frac{a\pi}{2} \Rightarrow 1{,}5 = -\frac{a\pi}{2} \Rightarrow$$

$$\Rightarrow 3 = -a\pi \Rightarrow a = -\frac{3}{\pi}; \quad 3 = \int_0^2 f(x)dx =$$

$$= \int_0^2 \left(-\frac{3}{\pi}\cos\frac{\pi x}{2} + b\right)dx = -\frac{3}{\pi}\int_0^2 \cos\frac{\pi x}{2}dx + b\int_0^2 dx =$$

$$= -\frac{3}{\pi} \cdot \frac{2}{\pi}\sin\frac{\pi x}{2}\Big|_0^2 + bx\Big|_0^2 = -\frac{6}{\pi^2}[\sin\pi - \sin 0] +$$

$$+b(2 - 0) = 2b \Rightarrow 3 = 2b \Rightarrow b = 1{,}5.$$ Javobi: C.

30. $f(x) = \sin 2x + 2\cos x$ funksiyaning $\left[\frac{\pi}{2}; \pi\right]$ kesmadagi eng kichik qiymatini toping.

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

Yechilishi: $f(x) = sin2x + 2cosx;\ \ \left[\frac{\pi}{2}; \pi\right];$

$$f'(x) = 2cos2x - 2sinx \Rightarrow 2cos2x - 2sinx = 0 \Rightarrow$$

$$\Rightarrow cos^2x - sin^2x - sinx = 0 \Rightarrow$$

$$\Rightarrow 1 - sin^2x - sin^2x - sinx = 0 \Rightarrow$$

$$\Rightarrow 2sin^2x + sinx - 1 = 0; \qquad sinx = y \Rightarrow$$

$$\Rightarrow 2y^2 + y - 1 = 0 \Rightarrow y_{1,2} = \frac{-1 \pm 3}{4} \Rightarrow \begin{cases} y_1 = -1 \\ y_2 = \frac{1}{2} \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} sinx = -1 \\ sinx = \frac{1}{2} \end{cases} \Rightarrow \begin{cases} x = -\frac{\pi}{2} + 2\pi k, \quad k \epsilon Z \\ x = (-1)^k \frac{\pi}{6} + \pi k, \quad k \epsilon Z \end{cases} \Rightarrow$$

$$\Rightarrow x = (-1)^k \frac{\pi}{6} + \pi k, k \epsilon Z; \ \ k = 0 \Rightarrow x = \frac{\pi}{6};$$

$$k = 1 \Rightarrow x = 150° \epsilon \left[\frac{\pi}{2}; \pi\right]$$

$$f(150°) = sin300° + 2cos150° = -1{,}5\sqrt{3};$$

$$f(90°) = sin180° + 2cos90° = 0°;$$

$$f(180°) = sin360° + 2cos180° = -2.$$

Javobi: C.

31. $3^{8x} - 4 \cdot 3^{4x} \leq -3$ tengsizlikning butun yechimlari yig‘indisini toping.

A) 8 B) 7 C) 4 D) 2 E) 0

Yechilishi: $3^{8x} - 4 \cdot 3^{4x} \leq -3 \Rightarrow (3^{4x})^2 - 4 \cdot 3^{4x} \leq -3 \Rightarrow$

$$\Rightarrow 3^{4x} = y \Rightarrow y^2 - 4y + 3 \le 0 \Rightarrow \begin{cases} y_1 = 1 \\ y_2 = 3 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} 3^{4x} = 1 \\ 3^{4x} = 3 \end{cases} \Rightarrow \begin{cases} 4x = 0 \\ 4x = 1 \end{cases} \Rightarrow \begin{cases} x = 0; \\ x = 0{,}25. \end{cases}$$ Javobi: E.

32. Agar $\log_{0,5} 27 = a$ bo‘lsa, $\log_{\sqrt{3}} \sqrt[6]{1{,}5}$ ning qiymatini toping.

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

C) $1 + a^{-3}$ E) $\sqrt[3]{a} - \frac{1}{3}$

Yechilishi: $\log_{\sqrt{3}} \sqrt[6]{1{,}5} = \left|\log_a x = \log_{a^k} x^k\right| =$

$$= \log_{(\sqrt{3})^6} \left(\sqrt[6]{1{,}5}\right)^6 = \log_{3^3} 1{,}5 = \log_{27} \frac{1}{2} \cdot 3 =$$

$$= \log_{27} 0{,}5 + \log_{27} 3 = \frac{1}{\log_{0,5} 27} + \frac{1}{3} =$$

$= \frac{1}{a} + \frac{1}{3} = a^{-1} + \frac{1}{3}$. Javobi: A.

33. Agar $\sqrt{3x^2 - 6x + 16} = 2x - 1$ bo‘lsa, $x^2(x + 2)$ ning qiymatini toping.

A) -75 B) -45 C) 15 D) 45 E) 75

Yechilishi: $\sqrt{3x^2 - 6x + 16} = 2x - 1 \Rightarrow$

$$\Rightarrow 3x^2 - 6x + 16 = 4x^2 - 4x + 1 \Rightarrow$$

$$\Rightarrow x^2 + 2x - 15 = 0 \Rightarrow \begin{cases} x_1 = -5 \ \ chet\ ildiz \\ x_2 = 3 \ \ ildiz \end{cases} \Rightarrow$$

$\Rightarrow x^2(x + 2) = 45$. Javobi: D.

34. Uchburchakning ikkita tashqi burchaklari $120°$ va $160°$ ga teng. Uning uchinchi tashqi burchgini toping.

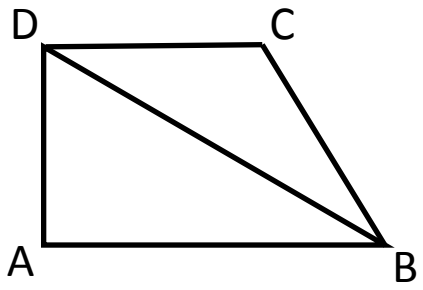
A) $100°$ B) $80°$ C) $90°$ D) $70°$ E) $60°$

Yechilishi: $360° - (120° + 160°) = 80°$. Javobi: B.

35. To‘rtburchakka diagonal o‘tkazish natijasida u perimetrlari 25 va 27 ga teng bo‘lgan ikkita uchburchakka ajratildi. Agar to‘rtburchakning perimetri 32 ga teng bo‘lsa, o‘tkazilgan diagonalning uzunligini hisoblang.

A) 6 B) 8 C) 10 D) 11 E) 10,5

Yechilishi:



$AB + BC + CD + AD = 32$

$$+\begin{matrix} AB+AD+BD=25 \\ \underline{BC+CD+BD=27} \end{matrix}$$

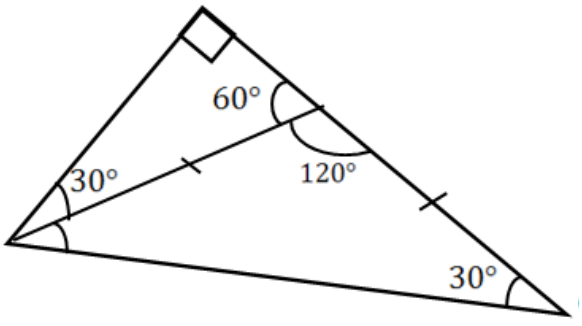
2BD+32=52⇒ $BD = 10$. Javobi: C.

36. Teng yonli uchburchakning asosidagi burchagi $30°$ ga teng. Shu uchburchakning yon tomoni va ikkinchi yon tomoniga tushirilgan balandligi orasidagi burchakni toping.

A) $75°$ B) $60°$ C) $45°$ D) $40°$ E) $30°$

Yechilishi:

Javobi: E.



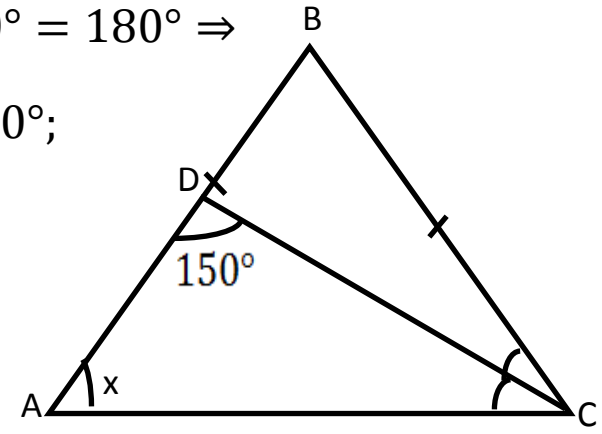
37. Teng yonli ABC uchburchakda AC – asos, $CD - C$ burchakning bissektrissasi va $\angle ADC = 150°$ bo‘lsa, $\angle B$ ning kattaligini toping.

A) 140° B) 120° C) 110° D) 40° E) 60°

Yechilishi: $x + \frac{x}{2} + 150° = 180° \Rightarrow$

$\Rightarrow 1{,}5x = 30° \Rightarrow x = 20°;$

$\angle B = 140°$. Javobi: A.



38. Ichki burchaklari yig‘indisi uning har bir uchidan bittadan olingan tashqi burchaklar yig‘indisidan 6 marta katta bo‘lgan ko‘pburchakning tomoni nechta?

A) 16 B) 10 C) 15 D) 12 E) 14

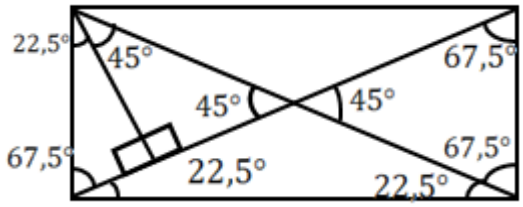
Yechilishi: $180(n - 2) = 6 \cdot 360 \Rightarrow n = 14$. Javobi: E.

39. To‘g‘ri to‘rtburchakning to‘g‘ri burchagi uchidan uning diagonaliga tushirilgan perpendikulyar to‘g‘ri burchakni 3:1 kabi nisbatda bo‘ladi. Shu perpendikulyar bilan boshqa diagonal orasidagi burchakni toping.

A) 22,5° B) 30° C) 45° D) 40° E) 32,5°

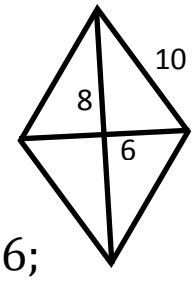
Yechilishi: $3x + x = 90° \Rightarrow$

$\Rightarrow x = 22{,}5°$. Javobi: C.



40. Diagonallari 12 va 16 ga teng bo‘lgan rombga ichki chizilgan aylananing radiusini toping.

A) 9,6 B) 8 C) 6 D) 3,6 E) 4,8



Yechilishi: $S_{\Delta} = \frac{1}{2} \cdot 8 \cdot 6 = 24 \Rightarrow$

$$\Rightarrow S_{romb} = 4 \cdot 24 = 96;$$

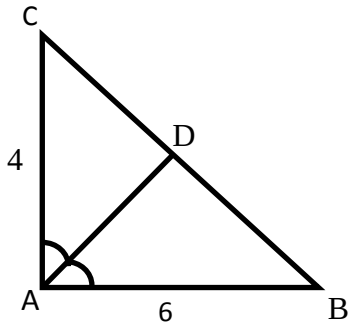
$$S = a \cdot h \Rightarrow 96 = 10 \cdot h \Rightarrow h = 9{,}6;$$

$r = \frac{h}{2} = 4{,}8$. Javobi: E.

41. To‘g‘ri burchakli uchburchakning katetlari 4 va 6 ga teng. Shu uchburchakning to‘g‘ri burchagidan chiqarilgan bissektrissasi uzunligini toping.

A) 3,6 B) $4{,}8\sqrt{2}$ C) $5\sqrt{2}$ D) 4,8 E) $2{,}4\sqrt{2}$

Yechilishi: 1) $BC = \sqrt{52}$;



2) $\frac{4}{CD} = \frac{6}{BD} \Rightarrow 4BD = 6CD \Rightarrow$

$$\Rightarrow BD = \frac{3}{2}CD; \quad BD = \sqrt{52} - CD \Rightarrow$$

$$\Rightarrow \sqrt{52} - CD = \frac{3}{2}CD \Rightarrow 2\sqrt{52} - 2CD = 3CD \Rightarrow$$

$$5CD = 2\sqrt{52} \Rightarrow CD = \frac{2}{5}\sqrt{52};$$

$$3)\ CD^2 = 4^2 + AD^2 - 2 \cdot 4 \cdot AD \cdot cos45° \Rightarrow$$

$$\Rightarrow \frac{4}{25} \cdot 52 = 16 + AD^2 - 4\sqrt{2} \cdot AD \Rightarrow$$

$$\Rightarrow 208 = 16 \cdot 25 + 25AD^2 - 100\sqrt{2}AD \Rightarrow$$

$$\Rightarrow 25AD^2 - 100\sqrt{2}AD + 192 = 0 \Rightarrow$$

$$\Rightarrow AD = \frac{100\sqrt{2} \pm \sqrt{20000 - 4 \cdot 25 \cdot 192}}{2 \cdot 25} =$$

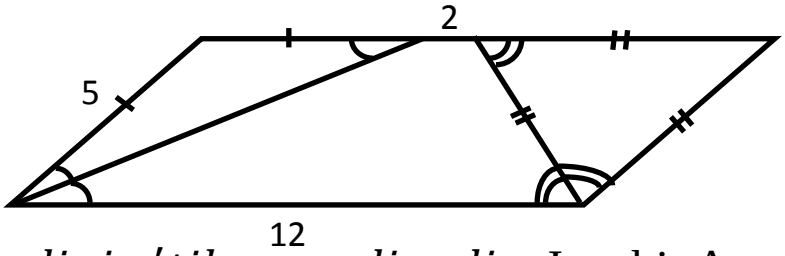
$$= \frac{100\sqrt{2} \pm 20\sqrt{2}}{50} = \frac{80\sqrt{2}}{50} = 1{,}6\sqrt{2};$$

$AD = \frac{120\sqrt{2}}{50} = 2{,}4\sqrt{2}$. Javobi: E.

42. Paralelogrammning tomonlari 12 va 5 ga teng. Uning katta tomoniga yopishgan burchaklarining bissektrissalari qarama-qarshi tomonni uch qismga ajratadi. Shu qismlardan eng kichigining uzunligini toping.

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

Yechilishi:



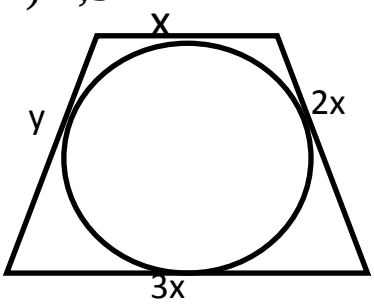
Ichki almashinuvchi burchaklar tengligi e'tiborga olinadi. Javobi: A.

43. Aylanaga tashqi chizilgan to‘rtburchakning uchta ketma-ket tomonlari nisbati 1:2:3 kabi . Agar to‘rtburchakning perimetri 24 ga teng bo‘lsa, uning eng kichik tomonini toping.

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

Yechilishi: *Formulaga asosan*

$$x + 3x = 2x + y \Rightarrow$$

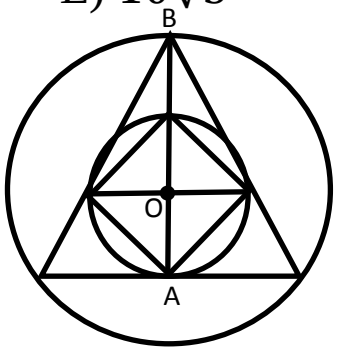


$\Rightarrow y = 2x;$ *U holda,* $8x = 24 \Rightarrow x = 3.$

Javobi: C.

44. Radiusi 5 ga teng bo‘lgan aylanaga muntazam uchburchak, uchburchakka yana aylana va aylanaga kvadrat ichki chizilgan. Kvadratning perimetrini toping.

A) 10 B) $10\sqrt{2}$ C) 8 D) $8\sqrt{2}$ E) $10\sqrt{3}$



$OB = 5; \quad OA = 2{,}5$

$AC = 2{,}5 \cdot 2 = 5 \Rightarrow 5 = a\sqrt{2} \Rightarrow$

$\Rightarrow a = \frac{5}{\sqrt{2}} \Rightarrow 4a = \frac{20}{\sqrt{2}} = 10\sqrt{2}.$

Javobi: B.

45. Agar $\left|\overrightarrow{AB}\right| = \left|\overrightarrow{AC}\right| = \left|\overrightarrow{AB} + \overrightarrow{AC}\right| = 4$ bo‘lsa, $\left|\overrightarrow{CB}\right|$ ning qiymatini toping.

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

Yechilishi: $\left|\overrightarrow{AB} + \overrightarrow{AC}\right| = 4 \Rightarrow$

$$\Rightarrow \left|\overrightarrow{AB}\right|^2 + \left|\overrightarrow{AC}\right|^2 + 2 \cdot \overrightarrow{AB} \cdot \overrightarrow{AC} = 16 \Rightarrow$$

$$\Rightarrow 16 + 16 + 2 \cdot \overrightarrow{AB} \cdot \overrightarrow{AC} = 16 \Rightarrow \overrightarrow{AB} \cdot \overrightarrow{AC} = -8 \Rightarrow$$

$$\Rightarrow \left|\overrightarrow{AB}\right| \cdot \left|\overrightarrow{AC}\right| \cdot cos\left(\overrightarrow{AB}, \wedge \overrightarrow{AC}\right) = -8 \Rightarrow$$

$$\Rightarrow 4 \cdot 4 \cdot cos\left(\overrightarrow{AB}, \wedge \overrightarrow{AC}\right) = -8 \Rightarrow cos\left(\overrightarrow{AB}, \wedge \overrightarrow{AC}\right) = -\frac{1}{2} \Rightarrow$$

$$\Rightarrow \overrightarrow{AB}, \wedge \overrightarrow{AC} = 120°;$$

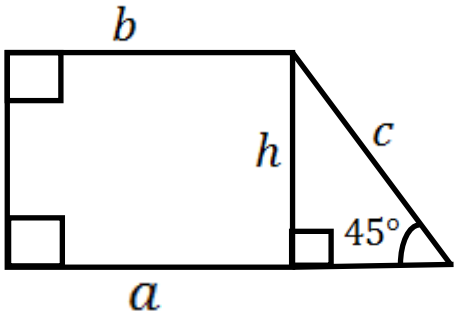
$$\left|\overrightarrow{CB}\right|^2 = 4^2 + 4^2 - 2 \cdot 4 \cdot 4 \cdot cos120° =$$

$= 16 + 16 + 16 = 48 \Rightarrow \left|\overrightarrow{CB}\right| = 4\sqrt{3}.$ Javobi: B.

46. To‘g‘ri burchakli trapetsiyaning o‘tkir burchagi 45° ga, perimetri 2 ga teng. Balandlik qanday bo‘lganda, shu trapetsiyaning yuzi eng katta bo‘ladi?

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

Yechilishi: $a+b+c+h=2;$



$$\frac{h}{c}=sin45°\Rightarrow\frac{h}{c}=\frac{\sqrt{2}}{2}\Rightarrow$$

$$\Rightarrow 2h=\sqrt{2}c\Rightarrow c=\frac{2h}{\sqrt{2}}=\sqrt{2}h.$$

$$\Rightarrow a+b+\sqrt{2}h+h=2\Rightarrow a+b=2-\left(\sqrt{2}+1\right)\cdot h.$$

$$S=\frac{a+b}{2}\cdot h=\frac{2-\left(\sqrt{2}+1\right)}{2}\cdot h=h-\frac{\sqrt{2}+1}{2}\cdot h^2\Rightarrow$$

$$\Rightarrow S'=1-\frac{\sqrt{2}+1}{2}\cdot 2h=1-\left(\sqrt{2}+1\right)\cdot h\Rightarrow S'=0\Rightarrow$$

$\Rightarrow \left(\sqrt{2}+1\right)\cdot h=1\Rightarrow h=\frac{1}{\sqrt{2}+1}=\sqrt{2}-1.$ Javobi: E.

47. Uchlari $A(2;3;0)$, $B(3;2;1)$ va $C(3;4;1)$ nuqtalarda bo‘lgan teng yonli uchburchakning asosidagi burchakni toping.

A) $arccos\frac{2}{3}$ B) $arccos\frac{1}{3}$ C) $arccos\frac{1}{\sqrt{3}}$ D) $\frac{\pi}{6}$ E) $\frac{\pi}{3}$

Yechilishi: $\overrightarrow{AB}=\{3-2;2-3;1-0\}=\{1;-1;1\}\Rightarrow$

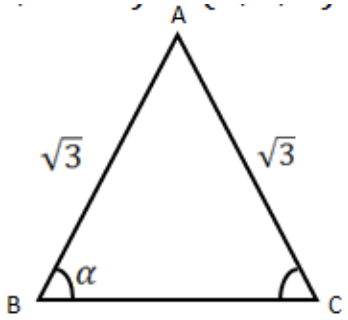
$$\Rightarrow\left|\overrightarrow{AB}\right|=\sqrt{3};\quad \overrightarrow{AC}=\{3-2;4-3;1-0\}=\{1;1;1\}\Rightarrow$$

$$\Rightarrow\left|\overrightarrow{AC}\right|=\sqrt{3};\ \overrightarrow{BC}=\{3-3;4-2;1-1\}=\{0;2;0\}\Rightarrow$$

$\Rightarrow |\overrightarrow{BC}| = 2; \quad cos\alpha = \frac{\overrightarrow{BA}\cdot\overrightarrow{BC}}{|\overrightarrow{BA}|\cdot|\overrightarrow{BC}|} =$

$= \frac{\{2-3;3-2;0-1\}\cdot\{0;2;0\}}{\sqrt{3}\cdot 2} = \frac{1}{\sqrt{3}} \Rightarrow$

$\Rightarrow \alpha = arccos\frac{1}{\sqrt{3}}$. Javobi: C.



48. Muntazam ABC uchburchakning C uchi muntazam ABD uchburchakning markaziga proeksiyalanadi. ABC va ABD uchburchaklar orasidagi burchakni toping.

A) 60° B) $arccos\frac{1}{3}$ C) 45° D) 30° E) $arccos\frac{1}{\sqrt{3}}$

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

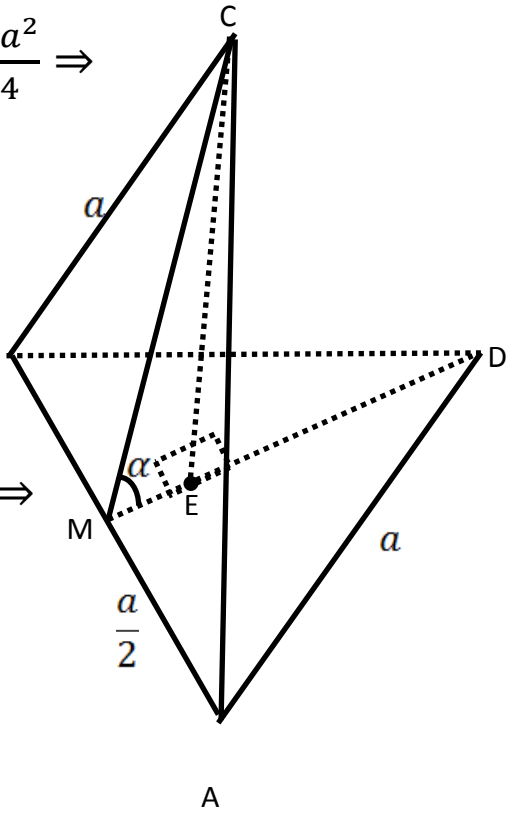
$\Rightarrow MC = \frac{a\sqrt{3}}{2}; \quad MC = MD;$

$ME = \frac{1}{3}MD = \frac{1}{3}\cdot\frac{a\sqrt{3}}{2} = \frac{a\sqrt{3}}{6};$

$cos\alpha = \frac{ME}{MC} = \frac{a\sqrt{3}}{6}\cdot\frac{2}{a\sqrt{3}} = \frac{1}{3} \Rightarrow$

$\Rightarrow \alpha = arccos\frac{1}{3}$.

Javobi: B.



49. Muntazam to‘rtburchakli piramida asosining tomoni 12 ga, unga ichki chizilgan sharning radiusi 3 ga teng. Piramidaning yon sirtini toping.

A) 240 B) 120 C) 480 D) 360 E) 280

Yechilishi: $h^2 = l^2 - 6^2 \Rightarrow h = \sqrt{l^2 - 36}$

Teng yonli uchburchakka ichki chizilgan aylana radiusi formulasidan

$$r = \frac{a(2l-a)}{4h} \Rightarrow 3 = \frac{12(2l-12)}{4 \cdot \sqrt{l^2-36}}$$

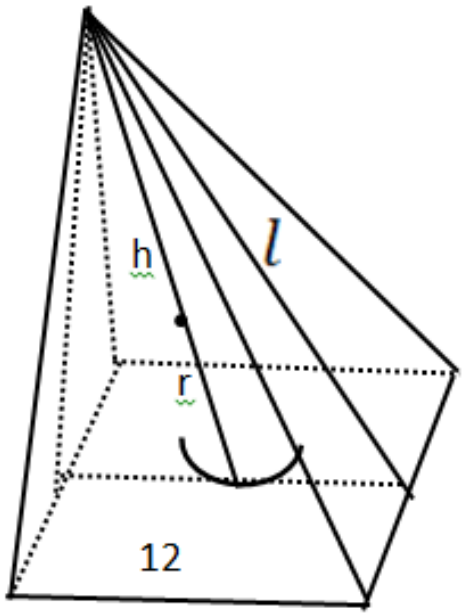
$$\Rightarrow \sqrt{l^2-36} = 2l - 12 \Rightarrow$$

$$\Rightarrow l^2 - 36 = 4l^2 - 48l + 144 \Rightarrow$$

$$\Rightarrow 3l^2 - 48l + 180 = 0 \Rightarrow$$

$$\Rightarrow l^2 - 16l + 60 = 0 \Rightarrow$$

$$\Rightarrow \begin{cases} l_1 \neq 6; \\ l_2 = 10. \end{cases} \Rightarrow$$



$S_{yon} = \frac{1}{2} P_{asos} \cdot l = \frac{1}{2} \cdot 4 \cdot 12 \cdot 10 = 240.$ Javobi: A.

50. Asosi a ga, asosidagi burchagi α ga teng bo‘lgan teng yonli uchburchakni yon tomoni atrofida aylantirishdan hosil bo‘lgan jismning hajmini toping.

A) $\frac{\pi a^3 sin\alpha}{3}$ B) $\frac{\pi a^3 sin^2\alpha}{6cos\alpha}$ C) $\frac{\pi a^3 tg\alpha}{2}$

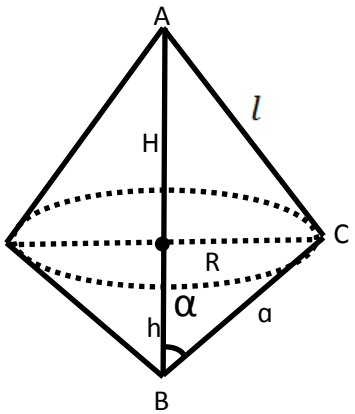
D) $\frac{\pi a^3 cos\alpha}{6sin^2\alpha}$ E) $\frac{\pi a^3 sin2\alpha}{12}$

Yechilishi: $\frac{R}{a} = sin\alpha \Rightarrow R = asin\alpha;$

$\frac{h}{a} = cos\alpha \Rightarrow h = acos\alpha; l = H + h;$

$l^2 = a^2 + l^2 - 2a \cdot l \cdot cos\alpha \Rightarrow$

$\Rightarrow 2a \cdot l \cdot cos\alpha = a^2 \Rightarrow l = \frac{a}{2cos\alpha};$



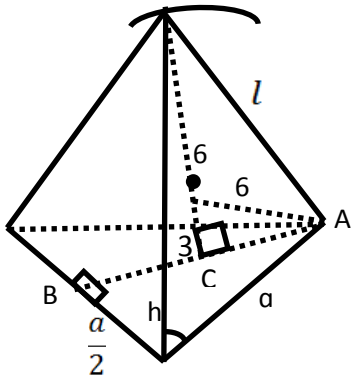
$$V = \frac{1}{3}\pi R^2(h+H) = \frac{1}{3}\pi R^2 l =$$

$= \frac{1}{3}\pi \cdot a^2 sin^2\alpha \cdot \frac{a}{2cos\alpha} = \frac{\pi a^3 sin^2\alpha}{6cos\alpha}$. Javobi: B.

51. Uchburchakli muntazam piramidaga tashqi chizilgan sharning markazi uning balandligini 6 va 3 ga teng bo‘lgan qismlarga ajratadi. Piramidaning hajmini toping.

A) $\frac{25\sqrt{3}}{4}$ B)$\frac{81\sqrt{3}}{2}$ C)$\frac{729\sqrt{3}}{4}$ D)$\frac{81\sqrt{3}}{4}$ E)$\frac{243\sqrt{3}}{4}$

Yechilishi: $AC^2 = 6^2 - 3^2 = 27$;



$AC = \sqrt{9 \cdot 3} = 3\sqrt{3}$; $\frac{2}{3}AB = 3\sqrt{3} \Rightarrow$

$\Rightarrow AB = \frac{9\sqrt{3}}{2}$; $AB^2 = a^2 - \frac{a^2}{4} = \frac{3a^2}{4} \Rightarrow$

$$\Rightarrow AB = \frac{a\sqrt{3}}{2} \Rightarrow \frac{9\sqrt{3}}{2} = \frac{a\sqrt{3}}{2} \Rightarrow a = 9;$$

$$S_\Delta = \frac{1}{2} \cdot a \cdot h = \frac{1}{2} \cdot 9 \cdot \frac{9\sqrt{3}}{2} = \frac{81\sqrt{3}}{4};$$

$V = \frac{1}{3}S_{asos} \cdot H = \frac{1}{3} \cdot \frac{81\sqrt{3}}{4} \cdot 9 = \frac{243\sqrt{3}}{4}$. Javobi: E.

52. $cos\frac{\pi}{5} - cos\frac{2\pi}{5}$ ni hisoblang.

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

Yechilishi: $cos\frac{\pi}{5} - cos\frac{2\pi}{5} =$

$$= \frac{1}{2sin\frac{\pi}{5}}\left(2sin\frac{\pi}{5}cos\frac{\pi}{5} - 2sin\frac{\pi}{5}cos\frac{2\pi}{5}\right) =$$

$$= \left|sin\alpha cos\beta = \frac{1}{2}[\sin(\alpha+\beta) + \sin(\alpha-\beta)]\right| =$$

$$= \frac{1}{2sin\frac{\pi}{5}}\left(sin\frac{2\pi}{5} - 2\cdot\frac{1}{2}\left(sin\frac{3\pi}{5} - sin\frac{\pi}{5}\right)\right) =$$

$$= \frac{1}{2sin\frac{\pi}{5}}\left(sin\frac{2\pi}{5} - sin\frac{3\pi}{5} + sin\frac{\pi}{5}\right) =$$

$$= \left|sin\frac{3\pi}{2} = sin\left(\pi - \frac{2\pi}{5}\right) = sin\frac{2\pi}{5}\right| =$$

$= \frac{1}{2sin\frac{\pi}{5}}\left(sin\frac{2\pi}{5} - sin\frac{2\pi}{5} + sin\frac{\pi}{5}\right) = \frac{1}{2}$. Javobi: E.

53. $\frac{4cos^2 2\alpha - 4cos^2 a + 3sin^2 a}{4cos^2\left(\frac{5\pi}{2}-\alpha\right) - sin^2 2(\alpha-\pi)}$ ni soddalashtiring.

A) $\frac{3cos\alpha}{4sin^2\alpha}$ B) $\frac{8cos2\alpha+1}{2cos2\alpha-2}$ C) $4cos2\alpha - 1$

D) $\frac{2cos2\alpha}{sin^2\alpha}$ E) $tg^2 2\alpha - 3$

Yechilishi: $\frac{4cos^2 2\alpha - 4cos^2 a + 3sin^2 a}{4cos^2\left(\frac{5\pi}{2}-\alpha\right) - sin^2 2(\alpha-\pi)} =$

$$= \frac{4\left(cos^2 2\alpha - cos^2\alpha\right) + 3sin^2\alpha}{4\left[cos\left(\frac{5\pi}{2}-\alpha\right)\right]^2 - [-sin(2\pi-2\alpha]^2} =$$

$$= \frac{4(cos2\alpha - cos\alpha)(cos2\alpha + cos\alpha) + 3sin^2\alpha}{4sin^2\alpha - sin^2 2\alpha} =$$

$$= \frac{-4\cdot 2\cdot sin\frac{3\alpha}{2}sin\frac{\alpha}{2}\cdot 2cos\frac{3\alpha}{2}cos\frac{\alpha}{2} + 3sin^2\alpha}{4sin^2\alpha - (2sin\alpha cos\alpha)^2} =$$

$$= \frac{-4 \cdot 2 \cdot sin\frac{3\alpha}{2} sin\frac{\alpha}{2} \cdot 2cos\frac{3\alpha}{2} cos\frac{\alpha}{2} + 3sin^2\alpha}{4sin^2\alpha - 4sin^2\alpha cos^2\alpha} =$$

$$= \frac{-4sin3\alpha sin\alpha + 3sin^2\alpha}{4sin^2\alpha(1 - cos^2\alpha)} = \frac{sin\alpha(3sin\alpha - 4sin3\alpha)}{4sin^4\alpha} =$$

$$= \frac{3sin\alpha - 4sin3\alpha}{4sin^3\alpha} = \frac{3}{4sin^2\alpha} - \frac{sin3\alpha}{sin^3\alpha} =$$

$$= \frac{3}{4sin^2\alpha} - \frac{3sin\alpha - 4sin^3\alpha}{sin^3\alpha} = \frac{3}{4sin^2\alpha} - \frac{3}{sin^2\alpha} + 4 =$$

$$= \frac{3 - 12 + 16sin^2\alpha}{4sin^2\alpha} = \frac{16sin^2\alpha - 9}{4sin^2\alpha}$$

$$= \frac{16 \cdot \frac{1}{2}(1 - cos2\alpha) - 9}{4 \cdot \frac{1}{2}(1 - cos2\alpha)} =$$

$= \frac{8-8cos2\alpha-9}{2-2cos2\alpha} = \frac{-(8cos2\alpha+1)}{-(2cos2\alpha-2)} = \frac{8cos2\alpha+1}{2cos2\alpha-2}$. Javobi: B.

54. $cos\left(2arcsin\frac{2}{5}\right)$ ning qiymatini toping.

A) $\frac{9}{25}$ B) $\frac{1}{5}$ C) $\frac{4}{5}$ D) $\frac{17}{25}$ E) $\frac{8}{25}$

Yechilishi: $cos\left(2arcsin\frac{2}{5}\right)$; $\alpha = arcsin\frac{2}{5} \Rightarrow$

$$\Rightarrow sin\alpha = sinarcsin\frac{2}{5} \Rightarrow sin\alpha = \frac{2}{5};$$

$$cos2\alpha = cos^2\alpha - sin^2\alpha = 1 - sin^2\alpha - sin^2\alpha =$$

$= 1 - 2sin^2\alpha = 1 - 2 \cdot \left(\frac{2}{5}\right)^2 = 1 - \frac{8}{25} = \frac{17}{25}$. Javobi: D.

55. $cosxcos2xcos4x = 1$ tenglama $[-2\pi; 2\pi]$ kesmada nechta ildizga ega?

A) 1 B) 2 C) 3 D) 4 E) ∅

Yechilishi: $cosxcos2xcos4x = 1 \Rightarrow$

$$\Rightarrow 2sinxcosxcos2xcos4x = 2sinx \Rightarrow$$

$$\Rightarrow sin2xcos2xcos4x = 2sinx \Rightarrow 2sin2xcos2xcos4x =$$

$$= 4sinx \Rightarrow sin4xcos4x = 4sinx \Rightarrow$$

$$\Rightarrow 2sin4xcos4x = 8sinx \Rightarrow sin8x = 8sinx \Rightarrow$$

$$\Rightarrow sinx = 0 \Rightarrow x = \pi k, k\epsilon Z;$$

$$k = -2 \Rightarrow x = -2\pi;\ \ k = 0 \Rightarrow x = 0;$$

$k = 2 \Rightarrow x = 2\pi$. Javobi: C.

56. $cosx < sinx$ tengsizlikni yeching.

A) $\left(\frac{\pi}{4} + \pi k;\ \frac{3\pi}{4} + \pi k\right), k\epsilon Z$ B) $\left(\frac{\pi}{4} + \pi k;\ \frac{5\pi}{4} + \pi k\right), k\epsilon Z$

C)$\left(\frac{\pi}{4} + 2\pi k;\ \frac{3\pi}{4} + 2\pi k\right), k\epsilon Z$ D)$(2\pi k;\ \pi + 2\pi k), k\epsilon Z$

E) $\left(\frac{\pi}{4} + 2\pi k;\ \frac{5\pi}{4} + 2\pi k\right),\ k\epsilon Z$

Yechilishi: $cosx < sinx \Rightarrow \sqrt{2}sin(45° - \alpha) < 0 \Rightarrow$

$$\Rightarrow -\sqrt{2}sin\left(\alpha - \frac{\pi}{4}\right) < 0 \Rightarrow sin\left(\alpha - \frac{\pi}{4}\right) > 0 \Rightarrow$$

$$\Rightarrow 0 < \alpha - \frac{\pi}{4} < \pi \Rightarrow 2\pi k < \alpha - \frac{\pi}{4} < \pi + 2\pi k \Rightarrow$$

$$\Rightarrow \frac{\pi}{4} + 2\pi k < \alpha < \pi + \frac{\pi}{4} + 2\pi k \Rightarrow$$

$\Rightarrow \frac{\pi}{4} + 2\pi k < \alpha < \frac{5\pi}{4} + 2\pi k,\ k \in Z$. Javobi: E.

2000-YIL, 7-AXBOROTNOMA

1. $\frac{0,(2)\cdot 0,625\cdot 4,5+1,8\cdot 0,175\cdot 0,(5)}{\frac{6}{7}\cdot 2\frac{1}{3}-1\frac{1}{6}\cdot\frac{6}{7}}$ ni hisoblang.

A) 0,9 B) 0,7 C) 0,8 D) 0,6 E) 0,5

Yechilishi: $\frac{0,(2)\cdot 0,625\cdot 4,5+1,8\cdot 0,175\cdot 0,(5)}{\frac{6}{7}\cdot 2\frac{1}{3}-1\frac{1}{6}\cdot\frac{6}{7}} =$

$= \frac{\frac{2}{9}\cdot\frac{625}{1000}\cdot\frac{45}{10}+\frac{18}{10}\cdot\frac{175}{1000}\cdot\frac{5}{9}}{\frac{6}{7}\cdot\frac{7}{3}-\frac{7}{6}\cdot\frac{6}{7}} = \frac{0,625+0,175}{2-1} = 0,8.$ Javobi: C.

2. 18 va 12 sonlari eng kichik umumiy karralisining eng katta umumiy bo‘luvchisiga ko‘paytmasini toping.

A) 220 B) 218 C) 214 D) 216 E) 212

Yechilishi: $K(18;12) = 2^2\cdot 3^2 = 36;$

18	2	12	2
9	3	6	2
3	3	3	3
1		1	

$D(18;12) = 2\cdot 3 = 6.$

$36\cdot 6 = 216.$ Javobi: D.

3. 752 sonining o‘ng tomoniga qanday raqam yozilsa, hosil bo‘lgan son 36 ga qoldiqsiz bo‘linadi?

A) 0 B) 2 C) 6 D) 7 E) 4

Yechilishi: $4\ ga\ va\ 9\ ga\ bo'linadigan\ sonlar\ 36\ ga\ qoldiqsiz\ bo'linadi.$ $7524:36 = 209.$ Javobi: E.

4. 624 ni qanday songa bo‘lganda, bo‘linma 41 ga, qoldiq esa 9 ga teng bo‘ladi?

A) 16 B) 17 C) 13 D) 15 E) 12

Yechilishi: $624 = 41n + 9 \Rightarrow n = \frac{624-9}{41} = 15.$

Javobi: D.

5. Uchta sonning o‘rta arifmetigi 30 ga, dastlabki ikkitasiniki esa 25 ga teng. Uchinchi sonni toping.

A) 44 B) 40 C) 45 D) 38 E) 36

Yechilishi: $\begin{cases} \frac{a+b+c}{3} = 30 \\ \frac{a+b}{2} = 25 \end{cases} \Rightarrow -\frac{a+b+c=90}{\underline{a+b=50}}{c=40}$. Javobi: B.

6. Mahsulotning narxi birinchi marta 25% ga, ikkinchi marta yangi bahosi yana 20% ga, oshirildi. Maxsulotning oxirgi bahosi necha foizga kamaytirilsa, uning narxi dastlabki narxiga teng bo‘ladi?

A) 45 B) 48 C) 50 D) $33\frac{1}{3}$ E) 42

Yechilishi: $(1{,}25x) \cdot 1{,}2 = 1{,}5x \Rightarrow 50\%$. Javobi: C.

7. 9,10,22 va 25 sonlari orasida nechta o‘zaro tub sonlar jufti bor?

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

Yechilishi: $(9; 10), (9; 22), (9; 25), (22; 25)$. Javobi: A.

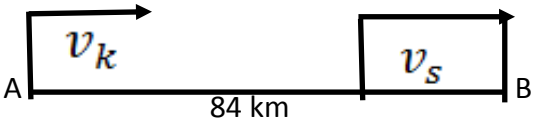
8. Daryodagi A va B pristanlar orasidagi masofa 84 km ga teng. Bir vaqtning o‘zida oqim bo‘ylab A pristandan kater (turg‘un suvdagi tezligi 21km/soat), B pristandan sol jo‘natildi. Agar daryo oqimining tezligi 3km/soat bo‘lsa, Qancha vaqtdan keyin kater solga yetib oladi?

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

Yechilishi: $S_k = (v_k + v_s)t = 24t; v_0 = v_s;$

$S_s = v_s \cdot t = 3t; \quad 24t = 84 + 3t \Rightarrow t = 4.$

Javobi: B.



9. Muayyan ishni bajarishga bir ishchi 3 soat, ikkinchi ishchi esa 6 soat vaqt sarflaydi. Birinchi ishchi 1 soat ishlaganidan keyin unga ikkinchi ishchi qo‘shildi. Ikkala ishchi birgalikda qolgan ishni necha soatda tugatishadi?

A) 2 $soat$ 30 min B) 1 $soat$ 40 min C) 1 $soat$ 20 min

D) 2 $soat$ E) 1 $soat$ 30 min

Yechilishi: $\left(\frac{1}{3} + \frac{1}{6}\right) t = 1 \Rightarrow t = 2. Demak, ikkala\ ishchi$

$birgalikda\ ishlashsa, butun\ ishni\ 2\ soatda\ bajarar\ edi.$

$$A - butun\ ish;\ \frac{1}{3}A - birinchi\ ishchi\ bajrgan\ ish;$$

$$A - \frac{1}{3}A = \frac{2}{3}A - qolgan\ ish;\ \ Uholda,$$

$$\begin{matrix} A - - - - - 2\ soatda \\ \frac{2}{3}A - - - - - t_1\ soatda \end{matrix} \Rightarrow t_1 \cdot A = 2 \cdot \frac{2}{3}A \Rightarrow t_1 = \frac{4}{3}$$

$$= 1\frac{1}{3} =$$

$= 1soat. 20min.$ Javobi: C.

10. Agar $a^2 + 3ab + b^2 = 44$ va $a^2 + ab + b^2 = 28$ ga teng bo‘lsa, $a^2 - ab + b^2$ ning qiymati nechaga teng bo‘ladi?

A) 14 B) 18 C) 12 D) 19 E) 16

Yechilishi: $-\begin{matrix}a^2+3ab+b^2=44\\ a^2+ab+b^2=28\end{matrix} \Rightarrow 2ab = 16 \Rightarrow ab = 8.$

$a^2 + b^2 = 44 - 24 = 20;\ a^2 - ab + b^2 = 12.$ Javobi: C.

11. Agar $x + y + 2z = 13,\ x + 2y + z = 12$ va $2x + y + z = 11$ bo‘lsa, $x + y$ ning qiymati nechaga teng bo‘ladi?

A) 4 B) 6 C) 5 D) 3 E) 7

Yechilishi: $x + y + 2z = 13;\ +\begin{cases}x + 2y + z = 12\\ 2x + y + z = 11\end{cases}$

$$3x + 3y + 2z = 23 \Rightarrow 2z = 23 - 3x - 3y;$$

$$x + y + 23 - 3x - 3y = 13 \Rightarrow 2x + 2y = 10 \Rightarrow$$

$x + y = 5.$ Javobi: C.

12. Ildizlari $x^2 + px + q = 0$ tenglamaning ildizlariga teskari bo‘lgan tenglamani ko‘rsating.

A) $px^2 + qx + 1 = 0$ B) $qx^2 + px - 1 = 0$

C) $qx^2 + px + 1 = 0$ D) $qx^2 - px + 1 = 0$

E) $qx^2 - px - 1 = 0$

Yechilishi: $Berilgan\ tenglamaning\ ildizlari\ x_1\ va\ x_2$

$bo'lsa, ularga\ mos\ teskari\ ildizlar\ \frac{1}{x_1}\ va\ \frac{1}{x_2}\ bo'ladi.$

$$U\ holda, \left(x - \frac{1}{x_1}\right)\left(x - \frac{1}{x_2}\right) = 0 \Rightarrow$$

$$\Rightarrow x^2 - \frac{x}{x_2} - \frac{x}{x_1} + \frac{1}{x_1 x_2} = 0 \Rightarrow$$

$$\Rightarrow x^2 \cdot x_1 x_2 - x x_1 - x x_2 + 1 = 0 \Rightarrow$$

$$\Rightarrow x_1 x_2 \cdot x^2 - (x_1 + x_2) \cdot x + 1 = 0 \Rightarrow$$

$$\Rightarrow qx^2 - px + 1 = 0 \Rightarrow qx^2 + px + 1 = 0.$$

Javobi: C.

13. $(a^3 - 3a^2b + 3ab^2 - b^3)(a+b):\left(\frac{a^3+b^3}{a+b} - ab\right)$ ni soddalashtiring.

A) $b^2 - a^2$ B) $a^2 - b^2$ C) $(a-b)^2$

D) $(a+b)^2$ E) $a^2 + b^2$

Yechilishi:

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

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

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

$$=$$

$$= (a-b)^3 \cdot (a+b):(a^2-2ab+b^2) =$$

$= \frac{(a-b)^3(a+b)}{(a-b)^2} = a^2 - b^2$. Javobi: B.

14. $x^2 + px + q^2$ $(q \neq 0)$ tenglama p/q ning qanday qiymatlarida haqiqiy ildizlarga ega emas?

A) $[0;2]$ B) $(0;2]$ C) $[-2;2]$ D) $(-2;0)$ E) $(-2;2)$

Yechilishi: $p^2 - 4q^2 < 0 \Rightarrow p^2 < 4q^2 \Rightarrow \frac{p^2}{q^2} < 4 \Rightarrow$

$\Rightarrow \left|\frac{p}{q}\right| < 2 \Rightarrow -2 < \frac{p}{q} < 2$. Javobi: E.

15. $2x^2 - 3x - 2 = 0$ va $2x^2 - 5x + 2 = 0$ tenglamaning umumiy ildizi 5 dan qancha kam?

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

Yechilishi: $x_{1,2}=\frac{3\pm\sqrt{9+4\cdot2\cdot2}}{2\cdot2}=\frac{3\pm5}{4}\Rightarrow\begin{cases}x_1=-\frac{1}{2}\\x_2=2\end{cases}\Rightarrow$

$$\Rightarrow x_{1,2}=\frac{5\pm\sqrt{25-4\cdot2\cdot2}}{2\cdot2}=\frac{5\pm3}{4}$$

$$\Rightarrow\begin{cases}x_1=\frac{1}{2};\\x_2=2\end{cases}\ 5-x_2=3.$$

Javobi: D.

16. $\sqrt[3]{x^3+19}=x+1$ tenglama katta ildizining kichik ildiziga nisbatini toping.

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

Yechilishi: $\sqrt[3]{x^3+19}=x+1\Rightarrow$

$$\Rightarrow x^3+19=x^3+3x^2+3x+1\Rightarrow$$

$$\Rightarrow 3x^2+3x-18=0\Rightarrow x^2+x-6=0;$$

$x_1=-3;\ x_2=2;\ \frac{x_2}{x_1}=-\frac{2}{3}$. Javobi: B.

17. Koordinat boshidan $y=x^2$ va $y=\frac{1}{x}$ funksiyalarning grafiklari kesishgan nuqtagacha bo‘lgan masofani toping.

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

Yechilishi: $\begin{cases}y=x^2\\y=\frac{1}{x}\end{cases}\Rightarrow x^2=\frac{1}{x}\Rightarrow x^3=1\Rightarrow x=1\Rightarrow$

$\Rightarrow y=1;\quad O(0;0),\qquad A(1;1);\ \left|\overrightarrow{OA}\right|=\sqrt{1+1}=\sqrt{2}.$

Javobi: C.

18. $\frac{\sqrt[4]{3+2\sqrt{2}}}{\sqrt{\sqrt{2}+1}}$ ni hisoblang.

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

Yechilishi: $\frac{\sqrt[4]{3+2\sqrt{2}}}{\sqrt{\sqrt{2}+1}} = \frac{\sqrt[4]{\left(\sqrt{2}+1\right)^2}}{\sqrt[4]{\left(\sqrt{2}+1\right)^2}} = 1.$ Javobi: E.

19. $n^2(n^2-n-6) \le 0$ tengsizlik o‘rinli bo‘ladigan n ning barcha natural qiymatlari yig‘indisini toping.

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

Yechilishi: $n^2(n^2-n-6) \le 0 \Rightarrow n^2-n-6 \le 0 \Rightarrow$

$$\Rightarrow n_{1,2} = \frac{1}{2} \pm \sqrt{\frac{1}{4}+6} = \frac{1}{2} \pm \frac{5}{2}$$

$$\Rightarrow \begin{cases} n_1 = -2 \\ n_2 = 3 \end{cases}; \ 1+2+3 = 6.$$

Javobi: E.

20. Agar $\begin{cases} (x-2)^2 + |y| = 4 \\ |x-2| + |y| = 2 \end{cases}$ bo‘lsa, $x+y$ ning qiymatini toping.

A) 4 $yoki$ 2 $yoki$ 0 B) 0 $yoki$ 3 C) 2 $yoki$ 4

D) 0 $yoki$ 4 E) 3 $yoki$ 4

Yechilishi: $\begin{cases} (x-2)^2 + |y| = 4 \\ |x-2| + |y| = 2 \end{cases} \Rightarrow (x-2)^2 = |x-2|^2 \Rightarrow$

$$\Rightarrow -\begin{cases} |x-2|^2 + |y| = 4 \\ |x-2| + |y| = 2 \end{cases} \Rightarrow \begin{cases} |x-2|^2 - |x-2| = 2; \\ |y| = 2 - |x-2|; \\ |y| = 4 - |x-2|^2. \end{cases}$$

$$|x-2|=t \Rightarrow t^2-t-2=0 \Rightarrow \begin{cases} t_1=-1 \\ t_2=2 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} |x-2| \neq -1 \\ |x-2|=2 \end{cases} \Rightarrow \begin{cases} -x+2=2 \\ x-2=2 \end{cases} \Rightarrow \begin{cases} x=0; \\ x=4. \end{cases}$$

$$\begin{cases} x=0 \Rightarrow \begin{cases} |y|=2-|0-2|=0; \\ |y|=4-|0-2|^2=0; \end{cases} \Rightarrow \begin{cases} x=0; \\ y=0; \end{cases} \\ x=4 \Rightarrow \begin{cases} |y|=2-|4-2|=0; \\ |y|=4-|4-2|^2=0. \end{cases} \Rightarrow \begin{cases} x=4; \\ y=0; \end{cases} \end{cases} \Rightarrow$$

$\Rightarrow x+y=0 \; yoki \; 4.$ Javobi: D.

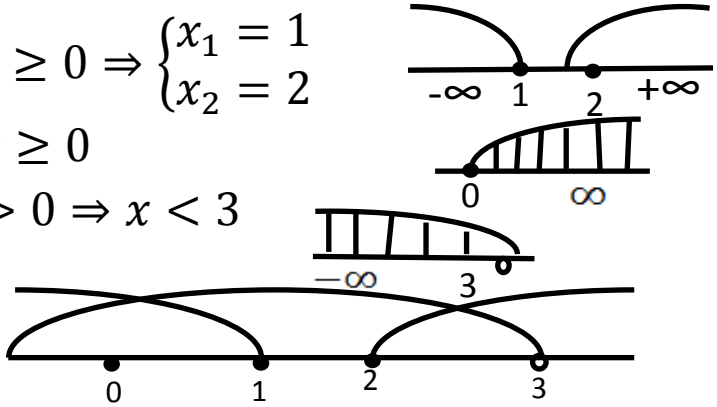
21. $y=\frac{\sqrt{x^2-3x+2}+\sqrt{x}}{\sqrt{3-x}}$ funksiyaning aniqlanish sohasini toping.

A) $(0;1)[2;3]$ B) $[0;1)(2;3)$ C) $(0;1)(2;3)$

D) $[0;1][2;3)$ E) $[2;3)$

Yechilishi: $y=\frac{\sqrt{x^2-3x+2}+\sqrt{x}}{\sqrt{3-x}} \Rightarrow$

$$\Rightarrow \begin{cases} x^2-3x+2 \geq 0 \Rightarrow \begin{cases} x_1=1 \\ x_2=2 \end{cases} \\ x \geq 0 \\ \sqrt{3-x}>0 \Rightarrow x<3 \end{cases}$$



$[0;1] \cup [2;3)$.

Javobi: D.

22. a ning qanday qiymatida $y=x^2-4x+12-a$ parabolaning uchi $M(2;4)$ nuqtada yotadi?

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

Yechilishi: $y=x^2-4x+12-a; \quad M(2;4)$

$4=2^2-4\cdot 2+12-a \Rightarrow a=4.$ Javobi: C.

23. $\sqrt{x^2-16} < \sqrt{4x+16}$ tengsizlikning eng katta butun va eng kichik butun yechimlari ayirmasini toping.

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

Yechilishi: $\sqrt{x^2-16} < \sqrt{4x+16} \Rightarrow x^2-16 < 4x+16 \Rightarrow$

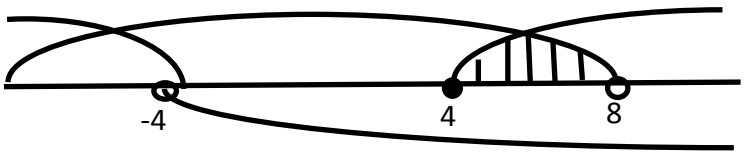
$$\Rightarrow x^2-4x-32 < 0 \Rightarrow x_{1,2} = \frac{4 \pm \sqrt{16+4\cdot 1\cdot 32}}{2\cdot 1}$$

$$= \begin{cases} x_1 = -4 \\ x_2 = 8 \end{cases} \Rightarrow$$

$$\Rightarrow 1) x^2-16 \geq 0 \Rightarrow x^2 \geq 16;\ |x| \geq 4 \Rightarrow$$

$$\Rightarrow (-\infty;-4] \cup [4;+\infty); \quad 2)\ 4x+16 \geq 0 \Rightarrow x \geq -4.$$

$[4;8) \Rightarrow 7-4=3.$



Javobi: D.

24. $2sin^2x + \sqrt{3}cos2x$ ifodaning eng kichik qiymatini toping.

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

Yechilishi: $y = 2sin^2x + \sqrt{3}cos2x;$

$$y' = 2\cdot 2sinxcosx - 2\sqrt{3}sin2x = sin2x\left(2-2\sqrt{3}\right) \Rightarrow$$

$$\Rightarrow sin2x\left(2-2\sqrt{3}\right) = 0 \Rightarrow sin2x = 0 \Rightarrow 2x = \pi k \Rightarrow$$

$$\Rightarrow x = \frac{\pi}{2};\ y = 2\cdot\left(sin\frac{\pi}{2}\right)^2 + \sqrt{3}cos2\cdot\frac{\pi}{2} = 2-\sqrt{3}.$$

Javobi: C.

25. Arifmetik progressiyaning birinchi va to‘qqizinchi hadlari yig‘indisi 64 ga teng. Shu progressiyaning dastlabki to‘qqista hadlari yig‘indisi va beshinchi hadi ayirmasini toping.

A) 256 B) 260 C) 270 D) 208 E) 180

Yechilishi: $a_1 + a_9 = 64$; $S_9 - a_5 = ?$

$$S_9 = \frac{64}{2} \cdot 9 = 288; \quad a_1, a_2, \dots, a_5, \dots, a_8, a_9 \Rightarrow a_5 = 32;$$

$S_9 - a_5 = 288 - 32 = 256$. Javobi: A.

26. Barcha hadlari musbat bo‘lgan geometrik progressiyaning birinchi hadi 2 ga, beshinchi hadi 18 ga teng. Shu progressiyaning beshinchi va uchinchi hadlari ayirmasini toping.

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

Yechilishi: $b_1 = 2$; $b_5 = 8$; $b_n = b_1 q^{n-1} \Rightarrow b_5 = b_1 q^4$

$$\Rightarrow 18 = 2 \cdot q^4 \Rightarrow q^4 = 9 \Rightarrow |q| = \sqrt{3} \Rightarrow q = \pm\sqrt{3} \Rightarrow$$

$$\Rightarrow q = \sqrt{3}; \quad b_3 = b_1 q^2 = 2 \cdot 3 = 6; \quad b_5 - b_3 = 12.$$

Javobi: B.

27. $sin\left(\frac{\pi}{2} - arccos\frac{3}{5}\right)$ ni hisoblang.

A) 0,8 B) 0,4 C) 0,7 D) 0,5 E) 0,6

Yechilishi: $sin\left(\frac{\pi}{2} - arccos\frac{3}{5}\right) = cosarccos\frac{3}{5} = \frac{3}{5}$.

Javobi: E.

28. Tengsizliklarni qaysi biri noto‘g‘ri?

A) $sin65° > cos35°$ B) $tg17° < ctg27°$

C) $cos15° > cos35°$ D) $cos40° > sin80°$

E) $ctg14° < tg80°$

Yechilishi: $Burchakning\ qiymati\ ortgan\ sari\ cosx$

$bilan\ ctgx\ ning\ qiymati\ kamayib, sinx\ bilan\ tgx\ ning\ qiymati\ ortib\ boradi.\ \ sin(90° - 25°) > cos35° \Rightarrow$

$\Rightarrow cos25° > cos35°;$

$sin(90° - 25°) > cos35° \Rightarrow cos25° > cos35°;$

$tg(90° - 73°) < ctg27° \Rightarrow ctg73° < ctg27°;$

$cos(90° - 50°) > sin80° \Rightarrow sin50° > sin80°.$ Javobi: D.

29. $\frac{1+cos2\alpha+cos^2\alpha}{sin^2\alpha}$ ni soddalashtiring.

A) $3ctg^2\alpha$ B) $3tg^2\alpha$ C) $1{,}5ctg^2\alpha$ D) $1{,}5tg^2\alpha$ E) $ctg^2\alpha$

Yechilishi: $\frac{1+cos2\alpha+cos^2\alpha}{sin^2\alpha} =$

$= \frac{sin^2\alpha+cos^2\alpha+cos^2\alpha-sin^2\alpha+cos^2\alpha}{sin^2\alpha} = 3ctg^2\alpha.$ Javobi: A.

30. Agar $sin\alpha cos\beta = 1$ va $sin\beta cos\alpha = \frac{1}{2}$ bo‘lsa, $\alpha - \beta$ ning qiymatini toping.

A) $(-1)^k \frac{\pi}{4} + \pi k,\ k\epsilon Z,$ B) $(-1)^k \frac{\pi}{4} + 2\pi k,\ k\epsilon Z,$

C) $(-1)^k \frac{\pi}{3} + 2\pi k,\ k\epsilon Z,$ D) $(-1)^k \frac{\pi}{3} + \pi k,\ k\epsilon Z,$

E) $(-1)^k \frac{\pi}{6} + \pi k,\ k\epsilon Z,$

Yechilishi: $\begin{matrix} sin\alpha cos\beta = 1 \\ cos\alpha sin\beta = \frac{1}{2} \end{matrix} \Rightarrow sin\alpha cos\beta - cos\alpha sin\beta = \frac{1}{2};$

$sin(\alpha - \beta) = \frac{1}{2} \Rightarrow \alpha - \beta = (-1)^k \frac{\pi}{6} + \pi k.$ Javobi: E.

31. $2\log_2 3 \cdot \log_3 2 \cdot \log_3 \frac{1}{81}$ ni hisoblang.

A) -6 B) -9 C) -4 D) -8 E) -5

Yechilishi: $2\log_2 3 \cdot \log_3 2 \cdot \log_3 3^{-4} =$

$= 2 \cdot \log_2 3 \cdot \frac{1}{\log_2 3} \cdot (-4) \cdot 1 = -8$. Javobi: D.

32. $n = \log_{\frac{1}{2}} 4 + \log_{\frac{1}{2}} 2$; $m = \log_{\frac{1}{3}} 15 - \log_{\frac{1}{3}} 5$ va $p = \ln e^{-2}$ sonlarni kamayish tartibida joylashtiring.

A) $p > m > n$ B) $m > n > p$ C) $n > p > m$

D) $p > n > m$ E) $m > p > n$

Yechilishi:

$$\begin{cases} n = 2\log_{\frac{1}{2}} 2 + \log_{\frac{1}{2}} 2 = 3\log_{\frac{1}{2}} 2 = 3\log_{2^{-1}} 2 = -3; \\ m = \log_{\frac{1}{3}} 3 + \log_{\frac{1}{3}} 5 - \log_{\frac{1}{3}} 5 = -1; \\ p = -2. \end{cases} \Rightarrow$$

$\Rightarrow m > p > n$. Javobi: E.

33. a ning qanday qiymatlarida $\lg x + \lg(x-6) = \lg(-a)$ tenglama bitta ildizga ega?

A) 9 B) 8 C) 7 D) 6 E) $\emptyset$

Yechilishi: $\lg x + \lg(x-6) = \lg(-a) \Rightarrow a < 0$;

$$\lg(x^2 - 6x) = \lg(-a) \Rightarrow x^2 - 6x + a = 0 \Rightarrow$$

$\Rightarrow (-6)^2 - 4 \cdot 1 \cdot a = 0 \Rightarrow 4a = 36 \Rightarrow a = 9$. Javobi: E.

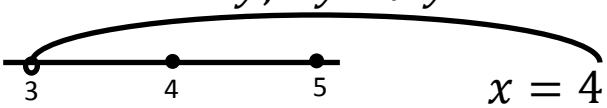
34. $2^{\log_2(x-3)} + (x-3)^2 < 6$ tengsizlikning eng kichik yechimi 15 dan qancha kam?

A) 10 B) 9 C) 11 D) 8 E) 14

Yechilishi: $2^{\log_2(x-3)} + (x-3)^2 < 6$;

1) $x - 3 > 0 \Rightarrow x > 3$; $(x-3)^2 + (x-3) - 6 < 0$;

$x-3=y;\quad y^2+y-6=0 \Rightarrow \begin{cases} y_1=-3 \\ y_2=2 \end{cases} \Rightarrow \begin{cases} x_1=0; \\ x_2=5. \end{cases}$



$x=4 \Rightarrow 15-4=11.$ Javobi: C.

35. $f(x)=3^{1+x}+3^{1-x}$ funksiyaning eng kichik qiymatini toping.

A) 9 B) 4 C) 8 D) 6 E) 5

Yechilishi: $f(x)=3^{1+x}+3^{1-x}=$

$$=f'(x)=3\cdot 3^x\cdot \ln 3+3\cdot 3^{-x}\ln 3\cdot(-1)=$$

$$=3\ln 3\,(3^x-3^{-x}) \Rightarrow 3^x-3^{-x}=0 \Rightarrow$$

$$\Rightarrow 3^x=3^{-x} \Rightarrow x=-x \Rightarrow x=0;$$

$\Rightarrow f(0)=3^{1+0}+3^{1-0}=6.$ Javobi: D.

36. $2^{|x-5|+2x}=64$ tenglamani yeching.

A) 1,5 B) 1 C) 2 D) 0,5 E) 1,8

Yechilishi: $2^{|x-5|+2x}=64 \Rightarrow |x-5|+2x-6=0 \Rightarrow$

$\begin{cases} x-5+2x-6=0 \\ -x+5+2x-6=0 \end{cases} \Rightarrow \begin{cases} x=\frac{11}{3}\ \ chet\ ildiz; \\ x=1\ ildiz. \end{cases}$ Javobi: B.

37. $f(x)=\frac{2}{3}x^3-4x^2+3$ funksiya kamayadigan oraliqdagi barcha butun qiymatlar yig‘indisini toping.

A) 9 B) 8 C) 10 D) 7 E) 11

Yechilishi: $f(x)=\frac{2}{3}x^3-4x^2+3 \Rightarrow f'(x)\le 0 \Rightarrow$

$$\Rightarrow 2x^2-8x\le 0 \Rightarrow 2x(x-4)\le 0 \Rightarrow \begin{cases} x=0; \\ x=4. \end{cases}$$

$0+1+2+3+4=10.$ Javobi: C.

38. Moddiy nuqta to‘g‘ri chiziq bo‘ylab

$S(t) = -\frac{1}{12}t^4 + \frac{2}{3}t^3 - \frac{3}{2}t^2$ qonuniyat bo‘yicha harakatlanayapti, harakat boshlangandan qancha sekund o‘tgach uning tezlanishi eng katta bo‘ladi?

A)1,5 B)2,5 C)3 D)1,75 E)2

Yechilishi: $S(t) = -\frac{1}{12}t^4 + \frac{2}{3}t^3 - \frac{3}{2}t^2 \Rightarrow$

$$\Rightarrow v = -\frac{1}{12}4t^3 + \frac{2}{3}3t^2 - \frac{3}{2}2t = -\frac{1}{3}t^3 + 2t^2 - 3t;$$

$$a = (v)' = -t^2 + 4t - 3 \Rightarrow t^2 - 4t + 3 = 0;$$

$$a' = -2t + 4 \Rightarrow -2t + 4 = 0 \Rightarrow t = 2;$$

$a = -2^2 + 4 \cdot 2 - 3 = 1$. Javobi: E.

39. $f(x) = \frac{1}{3}x^3 - 2x$ funksiyaning grafigiga o‘tkazilgan urinma OX o‘qining musbat yo‘nalishi bilan $135°$ burchak tshkil qiladi. Urinish nuqtasining koordinatalarini toping.

A) $\left(1; -1\frac{1}{3}\right)$ $yoki$ $\left(-1; 1\frac{2}{3}\right)$ B) $\left(1; -1\frac{1}{3}\right)$ C) $\left(1; -1\frac{2}{3}\right)$

D) $\left(2; -1\frac{1}{3}\right)$ E) $\left(-1; 1\frac{1}{3}\right)$ $yoki$ $\left(1; -1\frac{1}{3}\right)$

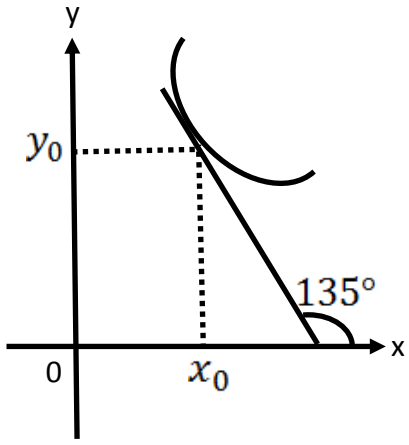
Yechilishi: $f(x) = \frac{1}{3}x^3 - 2x \Rightarrow f'(x) = x^2 - 2;$

$(x_0; y_0)$ $urinish\ nuqta$

$f'(x_0) = {x_0}^2 - 2$

$tg135° = {x_0}^2 - 2$

$-1 = {x_0}^2 - 2 \Rightarrow {x_0}^2 = 1 \Rightarrow$



$$\Rightarrow \begin{cases} x_0 = -1 \Rightarrow y_0 = \frac{1}{3}(-1)^3 - 2(-1) = -\frac{1}{3} + 2 = 1\frac{2}{3} \\ x_0 = 1 \Rightarrow y_0 = \frac{1}{3} - 2 = \frac{1-6}{3} = -1\frac{2}{3} \end{cases}$$

$Demak,\ \left(-1;1\frac{2}{3}\right)\ yoki\ \left(1;-1\frac{2}{3}\right)$. Javobi: A.

40. $\int_{\frac{1}{2}}^{2}|x-1|dx$ ni hisoblang.

A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{8}$ D) $\frac{1}{4}$ E) $\frac{3}{2}$

Yechilishi: $\int_{\frac{1}{2}}^{2}|x-1|dx = |y=x-1| =$

$$= -\int_{\frac{1}{2}}^{1}(x-1)dx + \int_{1}^{2}(x-1)dx = y = x-1$$

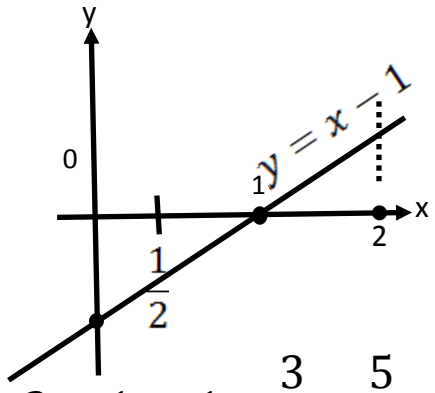
$$= -\int_{\frac{1}{2}}^{1} xdx + \int_{\frac{1}{2}}^{1} dx + \int_{1}^{2} xdx - \int_{1}^{2} dx =$$

$$= -\frac{x^2}{2}\Big|_{\frac{1}{2}}^{1} + x\Big|_{\frac{1}{2}}^{1} + \frac{x^2}{2}\Big|_{1}^{2} - x\Big|_{1}^{2} =$$

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

$$+\frac{1}{2}[2^2-1^2] - [2-1] =$$

$$= -\frac{1}{2}\left(1-\frac{1}{4}\right) + \frac{1}{2} + \frac{3}{2} - 1 = -\frac{1}{2}\cdot\frac{3}{2} + 2 - 1 = 1 - \frac{3}{8} = \frac{5}{8}.$$

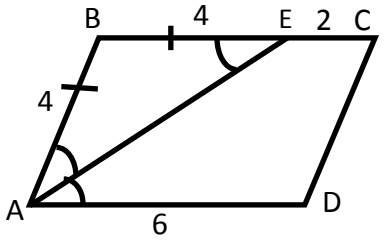


Javobi: C.

41. $ABCD$ paralelogrammning A burchagi 30° ga teng. A burchakning bissektrissasi BC tomonni E nuqtada kesib o‘tadi. Agar $BE = 4$ va $EC = 2$ bo‘lsa, paralelogrammning yuzini toping.

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

Yechilishi: $Uchburchakda\ teng\ burchaklar\ qarshisida\ teng\ tomonlar\ yotadi. U\ holda,$



$S_p = 4 \cdot 6 \cdot sin30° = 12$. Javobi: D.

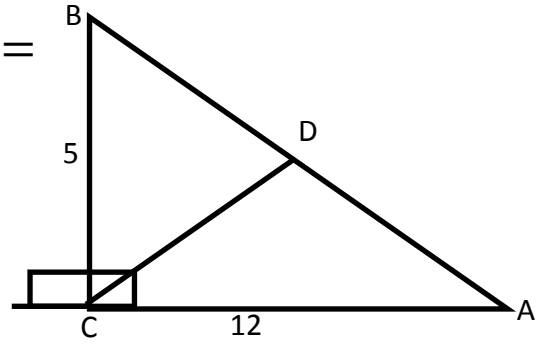
42. ABC uchburchakning C uchidagi tashqi burchagi 90° ga teng. Agar $CA = 12$ va $CB = 5$ bo‘lsa, AB tomoniga tushirilgan CD mediananing uzunligini toping.

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

Yechilishi: $AB^2 = 144 + 25 =$

$= 169 \Rightarrow AB = 13;$

$CD = 6{,}5$. Javobi: B.



43. Muntazam oltiburchakning tomoni $4\sqrt{3}$ ga teng. Shu oltiburchakka ichki va tashqi chizilgan aylanalar orasidagi yuzani toping.

A) 12π B) 10π C) 11π D) 13π E) 8π

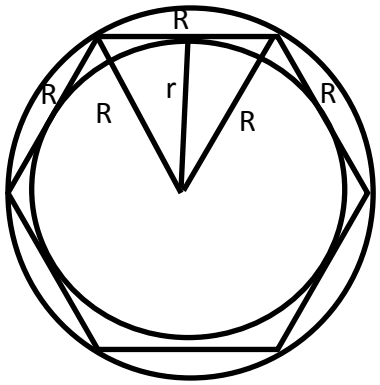
Yechilishi: $a = R = 4\sqrt{3};$

1) $S_1 = \pi R^2 = \pi\left(4\sqrt{3}\right)^2 = 48\pi;$

2) $r^2 = R^2 - \left(\frac{R}{2}\right)^2 = 48 - 12 = 36 \Rightarrow$

$\Rightarrow r = 6 \Rightarrow S_2 = 36\pi;$

$S_1 - S_2 = 12\pi$. Javobi: A.



44. Agar $(\vec{m} - 2\vec{n})^2 + (\vec{m} + \vec{n})^2 = 73$; $|\vec{m}| = 2\sqrt{2}$ va $|\vec{n}| = 3$ bo‘lsa, $\vec{m}$ va $\vec{n}$ vektorlar orasidagi burchakni toping.

A) 120° B) 130° C) 128° D) 150° E) 135°

Yechilishi: $(\vec{m} - 2\vec{n})^2 + (\vec{m} + \vec{n})^2 = 73;$

$$|\vec{m}|^2 - 4\vec{m}\vec{n} + 4|\vec{n}|^2 + |\vec{m}|^2 + 2\vec{m}\vec{n} + |\vec{n}|^2 =$$

$$= 2|\vec{m}|^2 + 5|\vec{n}|^2 - 2\vec{m}\vec{n} = 73 \Rightarrow$$

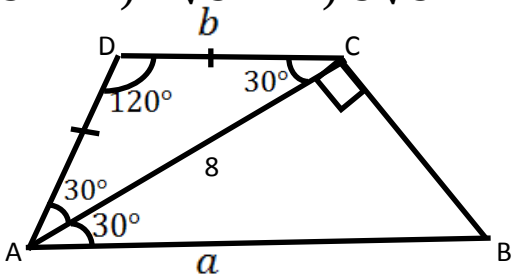
$$\Rightarrow 2 \cdot \left(2\sqrt{2}\right)^2 + 5 \cdot 3^2 - 2 \cdot |\vec{m}| \cdot |\vec{n}| cos(\vec{m}, \hat{}\vec{n}) = 73 \Rightarrow$$

$$\Rightarrow 16 + 45 - 2 \cdot 2\sqrt{2} \cdot 3cos(\vec{m}, \hat{}\vec{n}) = 73 \Rightarrow$$

$\Rightarrow 12\sqrt{2}cos(\vec{m}, \hat{}\vec{n}) = -12 \Rightarrow cos(\vec{m}, \hat{}\vec{n}) = -\frac{\sqrt{2}}{2} \Rightarrow$ $(\vec{m}, \hat{}\vec{n}) \Rightarrow 135°$. Javobi: E.

45. $ABCD$ trapetsiyaning AC diagonali yon tomoniga perpendikulyar hamda DAB burchakning bissektrissasida yotadi. Agar $AC = 8$ va $\angle DAB = 60°$ bo‘lsa, trapetsiyaning o‘rta chizig‘ini toping.

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



Yechilishi: 1) $\frac{8}{a} = cos30° \Rightarrow$

$$\Rightarrow 8 = a \cdot \frac{\sqrt{3}}{2} \Rightarrow a = \frac{16}{\sqrt{3}};$$

2) $8^2 = b^2 + b^2 - 2b \cdot b \cdot cos120° \Rightarrow$

$$\Rightarrow 64 = 2b^2 - 2b^2 \cdot \left(-\frac{1}{2}\right) = 3b^2 \Rightarrow b^2 = \frac{64}{3} \Rightarrow b = \frac{8}{\sqrt{3}};$$

3) $MN = \frac{1}{2}(a + b) = \frac{1}{2}\left(\frac{16}{\sqrt{3}} + \frac{8}{\sqrt{3}}\right) = \frac{1}{2} \cdot \frac{24}{\sqrt{3}} = 4\sqrt{3}.$

Javobi: D.

46. $\begin{cases} x^2 - 3x - 4 \le 0 \\ x^2 - 6x + 8 \le 0 \end{cases}$ tengsizliklar sistemsining eng katta va eng kichik yechimlari yig‘indisini toping.

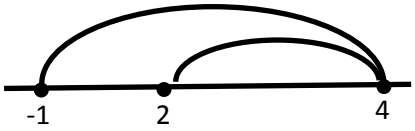
A) 3 B) 4 C) 5 D) 6 E) 7

Yechilishi: $\begin{matrix} x^2-3x-4\le 0 \\ x^2-6x+8\le 0 \\ 3x-12\le 0 \end{matrix} \Rightarrow x \le 4;$

$$1)\ x_{1,2} = \frac{3}{2} \pm \sqrt{\frac{9}{4}+4} = \frac{3}{2} \pm \frac{5}{2} \Rightarrow \begin{cases} x_1 = -1; \\ x_2 = 4. \end{cases}$$

$$2)\ x_{3,4} = 3 \pm \sqrt{9-8} = 3 \pm 1 \Rightarrow \begin{cases} x_3 = 2; \\ x_4 = 4. \end{cases}$$

3) $1) - va\ \ 2) - lardan$



$[2;4]$ *eng katta yechimi* 4, *eng kichik yechimi* 2, *shuning uchun,* $2+4=6.$

Javobi: D.

47. m ning qanday qiymatlarida $x^2 - 4mx + 48 = 0$ tenglamaning ildizlaridan biri boshqasidan 3 marta katta bo‘ladi?

A) 2 B) ± 4 C) ± 3 D) 4 E) ± 2

Yechilishi: $x^2 - 4mx + 48 = 0;$

$$x_1 = 2m - \sqrt{4m^2-48};\quad x_2 = 2m + \sqrt{4m^2-48};$$

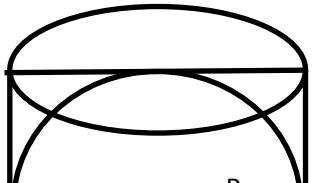
$$3x_1 = x_2 \Rightarrow 6m - 3\sqrt{4m^2-48} = 2m + \sqrt{4m^2-48} \Rightarrow$$

$$\Rightarrow 4m = 4\sqrt{4m^2-48} \Rightarrow m = \sqrt{4m^2-48} \Rightarrow$$

$\Rightarrow m^2 = 4m^2 - 48 \Rightarrow m = \pm 4.$ Javobi: B.

48. Teng tomonli silindrga shar ichki chizilgan. Agar sharning xajmi $10\frac{2}{3}\pi$ ga teng bo‘lsa, silindrning yon sirtini toping.

A) 12π B) 13π C) 16π D) 15π E) 17π



Yechilishi: $V = \frac{4}{3}\pi R^3$;

$\frac{32}{3}\pi = \frac{4}{3}\pi R^3$;

$R^3 = 8 \Rightarrow R = 2 \Rightarrow 2R = 4$;

$S_{yon} = 2\pi R \cdot H = 2\pi \cdot 2 \cdot 4 = 16\pi$.

Javobi: C.

49. Muntazam to‘rtburchakli prizmaga konus ichki chizilgan. Konusning asosi prizmaning ostki asosida, uchi esa prizma ustki asosining markazida yotadi.Prizma hajmining konus hajmiga nisbatini toping.

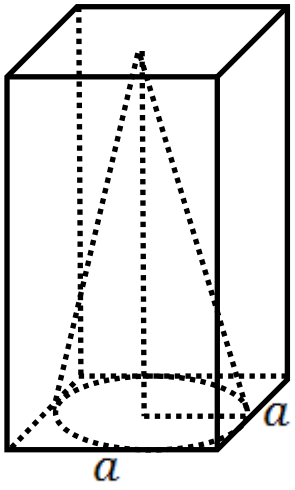
A) $\frac{8}{\pi}$ B) $\frac{9}{\pi}$ C) $\frac{12}{\pi}$ D) $\frac{10}{\pi}$ E) $\frac{7}{\pi}$

Yechilishi: $V_n = S_{asos} \cdot H = a^2 \cdot H$;

$V_k = \frac{1}{3}\pi R^2 H = \frac{1}{3}\pi \cdot \left(\frac{a}{2}\right)^2 \cdot H =$

$= \frac{\pi a^2 H}{12}$; $\frac{V_n}{V_k} = a^2 \cdot H \cdot \frac{12}{\pi a^2 H} = \frac{12}{\pi}$.

Javobi: C.



50. Tenglama $x^2 + y^2 + z^2 - 4x + 10z - 35 = 0$ bo‘lgan sferaning radiusi uzunligini toping.

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

Yechilishi: $x^2 + y^2 + z^2 - 4x + 10z - 35 = 0$;

$x^2 - 4x + 2^2 - 2^2 + y^2 + z^2 + 10z + 5^2 - 5^2 - 35 = 0$;

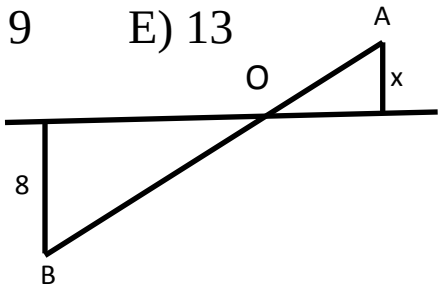
$(x-2)^2 + (y-0)^2 + (z+5)^2 - 4 - 25 - 35 = 0$;

$$(x-2)^2+(y-2)^2+(z+5)^2=8^2 \Rightarrow R=8.$$

Javobi: D.

51. AB kesma α tekislikni O nuqtada kesib o‘tadi. Agar $AO:OB=3:2$ bo‘lib, B nuqtadan α tekislikkacha bo‘lgan masofa 8 ga teng bo‘lsa, A nuqtadan tekislikkacha bo‘lgan masofani toping.

A) 11 B) 12 C) 10 D) 9 E) 13

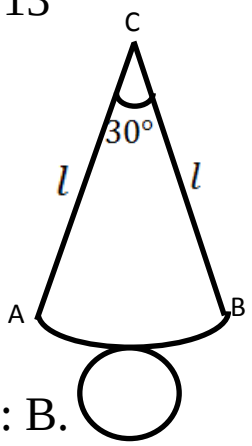


Yechilishi: $\frac{x}{8}=\frac{AO}{OB} \Rightarrow \frac{x}{8}=\frac{3}{2} \Rightarrow$

$\Rightarrow x=12$. Javobi: B.

52. Konusning yon sirti tekislikka yoyilganda, yoyilmaning uchidagi burchak 30° ga teng bo‘ldi. Konus yasovchisining asos radiusiga nisbatini toping.

A) 10 B) 12 C) 11 D) 9 E) 13



Yechilishi: 1) $\overset{\smile}{AB}=2\pi R-konus\ asosi\ aylanasi\ uzunligi$; 2) $l\ esa\ konusni\ yoyishdan\ hosil\ bo'lgan\ sektor\ radiusi$;

4) $c=\frac{\pi l n^{\circ}}{180^{\circ}}-sektor\ yoyi\ uzunligi$;

5)

4) $\overset{\smile}{AB}=C \Rightarrow 2\pi R=\frac{\pi\cdot l\cdot 30^{\circ}}{180^{\circ}} \Rightarrow \frac{l}{R}=12$. Javobi: B.

2000-YIL, 8- AXBOROTNOMA

1. 5 va 1 sonlar orasiga shu sonlar bilan arifmetik progressiya tashkil etadigan bir nechta son joylashtirildi. Agar bu sonlarning yig‘indisi 33 ga teng bo‘lsa, nechta had joylashtirilgan?

   A) 11 B) 10 C) 9 D) 12 E) 6

   Yechilishi: $5, a_2, a_3, \dots, a_{n-1}, 1;\ S_n = \frac{5+1}{2} \cdot n = 3n \Rightarrow$

$\Rightarrow 3n = 33 \Rightarrow n = 11.$ Javobi: A.

2. Kitob betlarini sahifalab chiqish uchun 1012 ta raqam ishlatildi. Agar sahifalash 3-betdan boshlangan bo‘lsa, kitob necha betlik?

   A) 374 B) 400 C) 506 D) 421 E) 434

   Yechilishi:

$$a_n = a_1 + d(n-1)\ formuladan\ foydalanib,$$

$$Bittadan\ raqam\ ishlatilgan:$$

$$3,4, \dots ,8,9 \Rightarrow 9 = 3 + n - 1 \Rightarrow n = 7\ bet;$$

$$Ikkitadan\ raqam\ ishlatilgan:$$

$$10, \dots ,99 \Rightarrow 99 = 10 + n - 1 \Rightarrow n = 90\ bet;$$

$$Qolgan\ raqamlar\ soni: 1012 - (7 + 90 \cdot 2) = 825;$$

$$Uchtadan\ raqam\ ishlatilgan\ betlar\ soni:$$

$$825:3 = 75\ bet.\ Jami: 275 + 90 + 7 + 2 = 374\ bet.$$

Javobi: A.

3. $3 * 470$ yozuvdagi yulduzchani shunday raqam bilan almashtiringki, hosil bo‘lgan son 45 ga qoldiqsiz bo‘linadi?

A) 4 B) 5 C) 0 D) 6 E) 8

Yechilishi: $3 * 470$ $bu\ son\ 45\ ga\ bo'linishi\ uchun\ 5\ va\ 9\ ga, bo'linishi\ kerak. Oxirgi\ raqami\ 0\ bo'lganligi\ uchun\ 5\ ga\ bo'linadi.\ 9\ ga\ \ bo'linishi\ uchun\ (*)o'rniga\ 4\ qo'yiladi. Chunki\ 34470\ sonining\ raqamlar\ yig'indisi\ 3+4+4+7+0=18\ soni\ 9\ ga\ bo'linadi.$ Javobi: A.

4. $5n^3 - 5n$ ifoda istalgan natural n da quyidagi sonlardan qaysi biriga qoldiqsiz bo‘linadi?

A) 30 B) 22 C) 25 D) 45 E) 60

Yechilishi: $5n^3 - 5n = 5n(n^2 - 1);\ \ n = 1,2, \ldots : 30.$

Javobi: A.

5. $(x^2 - 9)\sqrt{x+1} = 0$ tenglamani yeching.

A) $-1; 3$ B) ± 3 C) $\pm 3; 1$ D) 2 E) -3

Yechilishi: $(x^2 - 9)\sqrt{x+1} = 0 \Rightarrow$

$$\Rightarrow \begin{cases} x^2 = 9 \\ x + 1 = 0 \\ x + 1 \geq 0 \end{cases} \Rightarrow \begin{cases} x = \pm 3; \\ x = -1; \\ x \geq -1. \end{cases}$$ Javobi: A.

6. $x^{\log_3 x^2 + \log^2_3 x - 10} = \frac{1}{x^2}$ tenglamani yeching.

A) $1; 9; \frac{1}{81}$ B) $1; 9$ C) $1; \frac{1}{81}$ D) $9; \frac{1}{81}$ E) $4; 1; \frac{1}{81}$

Yechilishi: $x^{\log_3 x^2 + \log^2_3 x - 10} = \frac{1}{x^2};\ \ x > 0;\ \ x = 1;$

$$2\log_3 x + \log^2_3 x - 10 + 2 = 0;\ \ \log_3 x = y;$$

$$y^2 + 2y - 8 = 0 \Rightarrow y_{1,2} = -1 \pm \sqrt{1+8} = -1 \pm 3 \Rightarrow$$

$$\Rightarrow \begin{cases} y_1 = -4 \\ y_2 = 2 \end{cases} \Rightarrow \begin{cases} \log_3 x_1 = -4 \\ \log_3 x_2 = 2 \end{cases} \Rightarrow \begin{cases} x_1 = 3^{-4} = \dfrac{1}{81}; \\ x_2 = 9. \end{cases}$$

$Demak,\ 1; 9; \frac{1}{81}$. Javobi: A.

7. $x^6 - 65x^3 = -64$ tenglama haqiqiy ildizlarining yig‘indisini toping.

A) 5 B) 65 C) 64 D) 16 E) 1

Yechilishi: $x^6 - 65x^3 + 64 = 0;\ y = x^3;$

$$y^2 - 65y + 64 = 0 \Rightarrow y_{1,2} = \frac{65}{2} \pm \sqrt{\frac{4225}{4} - 64} =$$

$$= \frac{65}{2} \pm \frac{63}{2} \Rightarrow \begin{cases} y_1 = 1 \\ y_2 = 64 \end{cases} \Rightarrow \begin{cases} x^3 = 1 \\ x^3 = 64 \end{cases} \Rightarrow \begin{cases} x = 1; \\ x = 4. \end{cases}$$ Javobi: A.

8. O‘quvchiga testda 30 ta masala berildi. Har bir to‘g‘ri yechilgan masala uchun 7 ball berilib, noto‘g‘ri yechilgan har bir masala uchun 12 ball chegirildi. Agar o‘quvchi 77 ball to‘plagan bo‘lsa, u nechta masalani to‘g‘ri yechgan?

A) 23 B) 26 C) 21 D) 25 E) 19

Yechilishi: $7x - 12 \cdot (30 - x) = 77 \Rightarrow x = 23.$ Javobi: A.

9. x_1 va x_2 sonlari $3x^2 + 2x + b = 0$ tenglamaning ildizlari bo‘lib, $2x_1 = -3x_2$ ekanligi ma’lum bo‘lsa, b ning qiymatini toping.

A) -8 B) 6 C) 4 D) -3 E) 2

Yechilishi: $3x^2 + 2x + b = 0 \Rightarrow x^2 + \frac{2}{3}x + \frac{b}{3} = 0;$

$$\begin{cases} x_1 + x_2 = -\dfrac{2}{3} \\ x_1 \cdot x_2 = \dfrac{b}{3} \end{cases} \Rightarrow -3x_1 - 3x_2 = 2 \Rightarrow -3x_1 + 2x_1 = 2 \Rightarrow$$

$$\Rightarrow x_1 = -2 \Rightarrow x_2 = -\frac{2}{3} + 2 = \frac{4}{3};\ -2 \cdot \frac{4}{3} = \frac{b}{3} \Rightarrow b = -8.$$

Javobi: A.

10. $\left(\frac{1}{2}\right)^{2x-1} > \frac{1}{16}$ tengsizlikni yeching.

A) $(-\infty; 2{,}5)$ B)$(2{,}5; \infty)$ C) $(-\infty; 0)(0; 2{,}5)$

D) $(-2{,}5; \infty)$ E)$(2{,}5)$

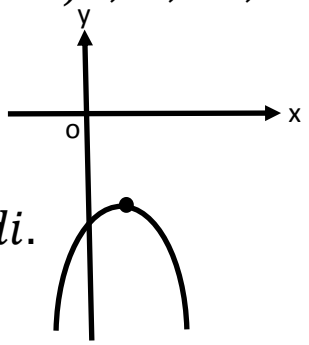
Yechilishi: $\left(\frac{1}{2}\right)^{2x-1} > \left(\frac{1}{2}\right)^{4} \Rightarrow \left|0 < \frac{1}{2} < 1\right| \Rightarrow$

$\Rightarrow 2x - 1 < 4 \Rightarrow x < 2{,}5.$ Javobi: A.

11. $f(x) = -4x^2 + 2x - 1$ funksiyaning grafigi koordinatalar tekisligining qaysi chorallaridaida joylashgan?

A) $III; IV$ B) $I; II; III$ C) $I; III$ D) $II; IV$ E) $I; II; III; IV$

Yechilishi: $f(x) = -4x^2 + 2x - 1;$



$Parabola\ uchining\ koordinatalari$

$topiladi\ va\ a = -4 < 0\ e'tiborga\ olinadi.$

$$x = -\frac{b}{2a} = -\frac{2}{2 \cdot (-4)} = \frac{1}{4};$$

$y = -\frac{b^2 - 4ac}{4a} = -\frac{4 - 4 \cdot (-4)(-1)}{4(-4)} = -\frac{5}{4}.$ Javobi: A.

12. $x^3 + 3x^2 - 4x - 12 = 0$ tenglama ildizlarining yig‘indisini toping.

A) -3 B) -7 C) 4 D) 12 E) 0

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

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

$\Rightarrow (x+3)(x-2)(x+2) = 0;$ $x_1 = -3,\ x_2 = -2,$

$x_3 = 2;\ x_1 + x_2 + x_3 = -3.$ Javobi: A.

13. $|x-2| < 5$ tengsizlikning butun yechimlari yig‘indisini toping.

A) 18 B) 21 C) 20 D) 19 E) 15

Yechilishi: $|x-2| < 5 \Rightarrow -5 < x-2 < 5 \Rightarrow -3 < x < 7;$

$-2 + (-1) + 0 + 1 + 2 + 3 + 4 + 5 + 6 = 18.$ Javobi: A.

14. $\begin{cases} xy = 6 \\ yz = 12 \\ zx = 8 \end{cases}$ bo‘lsa, $x + y + z$ ning qiymatini toping.

A) $-9\ yoki\ 9$ B) 18 C) 0 D) 36 E) 26

Yechilishi: $\begin{cases} xy = 6 \\ yz = 12 \\ zx = 8 \end{cases} \Rightarrow \begin{cases} y = \frac{6}{x} \\ \frac{6}{x} \cdot z = 12 \\ zx = 8 \end{cases} \Rightarrow \begin{cases} y = \frac{6}{x} \\ z = 2x \\ 2x^2 = 8 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} y = \frac{6}{x} \\ z = 2x \\ x^2 = 4 \end{cases} \Rightarrow \begin{cases} y = \pm 3 \\ z = \pm 4 \\ x = \pm 2 \end{cases} \Rightarrow x + y + z = \pm 9.$ Javobi: A.

15. $\log_2(9^{x-1} + 7) = 2\log_2(3^{x-1} + 1)$ tenglamani yeching.

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

Yechilishi: $\log_2(9^{x-1} + 7) = 2\log_2(3^{x-1} + 1);$

$$3^{2(x-1)} + 7 = (3^{x-1} + 1)^2;$$

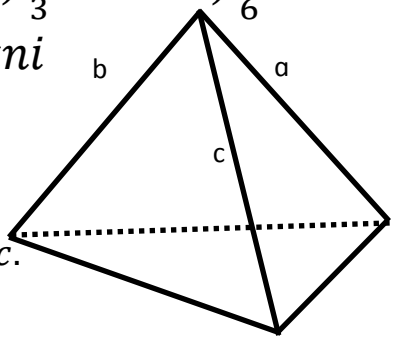
$$3^{2(x-1)} + 7 = 3^{2(x-1)} + 2 \cdot 3^{x-1} + 1;$$

$2 \cdot 3^{x-1} = 6 \Rightarrow 3^{x-1} = 3 \Rightarrow x = 2.$ Javobi: A.

16. Uchburchakli piramidaning yon qirralari o‘zaro perpendikulyar hamda uzunliklari a, b va c ga teng. Piramidaning hajmini toping.

A) $\frac{1}{6}abc$ B) $\frac{1}{3}abcsin\alpha$ C) $\frac{1}{3}a^2b$ D) $\frac{1}{3}abc$ E) $\frac{1}{6}a^2c$

Yechilishi: *b va c katetli uchburchakni piramida asosi deb olinsa, a tomon balandlik bo'ladi. U holda,*



$S_{asos} = \frac{1}{2}bc. V = \frac{1}{3}S_{asos} \cdot H = \frac{1}{3} \cdot \frac{1}{2}bc \cdot a = \frac{1}{6}abc.$

Javobi: A.

17. To‘g‘ri paralellepiped asosining tomonlari $2\sqrt{2}$ va 5 cm bo‘lib, o‘zaro $45°$ li burchak tashkil qiladi. Paralellepipedning kichik diagonali 7 cm. Uning hajmi necha cm^3 bo‘ladi?

A) 60 B) 120 C) 80 D) 90 E) 100

Yechilishi: $S_{asos} = 2\sqrt{2} \cdot 5sin45° =$

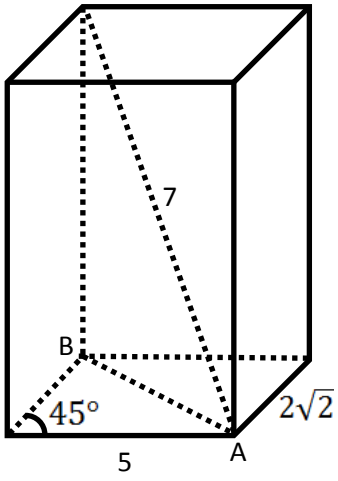
$$= 10\sqrt{2} \cdot \frac{\sqrt{2}}{2} = 10;$$

$$AB^2 = 5^2 + \left(2\sqrt{2}\right)^2 - 2 \cdot 5 \cdot 2\sqrt{2}cos45° =$$

$$= 25 + 8 - 20\sqrt{2} \cdot \frac{\sqrt{2}}{2} = 13;$$

$7^2 = H^2 + 13 \Rightarrow H^2 = 36 \Rightarrow H = 6;$

$V = S_{asos} \cdot H = 60\ (sm^3).$ Javobi: A.



18. Oktaedrning qirrasi a ga teng. Uning to‘la sirtini toping.

A) $2a^2\sqrt{3}$ B) $a^2\sqrt{3}$ C) $\frac{2\sqrt{3}}{3}a^2$ D) $4a^2\sqrt{3}$ E) $\frac{\sqrt{3}}{3}a^2$

Yechilishi: $S = 8 \cdot S_{\Delta} = 8 \cdot \frac{a^2\sqrt{3}}{4} = 2\sqrt{3}a^2$. Javobi: A.

19. Shar sirtining yuzi Q bo‘lsa, uning hajmi nimaga teng.

A) $\frac{Q\sqrt{Q}}{6\sqrt{\pi}}$ B) $\frac{1}{3}Q\pi$ C) $\frac{3\pi}{4}\sqrt{Q}$ D) $\frac{4}{3}Q\sqrt{Q}$ E) $\frac{\sqrt{Q\pi}}{6}$

Yechilishi: $4\pi R^2 = Q \Rightarrow R^2 = \frac{Q}{4\pi} \Rightarrow R = \sqrt{\frac{Q}{4\pi}};$

$V = \frac{4}{3}\pi R^3 = \frac{4\pi}{3} \cdot \frac{Q\sqrt{Q}}{8\pi\sqrt{\pi}} = \frac{Q\sqrt{Q}}{6\sqrt{\pi}}$. Javobi: A.

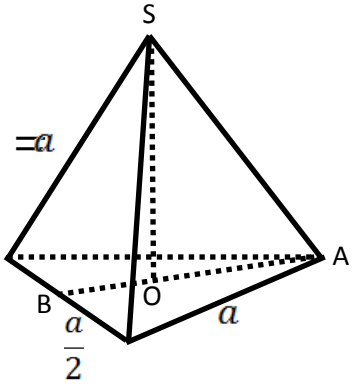
20. Qirrasining uzunligi a ga teng bo‘lgan muntazam tetraedrning hajmini toping.

A) $\frac{1}{12}a^3\sqrt{2}$ B) $\frac{1}{24}a^3$ C) $\frac{1}{12}a^3\sqrt{3}$

D) $\frac{1}{24}a^3\sqrt{3}$ D) $\frac{1}{24}a^3\sqrt{2}$

Yechilishi: $S_{\Delta} = \frac{a^2\sqrt{3}}{4}$; $AB^2 = a^2 - \frac{a^2}{4} = \frac{3a^2}{4} \Rightarrow$

$\Rightarrow AB = \frac{a\sqrt{3}}{2}$; $AO = \frac{2}{3}AB = \frac{a\sqrt{3}}{3}$;



$SO^2 = a^2 - AO^2 =$

$= a^2 - \frac{a^2 \cdot 3}{9} = \frac{2a^2}{3} \Rightarrow SO = \frac{\sqrt{2}}{\sqrt{3}}a;$

$V = \frac{1}{3} \cdot \frac{a^2\sqrt{3}}{4} \cdot \frac{\sqrt{2}}{\sqrt{3}}a = \frac{1}{12}a^3\sqrt{2}.$

Javobi: A.

21. $x^2 + y^2 - 4x - 6y - 12 \leq 0$ tengsizlik bilan berilgan figuraning yuzini hisoblang.

A) 25π B) 36π C) 20π D) 16π E) 40π

Yechilishi: $x^2 - 4x + 2^2 - 2^2 + y^2 - 6y + 3^2 - 3^2 - 12 \leq 0;$

$$(x-2)^2 + (y-3)^2 \leq 5^2 \Rightarrow R = 5;$$

$S = \pi R^2 = 25\pi$. Javobi: A.

22. Tenglamasi $x^2 + y^2 - 6x - 8y + 9 = 0$ bo‘lgan aylana markazidan koordinatalar boshigacha bo‘lgan masofa toping.

A) 5 B) 4 C) 3 D) 7 E) 6

Yechilishi: $x^2 - 6x + 3^2 - 3^2 + y^2 - 8y + 4^2 - 4^2 + 9 = 0 \Rightarrow$

$$\Rightarrow (x-3)^2 + (y-4)^2 = 4^2;\ \ A(3;4);\ \ O(0;0)$$

$\left|\overrightarrow{AO}\right| = \sqrt{3^2 + 4^2} = 5$. Javobi: A.

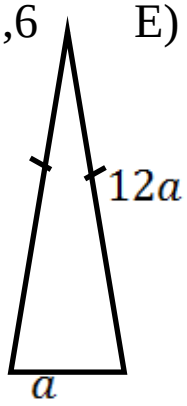
23. Teng yonli uchburchakning perimetri 10 ga teng, yon tomoni asosidan 12 marta uzun. Uchburchakning asosi qanchaga teng.

A) 0,4 B) 0,8 C) 0,5 D) 0,6 E) 0,7

Yechilishi: $P = 2 \cdot 12a + a \Rightarrow$

$\Rightarrow 10 = 25a \Rightarrow a = 0{,}4.$

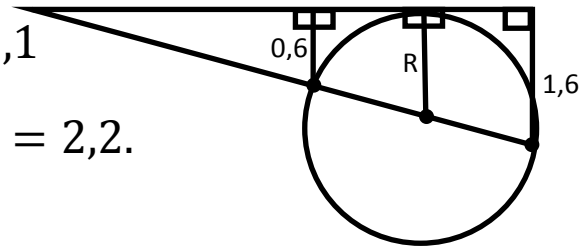
Javobi: A.



24. Aylana diametrining uchlaridan aylanaga o‘tkazilgan urinmagacha bo‘lgan masofalar 1,6 va 0,6 ga teng. Diametrining uzunligini toping.

A) 2,2 B) 1,8 C) 2 D) 2,4 E) 1,9

Yechilishi: $R = \frac{1,6+0,6}{2} = 1,1$



$$d = 2,2.$$

Javobi: A.

25. Agar $\sqrt{8-a} + \sqrt{5+a} = 5$ bo‘lsa, $\sqrt{(8-a)(5+a)}$ ning qiymatini toping.

A) 6 B) 20 C) 12 D) 10 E) 7

Yechilishi: $\sqrt{8-a} + \sqrt{5+a} = 5;$

$$8 - a + 2\sqrt{(8-a)(5+a)} + 5 + a = 25;$$

$\sqrt{(8-a)(5+a)} = 6.$ Javobi: A.

26. Agar $\sqrt{25-x^2} + \sqrt{15-x^2} = 5$ bo‘lsa,

$\sqrt{25-x^2} - \sqrt{15-x^2}$ ifodaning qiymatini toping.

A) 2 B) 3 C) 5 D) 6 E) 10

Yechilishi: $\sqrt{25-x^2} + \sqrt{15-x^2} = 5;$

$$\left(\sqrt{25-x^2} + \sqrt{15-x^2}\right)\left(\sqrt{25-x^2} - \sqrt{15-x^2}\right) =$$

$$= 5 \cdot \left(\sqrt{25-x^2} - \sqrt{15-x^2}\right) \Rightarrow$$

$$\Rightarrow 25 - x^2 - 15 + x^2 = 5\left(\sqrt{25-x^2} - \sqrt{15-x^2}\right) \Rightarrow$$

$\Rightarrow \sqrt{25-x^2} - \sqrt{15-x^2} = 2.$ Javobi: A.

27. $\sqrt{2+\sqrt{3}} \cdot \sqrt{2+\sqrt{2+\sqrt{3}}} \cdot \sqrt{2+\sqrt{2+\sqrt{2+\sqrt{3}}}} \cdot$

$\cdot\sqrt{2-\sqrt{2+\sqrt{2+\sqrt{3}}}}$ ni soddalashtiring.

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

Yechilishi: $\sqrt{2+\sqrt{3}}\cdot\sqrt{2+\sqrt{2+\sqrt{3}}}\cdot\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{3}}}}\cdot$

$$\cdot\sqrt{2-\sqrt{2+\sqrt{2+\sqrt{3}}}}=$$

$$=\sqrt{2+\sqrt{3}}\cdot\sqrt{2+\sqrt{2+\sqrt{3}}}\cdot\sqrt{4-2-\sqrt{2+\sqrt{3}}}=$$

$$=\sqrt{2+\sqrt{3}}\cdot\sqrt{2+\sqrt{2+\sqrt{3}}}\cdot\sqrt{2-\sqrt{2+\sqrt{3}}}=$$

$$=\sqrt{2+\sqrt{3}}\cdot\sqrt{4-2-\sqrt{3}}=\sqrt{2+\sqrt{3}}\cdot\sqrt{2-\sqrt{3}}=$$

$=\sqrt{4-3}=1$. Javobi: A.

28. $\sqrt{6-2\sqrt{5}}$ ni soddalashtiring.

A) $\sqrt{5}-1$ B) $1-\sqrt{5}$ C) $2-\sqrt{3}$ D) $1+\sqrt{5}$ E) $2-\sqrt{5}$

Yechilishi: $\sqrt{6-\sqrt{20}}=\sqrt{\frac{6+\sqrt{36-20}}{2}}-\sqrt{\frac{6-4}{2}}=\sqrt{5}-1.$

Javobi: A.

29. $1; \sqrt{2}; \sqrt[3]{3}$; va $\sqrt[4]{4}$ sonlarni o‘sish tartibida joylashtiring.

A) $1; \sqrt{2} = \sqrt[4]{4}; \sqrt[3]{3}$ B) $1; \sqrt[3]{3}\sqrt{2}; \sqrt[4]{4}$; C) $\sqrt[3]{3}; \sqrt{2} = \sqrt[4]{4}; 1$

D) $\sqrt{2} = \sqrt[4]{4}; \sqrt{3}; 1$ E) $\sqrt[3]{3}; 1; \sqrt[4]{4}; \sqrt{2}$

Yechilishi: *Bu sonlar katta idiz ko'rsatkichga darajaga ko'tarish orqali taqqoslanadi.*

$$\begin{cases} \left(\sqrt{2}\right)^3 = 2\sqrt{2} \\ \left(\sqrt[3]{3}\right)^3 = 3 \end{cases} \Rightarrow \sqrt{2} < \sqrt[3]{3};$$

$$\begin{cases} \left(\sqrt[3]{3}\right)^4 = 3\sqrt[3]{3} \\ \left(\sqrt[4]{4}\right)^4 = 4 \end{cases} \Rightarrow \begin{cases} \left(3\sqrt[3]{3}\right)^3; \sqrt[4]{4} = \sqrt[4]{2^2} = 2^{\frac{2}{4}} = 2^{\frac{1}{2}} = \sqrt{2}. \\ 4^3 = 64. \end{cases}$$

$1; \sqrt{2} = \sqrt[4]{4}; \sqrt[3]{3}$. Javobi: A.

30. Kasr surati va maxrajining yig‘indisi 23 ga teng. Surati maxrajidan 9 ta kam. Kasrni toping.

A) $\frac{7}{16}$ B) $\frac{8}{15}$ C) $\frac{16}{7}$ D) $\frac{10}{13}$ E) $\frac{11}{12}$

Yechilishi: $\frac{m}{n} \Rightarrow \begin{cases} m+n=23 \\ m+9=n \end{cases} \Rightarrow \begin{cases} + \\ m+n=23 \\ m-n=-9 \end{cases} \Rightarrow$

$\Rightarrow 2m = 14 \Rightarrow m = 7 \Rightarrow n = 16$. Javobi: A.

31. b ning qanday qiymatida $x^2 + \frac{2}{3}x + b$ uchhad to‘la kvadrat bo‘ladi?

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

Yechilishi: $x^2 + \frac{2}{3}x + b \Rightarrow$

$$\Rightarrow ax^2 + bx + c = a\left(x + \frac{b}{2a}\right) + \frac{4ac - b^2}{4a} \Rightarrow$$

$$\Rightarrow x^2+\frac{2}{3}x+b \Rightarrow \frac{4b-\frac{4}{9}}{4}=0 \Rightarrow b-\frac{1}{9}=0 \Rightarrow b=\frac{1}{9}.$$

Javobi: A.

32. x_1 va x_2 lar $3x^2-8x-15=0$ tenglamaning ildizlari bo‘lsa, $\frac{x_1}{x_2}+\frac{x_2}{x_1}$ ning qiymatini toping.

A) $-3\frac{19}{45}$ B) $-3\frac{1}{45}$ C) 5 D) $-\frac{8}{3}$ E) $-1\frac{11}{13}$

Yechilishi: $3x^2-8x-15=0 \Rightarrow$

$$\Rightarrow x^2-\frac{8}{3}x-5=0 \Rightarrow p=\frac{8}{3};\quad q=-5;$$

$$\frac{x_1}{x_2}+\frac{x_2}{x_1}=\frac{{x_1}^2+{x_2}^2}{x_1\cdot x_2}=\frac{(x_1+x_2)^2-2x_1x_2}{x_1\cdot x_2}$$

$$=\frac{(x_1+x_2)^2}{x_1\cdot x_2}-2=$$

$=\frac{\left(\frac{8}{3}\right)^2}{-5}-2=-\frac{64}{9}\cdot\frac{1}{5}-2=-\frac{64}{45}-2=-3\frac{19}{45}$. Javobi: A.

33. k ning $4y^2-3y+k=0$ tenglama haqiqiy ildizlarga ega bo‘lmaydigan eng kichik butun qiymatini toping.

A) 1 B) 3 C) 4 D) 5 E) 12

Yechilishi: $4y^2-3y+k=0 \Rightarrow b^2-4ac<0 \Rightarrow$

$\Rightarrow 9-4\cdot 4\cdot k<0 \Rightarrow k>\frac{9}{16} \Rightarrow k=1$. Javobi: A.

34. k ning qanday qiymatlarida

$x^2+2(k-9)x+k^2+3k+4$ ifodani to‘la kvadrat shaklida tasvirlab bo‘ladi?

A) $\frac{11}{3}$ B) 3 C) 4 D) $\frac{5}{7}$ E) $\frac{7}{9}$

Yechilishi: $To'la\ kvadratga\ ajratish\ formulasidan$

$$\frac{4ac-b^2}{4a}=0 \Rightarrow \frac{4(k^2+3k+4)-[2(k-9)]^2}{4}=0 \Rightarrow$$

$$\Rightarrow \frac{4(k^2+3k+4-k^2+18k-81)}{4}=0 \Rightarrow 21k=77 \Rightarrow k=\frac{11}{3}.$$

Javob: A.

35. a ning qanday qiymatlarida $x^2+ax+a-2=0$ tenglama ildizlari kvadratlarining yig‘indisi eng kichik bo‘ladi?

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

Yechilishi: $x^2+ax+a-2=0;\ \ p=-a;\ \ q=a-2;$

$$\begin{cases} x_1+x_2=-a \\ x_1\cdot x_2=a-2 \end{cases} \Rightarrow {x_1}^2+{x_2}^2+2x_1x_2=a^2 \Rightarrow$$

$$\Rightarrow {x_1}^2+{x_2}^2=a^2-2x_1x_2=a^2-2(a-2) \Rightarrow$$

$$\Rightarrow y=a^2-2a+4;\ \ y'=2a-2 \Rightarrow 2a-2=0 \Rightarrow$$

$\Rightarrow a=1.$ Javobi: A.

36. Agar maydonning har gektaridan 35sr dan bug‘doy xosili olinsa, planni bajarish uchun 20 t yetmaydi, agar har gektardan 42 sr dan hosil olinsa, plan 50 t oshirib bajariladi. Maydonning yuzi necha gekterga teng?

A) 100 B) 90 C) 110 D) 70 E) 84

Yechilishi: $\frac{-4,2x=a+50}{3,5x=a-20} \Rightarrow x=100.\ Bu\ yerda\ x-gektar,$

$a-reja\ deb\ belgilangan.$ Javobi: A.

37. $3x^2-6xm-9m^2$ ni ko‘paytuvchilarga ajrating.

A) $3(x+m)(x-3m)$ B)$(x-3m)^2$

C) $3(x-m)(x+3m)$ D) $(3x-m)^2$

E) $3(x-m)(x-3m)$

Yechilishi: $3x^2-6xm-9m^2=3(x^2-2xm-3m^2)\Rightarrow$

$\Rightarrow x_{1,2}=m\pm\sqrt{m^2+3m^2}=m\pm 2m\Rightarrow x_1=-m;$

$x_2=3m\Rightarrow 3(x+m)(x-3m)$. Javobi: A.

38. Agar $\lg 5=a,\ \lg 3=b$ bo‘lsa, $\log_{30}8$ ni toping.

A) $\frac{3-3a}{1+b}$ B)$\frac{3-3b}{1+a}$ C)$\frac{3(a-b)}{a+b}$ D)$\frac{b-1}{a+1}$ E)$\frac{a+1}{b-1}$

Yechilishi: $\lg 5=a,\ \lg 3=b;\ \log_{30}8=\frac{\lg 8}{\lg 30}=$

$$=\frac{\lg 2^3}{\lg 3\cdot 10}=\frac{3\lg 2}{\lg 3+\lg 10}=\frac{3\lg\frac{10}{5}}{b+1}=\frac{3(\lg 10-\lg 5)}{b+1}$$
$$=\frac{3-3a}{1+b}.$$

Javobi: A.

39. $\log_{\sqrt{5}}x+\log_{\sqrt[4]{5}}x+\log_{\sqrt[6]{5}}x+\cdots+\log_{\sqrt[16]{5}}x=36.$ tenglamani yeching.

A) $\sqrt{5}$ B) 5 C) 2 D) 10 E) $\sqrt{3}$

Yechilishi: $x>0;$

$$\log_{\sqrt{5}}x+\log_{\sqrt[4]{5}}x+\log_{\sqrt[6]{5}}x+\cdots+\log_{\sqrt[16]{5}}x=36\Rightarrow$$
$$\Rightarrow\log_{5^{\frac{1}{2}}}x+\cdots+\log_{5^{\frac{1}{16}}}x=36\Rightarrow$$
$$\Rightarrow 2\log_5 x+4\log_5 x+6\log_5 x+\cdots+16\log_5 x=36;$$
$$2,4,\ldots 16\Rightarrow 16=2+2(n-1)\Rightarrow n=8;$$

$S_8 = \frac{2+16}{2} \cdot 8 = 72 \Rightarrow 72.\ \log_5 x = 36 \Rightarrow \log_5 x = \frac{1}{2} \Rightarrow$

$\Rightarrow x = \sqrt{5} > 0.$ Javobi: A.

40. $3^{\log_3 x + \log_3 x^2 + \log_3 x^3 + \cdots + \log_3 x^8} = 27x^{30}.$

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

Yechilishi: $x > 0;$

$$3^{\log_3 x + \log_3 x^2 + \log_3 x^3 + \cdots + \log_3 x^8} = 27x^{30} \Rightarrow$$

$\Rightarrow 3^{\log_3 (x \cdot x^2 \cdot \ldots \cdot x^8)} = 27x^{30} \Rightarrow x^{36} = 27x^{30} \Rightarrow x^6 = 27 \Rightarrow$

$\Rightarrow (x^2)^3 = 3^3 \Rightarrow x^2 = 3 \Rightarrow x = \sqrt{3}.$ Javobi: A.

41. $\log_2 cos20° + \log_2 cos40° + \log_2 60° + \log_2 cos80°$ ni hisoblang.

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

Yechilishi:

$$\log_2 cos20° + \log_2 cos40° + \log_2 60° + \log_2 cos80° =$$

$$= \log_2 (cos20° \cdot cos40° \cdot cos80°) + \log_2 60° =$$

$$\left| cos\alpha° \cdot \cos(60 - \alpha)\, ° cos(60 + \alpha)° = \frac{1}{4} cos3\alpha \right|$$

$= \log_2 \frac{1}{8} + \log_2 \frac{1}{2} = \log_2 2^{-3} + \log_2 2^{-1} = -4.$ Javobi: A.

42. $\log_5 tg36° + \log_5 tg54°$ ni hisoblang.

A) 0 B) 1 C) $\sqrt{3}$ D) $\sqrt{2}$ E) $\emptyset$

Yechilishi: $\log_5 tg36° + \log_5 tg54° = \log_5 tg36° \cdot tg54° =$

$= \log_5 tg36° \cdot tg(90° - 36°) = \log_5 tg36° \cdot ctg36° = 0.$

Javobi: A.

43. $\sqrt{25^{\frac{1}{\log_6 5}} + 49^{\frac{1}{\log_8 7}}}$ ni hisoblang.

A) 10 B) $\sqrt{73}$ C) 1 D) 12 E) 14

Yechilishi: $\sqrt{25^{\frac{1}{\log_6 5}} + 49^{\frac{1}{\log_8 7}}} = \sqrt{5^{2\log_5 6} + 7^{2\log_7 8}} =$

$= \sqrt{36 + 64} = 10.$ javobi: A.

44. $36^{\log_6 5} + 10^{1-\lg 2} - 3^{\log_6 36}$ ni soddalashtiring.

A) 21 B) 43 C) 13 D) 1 E) 0

Yechilishi: $36^{\log_6 5} + 10^{1-\lg 2} - 3^{\log_6 36} =$

$$= 6^{2\log_5 6} + 10 \cdot 10^{-\lg 2} - 3^{\log_6 6^2} =$$

$$= 6^{\log_6 25} + \frac{10}{10^{\lg 2}} - 3^{2\log_6 6} = 25 + \frac{10}{2} - 9 = 21.$$

Javobi: A.

45. $|-2x + 1| > 5$ tengsizlikni yeching.

A) $(-\infty; -2) \cup (3; \infty)$ B)$(-2; 3)$ C)$(-2; \infty)$

D) $(-\infty; 3)$ E)$(-\infty; 0) \cup (0; \infty)$

Yechilishi: $|-2x + 1| > 5 \Rightarrow \begin{cases} -2x + 1 > 5 \\ -2x + 1 < -5 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} 2x < -4 \\ 2x > 6 \end{cases} \Rightarrow \begin{cases} x < -2 \\ x > 3 \end{cases} \Rightarrow (-\infty; -2) \cup (3; \infty).$$

Javobi: A.

46. $cos50°cos40° - 2cos20°sin50°sin20°$ ni hisoblang.

A) 0 B) 1 C) -1 D) $cos20°$ E) $sin40°$

Yechilishi: $cos50°cos40° - 2cos20°sin50°sin20° =$

$= cos50°cos40° - sin50°sin40° = cos(50° + 40°) = 0.$

Yechilishi: A.

47. $|tgx + ctgx| = \frac{4}{\sqrt{3}}$ tenglamani yeching.

A) $\pm\frac{\pi}{6} + \frac{\pi k}{2}; k\epsilon Z$ B) $\frac{\pi}{3} + 2\pi k; k\epsilon Z$

C) $(-1)^n \frac{\pi}{6} + 2\pi k; k\epsilon Z$ D) $\pm\frac{\pi}{3} + \pi k; k\epsilon Z$

E) $\frac{2\pi}{3} + \pi k;\ \ k\epsilon Z$

Yechilishi: $|tgx + ctgx| = \frac{4}{\sqrt{3}} \Rightarrow \left|tgx + \frac{1}{tgx}\right| = \frac{4}{\sqrt{3}} \Rightarrow$

$$\Rightarrow \left|\frac{tg^2x + 1}{tgx}\right| = \frac{4}{\sqrt{3}} \Rightarrow \left|\frac{1}{cos^2x} \cdot \frac{cosx}{sinx}\right| = \frac{4}{\sqrt{3}}$$

$$\Rightarrow \left|\frac{2}{2sinxcosx}\right| = \frac{4}{\sqrt{3}} \Rightarrow$$

$$\Rightarrow \left|\frac{2}{sin2x}\right| = \frac{4}{\sqrt{3}} \Rightarrow \pm\frac{2}{sin2x} = \frac{4}{\sqrt{3}} \Rightarrow \pm 2\sqrt{3 = 4sin2x} \Rightarrow$$

$$\Rightarrow sin2x = \pm\frac{\sqrt{3}}{2} \Rightarrow 2x = \pm\frac{\pi}{3} + k\pi \Rightarrow$$

$\Rightarrow x = \pm\frac{\pi}{6} + \frac{k\pi}{2}, k \in Z$. Javobi: A.

48. $cos\frac{2\pi}{7} + cos\frac{4\pi}{7} + cos\frac{6\pi}{7}$ ni hisoblang.

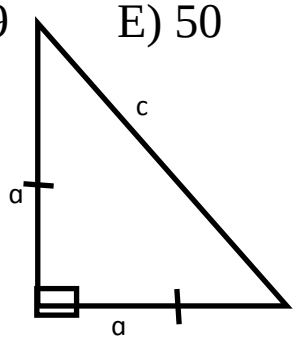
A) 0 B) $\frac{1}{4}$ C) $\frac{1}{3}$ D) $\frac{\sqrt{2}}{3}$ E) $-\frac{\sqrt{3}}{2}$

Yechilishi: $cos\frac{2\pi}{7} + cos\frac{4\pi}{7} + cos\frac{6\pi}{7} =$

$= \frac{sin\frac{(2\cdot 3+1)}{2}:\frac{2\pi}{7} - sin\frac{1}{2}\cdot\frac{2\pi}{7}}{2\cdot sin\frac{1}{2}\cdot\frac{2\pi}{7}} = \frac{sin\pi - sin\frac{\pi}{7}}{2sin\frac{\pi}{7}} = -\frac{1}{2}$. Javobi:

49. Teng yonli to‘g‘ri burchakli uchburchakning yuzi 1225 ga teng bo‘lsa, uning gipotenuzasini toping.

A) 70 B) 65 C) 72 D) 49 E) 50



Yechilishi: $S_{\Delta} = \frac{1}{2}a \cdot b = \frac{1}{2}a^2$

$1225 = \frac{1}{2}a^2 \Rightarrow\ a^2 = 2450 \Rightarrow$

$\Rightarrow c^2 = 2a^2 = 4900 \Rightarrow c = 70.$

Javobi: A.

50. Tengyonlitrapetsiyaningasoslari 20 va 12 gatengbo‘lib, ungatashqichizilganaylananingmarkazikattaasosdayotadi. Trapetsiyaning diagonalini toping.

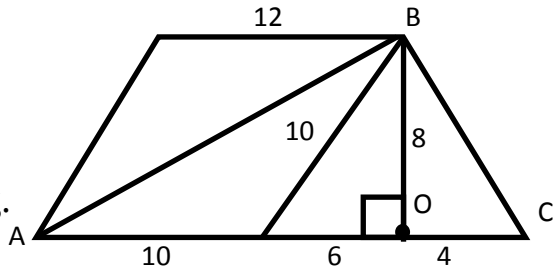
A) $8\sqrt{5}$ B) $4\sqrt{5}$ C) $6\sqrt{5}$ D) 16 E) 12

Yechilishi:$Misr\ uchburchagidan\ BC = 8; OC = 6.$

$\Delta ABC\ dan\ AB^2 = 16^2 + 8^2 = 256 + 64 = 320 \Rightarrow$

$\Rightarrow AB = 8\sqrt{5}.$

Javobi: A.



51. $\frac{3375-1331}{4} : 511 - 1$ ni hisoblang.

A) -1 B) 0 C) 1 D) 25 E) -25

Yechilishi: $\frac{3375-1331}{4} \cdot \frac{1}{511} - 1 = \frac{2044}{2044} - 1 = 0.$ Javobi: B.

52. $\left(-\frac{4}{6}\right) \cdot \left(\frac{8}{6}\right)^3 \cdot \left(-\frac{3}{2}\right)^2 \cdot (0{,}75)^3$ ni hisoblang.

A) 1,5 B) 1,75 C) 2,75 D) 2 E) -1,5

Yechilishi: $\left(-\frac{4}{6}\right) \cdot \left(\frac{8}{6}\right)^3 \cdot \left(-\frac{3}{2}\right)^2 \cdot (0{,}75)^3 =$

$$= \left(-\frac{2}{3}\right) \cdot \left(-\frac{2}{3}\right)^{-2} \cdot \left(\frac{3}{4}\right)^{-3} \cdot \left(\frac{3}{4}\right)^{3} = \left(-\frac{2}{3}\right)^{1-2} \cdot \left(\frac{3}{4}\right)^{-3+3} = -1{,}5.$$

Javobi: E.

53. $\frac{a^{\frac{3}{4}}-36a^{\frac{1}{4}}}{a^{\frac{1}{2}}-6a^{\frac{1}{4}}}$ ni soddalashtiring.

A)$\sqrt[4]{a}-6$ B)$\sqrt[4]{a}+6$ C)$\sqrt{a}-6$ D)$\sqrt{a}+6$ E)$a+6$

Yechilishi: $Kasrning\ surati\ va\ maxraji\ a^{\frac{1}{4}}\ ga\ bo'linadi.$

$$\frac{a^{\frac{3}{4}}-36a^{\frac{1}{4}}}{a^{\frac{1}{2}}-6a^{\frac{1}{4}}} = \frac{a^{\frac{3}{4}-\frac{1}{4}}-36}{a^{\frac{1}{2}-\frac{1}{4}}-6} = \frac{a^{\frac{1}{2}}-6^2}{a^{\frac{1}{4}}-6} = \frac{\left(a^{\frac{1}{4}}\right)^2-6^2}{a^{\frac{1}{4}}-6} =$$

$$= \frac{\left(a^{\frac{1}{4}}-6\right)\left(a^{\frac{1}{4}}+6\right)}{a^{\frac{1}{4}}-6} = \sqrt[4]{a}+6.$$ Javobi: B.

54. $\frac{a^8-a^4}{a^4+a^2}$ ni qisqartiring.

A) a^6 B) a^4-a^2 C) a^4-1 D) a^4+a^2 E) a^2-a^4

Yechilishi: $\frac{a^8-a^4}{a^4+a^2} = \frac{(a^4)^2-\left(a^2\right)^2}{a^4+a^2} = a^4-a^2$. Javobi: B.

55. $\sqrt[3]{2-\sqrt{3}} \cdot \sqrt[6]{7+4\sqrt{3}}$ ni hisoblang.

A) 1 B) -1 C) 0 D) 7 E) 2

Yechilishi: $\sqrt[3]{2-\sqrt{3}} \cdot \sqrt[6]{7+4\sqrt{3}} =$

$$= \sqrt[3]{2-\sqrt{3}} \cdot \sqrt[3]{\sqrt{7+\sqrt{48}}} =$$

$$= \Big| Murakkab\ radikal\ formulasidan$$

$$\sqrt{7+\sqrt{48}} = \left(2+\sqrt{3}\right). \Big| =$$

$= \sqrt[3]{(2-\sqrt{3})(2+\sqrt{3})} = \sqrt[3]{4-3} = 1$; Javobi: A.

56. $\sqrt[6]{3-2\sqrt{2}} : \sqrt[3]{\sqrt{2}-1}$ ni hisoblang.

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

Yechilishi: $\sqrt{3-2\sqrt{2}} = \sqrt{3-\sqrt{8}} = \sqrt{2}-1$;

$\sqrt[3]{\sqrt{3-2\sqrt{2}}} : \sqrt[3]{\sqrt{2}-1} = \frac{\sqrt[3]{\sqrt{2}-1}}{\sqrt[3]{\sqrt{2}-1}} = 1$. Javobi: C.

57. $\frac{1}{1\cdot 2} + \frac{1}{2\cdot 3} + \frac{1}{3\cdot 4} + \cdots + \frac{1}{99\cdot 100}$ yig‘indini hisoblang.

A) $\frac{1}{9}$ B) $\frac{1}{10}$ C) $\frac{1}{100}$ D) $\frac{1}{99}$ E) $\frac{99}{100}$

Yechilishi: $\frac{1}{1\cdot 2} + \frac{1}{2\cdot 3} + \frac{1}{3\cdot 4} + \cdots + \frac{1}{99\cdot 100} =$

$$= \frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \cdots + \frac{1}{99} - \frac{1}{100} =$$

$= 1 - \frac{1}{100} = \frac{99}{100}$. Javobi: E.

58. $72°$ ning radian o‘lchovini toping.

A) 72 B) 1 C) 0,3 D) $\frac{2\pi}{5}$ E) $\frac{\pi}{5}$

Yechilishi: $72° = 72 \cdot 1° = 72° \cdot \frac{\pi}{180°} = \frac{2\pi}{5}$. Javobi: D.

59. $sin10° + sin50° - cos20°$ ni hisoblang.

A) 0 B) -1 C) 1 D) $cos20°$ E) $sin20°$

Yechilishi: $sin10° + sin50° - cos20° =$

$= 2 \cdot sin30° cos20° - cos20° = 0$. Javobi: A.

60. $\frac{tg(\pi-\alpha)}{\cos(\pi+\alpha)} \cdot \frac{sin\left(\frac{3\pi}{2}+\alpha\right)}{tg\left(\frac{3\pi}{2}+\alpha\right)}$ ni soddalashtiring.

A) $tg^2\alpha$ B) $ctg^2\alpha$ C)$-tg^2\alpha$ D)$\frac{1}{tg\alpha}$ E) $\frac{1}{ctg\alpha}$

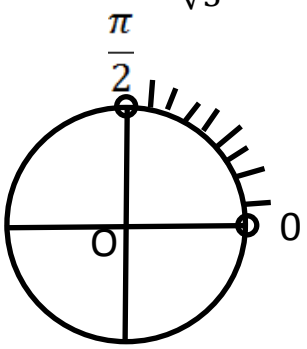
Yechilishi: $\frac{tg(\pi-\alpha)}{\cos(\pi+\alpha)} \cdot \frac{sin\left(\frac{3\pi}{2}+\alpha\right)}{tg\left(\frac{3\pi}{2}+\alpha\right)} = \frac{-tg\alpha}{-cos\alpha} \cdot \frac{-cos\alpha}{-ctg\alpha} =$

$= tg\alpha \cdot \frac{1}{ctg\alpha} = tg^2\alpha.$ Javobi: A.

61. Agar $0 < \alpha < \frac{\pi}{2}$ va $tg\alpha = 2$ bo‘lsa, $cos\alpha$ ni hisoblang.

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

Yechilishi: $\alpha = arctg2$;



$cosarctg2 = \frac{1}{\sqrt{1+2^2}} = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}.$

Javobi: C.

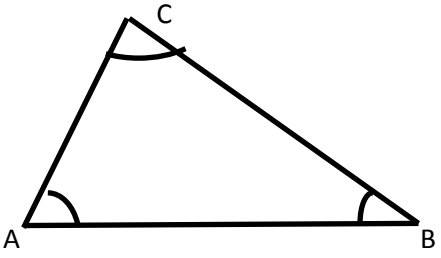
62. Agar A, B va C lar uchburchakning burchaklari bo‘lsa, $sin\frac{A+B}{2}$ nimaga teng.

A) $sin\frac{C}{2}$ B) $cos\frac{C}{2}$ C) $-sin\frac{C}{2}$ D) $sinC$ E) osC

Yechilishi: $A + B + C = 180° \Rightarrow$

$\Rightarrow A + B = 180° - C \Rightarrow$

$\Rightarrow \frac{A+B}{2} = 90° - \frac{C}{2} \Rightarrow sin\frac{A+B}{2} =$



$= sin\left(90° - \frac{C}{2}\right) = cos\frac{C}{2}.$ Javobi: B.

63. $cos2x = 2cosx$ tenglamani yeching.

A) $\pm arccos\frac{1+\sqrt{3}}{2}+2\pi n, n\epsilon Z$

B) $\pm\left(\pi-arccos\frac{\sqrt{3}-1}{2}\right)+2\pi n,\ n\epsilon Z$

C) $arccos\frac{1+\sqrt{3}}{2}+\pi n, n\epsilon Z$

D) $-arccos\frac{1-\sqrt{3}}{2}+(n+1)\pi, n\epsilon Z$

E) $arccos\frac{1-\sqrt{3}}{2}+2\pi n, n\epsilon Z$

Yechilishi: $cos2x=2cosx\Rightarrow$

$$\Rightarrow cos^2x-sin^2x-2cosx=0\Rightarrow$$

$$\Rightarrow cos^2x-(1-cos^2x)-2cosx=0\Rightarrow$$

$$\Rightarrow 2cos^2x-2cosx-1=0;\quad cosx=y;$$

$$2y^2-2y-1=0\Rightarrow y_{1,2}=\frac{2\pm\sqrt{4+4\cdot2\cdot1}}{2\cdot2}=$$

$$=\frac{1\pm\sqrt{3}}{2}\Rightarrow\begin{cases}y_1=\frac{1-\sqrt{3}}{2};\\ y_2=\frac{1+\sqrt{3}}{2}.\end{cases}$$ 1) $cosx=\frac{1-\sqrt{3}}{2}<0\Rightarrow$

$$\Rightarrow\pm\left(\pi-arccos\frac{\sqrt{3}-1}{2}\right)+2\pi n, n\epsilon Z;$$

2) $cosx\neq\frac{1+\sqrt{3}}{2}>1\ yechimga\ ega\ emas.$ Javobi: B.

64. $1998x^2-2000x+2=0$ tenglamani yeching.

A) $1;\ \frac{2}{1998}$ B)$-1;\ \frac{2}{1998}$ C) $1;\ -\frac{2}{1998}$

D) $-1;\ -\frac{2}{1998}$ E) $1;\ -1$

Yechilishi: $1998x^2 - 2000x + 2 = 0 \Rightarrow$

$$\Rightarrow 1998x^2 - 1998x - 2x + 2 = 0 \Rightarrow$$

$$\Rightarrow 1998x(x-1) - 2(x-1) = 0 \Rightarrow$$

$$\Rightarrow (1998x - 2)(x-1) = 0 \Rightarrow$$

$$\Rightarrow \begin{cases} 1998x - 2 = 0 \Rightarrow x_1 = \frac{2}{1998}; \\ x - 1 = 0 \Rightarrow x_2 = 1. \end{cases}$$ Javobi: A.

65. Agar $a_1, a_2, \dots, a_n$ sonlar arifmetik progressiya tashkil qilsa, $\frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} + \frac{1}{a_3 a_4} + \cdots + \frac{1}{a_{n-1} a_n}$ yig‘indini toping.

A) a_1 B) $a_1 a_{n+1}$ C) $\frac{1}{a_1}$ D) $\frac{n}{a_1}$ E) $\frac{n-1}{a_1 a_n}$

Yechilishi: $\frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} + \frac{1}{a_3 a_4} + \cdots + \frac{1}{a_{n-1} a_n} =$

$$= \frac{1}{a_1(a_1+d)} + \frac{1}{(a_1+d)(a_1+2d)} + \cdots$$

$$+ \frac{1}{[a_1+nd][a_1+d(n-1)]} =$$

$$= \frac{1}{d} \cdot \left[\frac{1}{a_1} - \frac{1}{a_1+d} + \frac{1}{a_1+d} - \cdots - \frac{1}{a_1+d(n-1)}\right] =$$

$= \frac{1}{d} \cdot \left[\frac{1}{a_1} - \frac{1}{a_1+dn-d}\right] = \frac{1}{d} \cdot \frac{a_1+dn-d-a_1}{a_1 \cdot (a_1+d(n-1))} = \frac{n-1}{a_1 a_n}$. Javobi: E.

66. Agar uchburchakning tomonlari butun sonlar bo‘lib, uning perimetri 15 ga teng bo‘lsa, tomonlarini aniqlang.

A) 3; 5; 7 B) 4; 4; 7 C) 4; 5; 6

D) 3; 4; 8 E) 3; 5; 7 yoki 4; 5; 6

Yechilishi: *Uchburchakda ikki tomon yig′indisi uchinchi tomondan katta bo′ladi.* Javobi: E.

67. $f(x)=sin\left(\frac{1}{x}-1\right)$ funksiyaning hosilasini aniqlang.

A) $\frac{1}{x}cos\left(\frac{1}{x}-1\right)$ B) $-\frac{1}{x}cos\left(\frac{1}{x}-1\right)$ C) $\frac{1}{x}cos\left(\frac{1}{x}+1\right)$

D) $\frac{1}{x^2}cos\left(\frac{1}{x}-1\right)$ E) $-\frac{1}{x^2}cos\left(\frac{1}{x}-1\right)$

Yechilishi: $f(x)=sin\left(\frac{1}{x}-1\right)$;

$$f'(x)=cos\left(\frac{1}{x}-1\right)\cdot(x^{-1}-1)'=-\frac{1}{x^2}cos\left(\frac{1}{x}-1\right).$$

Javobi: E.

68. $f(x)=\sqrt{2x^2+1}$ funksiyaning hosilasini toping.

A) $\frac{2x}{\sqrt{2x^2+1}}$ B) $\frac{-2x}{\sqrt{2x^2+1}}$ C) $\frac{x}{2\sqrt{2x^2+1}}$ D) $\frac{2x}{\sqrt{4x^2+1}}$ E) $\frac{2x}{4\sqrt{2x^2+1}}$

Yechilishi: $f(x)=\sqrt{2x^2+1}$;

$f'(x)=\frac{1}{2\sqrt{2x^2+1}}(2x^2+1)'=\frac{2x}{\sqrt{2x^2+1}}$. Javobi: A.

69. $f(x)=\frac{1}{2\sqrt{(1-x)^3}}$ funksiyaning boshlang‘ich funksiyasini toping.

A) $\frac{1}{\sqrt{1-x}}$ B) $\frac{2}{\sqrt{1-x}}$ C) $-\frac{3}{\sqrt{1-x}}$ D) $\frac{6}{\sqrt{1-x}}$ E) $\frac{6}{\sqrt{(1-x)^3}}$

Yechilishi: $f(x)=\frac{1}{2\sqrt{(1-x)^3}}$;

$$F(x)=\frac{1}{2}\int\frac{dx}{\sqrt{(1-x)^3}}=\frac{1}{2}\int(1-x)^{-\frac{3}{2}}dx=$$

$$=-\frac{1}{2}\int(1-x)^{-\frac{3}{2}}d(1-x)=-\frac{1}{2}\cdot\frac{(1-x)^{-\frac{3}{2}+1}}{-\frac{3}{2}+1}=$$

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

2000-YIL, 9-AXBOROTNOMA

1. $F(x) = lncosx + C$ funksiya quyidagi funksiyalardan qaysi birining boshlang‘ich funksiyasi bo‘ladi?

   1) $y = -ctgx$; 2) $y = ctgx$; 3) $y = tgx$; 4) $y = -tgx$.

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

   E)$Hech\ qaysining\ boshlang'ich\ funksiyasi\ bo'lmaydi$

   Yechilishi: $F(x) = lncosx + C \Rightarrow \big(F(x)\big)' = f(x) \Rightarrow$

$\Rightarrow f(x) = \frac{1}{cosx} \cdot (cosx)' + 0 = -tgx.$ Javobi: D.

2. $\int_0^2 |x^2 - 1| dx$ ni hisoblang.

   A) 8 B) $3\frac{2}{3}$ C) $2\frac{2}{3}$ D) $6\frac{2}{3}$ E) 2

   Yechilishi: $\int_0^2 |x^2 - 1| dx = -\int_0^1 (x^2 - 1) dx + \int_1^2 (x^2 - 1) dx =$

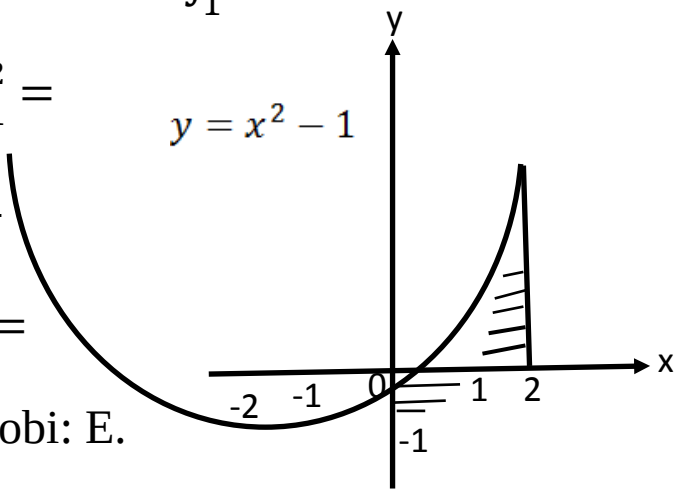
$= -\left[\int_0^1 x^2 dx - \int_0^1 dx\right] + \int_1^2 x^2\, dx - \int_1^2 dx =$

$= -\frac{x^3}{3}\Big|_0^1 + x\Big|_0^1 + \frac{x^2}{3}\Big|_1^2 - x\Big|_1^2 =$

$= -\frac{1}{3}[1^3 - 3^3] + [1 - 0] +$

$+\frac{1}{3}[2^3 - 1^3] - [2 - 1] =$

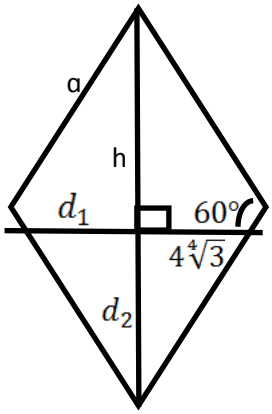
$= -\frac{1}{3} + 1 + \frac{7}{3} - 1 = 2.$ Javobi: E.



3. Rombning katta burchagi $120°$ ga, kichik diagonali $8\sqrt[4]{3}$ ga teng. Romning yuzini toping.

A) 54 B) 102 C) 84 D) 48 E) 96

Yechilishi: $d = 8\sqrt[4]{3}$; $\frac{4\sqrt[4]{3}}{a} = cos60° \Rightarrow$



$\Rightarrow a = 8\sqrt[4]{3}$; $S = a^2 \cdot sin60° =$

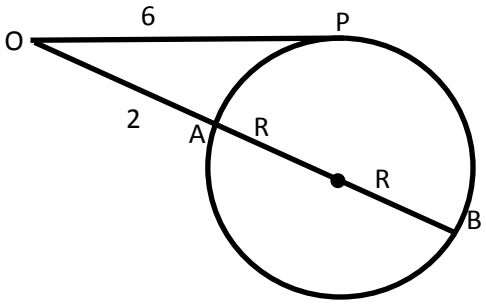
$= 64\sqrt{3} \cdot \frac{\sqrt{3}}{2} = 96.$

Javobi: E.

4. Aylanadan tashqaridagi nuqtadan ungacha bo‘lgan eng qisqa masofa 2 ga, urinish nuqtasigacha bo‘lgan masofa esa 6 ga teng. Aylananing radiusini toping.

A) 12 B) 4 C) 10 D) 8 E) 6

Yechilishi: $OP^2 = OB \cdot OA \Rightarrow$



$\Rightarrow 6^2 = (2R + 2) \cdot 2 \Rightarrow$

$\Rightarrow 18 = 2R + 2 \Rightarrow$

$\Rightarrow R = 8.$ Javobi: D.

5. $a = \{3; x; 6\}$ va $b = \{6; 6; y\}$ vektorlar kolliner, xy ko‘paytmaning qiymatini toping.

A) 32 B) 48 C) 52 D) 36 E) 42

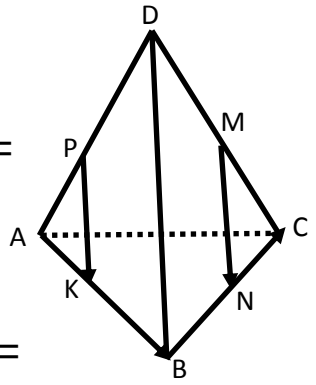
Yechilishi: $\frac{6}{3} = \frac{6}{x} = \frac{y}{6} \Rightarrow \begin{cases} x = 3 \\ y = 12 \end{cases} \Rightarrow x \cdot y = 36.$ Javobi: D.

6. Muntazam $DABC$ tetraedrda $M; N; K$ va P nuqta mos ravishda $DC; BC; AB$ va DA qirralarning o‘rtalari. Agar tetraedrning qirrasi 4 ga teng bo‘lsa, $\overrightarrow{MN} \cdot \overrightarrow{PK} + \overrightarrow{AB} \cdot \overrightarrow{BC}$ vektorlar skalyar ko‘paytmasining yig‘indisini toping.

A) 12 B) 8 C) 6 D) -4 E) 4

Yechilishi: $\overrightarrow{MN}\cdot\overrightarrow{PK}+\overrightarrow{AB}\cdot\overrightarrow{BC}=\left|\overrightarrow{MN}\right|\cdot$
$\left|\overrightarrow{PK}\right|cos\left(\overrightarrow{MN},\hat{}\overrightarrow{PK}\right)+$

$+\left|\overrightarrow{AB}\right|\cdot\left|\overrightarrow{BC}\right|cos\left(\overrightarrow{AB},\hat{}\overrightarrow{BC}\right)=$



$=\left|\overrightarrow{MN}\right|\cdot\left|\overrightarrow{PK}\right|cos0°+4\cdot4\cdot cos60°=$

$=\left|\overrightarrow{MN}\right|^2+8;$

$\left|\overrightarrow{MN}\right|^2=2^2+2^2-2\cdot2\cdot2\cdot cos60°=$

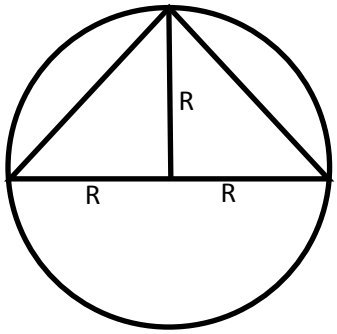
$=4+4-8\cdot\frac{1}{2}=4.\ Demak,\overrightarrow{MN}\cdot\overrightarrow{PK}+\overrightarrow{AB}\cdot\overrightarrow{BC}=12.$

Javobi: A.

7. Sharga ichki chizilgan konusning asosi sharning katta doirasiga teng. Konus o‘q kesimining yuzi 9 ga teng. Sharning hajmini toping.

A) 30π B) 32π C) 42π D) 36π E) 48π

Yechilishi: $S_\Delta=9\Rightarrow9=\frac{1}{2}\cdot2R\cdot R\Rightarrow$

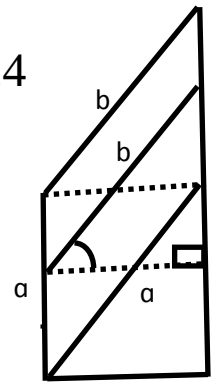


$\Rightarrow R=3\Rightarrow V=\frac{4}{3}\pi3^3=36\pi.$

Javobi: D.

8. To‘g‘ri to‘rtburchakning yuzi 72 ga teng. Uning tekislikdagi ortogonal proeksiyasi kvadratdan iborat. Tekislik va to‘g‘ri to‘rtburchak yotgan tekislik orasidagi burchak $60°$ ga teng. Kvadratning perimetrining toping.

A) 30 B) 26 C) 20 D) 28 E) 24

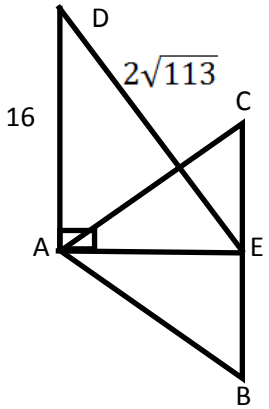


Yechilishi: $\begin{cases} a \cdot b = 72 \\ \frac{a}{b} = cos60° \end{cases} \Rightarrow \begin{cases} 2a^2 = 72 \\ b = 2a \end{cases} \Rightarrow$

$\Rightarrow a^2 = 36 \Rightarrow a = 6 \Rightarrow P = 24.$ Javobi: E.

9. Teng yonli ABC uchburchakning $(AB = AC)$ A uchidan uchburchak tekisligiga uzunligi 16 ga, teng bo‘lgan AD perpendikulyar o‘tkazildi. D nuqtadan BC tomongacha bo‘lgan masofa $2\sqrt{113}$ ga teng. ABC uchburchakning BC tomoniga o‘tkazilgan balandligi qanchaga teng?

A) 6 B) 8 C) 12 D) 10 E) 14



Yechilishi: $AE^2 = DE^2 - AD^2 =$

$$= \left(2\sqrt{113}\right)^2 - 16^2 =$$

$= 4 \cdot 113 - 256 = 196 \Rightarrow AE = 14.$

Javobi: E.

10. $\frac{1}{15} + \frac{1}{35} + \frac{1}{63} + \frac{1}{99} + \cdots + \frac{1}{255}$ ni hisoblang.

A) $\frac{7}{51}$ B) $\frac{2}{15}$ C) $\frac{2}{25}$ D) $\frac{3}{35}$ E) $\frac{7}{40}$

Yechilishi: $\frac{1}{3\cdot5} + \frac{1}{5\cdot7} + \frac{1}{7\cdot9} + \frac{1}{9\cdot11} + \cdots + \frac{1}{13\cdot15} =$

$$= \frac{1}{2} \cdot \left[\frac{1}{3} - \frac{1}{5} + \frac{1}{5} - \frac{1}{7} + \cdots + \frac{1}{15} - \frac{1}{17}\right] = \frac{1}{2} \cdot \left[\frac{1}{3} - \frac{1}{17}\right] =$$

$= \frac{1}{2} \cdot \frac{14}{3 \cdot 17} = \frac{7}{51}$. Javobi: A.

11. Agar $A(A-B)+B(B-C)+C(C-A)=0$ va $A \cdot B \cdot C \neq 0$ bo‘lsa, $\frac{A^3+B^3+C^3}{A(A+B)^2+B(A+C)^2+C(A+B)^2}$ ning qiymati nechaga teng bo‘ladi?

A) 0,25 B) 0,5 C) 0,75 D) 1 E) 1,25

Yechilishi: $A^2-AB+B^2-BC+C^2-AC=0 \Rightarrow$

$$\Rightarrow A^2+B^2+C^2=AB+BC+AC \Rightarrow$$

$$\Rightarrow \begin{cases} A^2=AB \\ B^2=BC \\ C^2=AC \end{cases} \Rightarrow \begin{cases} A=B \\ B=C \\ C=A \end{cases} \Rightarrow A=B=C \Rightarrow$$

$\Rightarrow \frac{A^3+A^3+A^3}{A(A+A)^2+A(A+A)^2+A(A+A)^2} = \frac{3A^3}{12A^3} = \frac{1}{4} = 0{,}25$.Javobi: A.

12. $\frac{t-6}{m-8} = \frac{m}{t}$ tenglama ildizga ega bo‘lmaydigan m ning barcha natural qiymatlari yig‘indisini hisoblang.

A) 20 B) 25 C) 28 D) 30 E) 32

Yechilishi: $\frac{t-6}{m-8} = \frac{m}{t} \Rightarrow \begin{cases} m \neq 8 \\ t^2-6t=m(m-8) \end{cases} \Rightarrow$

$$\Rightarrow t^2-6t-m(m-8)=0 \Rightarrow D<0 \Rightarrow$$

$$\Rightarrow (-6)^2-4 \cdot 1 \cdot \big(-m(m-8)\big)<0 \Rightarrow$$

$\Rightarrow 36+4m^2-32m<0 \Rightarrow m^2-8m+9<0 \Rightarrow$

$\Rightarrow \begin{cases} m_1=4-\sqrt{7} \\ m_2=4+\sqrt{7} \end{cases}$

$m=2,3,4,5,6,8$ *bo'lgani uchun*

$2+3+4+5+6+8=28$. Javobi: C.

13. $y; 3y+5; 5y+10;$ ... arifmetik progressiyaning dastlabki 8 ta hadi yig‘indisi 396 ga, teng. y ning qiymatini toping.

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

Yechilishi: $y; 3y+5; 5y+10; \ldots;\ d = 3y+5-y =$

$= 2y+5;\ a_8 = a_1 + 7d = y + 14y + 35 = 15y + 35;$

$$S_8 = \frac{a_1 + a_8}{2} \cdot 8 = 4(a_1 + a_8) \Rightarrow$$

$\Rightarrow 396 = 4(y + 15y + 35) \Rightarrow y = 4.$ Javobi: C.

14. $\frac{729a+1}{81\sqrt[3]{a^2}-9a^{\frac{1}{3}}+1} - \frac{729a-1}{81\sqrt[3]{a^2}+9a^{\frac{1}{3}}+1}$ ni soddalashtiring.

A) 1 B) 2 C) 3 D) 5 E) 6

Yechilishi: $\frac{729a+1}{81\sqrt[3]{a^2}-9a^{\frac{1}{3}}+1} - \frac{729a-1}{81\sqrt[3]{a^2}+9a^{\frac{1}{3}}+1} =$

$$= \frac{\left(9\sqrt[3]{a}\right)^3 + 1^3}{81\sqrt[3]{a^2} - 9\sqrt[3]{a} + 1} - \frac{\left(9\sqrt[3]{a}\right)^3 - 1^3}{81\sqrt[3]{a^2} + 9\sqrt[3]{a} + 1} =$$

$$= \frac{\left(9\sqrt[3]{a}+1\right)\left(81\sqrt[3]{a^2} - 9\sqrt[3]{a} + 1\right)}{81\sqrt[3]{a^2} - 9\sqrt[3]{a} + 1}$$

$$- \frac{\left(9\sqrt[3]{a}-1\right)\left(81\sqrt[3]{a^2} + 9\sqrt[3]{a} + 1\right)}{81\sqrt[3]{a^2} + 9\sqrt[3]{a} + 1} =$$

$= 9\sqrt[3]{a} + 1 - 9\sqrt[3]{a} + 1 = 2.$ Javobi: B.

15. $\overline{ABC} + \overline{MN} = \overline{FEDP}\left(\overline{MN} - ikki\ xonali,\ \overline{ABC} - uch\ xonali,\ \overline{FEDP} - to'rt\ xonali\ son\right) F^{M+N} + A^F$ ni hisoblang.

A) $aniqlab\ bo'lmaydi$ B) 1 C) 2 D) 9 E) 10

Yechilishi: $\overline{ABC} + \overline{MN} = \overline{FEDP} \Rightarrow$

$$\Rightarrow 100A + 10B + C + 10M + N =$$

$$= 1000F + 100E + 10D + P \Rightarrow$$

$$\Rightarrow 100A + 10(B + M) + (C + N) =$$

$$= 1000F + 100E + 10D + P;\ \ F = 1;\ \ A = E;$$

$$B + M = D;\ \ C + N = P;\ \ \ A = 9;\ \ F^{M+N} + A^{F} = 10.$$

Javobi: E.

16 Korxonada maxsuot ishlab chiqarish birinchi yili 20% ga, ikkinchi yili 10% ga ortdi. Maxsulot ishlab chiqarish ikki yil mobaynida necha foizga ortgan?

A) 50 B) 28 C) 30 D) 32 E) 36

Yechilishi: $\frac{100+20}{100} \cdot \frac{100+10}{100} = 1{,}2 \cdot 1{,}1 = 1{,}32 \Rightarrow 32\% \Rightarrow$

$ortgan.$ Javobi: D.

17. Lagerda dam olayotgan o‘g‘il bollalar va qizlarning soni teng. 13 yoshgacha bo‘lgan bolalar soni 13 yoshdan katta bolalardan 2 marta ko‘p. Agar 4 sonining o‘ng va chap tomoniga bir xil raqam yozilsa, lagerdagi bolalar soni hosil bo‘ladi. Bu qanday raqam?

A) 2 B) 3 C) 4 D) 6 E) 8

Yechilishi: 13 $yoshdan\ katta\ bolalar\ x,$ 13 $yoshdan$

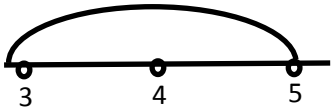
$kichik\ bolalar\ 2x,\ \ bolalar - 3x,\ \ \ \ qizlar - 3x;$

$a4a = 6x \Rightarrow x = \frac{a4a}{6} = butun\ son \Rightarrow a = 4.$ Javobi: C.

18. $y = \frac{\sqrt{x+1}+\sqrt{x-2}}{\sqrt{x-3}-\sqrt{5-x}}$ funksiyaning aniqlanish sohasiga tegishli barcha butun sonlarning yig‘indisini toping.

A) 12 B) 8 C) 7 D) 4 E) ∅

Yechilishi: $y=\frac{\sqrt{x+1}+\sqrt{x-2}}{\sqrt{x-3}-\sqrt{5-x}} \Rightarrow \begin{cases} x+1\geq 0 \\ x-2\geq 0 \\ x-3\geq 0 \\ 5-x\geq 0 \\ \sqrt{x-3}-\sqrt{5-x}\neq 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x\geq -1 \\ x\leq 2 \\ x>3 \\ x<5 \\ x\neq 4 \end{cases} \Rightarrow$ 

Javobi: E.

19. Agar x, y, z, t ketma-ket keladigan natural sonlar bo‘lsa, quyidagilarning qaysi biri albatta juft son bo‘ladi?

A) $\frac{x+y+z}{3}$ B) $\frac{xyzt}{24}$ C) $\frac{xyz}{6}$ D) $\frac{x(x^2-1)}{3}$ E) $\frac{y(y^2-1)}{2}$

Yechilishi: $x\ o'rniga\ ixtiyoriy\ natural\ son\ qo'yib\ hisoblanganda\ natija\ juft\ son\ bo'ladi.$ Javobi: D.

20. Agar $\sqrt{13+z^3}+\sqrt{z^3-14}=3$ bo‘lsa,

$\sqrt{13+z^3}-\sqrt{z^3-14}$ ning qiymatini toping.

A) 5 B) 6 C) 7 D) 3 E) 9

Yechilishi: $\sqrt{13+z^3}+\sqrt{z^3-14}=3 \Rightarrow$

$$\Rightarrow \frac{\left(\sqrt{13+z^3}+\sqrt{z^3-14}\right)\left(\sqrt{13+z^3}-\sqrt{z^3-14}\right)}{\sqrt{13+z^3}-\sqrt{z^3-14}}=3$$

$$\Rightarrow$$

$$\Rightarrow \frac{13+z^3-z^3+14}{\sqrt{13+z^3}-\sqrt{z^3-14}}=3$$

$$\Rightarrow 3\left(\sqrt{13+z^3}-\sqrt{z^3-14}\right)=27 \Rightarrow$$

$\Rightarrow \sqrt{13+z^3}-\sqrt{z^3-14}=9.$ Javobi: E.

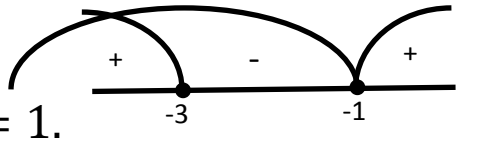
21. $(x+3)(x-2)^2(x+1)^3(x-5)^4 \le 0$ tengsizlikning barcha butun yechimlari yig‘indisini toping.

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

Yechilishi: $(x+3)(x-2)^2(x+1)^3(x-5)^4 \le 0;$

Tengsizlikning ikkala tomoni musbat songa bo′linsa, tengsizlik belgisi o′zgarmaydi.

$$x=2; x=5 \Rightarrow (x+3)(x+1)^3 \le 0 \Rightarrow \begin{cases} x=-3; \\ x=-1. \end{cases}$$



$[-3;-1];$

$-3+(-2)+(-1)+2+5=1.$

Javobi: A.

22. $\log_{\frac{1}{5}}(x+17)^8 \le \log_{\frac{1}{5}}(x+13)^8$ tengsizlikni yeching.

A) $(-15;-13)\cup(-13;\infty)$ B) $[-15;-13)\cup(-13;\infty)$

C)$(-13;\infty)$ D)$(-\infty;-17\infty)\cup(-17;-13)\cup(-13;\infty)$

E) $(-17;\infty)$

Yechilishi: $\log_{\frac{1}{5}}(x+17)^8 \le \log_{\frac{1}{5}}(x+13)^8$;

1) $\begin{matrix}(x+17)^8>0\Rightarrow x>-17\\ (x+13)^8>0\Rightarrow x>-13\end{matrix} \Rightarrow (-13;\ +\infty)$

$$2)\ 0<\frac{1}{5}<1 \Rightarrow (x+17)^8 \ge (x+13)^8 \Rightarrow$$

$$\Rightarrow (x+17)^2-(x+13)^2 \ge 0 \Rightarrow$$

$$\Rightarrow (x+17-x-13)(x+17+x+13) \ge 0 \Rightarrow$$

$$\Rightarrow 4\cdot(2x+30) \ge 0 \Rightarrow x \ge -15 \Rightarrow [-15;+\infty);$$

1) *va* 2) *dan* $[-15;-13)\cup(-13;\infty)$. Javobi: B.

23. $\sqrt[4]{(2x-7)^4} = 7-2x$ tenglamaning natural ildizlari nechta?

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

Yechilishi: $\sqrt[4]{(2x-7)^4} = 7-2x \Rightarrow |2x-7| = 7-2x;$

$\begin{cases} 2x-7 = 7-2x \\ -2x+7 = 7-2x \end{cases} \Rightarrow \begin{cases} x = \frac{7}{2}; \\ x \epsilon R. \end{cases}$ $x = 1; 2; 3.$ Javobi: D.

24. $\log_3 x + \log_x 3 = 2cos(6\pi x^2)$ tenglamaning ildizlari nechta?

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

Yechilishi: $\log_3 x + \log_x 3 = 2cos(6\pi x^2); x > 0; x \neq 1.$

$Tenglama\ ikkita\ funksiya\ ko'rinishida\ yozib\ olinadi$:

$y = \log_3 x + \log_x 3\ va\ y = 2cos(6\pi x^2)\ bu\ ikki\ funksiyaning\ grafiklari\ x = 3\ da\ bitta\ (3; 2)\ nuqtada\ kesishadi.\ Yechim\ 1\ ta.$ Javobi: B.

25. $y = arcsin\left(5^{2x^2+5x+2}\right) + \lg\left(\frac{x^2+5x+6}{x+2}\right)$ funksiyaning aniqlanish sohasini toping.

A) $(-3; \infty)$ B) $\left[-2; -\frac{1}{2}\right]$ C) $[-2; \infty)$

D) $\left(-2; -\frac{1}{2}\right]$ E) $\left(-3; -\frac{1}{2}\right)$

Yechilishi: $y = arcsin\left(5^{2x^2+5x+2}\right) + \lg\left(\frac{x^2+5x+6}{x+2}\right);$

$$\begin{cases} -\frac{\pi}{2} \leq arcsin\left(5^{2x^2+5x+2}\right) \leq \frac{\pi}{2}; \\ \frac{x^2+5x+6}{x+2} > 0. \end{cases} \Rightarrow$$

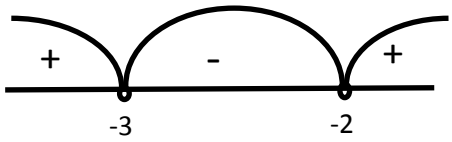
$$\Rightarrow sin\left(-\frac{\pi}{2}\right) \le sinarcsin\left(5^{2x^2+5x+2}\right) \le sin\frac{\pi}{2} \Rightarrow$$

$$\Rightarrow -1 \le 5^{2x^2+5x+2} \le 1 \Rightarrow 5^{2x^2+5x+2} \le 5^0 \Rightarrow$$

$$\Rightarrow 2x^2+5x+2 \le 0 \Rightarrow \begin{cases} x_1 = -2 \\ x_2 = -\frac{1}{2} \end{cases} \Rightarrow \left[-2; -\frac{1}{2}\right].$$

2) $\frac{x^2+5x+6}{x+2} > 0 \Rightarrow \begin{cases} x^2+5x+6=0 \\ x+2 \neq 0 \end{cases} \Rightarrow \begin{cases} x_1 = -3; \\ x_2 = -2; \\ x_3 \neq -2. \end{cases}$

1) $va\ 2)\ dan\ \ (-2; \frac{1}{2}]$.



Javobi: D.

26. Agar $x > y; t = \frac{1}{z}$ bo‘lsa, quyidagilardan qaysi biri doimo o‘rinli bo‘ladi?

A) $t + \frac{1}{x} = x + \frac{1}{y}$ B) $x + \frac{1}{t} < y + z$ C) $x + \frac{1}{t} > y + z$

D) $x + \frac{1}{z} > y$ E) $x + \frac{1}{t} > y + \frac{1}{z}$

Yechilishi: C) $x + \frac{1}{\frac{1}{z}} > y + z \Rightarrow x + z > y + z \Rightarrow x > y;$

Javobi: C.

27. $\sqrt{x^2+10+6\sqrt{1+x^2}} + \sqrt{2+x^2-2\sqrt{x^2+1}} = 4$ tenglamaning ildizlari ko‘paytmasini toping.

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

Yechilishi: $\sqrt{x^2+10+6\sqrt{1+x^2}} + \sqrt{2+x^2-2\sqrt{x^2+1}} = 4;$

$$\sqrt{1+x^2} = y \Rightarrow y^2 = 1+x^2 \Rightarrow x^2 = y^2-1 \Rightarrow$$

$$\Rightarrow x = \sqrt{y^2-1};\ \sqrt{y^2-1+10+6y} + \sqrt{2+y^2-1-2y} = 4;$$

$$\sqrt{y^2+6y+9}+\sqrt{(y-1)^2}=4 \Rightarrow |y+3|+|y-1|=4 \Rightarrow$$

$$\Rightarrow \begin{cases} y+3 \geq 0 \\ y+3<0 \end{cases} \Rightarrow \begin{cases} y+3+|y-1|=4; \\ -y-3+|y-1|=4. \end{cases}$$

$$\begin{cases} y-1 \geq 0 \\ y-1<0 \end{cases} \Rightarrow \begin{cases} \begin{cases} y+3+y-1=4 \\ -y-3+y-1 \neq 4 \end{cases} \\ \begin{cases} y+3-y+1=4 \\ -y-3-y+1=4 \end{cases} \end{cases} \Rightarrow \begin{cases} y=1; \\ y=-3. \end{cases}$$

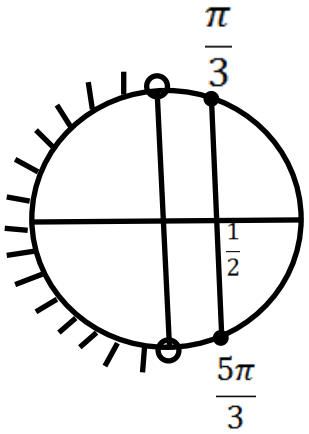
$\begin{cases} \sqrt{1+x^2}=1 \\ \sqrt{1+x^2} \neq -3 \end{cases} \Rightarrow x^2=1^2-1=0 \Rightarrow x=0.$ Javobi: A.

28. $\left(\frac{\pi}{2}-\frac{e}{3}\right)^{\ln(2cosx)} \geq 1$ tengsizlikni yeching. $x\epsilon([0;2\pi])$.

A) $\left[\frac{\pi}{3};\frac{\pi}{2}\right] \cup \left[\frac{3\pi}{2};\frac{5\pi}{3}\right]$ B) $\left[\frac{\pi}{3};\frac{5\pi}{3}\right]$ C) $\left[\frac{\pi}{3};\frac{\pi}{2}\right)$

D) $\left[\frac{\pi}{6};\frac{\pi}{2}\right) \cup \left(\frac{3\pi}{2};\frac{5\pi}{6}\right]$ E) $\left[\frac{\pi}{3};\frac{\pi}{2}\right) \cup \left(\frac{3\pi}{2};\frac{5\pi}{3}\right]$

Yechilishi: $\left(\frac{\pi}{2}-\frac{e}{3}\right)^{\ln(2cosx)} \geq 1;$



1) $\left(\frac{\pi}{2}-\frac{e}{3}\right)^{\ln(2cosx)} \geq \left(\frac{\pi}{2}-\frac{e}{3}\right)^{0}$

$0<\frac{\pi}{2}-\frac{e}{3}<1;\ \ln 2cosx \leq 0 \Rightarrow$

$\Rightarrow 2cosx \leq e^0 \Rightarrow cosx \leq \frac{1}{2};$

2) $cosx>0 \Rightarrow -\frac{\pi}{2}<x<\frac{\pi}{2};$ 1) va 2) dan

$\left[\frac{\pi}{3};\frac{\pi}{2}\right) \cup \left(\frac{3\pi}{2};\frac{5\pi}{3}\right]$. Javobi: E.

29. y va t $0{,}09^{-y^2} - 2 \cdot 0{,}3^{-y^2} \cdot cos(2t) + 1 = 0$ tenglikni qanoatlntiradi. $sin\left(\frac{3ty}{2}\right)$ ni hisoblang.

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

Yechilishi: $0{,}09^{-y^2} - 2 \cdot 0{,}3^{-y^2} \cdot cos(2t) + 1 = 0;$

$\left(0{,}3^{-y^2}\right)^2 - 2 \cdot 0{,}3^{-y^2} \cdot cos(2t) + 1 = 0;$ $(0{,}3)^{-y^2} = x;$

$$x^2 - 2x \cdot cos(2t) + 1 = 0 \Rightarrow \begin{cases} (x-1)^2 = 0 \\ cos2t = 1 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x = 1 \\ 2t = 2\pi \end{cases} \Rightarrow \begin{cases} x = 1 \\ t = \pi \end{cases} \Rightarrow (0{,}3)^{-y^2} = 1 \Rightarrow$$

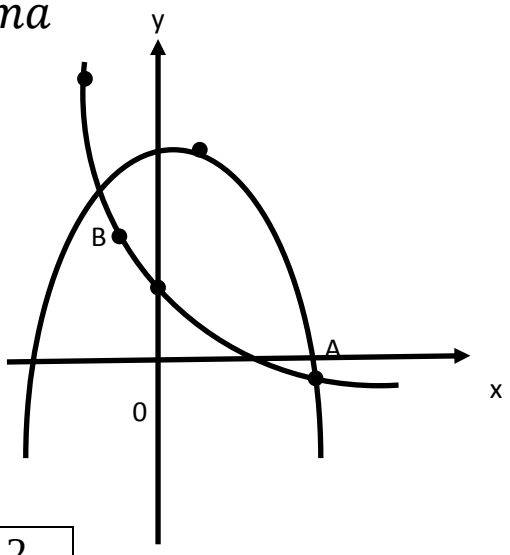
$$\Rightarrow (0{,}3)^{-y^2} = 0{,}3^0 \Rightarrow -y^2 = 0 \Rightarrow y = 0;$$

$sin\left(\frac{3ty}{2}\right) = sin\left(\frac{3 \cdot \pi \cdot 0}{2}\right) = 0.$ Javobi: C.

30. $3^{-x} = 4 + x - x^2$ tenglama nechta ildizga ega?

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

Yechilishi: *Berilgan tenglama* $y = 3^{-x}$ *va* $y = 4 + x - x^2$ *funksiyalar ko'rinishida yozilib, grafiklari chiziladi.*



x	-2	-1	0	1	2
$y = \frac{1}{3^x}$	9	3	1	$\frac{1}{3}$	$\frac{1}{9}$

x	-2	-1	0	1	2
y	-2	2	4	4	2

$Grafiklari\ 2\ ta\ nuqtada\ kesishishadi.\ Yechim\ ikkita.$
Javobi: C.

31. Agar $\sqrt[4]{ab} = 2\sqrt{3}$ va $a, b \epsilon N$ bo‘lsa, $a - b$ quyida keltirilgan qiymatlardan qaysi birini qabul qila olmaydi?

A) -32 B) 10 C) 0 D) 70 E) 25

Yechilishi: $\sqrt[4]{ab} = 2\sqrt{3} \Rightarrow a \cdot b = 144 \Rightarrow b = \frac{144}{a}$;

$$a - b = a - \frac{144}{a} = \frac{a^2 - 144}{a};$$

A) $\frac{a^2-144}{a} = -32 \Rightarrow a^2 - 144 = -32a \Rightarrow$

$$\Rightarrow a^2 + 32a - 144 = 0 \Rightarrow a_{1,2} = -16 \pm \sqrt{256 + 144} =$$

$$= -16 \pm 20 \Rightarrow \begin{cases} a_1 = -36 \\ a_2 = 4 \end{cases} \Rightarrow \begin{cases} b_1 = -4; \\ b_2 = 36. \end{cases}$$

$$\sqrt[4]{(-36)(-4)} = 2\sqrt{3};\ \ \sqrt[4]{4 \cdot 36} = 2\sqrt{3};$$

E) $\frac{a^2-144}{a} = 25 \Rightarrow a^2 - 25a - 144 = 0 \Rightarrow$

$$a_{1,2} = \frac{25}{2} \pm \sqrt{\frac{625}{4} + 144} = \frac{25}{2} \pm \frac{\sqrt{1201}}{2}$$

$$\Rightarrow \begin{cases} a_1 = \dfrac{25 - \sqrt{1201}}{2}; \\ a_2 = \dfrac{25 + \sqrt{1201}}{2}. \end{cases}$$

$b_1 = \frac{288}{25 - \sqrt{1201}} \notin N;\ \ b_2 = \frac{288}{25 + \sqrt{1201}} \notin N;\ \ a_1 - b_1 \neq 25.$

Javobi: E.

32. Agar $3arccosx + 2arcsinx = \frac{3\pi}{2}$ bo‘lsa, $|x+3|^3$ ning qiymati nechaga teng bo‘ladi?

A) 1 B) 8 C) 27 D) 64 E) 0

Yechilishi: $3arccosx + 2arcsinx = \frac{3\pi}{2}$;

$$arcsinx + arccosx = \frac{\pi}{2} \ va \ arctgx + arcctgx = \frac{\pi}{2}$$

$$ekanligidan \ foydalanamiz:$$

$$arccosx + 2(arccosx + arcsinx) = \frac{3\pi}{2};$$

$$arccosx = \frac{3\pi}{2} - 2 \cdot \frac{\pi}{2} \Rightarrow arccosx = \frac{\pi}{2};$$

$$cosarccosx = cos\frac{\pi}{2} \Rightarrow x = 0; \ \ |x+3|^3 = |0+3|^3 = 27.$$

Javobi: C.

33. $3sin4x - 2cosx = 5$ tenglamaning $[-2\pi; 3\pi]$ oraliqda nechta ildizi bor?

A) $\emptyset$ B) 1 C) 3 D) 4 E) 5

Yechilishi: $3sin4x - 2cosx = 5 \Rightarrow$

$$\Rightarrow 3(sin4x - 1) - 2(cosx + 1) = 0 \Rightarrow$$

$$\Rightarrow \begin{cases} sin4x = 1 \\ cosx = -1 \end{cases} \Rightarrow \begin{cases} 4x = \frac{\pi}{2} + 2\pi k, \ \ k \in Z, \\ x = \pi + 2\pi k, \ \ k \in Z \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x = \frac{\pi}{8} + \frac{\pi k}{2}, \ \ k \in Z; \\ x = \pi + 2\pi k, \ \ k \in Z. \end{cases} \ umumiy \ yechim \ yo'q.$$

Javobi: A.

34. $y=(sin4x+cos4x)^6$ funksiyaning eng katta qiymatini toping.

A) 64 B) 24 C) 32 D) 16 E) 8

Yechilishi: $y=(sin4x+cos4x)^6=\left[\sqrt{2}\cos(45-4x)\right]^6=$
$=8cos^6(45-4x)=8$. Javobi: E.

35. $\frac{5}{tg^2\alpha+ctg^2\alpha}+\frac{5sin2\alpha-cos\gamma}{5+cos3t}$ ifodaning eng katta qiymatini toping.

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

Yechilishi: $\frac{5}{tg^2\alpha+ctg^2\alpha}+\frac{5sin2\alpha-cos\gamma}{5+cos3t}$;

$\alpha=\frac{\pi}{4}$; $\gamma=\pi$; $t=\pi$; $\frac{5}{2}+\frac{5+1}{5-1}=\frac{16}{4}=4$. Javobi: E.

36. $a(sin^6x+cos^6x)=sin^4x+cos^4x$ tenglama ildizga ega bo‘ladigan a ning barcha qiymatlarini toping.

A) $[-1;1]$ B)$[0;1]$ C)$[1;2]$ D)$[1;1{,}5]$ E)$[1;2{,}5]$

Yechilishi: $a(sin^6x+cos^6x)=sin^4x+cos^4x$;

$$a-\frac{3a}{4}sin^2 2x=1-\frac{1}{2}sin^2 2x;$$

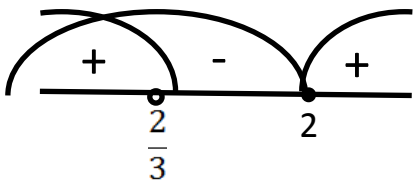
$$a-1=\frac{3a}{4}sin^2 2x-\frac{1}{2}sin^2 2x;$$

$$a-1=\left(\frac{3a}{4}-\frac{1}{2}\right)sin^2 2x;\ a-1=\frac{3a-2}{4}sin^2 2x;$$

$$\frac{4a-4}{3a-2}=sin^2 2x\Rightarrow\begin{cases}0\le sin^2 2x\le 1;\\ 0\le\dfrac{4a-4}{3a-2}\le 1.\end{cases}$$

1) $\frac{4a-4}{3a-2}\ge 0\Rightarrow\begin{cases}4a-4=0\\3a-2\neq 0\end{cases}\Rightarrow\begin{matrix}a=1;\\ a\neq\frac{2}{3}.\end{matrix}$

2) $\frac{4a-4}{3a-2}\le 1\Rightarrow\frac{a-2}{3a-2}\le 0\Rightarrow\begin{cases}a=2;\\ a\neq\dfrac{2}{3}.\end{cases}$



1) va 2) dan $[1;2]$. Javobi: C.

37. $cos\left(\frac{\pi\sqrt{3}}{12}\cdot x\right)=13+4\sqrt{3}x+x^2$ tenglama $[-2\pi;2\pi]$ kesmada nechta ildizi bor?

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

Yechilishi: $cos\left(\frac{\pi\sqrt{3}}{12}\cdot x\right)=13+4\sqrt{3}x+x^2$;

$$cos\left(\frac{\pi\sqrt{3}}{12}x\right)=x^2+2\cdot 2\sqrt{3}x+\left(2\sqrt{3}\right)^2+1;$$

$$cos\left(\frac{\pi\sqrt{3}}{12}x\right)=\left(x+2\sqrt{3}\right)^2+1\Rightarrow\begin{cases}x+2\sqrt{3}=0\\cos\left(\frac{\pi\sqrt{3}}{12}x\right)=1\end{cases}$$

$$\Rightarrow\begin{cases}x=-2\sqrt{3}\\\frac{\pi\sqrt{3}}{12}x=2\pi k,\ \ k\in Z\end{cases}\Rightarrow\begin{cases}x=-2\sqrt{3}\\x=\frac{24}{\sqrt{3}}k\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases}x=-2\sqrt{3}\\x=8\sqrt{3}k,k\in Z\end{cases}\Rightarrow\begin{cases}x=-2\sqrt{3}\\k=0\Rightarrow x=0.\end{cases}\Rightarrow x=-2\sqrt{3};$$

$x=0\,\epsilon[-2\pi;2\pi]$. Javobi: C.

38. $\sqrt{2+cos^2 2x}=sinx-cosx$ tenglamani yeching.

A) $\frac{\pi}{4}+2\pi n, n\epsilon Z$ B) $-\frac{\pi}{4}+\pi n, n\epsilon Z$ C) $\frac{3\pi}{4}+2\pi n, n\epsilon Z$

D) $-\frac{\pi}{4}+2\pi n, n\epsilon Z$ E) $\frac{\pi}{4}+\pi n, n\epsilon Z$

Yechilishi: $\sqrt{2+cos^2 2x}=sinx-cosx;\ 2+cos^2 2x=$
$=sin^2 x+cos^2 x-2sinxcosx\Rightarrow$

$\Rightarrow 2+cos^2 2x=1-sin2x\Rightarrow 2+1-sin^2 2x=$

$= 1 - sin2x \Rightarrow sin^2 2x - sin2x - 2 = 0 \Rightarrow sin2x = y \Rightarrow$

$\Rightarrow y^2 - y - 2 = 0 \Rightarrow y_{1,2} = \frac{1}{2} \pm \sqrt{\frac{1}{4} + 2} = \frac{1}{2} \pm \frac{3}{2} \Rightarrow$

$\Rightarrow \begin{cases} y_1 = -1 \\ y_2 = 2 \end{cases} \Rightarrow sin2x = -1 \Rightarrow 2x = -\frac{\pi}{2} + 2\pi n \Rightarrow$

$\Rightarrow x = -\frac{\pi}{4} + \pi n, n \epsilon Z \Rightarrow x \neq \pm\frac{\pi}{4}; x = \frac{3\pi}{4} + 2\pi n.$

Javobi: C.

39. $9(x^4 + y^4) - 6(x^2 + y^2) + 2 = 0$ ekanligi bilgan holda, $x^2 + y^2$ ning qiymatini hisoblang.

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

Yechilishi: $9(x^4 + y^4) - 6(x^2 + y^2) + 2 = 0 \Rightarrow$

$\Rightarrow 9x^4 + 9y^4 - 6x^2 - 6y^2 + 2 = 0 \Rightarrow$

$\Rightarrow x^4 + y^4 - \frac{2}{3}x^2 - \frac{2}{3}y^2 + \frac{2}{9} = 0 \Rightarrow$

$\Rightarrow x^4 - 2 \cdot \frac{1}{3}x^2 + \left(\frac{1}{3}\right)^2 - \left(\frac{1}{3}\right)^2 + y^4 - 2 \cdot \frac{1}{3}y^2 + \left(\frac{1}{3}\right)^2 -$

$- \left(\frac{1}{3}\right)^2 + \frac{2}{9} = 0 \Rightarrow \left(x^2 - \frac{1}{3}\right)^2 - \frac{1}{9} + \left(y^2 - \frac{1}{3}\right)^2 - \frac{1}{9} + \frac{2}{9} = 0 \Rightarrow$

$\Rightarrow \begin{cases} x^2 - \frac{1}{3} = 0 \\ y^2 - \frac{1}{3} = 0 \end{cases} \Rightarrow \begin{cases} x^2 = \frac{1}{3} \\ y^2 = \frac{1}{3} \end{cases} \Rightarrow x^2 + y^2 = \frac{2}{3}.$ Javobi: C.

40. x ning qanday qiymatlarida $0{,}16; x$ va $0,(25)$ sonlar ishoralari almashinuvchi geometrik progressiyaning ketma-ket hadlari bo‘ladi?

A) $0,(20)$ B) $\pm 0,(20)$ C) $-0,(20)$

D) $-0,(21)$ E) $0,(22)$

Yechilishi: $0,(16); x; 0,(25) \Rightarrow \frac{16}{99}; x; \frac{25}{99} \Rightarrow$

$$\Rightarrow \frac{16}{99};\ \frac{16}{99}\cdot(+q);\quad \frac{16}{99}q^2 = \frac{25}{99};\ \frac{16}{99}q^2 = \frac{25}{99} \Rightarrow q^2 = \frac{25}{16}$$

$$\Rightarrow q = \pm\frac{5}{4} \Rightarrow q = -\frac{5}{4};$$

$x = \frac{16}{99}\cdot\left(-\frac{5}{4}\right) = -\frac{16}{99}\cdot\frac{5}{4} = -0,(20)$. Javobi: C.

41. $y = (2x+1)^2$ egri chiziqqa o‘tkazilgan urinmasi $y = 2x + \frac{1}{2}$ to‘g‘ri chiziqqa parallel bo‘lgan nuqtadan koordinata boshigacha bo‘lgan masofani aniqlang.

A) $\frac{\sqrt{2}}{2}$ B) $\frac{\sqrt{2}}{4}$ C) $\frac{\sqrt{2}}{8}$ D) $\frac{1}{2}$ E) 1

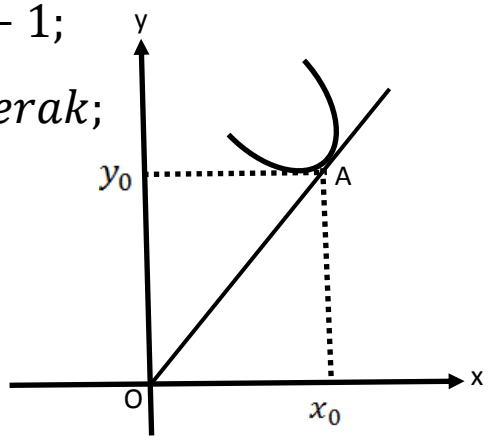
Yechilishi: $y = 4x^2 + 4x + 1;$

$y' = 8x + 4;\ \left|\overrightarrow{OA}\right|$ *ni topish kerak*;

$y_0 = 4{x_0}^2 + 4x_0 + 1;$

$y'(x_0) = 8x_0 + 4;$

$y - y_0 = y'(x_0)(x - x_0);$



$$y - (4{x_0}^2 + 4x_0 + 1) = (8x_0 + 4)(x - x_0) \Rightarrow$$

$$\Rightarrow y - 4{x_0}^2 - 4x_0 - 1 = 8x_0 \cdot x - 8{x_0}^2 + 4x - 4x_0 \Rightarrow$$

$$\Rightarrow y = 4{x_0}^2 + 4x_0 + 1 + 8xx_0 + 4x - 8{x_0}^2 - 4x_0 =$$

$$= (4x + 8xx_0) + (1 - 4{x_0}^2) \Rightarrow$$

$$\Rightarrow \begin{cases} y = (4 + 8x_0)x + (1 - 4{x_0}^2) \\ y = 2x + \frac{1}{2} \end{cases} \Rightarrow 4 + 8x_0 = 2$$

$$\Rightarrow \quad x_0 = -\frac{1}{4} \Rightarrow y_0$$

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

$$A(x_0; y_0) = A\left(-\frac{1}{4}; \frac{1}{4}\right); \quad |\overrightarrow{OA}| = \sqrt{\left(-\frac{1}{4}\right)^2 + \left(\frac{1}{4}\right)^2} =$$

$= \sqrt{\frac{1}{16} + \frac{1}{16}} = \sqrt{\frac{1}{8}} = \frac{\sqrt{2}}{4}$. Javobi: B.

42. $\int_0^{2\pi} sin^4 7x dx$ ni hisoblang.

A) $\frac{3\pi}{8}$ B) $\frac{\pi}{4}$ C) $\frac{3\pi}{4}$ D) $\frac{\pi}{8}$ E) $\frac{3\pi}{2}$

Yechilishi: *Darajani pasaytirish orqali yechiladi.*

$$\int_0^{2\pi} sin^4 7x dx = \int_0^{2\pi} (sin^2 7x)^2 dx =$$

$$= \int_0^{2\pi} \left[\frac{1}{2}(1 - cos14x)\right]^2 =$$

$$= \frac{1}{4}\int_0^{2\pi} (1 - 2cos14x + cos^2 14x) dx =$$

$$= \frac{1}{4}\int_0^{2\pi} \left[1 - 2cos14x + \frac{1}{2}(1 + cos28x)\right] dx =$$

$$= \frac{1}{4}\int_0^{2\pi}\left[1 - 2cos14x + \frac{1}{2} + \frac{1}{2}cos28x\right]dx =$$

$$= \frac{1}{4}\int_0^{2\pi}\left(\frac{3}{2} - 2cos14x + \frac{1}{2}cos28x\right)dx =$$

$$= \frac{3}{8}\int_0^{2\pi} dx - \frac{1}{2}\int_0^{2\pi} cos14xdx + \frac{1}{8}\int_0^{2\pi} cos28xdx =$$

$$= \frac{3}{8}x\Big|_0^{2\pi} - \frac{1}{2}\cdot\frac{1}{14}x\Big|_0^{2\pi} + \frac{1}{8}\cdot\frac{1}{28}sin28x\Big|_0^{2\pi} =$$

$= \frac{3}{8}[2\pi - 0] = \frac{3\pi}{4}$. Javobi: C.

43. Agar $f(x) = 2x^2$ va $\varphi(x) = x + 1$ bo‘lsa, x ning nechta qiymatida $f(\varphi(x)) = \varphi(f(x))$ bo‘ladi?

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

Yechilishi: $f(x) = 2x^2;\ \varphi(x) = x + 1;$

$$2(x+1)^2 = 2x^2 + 1 \Rightarrow 2(x^2 + 2x + 1) = 2x^2 + 1 \Rightarrow$$

$$\Rightarrow 2x^2 + 4x + 2 = 2x^2 + 1 \Rightarrow 4x = -1 \Rightarrow x = -\frac{1}{4}.$$

Javobi: B.

44. $f(x) = \log_5(81^{-x} - 3^{x^2+3})$ funksiyaning aniqlanish sohasini toping.

A) $(-\infty; -3) \cup (-2; \infty)$ B) $(-\infty; -1) \cup (3; \infty)$

C) $(1; 3)$ D) $(-3; -1)$ E) $(0; \infty)$

Yechilishi: $f(x) = \log_5(81^{-x} - 3^{x^2+3}) \Rightarrow$

$$\Rightarrow 81^{-x} - 3^{x^2+3} > 0 \Rightarrow 3^{-4x} > 3^{x^2+3} \Rightarrow 3 > 1 \Rightarrow$$

$$\Rightarrow -4x > x^2 + 3 \Rightarrow x^2 + 4x + 3 < 0 \Rightarrow$$

$\Rightarrow x_{1,2} = -2 \pm \sqrt{4-3} \Rightarrow$

$\Rightarrow \begin{cases} x_1 = -3; \\ x_2 = -1. \end{cases} (-3;-1)$. Javobi: D.

45. $f(x) = |x+2| + |x+8|$ funksiyaning qiymatlar sohasini toping.

A) $[0;\infty)$ B) $[3;\infty)$ C) $[4;\infty)$ D) $[6;\infty)$ E) $[5;\infty)$

Yechilishi: $f(x) = |x+2| + |x+8| \Rightarrow \begin{cases} x = -2; \\ x = -8. \end{cases}$

$x+2\ va\ x+8\ larning\ ishoralari\ o'zgarmaydigan\ oraliqlarini\ topamiz: x = -2; x = -8 \Rightarrow$

$1)\ (-\infty;-8);\ (-8;-2);\ (-2;+\infty)$

$x \in (-\infty;-8) \Rightarrow x+2 < 0;\ \ x+8 < 0.$

$y = -x-2-x-8 = -2x-10.$

$y' = -2 \Rightarrow f(-2) = 6;$

$2)\ x \in [-8;-2) \Rightarrow x+2 < 0; x+8 = x+8;$

$y = -x-2+x+8 = 6;$

$3) x \in [-2;+\infty) \Rightarrow x+2 \geq 0;\ x+8 > 0;$

$y \in [6;\infty)$. Javobi: D.

46. $\alpha \in \left(0;\frac{\pi}{2}\right)$ va $\beta, \gamma \in [0;\pi]$ miqdprlar

$2cos\gamma + 3sin2\beta + \frac{4}{tg^2\alpha + ctg^2\alpha} = 7$ tenglikni qanoatlantiradi.

$\frac{3\alpha-\gamma}{5\gamma+6\beta}$ ning qiymatini toping.

A) $\frac{3}{8}$ B) $\frac{1}{4}$ C) $\frac{2}{5}$ D) $\frac{1}{2}$ E) $\frac{4}{11}$

Yechilishi: $Boshqa\ \ holda\ 7\ butun\ son\ chiqmaydi.$

$$2cos0° + 3 \cdot sin2 \cdot \frac{\pi}{4} + \frac{4}{\left(tg\frac{\pi}{4}\right)^2 + \left(ctg\frac{\pi}{4}\right)^2} = 7;$$

$$\Rightarrow 2 \cdot 1 + 3 \cdot 1 + \frac{4}{2} = 7;$$

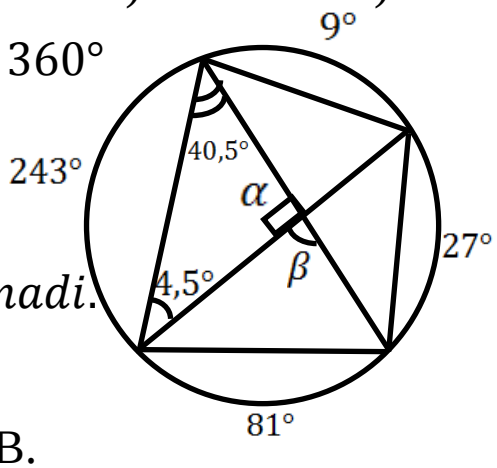
$\frac{3\alpha-\gamma}{5\gamma+6\beta} = \frac{3\cdot\frac{\pi}{4}-0}{5\cdot 0+6\cdot\frac{\pi}{4}} = \frac{1}{2}$. Javobi: D.

47. To‘rtta nuqta aylanani yoylarining uzunligi maxrji 3 ga teng bo‘lgan geometrik progressiya tashkil etuvchi bo‘laklarga ajratadi. Shu nuqtalarni ketma-ket tutashtirish natijasida hosil bo‘lgan to‘rtburchakning diagonallari orasidagi kichik burchakni toping.

A) 30° B) 45° C) 60° D) 70° E) 75°

Yechilishi: $x + 3x + 9x + 27x = 360°$

$x = 9°; Uchi\ aylanada\ yotgan\ burchak\ o'zi\ tiralgan\ yoyning\ yarmiga\ tengligi\ e'tiborga\ olinadi.$



$40{,}5° + 4{,}5° + \alpha = 180°;$

$\alpha = 135° \Rightarrow \beta = 45°$. Javobi: B.

48. BC va AD −trapetsiyaning asoslari, O, AC va BD diagonallarining kesisish nuqtasi. BOC va AOD uchburchaklarning yuzlari mos ravishda 9 va 16 ga teng. Trapetsiyaning yuzini toping.

A) 32 B) 36 C) 49 D) 64 E) 56

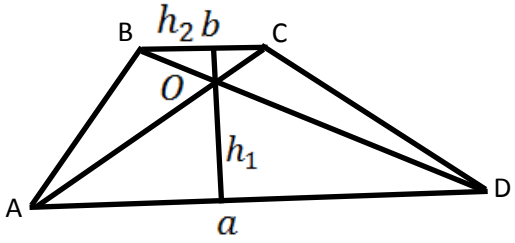
Yechilishi: $k^2 = \frac{16}{9} \Rightarrow k = \frac{4}{3}; k = \frac{h_1}{h_2} = \frac{4}{3} \Rightarrow h_1 = \frac{4}{3}h_2;$

$$\begin{cases} 9 = \frac{1}{2} b \cdot h_2 \\ 16 = \frac{1}{2} a \cdot h_1 \end{cases} \Rightarrow \begin{cases} b \cdot h_2 = 18 \\ a \cdot h_1 = 32 \end{cases} \Rightarrow a \cdot \frac{4}{3} h_2 = 32 \Rightarrow$$

$$\Rightarrow 4ah_2 = 96 \Rightarrow ah_2 = 24;$$

$$\underline{+ \begin{matrix} bh_2 = 18 \\ ah_2 = 24 \end{matrix}} \Rightarrow (a+b)h_2 = 42 \Rightarrow h_2 = \frac{42}{a+b};$$

$$h_1 = \frac{4}{3} h_2 = \frac{4}{3} \cdot \frac{42}{a+b} = \frac{56}{a+b};$$



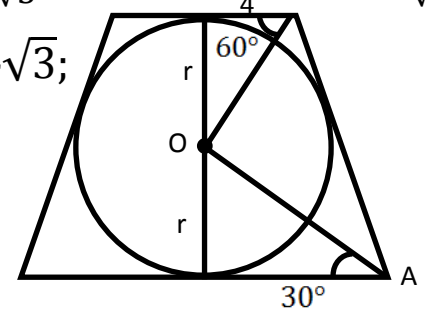
$$h = h_1 + h_2 = \frac{56}{a+b} + \frac{42}{a+b} = \frac{98}{a+b};$$

$$S_{trapetsiya} = \frac{a+b}{2} \cdot h = \frac{a+b}{2} \cdot \frac{98}{a+b} = 49.$$ Javobi: C.

49. Teng yonli trapetsiyaning burchagi $120°$ ga, kichik asosi 8 ga teng. Shu trapetsiyaga aylana ichki chizilgan. Trapetsiya katta asosining uchi aylananing markazidan qanday masofada joylashgan?

A) $8\sqrt{2}$ B) $\frac{16\sqrt{3}}{3}$ C) $\frac{24}{\sqrt{3}}$ D) $6\sqrt{3}$ E) $\frac{18}{\sqrt{2}}$

Yechilishi: $r = 4tg60° = 4\sqrt{3};$



$$OA = 2r = 8\sqrt{3} = \frac{24}{\sqrt{3}}.$$

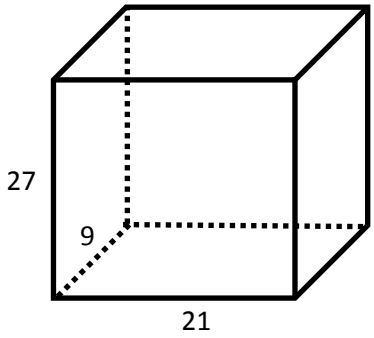
Javobi: C.

50. O‘lchovlari $21 \times 27 \times 9$ bo‘lgan to‘g‘ri burchakli parallelepipedga eng ko‘pi bilan qirrasi 5 ga teng bo‘lgan kublardan nechtasini joylashtirish mumkin? (kubning barcha qirralari parallelepipedning qirralariga parallel)

A) 20 B) 25 C) 30 D) 40 E) 41

Yechilishi: $Eniga\ 1\ ta, bo'yiga\ 4\ ta, balandligiga\ 5\ ta.$

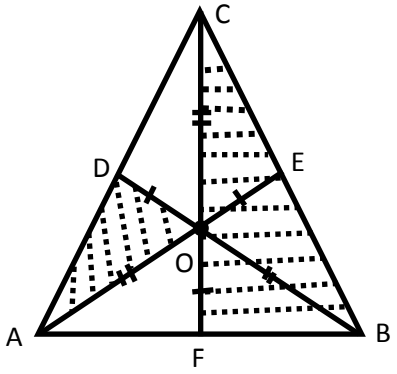
$1 \cdot 4 \cdot 5 = 20ta$. Javobi: A.



51. ABC uchburchakning BD, AE va CF medianalari O nuqtada kesishadi. Uchburchak AOD ning yuzi 2,8 ga teng. Uchburchak BFC ning yuzini toping.

A) $\frac{17}{3}$ B) $\frac{36}{5}$ C) $\frac{39}{4}$ D) $\frac{42}{5}$ E) $\frac{48}{5}$

Yechilishi: $Medianalar\ uchburchakni\ yuzlari\ bir-biriga\ teng\ 6\ ta$



$uchburchaklarga\ ajratadi.\ 2{,}8 \cdot 3 = 8{,}4 = \frac{42}{5}$.

Javobi: D.

52. Muntazam sakkizburchakli piramidaning apofemasi 10 ga, uning asosiga ichki chizilgan doiraning yuzi 36π ga teng. Shu piramidaga ichki chizilgan sharning radiusini toping.

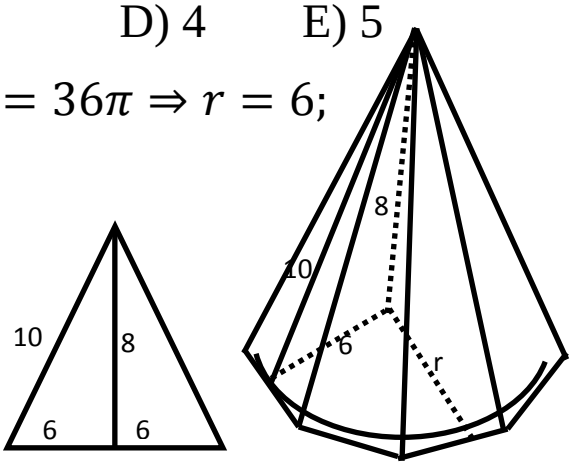
A) 1 B) 2 C) 3 D) 4 E) 5

Yechilishi: $S = \pi r^2 \Rightarrow \pi r^2 = 36\pi \Rightarrow r = 6;$

$S_\Delta = \frac{1}{2} \cdot 12 \cdot 8 = 48;$

$R = \frac{2S}{a+b+c} = \frac{96}{32} = 3.$

Javobi: C.



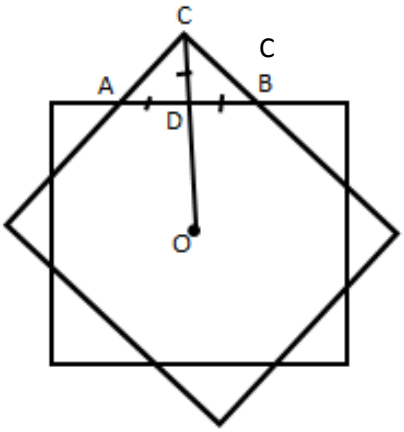
53. Tomonlari 1 ga teng bo‘lgan ikkita kvadrat ustma-ust qo‘yilganidan keyin, ulardan biri kvadratlarning umumiy simmetriya markaziga nisbatan 45° ga burildi. Hosil bo‘lgan figuraning yuzini toping.

A) $8 + \sqrt{2}$ B) $12 - 2\sqrt{2}$ C) $18 - 8\sqrt{2}$

D) $4 + \sqrt{2}$ E) $16 - 8\sqrt{2}$

Yechilishi: $OD = \frac{1}{2}; OC = \frac{\sqrt{2}}{2}; DC = OC - OD =$

$= \frac{\sqrt{2}}{2} - \frac{1}{2} = \frac{\sqrt{2}-1}{2};$



$AB = 2DC$

$S_{\Delta ABC} = \frac{1}{2}$

$= \frac{1}{2} \cdot \frac{\sqrt{2}-1}{2} \cdot (\sqrt{2} - 1) =$

$= \frac{2 - 2\sqrt{2} + 1}{4} = \frac{3 - 2\sqrt{2}}{4}; S = 1 + 4 \cdot S_{\Delta ABC}$

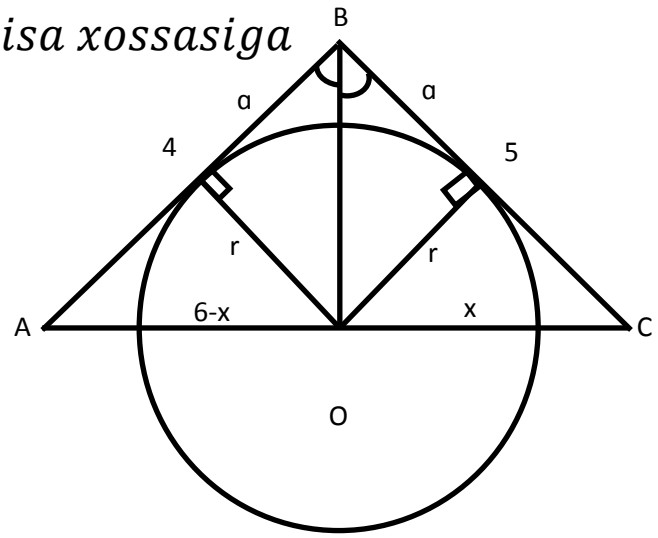
$= 1 + 4 \cdot \frac{3 - 2\sqrt{2}}{4} =$

$= 4 - 2\sqrt{2}$. Javobi: A.

54. ABC uchburchakning AB, BC va AC tomonlari mos ravishda 4, 5, va 6 ga teng. AB va BC tomonlarga urinadigan aylananing markazi AC tomonda yotadi. Aylananing markazi AC tomondan ajratgan kesmalarning uzunliklari ko‘paytmasini toping.

A) $6\frac{4}{9}$ B) $7\frac{3}{4}$ C) $8\frac{8}{9}$ D) $8\frac{2}{5}$ E) $9\frac{1}{3}$

Yechilishi: OB *bissektrisa xossasiga*



$asosan\ \frac{4}{6-x} = \frac{5}{x} \Rightarrow$

$\Rightarrow 4x = 30 - 5x \Rightarrow$

$\Rightarrow 9x = 30 \Rightarrow$

$\Rightarrow x = \frac{10}{3};$

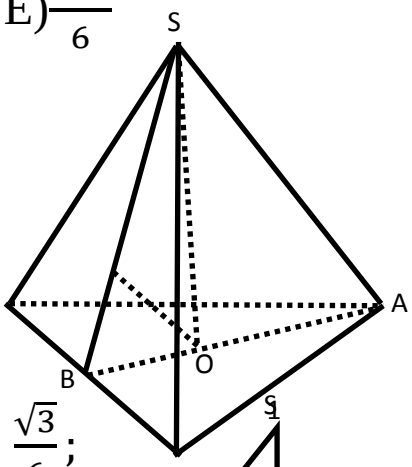
$6 - x = 6 - \frac{10}{3} = \frac{8}{3};$

$\frac{8}{3} \cdot \frac{10}{3} = 8\frac{8}{9}$. Javobi: C.

55. Muntazam tetraedrning qirrasi 1 ga teng. Uning asosiga tashqi chizilgan aylananing markazidan uning yon yog‘iga bo‘lgan masofani toping.

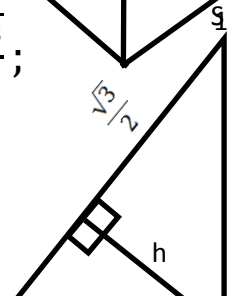
A) $\frac{2\sqrt{3}}{6}$ B) $\frac{\sqrt{6}}{9}$ C) $\frac{2\sqrt{2}}{5}$ D) $\frac{3\sqrt{6}}{8}$ E) $\frac{5\sqrt{6}}{6}$

Yechilishi: $R = \frac{2}{3}AB;$



$AB^2 = 1^2 - \left(\frac{1}{2}\right)^2 = \frac{3}{4} \Rightarrow AB = \frac{\sqrt{3}}{2};$

$R = \frac{2}{3} \cdot \frac{\sqrt{3}}{3} = \frac{\sqrt{3}}{6}; OB = \frac{1}{3}AB = \frac{1}{3} \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{6};$



$AB = SB;\ SO^2 = \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{\sqrt{3}}{6}\right)^2 = \frac{2}{3} \Rightarrow$ $\frac{\sqrt{2}}{\sqrt{3}}$

$\Rightarrow SO = \frac{\sqrt{2}}{\sqrt{3}};\ h = \frac{OB \cdot SO}{SB} =$ □

$= \frac{\sqrt{3}}{6} \cdot \frac{\sqrt{2}}{\sqrt{3}} \cdot \frac{2}{\sqrt{3}} = \frac{\sqrt{6}}{9}$. Javobi: B.

56. $\left(\left(3 \cdot 128^{\frac{3}{7}} \cdot e^{-\ln 48}\right)^{-\frac{1}{2}} - \left(tg\frac{7\pi}{6}\right)^{-1}\right)^2 + \frac{12}{\sqrt{6}}$ ni hisoblang.

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

Yechilishi: $\left(\left(3 \cdot 128^{\frac{3}{7}} \cdot e^{-\ln 48}\right)^{-\frac{1}{2}} - \left(tg\frac{7\pi}{6}\right)^{-1}\right)^2 + \frac{12}{\sqrt{6}} =$

$= \left[\left(3 \cdot \sqrt[7]{128^3} \cdot \frac{1}{48}\right)^{-\frac{1}{2}} - \frac{1}{tg\left(\pi + \frac{\pi}{6}\right)}\right]^2 + \frac{12}{\sqrt{6}} =$

$= \left[\left(3 \cdot \sqrt[7]{2097152} \cdot \frac{1}{48}\right)^{-\frac{1}{2}} - \frac{1}{tg\frac{\pi}{6}}\right]^2 + \frac{12}{\sqrt{6}} =$

$= \left[\left(3 \cdot \sqrt[7]{8^7} \cdot \frac{1}{48}\right)^{-\frac{1}{2}} - \frac{1}{\frac{\sqrt{3}}{3}}\right]^2 + \frac{12}{\sqrt{6}} =$

$= \left[\left(8 \cdot \frac{1}{16}\right)^{-\frac{1}{2}} - \frac{3}{\sqrt{3}}\right]^2 + \frac{12}{\sqrt{6}} = \left[\sqrt{2} - \sqrt{3}\right]^2 + \frac{12}{\sqrt{6}} = 5.$

Javobi: E.

57. Agar ikkita sondan biri 20% ga, ikkinchisi 12,5% ga kamaytirilsa, ularning ko‘paytmasi necha foizga kamayadi?

A) 40 B) 50 C) 45 D) 35 E) 30

Yechilishi: $Birinchi\ son\ x, ikkinchisi\ y\ bo'lsin. U\ holda,$

$$\begin{cases} \dfrac{100-20}{100}\cdot x = 0{,}8x \\ \dfrac{100-12{,}5}{100}y = 0{,}875y \end{cases} \Rightarrow$$

$\Rightarrow x\cdot y \Rightarrow 0{,}8\cdot x\cdot 0{,}875y = 0{,}7xy \Rightarrow 30\%$. Javobi: E.

58. $\dfrac{2^{cos\frac{\pi}{7}+cos\frac{2\pi}{7}+cos\frac{5\pi}{7}+cos\frac{6\pi}{7}}}{3^{cos\frac{3\pi}{7}+cos\frac{4\pi}{7}}}$ ni hisoblang.

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

Yechilishi: $\dfrac{2^{cos\frac{\pi}{7}+cos\frac{2\pi}{7}+cos\frac{5\pi}{7}+cos\frac{6\pi}{7}}}{3^{cos\frac{3\pi}{7}+cos\frac{4\pi}{7}}} =$

$$= \frac{2^{cos\frac{\pi}{7}+cos\frac{2\pi}{7}+\cos\left(\pi-\frac{2\pi}{7}\right)+\cos\left(\pi-\frac{\pi}{7}\right)}}{3^{\cos\left(\pi-\frac{4\pi}{7}\right)+cos\frac{4\pi}{7}}} = \frac{2^{\circ}}{3^{\circ}} = 1.$$ Javobi: A.

59. $cos^4x + sin^3x = 1$ tenglamaning $\left[-\frac{3\pi}{2}; 2\pi\right]$ kesmada nechta ildizi bor?

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

Yechilishi: $cos^4x + sin^3x = 1;$

$$1)\begin{cases} cos^4x = 1 \\ sin^3x = 0 \end{cases} \Rightarrow \begin{cases} cosx = \pm 1 \\ sinx = 0 \end{cases} \Rightarrow \begin{cases} x = 2\pi k,\ \ k\epsilon Z \\ x = \pi + 2\pi k,\ \ k\epsilon Z \\ x = \pi k,\ \ k\epsilon Z \end{cases} \Rightarrow$$

$$Bundan\ \ x = -\pi, 0, \pi, 2\pi\ \ kelib\ chiqadi.$$

$$2)\begin{cases} cos^4x = 0 \\ sin^3x = 1 \end{cases} \Rightarrow \begin{cases} cosx = 0 \\ sinx = 1 \end{cases} \Rightarrow \begin{cases} x = \dfrac{\pi}{2} + \pi k,\ \ k\epsilon Z \\ x = \dfrac{\pi}{2} + 2\pi k,\ \ k\epsilon Z \end{cases} \Rightarrow$$

$$Bundan\ x = -\frac{3\pi}{2}, -\frac{\pi}{2}, \frac{\pi}{2}, \frac{3\pi}{2}\ \ kelib\ chiqadi.$$

$-\pi, 0, \pi, 2\pi, -\frac{3\pi}{2}, \frac{\pi}{2}$. Javobi: C.

60. Agar $f(x-1) = x^2 + 3x - 2$ bo‘lsa, $f(x)$ ni aniqlang.

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

D) $x^2 - x - 2$E)$x^2 - 6x + 5$

Yechilishi: $f(x-1) = x^2 + 3x - 2. f(x-1)\ ni\ f(x)\ ga\ aylantirish\ uchun\ x\ o'rniga\ x+1\ qo'yish\ kifoya$

$$f(x) = (x + 1 - 1) \Rightarrow$$

$$\Rightarrow f(x) = (x+1)^2 + 3(x+1) - 2 = x^2 + 5x + 2.$$

Javobi: C.

61. $y = arcsin\sqrt[4]{3 - 2x - x^2}$ funksiyaning aniqlanish sohasiga tegishli butun sonlar nechta?

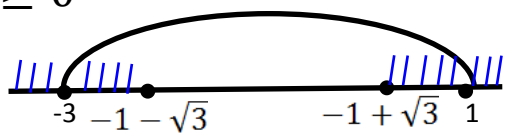
A) 1 B) 2 C) 3 D) 4 E)5

Yechilishi: $y = arcsin\sqrt[4]{3 - 2x - x^2}$;

$$-1 \le \sqrt[4]{3 - 2x - x^2} \le 1 \Rightarrow 0 \le \sqrt[4]{3 - 2x - x^2} \le 1 \Rightarrow$$

$$\Rightarrow \begin{cases} 3 - 2x - x^2 \ge 0 \\ 3 - 2x - x^2 \le 1 \end{cases} \Rightarrow \begin{cases} x^2 + 2x - 3 \le 0 \\ x^2 + 2x - 2 \ge 0 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x_1 = -3;\ x_2 = 1 \Rightarrow [-3; 1]. \\ x_1 = -1 - \sqrt{3};\ x_2 = -1 + \sqrt{3}; \end{cases}$$



$$(-\infty; -1 - \sqrt{3}] \cup [-1 + \sqrt{3}; +\infty);$$

$x = -3; 1$. Javobi: B.

62. Muntazam uchburchakli prizmaning hajmi 16 ga teng. Asosidagi tomonining uzunligi qanday bo‘lganda, prizmaning to‘la sirti eng katta bo‘ladi?

A) 3 B) 4 C) 2 D) 6 E) $3\sqrt{2}$

Yechilishi: $V = S_{asos} \cdot H \Rightarrow 16 = \frac{x^2\sqrt{3}}{4} \cdot H \Rightarrow x^2 H = \frac{64}{\sqrt{3}} \Rightarrow$

$$\Rightarrow H = \frac{64}{\sqrt{3}x^2}; \quad S_t = S_{yon} + 2S_{asos}$$

$$= P_{asos} \cdot H + 2 \cdot \frac{x^2\sqrt{3}}{4} =$$

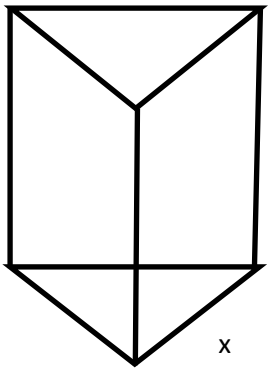
$$= 3x \cdot H + \frac{x^2\sqrt{3}}{2} = 3x \cdot \frac{64}{\sqrt{3}x^2} + \frac{\sqrt{3}x^2}{2} = \frac{3 \cdot 64}{\sqrt{3}x} + \frac{\sqrt{3}}{2} \cdot x^2$$

$$=$$

$$= 64 \cdot \sqrt{3} \cdot x^{-1} + \frac{\sqrt{3}}{2}x^2;$$

$$S_t{}' = -\frac{64\sqrt{3}}{x^2} + \sqrt{3}x \Rightarrow \sqrt{3}x = \frac{64}{x^2} \cdot \sqrt{3} \Rightarrow$$

$\Rightarrow x^3 = 64 \Rightarrow x = 4$. Javobi: B.



63. α $\vec{x} = 2\vec{i} + 5\vec{j} - \vec{k}$ va $\vec{y} = \vec{i} - \vec{j} - 3\vec{k}$ vektorlar orasidagi burchak. $cos^2\frac{\alpha}{2}$ ning qiymatini toping.

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

Yechilishi: $\vec{x} = \{2; 5; -1\}, \vec{y} = \{1; -1; -3\};$

$$\vec{x} \cdot \vec{y} = |\vec{x}| \cdot |\vec{y}| cos\alpha; \quad \vec{x} \cdot \vec{y} = \{2; 5; -1\} \cdot \{1; -1; -3\} =$$

$$= 2 - 5 + 3 = 0 \Rightarrow$$

$\Rightarrow \alpha = 90°;\ \ cos^2\frac{90°}{2} = (cos45°)^2 = \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{1}{2}$. Javobi:B.

64. $y = \sqrt{x - x^2}$ funksiyaning qiymatlar sohasini toping.

A) $[0;1]$ B) $\left[\frac{1}{2};1\right]$ C) $\left[0;\frac{1}{2}\right]$ D) $[0;2]$ E) $\left[1;\sqrt{2}\right]$

Yechilishi: $y = \sqrt{x - x^2} \Rightarrow x - x^2 \geq 0 \Rightarrow x(1-x) \geq 0 \Rightarrow$

$$\Rightarrow \begin{cases} x = 0 \\ x = 1 \end{cases} \Rightarrow x = -\frac{b}{2a} = -\frac{1}{2(-1)} = \frac{1}{2};$$

$y = \sqrt{\frac{1}{2} - \left(\frac{1}{2}\right)^2} = \frac{1}{2};\ \ y\epsilon\left[0;\frac{1}{2}\right]$. Javobi: C.

65. Agar $\alpha, \beta \in \left(0;\frac{\pi}{2}\right)$ va $\left(tg\alpha + \sqrt{3}\right)\cdot\left(tg\beta + \sqrt{3}\right) = 4$ bo‘lsa, $9 \cdot \left(\frac{\alpha+\beta}{\pi}\right)^2$ ning qiymatini hisoblang.

A) 0,25 B) 0,5 C) 0,36 D) 0,64 E) 0,16

Yechilishi: $\alpha, \beta \in \left(0;\frac{\pi}{2}\right);\ \ \left(tg\alpha + \sqrt{3}\right)\cdot\left(tg\beta + \sqrt{3}\right) = 4 \Rightarrow$

$$\Rightarrow tg\alpha tg\beta + \sqrt{3}tg\alpha + \sqrt{3}tg\beta + 3 = 4 \Rightarrow$$

$$\Rightarrow tg\alpha tg\beta + \sqrt{3}(tg\alpha + tg\beta) = 1 \Rightarrow$$

$$\Rightarrow \sqrt{3}(tg\alpha + tg\beta) = 1 - tg\alpha tg\beta \Rightarrow$$

$$\Rightarrow \sqrt{3}\cdot\frac{tg\alpha + tg\beta}{1 - tg\alpha tg\beta} = 1 \Rightarrow \frac{tg\alpha + tg\beta}{1 - tg\alpha tg\beta} = \frac{1}{\sqrt{3}} \Rightarrow$$

$$\Rightarrow tg(\alpha + \beta) = \frac{\sqrt{3}}{3} \Rightarrow \alpha + \beta = \frac{\pi}{6};$$

$9 \cdot \left(\frac{\alpha+\beta}{\pi}\right)^2 = 9 \cdot \left(\frac{\pi}{6}\cdot\frac{1}{\pi}\right)^2 = 9 \cdot \frac{1}{36} = 0{,}25$. Javobi: A.

66. Agar $3 \le x \le 6$ va $15 \le y \le 60$ bo‘lsa, $\frac{y}{x}$ ning qiymatini toping.

A) $[5; 10]$ B) $[0{,}5; 20]$ C) $[0{,}5; 20]$

D) $[2{,}5; 20]$ E) $[0{,}1; 0{,}2]$

Yechilishi: $\begin{cases} 3 \le x \le 6 \\ 15 \le y \le 60 \end{cases} \Rightarrow \frac{15}{6} \le \frac{y}{x} \le \frac{60}{3} \Rightarrow 2{,}5 \le \frac{y}{x} \le 20.$

Javobi: D.

67. N sonning o‘rta arifmetigi 13 ga, boshqa M tasiniki 28 ga teng. Shu $M + N$ ta sonning o‘rta arifmetigini toping.

A) $\frac{N}{M}$ B) $\frac{N+M}{41}$ C) $\frac{13N+28M}{M+N}$ D) $\frac{13M+28N}{M+N}$ E) $\frac{13N+28M}{MN}$

Yechilishi: $\frac{a_1+a_2+\cdots+a_N}{N} = 13 \Rightarrow a_1 + a_2 + \cdots + a_N = 13 \cdot N$; $\frac{c_1 + c_2 + \cdots + c_M}{M} = 28 \Rightarrow c_1 + c_2 + \cdots + c_M = 28M.$

$a_1 + a_2 + \cdots + a_N + c_1 + c_2 + \cdots + c_M = 13N + 28M \Rightarrow$

$\Rightarrow \frac{13N+28M}{N+M}$. Javobi: C.

Pirnazar DAVRONOV

2000-YIL, 10-AXBOROTNOMA

1. $\left[\left(\frac{1}{33}\right)^{-1}\cdot\left(\sqrt[4]{4}\right)^{-12}+\frac{2^{-5}}{-2}\right]^{-1}$ ni hisoblang.

A) $\frac{1}{2}$ B) 4 C) 2 D) $\frac{1}{4}$ E) 0,75

Yechilishi: $\left[\left(\frac{1}{33}\right)^{-1}\cdot\left(\sqrt[4]{4}\right)^{-12}+\frac{2^{-5}}{-2}\right]^{-1}=$

$$=\left[33\cdot\frac{1}{\left(\sqrt[4]{4}\right)^{12}}-\frac{1}{2\cdot 2^5}\right]^{-1}=\left[\frac{33}{4^3}-\frac{1}{2^6}\right]^{-1}=$$

$=\left[\frac{33}{64}-\frac{1}{64}\right]^{-1}=\left[\frac{32}{64}\right]^{-1}=2.$ Javobi: C.

2. 108 va 135 sonlarning eng kichik umumiy karralisini 12 va 54 sonlari eng kichik umumiy karralisiga nisbatini toping.

A) 8 B) 5 C) 12 D) 6 E) 10

Yechilishi:

54	2
27	3
9	3
3	3
1	

12	2
6	2
3	3
1	

135	3
45	3
15	3
5	5
1	

108	2
54	2
27	3
9	3
3	3
1	

$$K(108;135)=2^2\cdot 3^3\cdot 5;$$

$$K(12;54)=2^2\cdot 3^3;$$

$\frac{K(108;135)}{K(12;54)}=\frac{2^2\cdot 3^3\cdot 5}{2^2\cdot 3^3}=5.$ Javobi: B.

3. $\frac{3,(73)-0,2(19)}{3\frac{513}{990}}$ ni hisoblang.

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

Yechilishi: $\frac{3,(73)-0,2(19)}{3\frac{513}{990}} = \frac{\frac{373-3}{99}-\frac{219-2}{990}}{3\frac{57}{110}} = \frac{\frac{370}{99}-\frac{217}{990}}{\frac{387}{110}} =$

$= \frac{3700-217}{990} \cdot \frac{110}{387} = 1.$ Javobi: E.

4. $\sqrt{21-2\sqrt{21+2\sqrt{19-6\sqrt{2}}}}$ ni soddalashtiring.

A) $3\sqrt{2}+1$ B) $3\sqrt{2}+2$ C) $3\sqrt{2}-2$

D) $2\sqrt{3}+2$ E) $3\sqrt{2}-1$

Yechilishi: $\sqrt{21-2\sqrt{21+2\sqrt{19-6\sqrt{2}}}};$

$$\sqrt{19-6\sqrt{2}} = \sqrt{19-\sqrt{72}} = \sqrt{\frac{19+\sqrt{361-72}}{2}} - \sqrt{\frac{19-17}{2}} =$$

$$= \sqrt{\frac{19+\sqrt{289}}{2}} - 1 = \sqrt{18} - 1;$$

$$\sqrt{21-2\sqrt{21+2(\sqrt{18}-1)}} = \sqrt{21-2\sqrt{21+2\sqrt{18}-2}} =$$

$$= \sqrt{21-2\sqrt{18}-2} = \sqrt{19-\sqrt{72}} = 3\sqrt{2}-1.$$

Javobi: E.

5. $\left[65 \cdot \left(4^{\frac{1}{4}}\right)^{-12} + \frac{2^{-5}}{-2}\right]^{-1}$ ni hisoblang.

A) $\frac{1}{2}$ B) 2 C) $\frac{1}{4}$ D) $\frac{1}{8}$ E) 1

Yechilishi: $\left[65 \cdot \left(4^{\frac{1}{4}}\right)^{-12} + \frac{2^{-5}}{-2}\right]^{-1} = \left[65 \cdot \frac{1}{4^3} - \frac{1}{2 \cdot 2^5}\right]^{-1} =$

$= \left[\frac{65}{64} + \frac{1}{64}\right]^{-1} = 1.$ Javobi: E.

6. $\frac{x^{16}-x^8+1}{x^{24}+1}$ kasrni qisqartiring.

A) $[(x^2)^4 + 1]^{-1}$ B) $[(x^2)^3 + 1]^{-1}$ C)$[(x^2)^{-4} + 1]^{-1}$

D) $[(x^2)^{-3} + 1]^{-1}$ E) $[(x^3)^{-2} + 1]^{-1}$

Yechilishi:$\frac{x^{16}-x^8+1}{x^{24}+1} = \frac{(x^8)^2-x^8+1}{(x^8)^3+1^3} = \frac{1}{x^8+1} = [(x^2)^4 + 1]^{-1}.$

Javobi: A.

7. $y_1 = \frac{x}{x^4-2}$, $y_2 = \sqrt[3]{y^4}$, $y_3 = arccos(x^4 - 1)$,

$y_4 = \log_4 \log_4 x$, va $y_5 = (0{,}25)^x + (0{,}25)^{-x}$ funksiyalardan qaysilari juft funksiya?

A) y_1, y_2 B)y_2, y_3, y_4 C)y_3, y_4, y_5 D)y_2, y_3, y_5 E)y_2, y_5

Yechilishi: $y_1 = \frac{x}{x^4-2}$, $y_2 = \sqrt[3]{y^4}$, $y_3 = arccos(x^4 - 1)$,

$y_4 = \log_4 \log_4 x$, va $y_5 = (0{,}25)^x + (0{,}25)^{-x}$;

y_2, y_3, y_5. Javobi: D.

8. $y = |x - 1| - 5$ va $y = 0$ funksiyalar grafiklari kesishgan nuqtalari absissalarining kvadratlari yig‘indisini toping.

A) 36 B) 48 C) 24 D) 52 E) 32

Yechilishi: $\begin{cases} y = |x-1| - 5 \\ (Ox):\ y = 0 \end{cases} \Rightarrow |x-1| - 5 = 0 \Rightarrow$

$$\Rightarrow |x-1| = 5 \Rightarrow x - 1 = \pm 5 \Rightarrow \begin{cases} x - 1 = -5 \\ x - 1 = 5 \end{cases} \Rightarrow$$

$\Rightarrow \begin{cases} x_1 = -4; \\ x_2 = 6. \end{cases} {x_1}^2 + {x_2}^2 = 16 + 36 = 52.$ Javobi: D.

9. $y = -2x^2 + 4x - 8$ funksiyaning grafigi qaysi choraklarda joylashgan?

A) II, III, IV B) I, II, III, IV C) I, III, IV

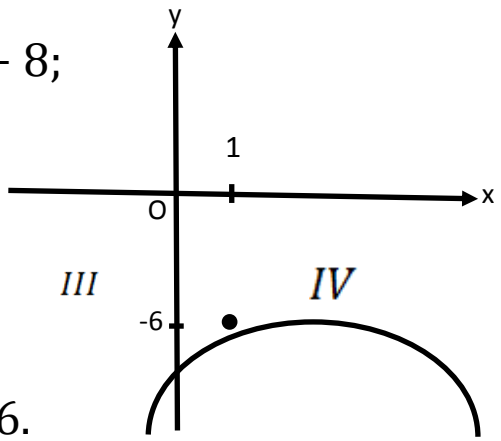
D) I, II, IV E) III, IV

Yechilishi: $y = -2x^2 + 4x - 8;$

$x = -\frac{b}{2a} = -\frac{4}{2\cdot(-2)} = 1;$

$$y = -\frac{b^2 - 4ac}{4a} =$$

$$= -\frac{16 - 4 \cdot (-2)(-8)}{4 \cdot (-2)} = -6.$$



Javobi: E.

10. k ning qanday qiymati $y_1 = -\frac{21}{5}x$ va $y_2 = kx - \frac{21}{5}$ funksiyalarning grafiklari o‘zaro parallel?

A) $\frac{21}{5}$ B) $\frac{5}{21}$ C) $-\left(\frac{5}{21}\right)^{-1}$ D) $-\frac{5}{41}$

E) $\emptyset$

Yechilishi: $y_1 = -\frac{21}{5}x;\ y_2 = kx - \frac{21}{5}$

$k = -\frac{21}{5} = -\left(\frac{5}{21}\right)^{-1}$. Javobi: C.

11. $y = \frac{6x+2}{x}$ funksiyaga teskari funksiyani toping.

A) $y = \frac{4}{x-6}$ B) $y = \frac{2}{x-6}$ C) $y = \frac{4}{x+6}$

D) $y = \frac{2}{x+6}$ E) $y = -\frac{2}{x-6}$

Yechilishi: $y = \frac{6x+2}{x} \Rightarrow yx = 6x + 2 \Rightarrow yx - 6x = 2 \Rightarrow$

$\Rightarrow x(y-6) = 2 \Rightarrow x = \frac{2}{y-6} \Rightarrow y = \frac{2}{x-6}$. Javobi: B.

12. $\frac{5\cdot 2^{k-2}+10\cdot 2^{k-1}}{10^{k+2}}$ ni soddalashtiring.

A)$4^{-1}\cdot 5^{-k}$ B)$4^{-2}\cdot 5^{-k}$ C) $4\cdot 5^{-k}$

D) $2^{-1}\cdot 5^{-k}$ E) $2\cdot 5^{-k}$

Yechilishi: $\frac{5\cdot 2^{k-2}+10\cdot 2^{k-1}}{10^{k+2}} = \frac{5\cdot 2^{k-1}\left(2^{-1}+2\right)}{5^{k+2}\cdot 2^{k+2}} = \frac{5\cdot 2^{k-1}\cdot\frac{5}{2}}{5^{k}\cdot 5^{2}\cdot 2^{k+2}} =$

$= \frac{5\cdot 5\cdot 2^{k-1}\cdot 2^{-1}}{5^{k}\cdot 5^{2}\cdot 2^{k+2}} = \frac{2^{k-2}}{5^{k}\cdot 2^{k+2}} = 4^{-2}\cdot 5^{-k}$. Javobi: B.

13. $cos\frac{\pi}{5}\cdot cos\frac{2\pi}{5}$ ni hisoblang.

A) $\frac{1}{2}$ B) $\frac{1}{8}$ C)$\frac{1}{4}$ D) $\frac{1}{12}$ E)$\frac{3}{4}$

Yechilishi: $cos\frac{\pi}{5}\cdot cos\frac{2\pi}{5} = \frac{1}{2sin\frac{\pi}{5}}\cdot 2sin\frac{\pi}{5}cos\frac{\pi}{5}cos\frac{2\pi}{5} =$

$= \frac{1}{2sin\frac{\pi}{5}}\cdot sin\frac{2\pi}{5}cos\frac{2\pi}{5} = \frac{1}{4sin\frac{\pi}{5}}\cdot 2sin\frac{2\pi}{5}cos\frac{2\pi}{5} =$

$= \frac{1}{4sin\frac{\pi}{5}}\cdot sin\frac{4\pi}{5} = \frac{1}{4sin\frac{\pi}{5}}sin\left(\pi-\frac{\pi}{5}\right) = \frac{1}{4}$. Javobi: C.

14. $\sqrt{1-x}-\sqrt{5+2\sqrt{1-x}}+1=0$ tenglama ildizlarining kvadratlarini toping.

A) 1;4 B)4 C) 9 D) 4; 9 E) 1; 9

Yechilishi: $\sqrt{1-x}-\sqrt{5+2\sqrt{1-x}}+1=0; x\leq 1;$

$$\sqrt{1-x}+1=\sqrt{5+2\sqrt{1-x}};$$

$1-x+2\sqrt{1-x}+1=5+2\sqrt{1-x}; \quad x=-3\Rightarrow x^2=9.$

Javobi: C.

15. $\vec{m}=\{4;1;x\}$ va $\vec{n}=\{-1;4;2\}$ vektorlar perpendikulyar bo‘lsa, x ning qiymatini toping.

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

Yechilishi: $\vec{m}\cdot\vec{n}=0\Rightarrow 4(-1)+1\cdot 4+2\cdot x=0\Rightarrow$

$\Rightarrow 2x=0\Rightarrow x=0.$ Javobi: E.

16. $tg\alpha=\frac{4}{5}; \quad \frac{sin\alpha+cos\alpha}{sin\alpha-cos\alpha}=?$

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

Yechilishi: $tg\alpha=\frac{4}{5}; \quad \frac{sin\alpha+cos\alpha}{sin\alpha-cos\alpha}=\frac{tg\alpha+1}{tg\alpha-1}=\frac{\frac{4}{5}+1}{\frac{4}{5}-1}=-9.$

Javobi: C.

17. Ikki shahar orasidagi masofa 200 km bo‘lsa, 1:2000000 masshtabli xaritada bu masofa necha mm ga teng bo‘ladi?

A) 100 B) 10 C) 20 D) 40 E) 200

Yechilishi: $\frac{1}{2000000}\Rightarrow\frac{1}{20km}\Rightarrow\frac{1}{20km}\cdot 200km=100.$

Javobi: A.

18. $|x| \cdot \left(x - \frac{1}{8}\right) < 0$ tengsizlikni yeching.

A) $\left(-\infty; \frac{1}{8}\right)$ B)$\left(0; \frac{1}{8}\right)$ C)$(-\infty; 0)$

D)$\left(-\infty; \frac{1}{8}\right) \cup \left(\frac{1}{8}; \infty\right)$ E)$(-\infty; 0) \cup \left(0; \frac{1}{8}\right)$

Yechilishi: $|x| \cdot \left(x - \frac{1}{8}\right) < 0 \Rightarrow x - \frac{1}{8} < 0 \Rightarrow x < \frac{1}{8} \Rightarrow$

$\Rightarrow (-\infty; 0) \cup \left(0; \frac{1}{8}\right)$. Javobi: E.

19. $A(0; 1)$ va $B(5; 6)$ nuqtalar orasidagi masofani aniqlang.

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

Yechilishi: $\overrightarrow{AB} = \{5 - 0; 6 - 1\} = \{5; 5\}$;

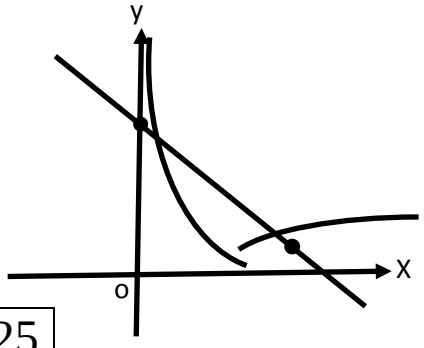
$\left|\overrightarrow{AB}\right| = \sqrt{5^2 + 5^2} = 5\sqrt{2}$. Javobi: D.

20. $|\log_5 x| = -x + 5$ tenglamaning nechta ildizi bor?

A) 1 B) $\emptyset$ C) 5 D) 2 E) 3

Yechilishi: $|\log_5 x| = -x + 5 \Rightarrow$

$\Rightarrow \begin{cases} y = |\log_5 x|, & x > 0; \\ y = -x + 5. \end{cases}$



x	1	5	$1/5$	$1/25$	25
$y = \|\log_x 5\|$	0	1	1	2	2

x	0	1
$y = -x + 5$	5	4

$yechim\ 2ta$. Javobi: D.

21. p ning qanday qiymatida $x^2 + px + 15 = 0$ tenglamaning ildizlridan biri 5 ga teng bo‘ladi?

A) -4 B) 4 C) -2 D) 2 E) -8

Yechilishi: $x^2 + px + 15 = 0 \Rightarrow x = 5 \Rightarrow$

$\Rightarrow 5^2 + 5p + 15 = 0 \Rightarrow p = -8.$ Javobi: E.

22. $4; 9; 14;$ ... arifmetik progressiyaning sakkizinchi hadi to‘rtinchi hadidan nechta ortiq?

A) 16 B) 18 C) 20 D) 22 E) 24

Yechilishi: $4; 9; 14, \ldots; \Rightarrow d = 5;$

$$a_8 = a_1 + 7d = 4 + 5 \cdot 7 = 39;$$

$a_4 = 19;$ $a_8 - a_4 = 20.$ Javobi: C.

23. $64; 32; 16;$ ... geometrik progressiyaning to‘qqizinchi hadi oltinchi hadidan nechta kam?

A) 1,025 B) 1,5 C) 1,25 D) 1,75 E) 1,85

Yechilishi: $64; 32; 16; \ldots;$ $q = \frac{1}{2};$

$$b_1 q^{n-1} \Rightarrow \begin{cases} b_9 = b_1 q^8 = 64 \cdot \dfrac{1}{2^8} = \dfrac{64}{256} = \dfrac{1}{4}; \\ b_6 = b_1 q^5 64 \cdot \dfrac{1}{32} = 2. \end{cases}$$

$b_6 - b_9 = 2 - \frac{1}{4} = \frac{7}{4} = 1{,}75.$ Javobi: D.

24. Radiusi 32 ga teng bo‘lgan aylananing $\frac{\pi}{16}$ radianga teng yoyning uzunligini toping.

A) $0{,}5\pi$ B) π C) 2π D) 4π E) 6π

Yechilishi: $l = \frac{\pi R n^\circ}{180^\circ} = \frac{\pi \cdot 32 \cdot 11{,}25}{180^\circ} = 2\pi.$ Javobi: C.

25. $arctg|x| = \frac{\pi}{2}$ tenglamaning nechta ildizi bor?

A) 2 B) 1 C) $\emptyset$ D) $cheksiz\ ko'p$ E) 3

Yechilishi: $arctg|x| = \frac{\pi}{2}; tgarctg|x| = tg\frac{\pi}{2} \Rightarrow$

$$\Rightarrow |x| = tg\frac{\pi}{2} \Rightarrow x = \pm tg\frac{\pi}{2};\ tg\frac{\pi}{2} - mavjud\ emas.$$

Javobi: C.

26. Yuzasi 9π bo‘lgan doira aylanasining uzunligini hisoblang.

A) $\frac{3\pi}{2}$ B) 3π C) 6π D) $\frac{4\pi}{3}$ E) 2π

Yechilishi: $\pi R^2 = 9\pi \Rightarrow R = 3 \Rightarrow l = 2\pi \cdot R = 6\pi.$

Javobi: C.

27. $y = \frac{lnx+2}{\sqrt{x}}.$ $y'(1) = ?$

A) 0 B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $\frac{1}{8}$ E) $\frac{1}{\sqrt{2}}$

Yechilishi: $y = \frac{lnx+2}{\sqrt{x}} \Rightarrow y' = \frac{(\ln x+2)'\sqrt{x}-(\ln x+2)(\sqrt{x})'}{(\sqrt{x})^2} =$

$= \frac{\frac{\sqrt{x}}{x} - \frac{\ln x+2}{2\sqrt{x}}}{x} \Rightarrow y'(1) = \frac{1-1}{1} = 0.$ Javobi: A.

28. $y = 12x - x^3$ funksiyaning $[-1; 3]$ kesmadagi eng katta va eng kichik qiymatlari ayirmasini hisoblang.

A) 27 B) 15 C) 5 D) 32 E) 7

Yechilishi: $y = 12x - x^3;$

$$y' = 12 - 3x^2 \Rightarrow 12 - 3x^2 = 0 \Rightarrow x^2 = 4 \Rightarrow$$

$$\Rightarrow \begin{cases} x_1 = -2; \\ x_2 = 2. \end{cases} \notin [-1; 3]\ ;$$

1) $x=-1 \Rightarrow y=12(-1)-(-1)^3=-11;$

2) $x=2 \Rightarrow y=12\cdot 2-2^3=16;$

3) $x=3 \Rightarrow y=12\cdot 3-3^3=11.$

4) $16-(-11)=27.$ Javobi: A.

29. $y=\sqrt[3]{x}+\frac{1}{3}$ funksiyaning grafigiga o‘tkazilgan urinma absissa o‘qi bilan $45°$ li burchak tashkil etadi. Urinish nuqtasining ordinatasini toping.

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

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

$$=\frac{1}{3\sqrt[3]{x^2}}\Rightarrow y'(x_0)=\frac{1}{3\sqrt[3]{{x_0}^2}}\Rightarrow tg45°=\frac{1}{3\sqrt[3]{{x_0}^2}}\Rightarrow$$

$$\Rightarrow 3\sqrt[3]{{x_0}^2}=1\Rightarrow \sqrt[3]{{x_0}^2}=\frac{1}{3}\Rightarrow {x_0}^2=\frac{1}{27}\Rightarrow x_0=\sqrt{\frac{1}{27}};$$

$$y_0=\sqrt[3]{x_0}+\frac{1}{3}=\sqrt[3]{\sqrt{\frac{1}{27}}}+\frac{1}{3}=\frac{1}{\sqrt[6]{3^3}}+\frac{1}{3}=\frac{1}{\sqrt{3}}+\frac{1}{3}$$

$$=\frac{1}{\sqrt{3}}+\frac{1}{\sqrt{3}\sqrt{3}}$$

$=\frac{\sqrt{3}+1}{3}$. Javobi: D.

30. m va n ning qanday qiymatida $\vec{a}=\{-1;m;2\}$ va $\vec{b}=\{-2;-4;n\}$ vektorlar kollinear bo‘ladi?

A) -2;4 B) -2;-4 C) 2;4 D) 2;-4 E) -4;4

Yechilishi: $\frac{-1}{-2}=\frac{m}{-4}=\frac{2}{n}\Rightarrow\frac{1}{2}=-\frac{m}{4}\Rightarrow m=-2;\ \frac{1}{2}=\frac{2}{n}\Rightarrow$
$\Rightarrow n=4.$ Javobi: A.

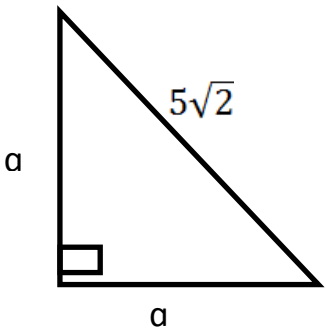
31. Teng yonli to‘g‘ri burchakli uchburchakning gipotenuzasi $5\sqrt{2}$ ga teng. Uning yuzini hisoblang.

A) 14,5 B) 12,5 C) 10,5 D) 8,5 E) 16,5

Yechilishi: $a^2+a^2=\left(5\sqrt{2}\right)^2\Rightarrow$

$\Rightarrow 2a^2=50\Rightarrow a=5;$

$S=\frac{1}{2}a^2=12{,}5.$ Javobi: B.



32. Qaysi nuqtada $y=x^2+2x+8$ funksiya grafigiga o‘tkazilgan urinma $y+2x-8=0$ to‘g‘ri chiziqqa parallel bo‘ladi?

A) $(-2;8)$ B)$(2;8)$ C)$(-2;-8)$ D)$(2;-8)$ E)$(0;8)$

Yechilishi: $y=x^2+2x+8\Rightarrow y'=2x+2\Rightarrow$

$$\Rightarrow y'(x_0)=2x_0+2\Rightarrow$$

$$\Rightarrow k=2x_0+2;\ \ y=-2x+8\Rightarrow k=-2\Rightarrow$$

$$\Rightarrow -2=2x_0+2\Rightarrow x_0=-2;\ y_0={x_0}^2+2x_0+8\Rightarrow$$

$$\Rightarrow y_0=(-2)^2+2(-2)+8=8;\ \ (x_0;y_0)=(-2;8).$$

Javobi: A.

33. Trapetsiyaning o‘rta chizig‘i 3 ga, balandligi 8 ga teng. Uning yuzini hisoblang.

A) 24 B) 12 C) 16 D) 32 E) 28

Yechilishi: $S_{trapetsiya}=MN\cdot h=3\cdot 8=24.$ Javobi: A.

34. Agar $\log_2 3=a$ bo‘lsa, $\log_8 0{,}75$ ni a orqali ifodalang.

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

D) $\frac{1}{3}(a+2)$ E) $\frac{1}{3}(2-a)$

Yechilishi: $\log_8 \frac{3}{4} = \log_8 3 - \log_8 4 = \frac{\log_2 3}{\log_2 8} - \frac{\log_2 4}{\log_2 8} =$

$= \frac{a}{\log_2 2^3} - \frac{\log_2 2^2}{\log_2 2^3} = \frac{a}{3} - \frac{2}{3} = \frac{1}{3}(a-2)$. Javobi: C.

35. Sharni bo‘yash uchun 100 g bo‘yoq ishlatildi. Agar sharning diametri uch marta orttirilsa, uni bo‘yash uchun necha g bo‘yoq kerak?

A) 900 B)300 C)600 D)450 E)350

Yechilishi: $S_{sh} = 4\pi R^2 = 4\pi\left(\frac{d}{2}\right)^2 = 4\pi\frac{d^2}{4} = \pi d^2;$

$$S_{sh}{}' = \pi \cdot (3d)^2 = 9\pi d^2;$$

$S_{sh}{}' = 9S_{sh} = 900g.$ Javobi: A.

36. $\int_0^1 \frac{e^x+e^{-1}}{e^{x-1}}dx$ ni hisoblang.

A) $\frac{e^2-e+1}{e}$ B) $\frac{e^2-e-1}{e}$ C) $\frac{-e^2+e-1}{e}$

D) $\frac{-e^2-e+1}{e}$ E) $\frac{e^2+e-1}{e}$

Yechilishi: $\int_0^1 \frac{e^x+e^{-1}}{e^{x-1}}dx$; $1) e^x + e^{-1} = e^x + \frac{1}{e} = \frac{e^x \cdot e+1}{e}$;

2) $e^{x-1} = e^x \cdot e^{-1} = \frac{e^x}{e}$; 3) $\frac{e^x+e^{-1}}{e^{x-1}} = \frac{e^x e+1}{e^x} = e + e^{-x}$;

$$4) \int_0^1 (e+e^{-x})dx = e\int_0^1 dx + \int_0^1 e^{-x}dx =$$

$$= ex\Big|_0^1 - e^{-x}\Big|_0^1 = e[1-0] - [e^{-1} - e^0] = e - \frac{1}{e} + 1 =$$

$= \frac{e^2+e-1}{e}$. Javobi: E.

37. $\sin(2arctg0{,}75)$ ni hisoblang.

A) $\frac{12}{15}$ B) $\frac{24}{25}$ C) $\frac{22}{25}$ D) $\frac{11}{15}$ E) $\frac{9}{25}$

Yechilishi: $x = \sin\left(2arctg\frac{3}{4}\right) = 2sinarctg\frac{3}{4}cosarctg\frac{3}{4} =$

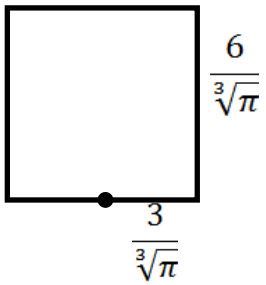
$= 2 \cdot \frac{\frac{3}{4}}{\sqrt{1+\left(\frac{3}{4}\right)^2}} \cdot \frac{1}{\sqrt{1+\left(\frac{3}{4}\right)^2}} = \frac{\frac{3}{2}}{1+\frac{9}{16}} = \frac{2}{3} \cdot \frac{16}{25} = \frac{24}{25}$. Javobi: B.

38. Silindrning o‘q kesimi tomoni $\frac{6}{\sqrt[3]{\pi}}$ ga teng kvadratdan iborat. Uning hajmini hisoblang.

A) 27 B) 9 C) 54 D) 36 E) 18

Yechilishi: $V = \pi R^2 H = \pi \cdot \left[\frac{3}{\sqrt[3]{\pi}}\right]^2 \cdot \frac{6}{\sqrt[3]{\pi}} =$

$= \pi \cdot \frac{9}{\sqrt[3]{\pi^2}} \cdot \frac{6}{\sqrt[3]{\pi}} = 54$. Javobi: C.



39. Agar $\log_7 2 = a$, $\log_2 10 = b$ bo‘lsa, $\log_4 78{,}4$ ni a va b orqali ifodalng.

A) $2 - \frac{1}{a} - \frac{b}{2}$ B) $2 + \frac{1}{a} + \frac{b}{2}$ C) $2 - \frac{1}{a} + \frac{b}{2}$

D) $2 + \frac{1}{a} - \frac{b}{2}$ E) $-2 + \frac{1}{a} + \frac{b}{2}$

Yechilishi: $\log_4 78{,}4 = \log_4 \frac{784}{10} = \log_4 784 - \log_4 10 =$

$= \frac{\log_7 784}{\log_7 4} - \log_{2^2} 10 = \frac{\log_7 7^2 \cdot 2^4}{\log_7 2^2} - \frac{1}{2}\log_2 10 =$

$= \frac{\log_7 7^2 + \log_7 2^4}{2\log_2 7} - \frac{1}{2}b = \frac{2+4a}{2a} - \frac{b}{2} = 2 + \frac{1}{a} - \frac{b}{2}$. Javobi: D.

40. $\log_x 3 \cdot \log_{3x} 3 = \log_{9x} 3$ tenglamani yechimlari ko‘paytmasini toping.

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

Yechilishi: $\log_x 3 \cdot \log_{3x} 3 = \log_{9x} 3 \Rightarrow \left| x > 0; x \neq 1 \right| \Rightarrow$

$$\Rightarrow \frac{1}{\log_3 x} \cdot \frac{1}{\log_3 3x} = \frac{1}{\log_3 9x}$$

$$\Rightarrow \log_3 9x = \log_3 x \cdot \log_3 3x \Rightarrow$$

$$\Rightarrow \log_3 3^2 + \log_3 x = \log_3 x\,(\log_3 3 + \log_3 x) \Rightarrow$$

$$\Rightarrow 2 + \log_3 x = \log_3 x + \log^2{}_3\, x \Rightarrow \log^2{}_3\, x = 2 \Rightarrow$$

$$\Rightarrow \log_3 x = \pm\sqrt{2} \Rightarrow \begin{cases} \log_3 x = -\sqrt{2} \\ \log_3 x = \sqrt{2} \end{cases} \Rightarrow \begin{cases} x_1 = 3^{-\sqrt{2}} \\ x_2 = 3^{\sqrt{2}} \end{cases} \Rightarrow$$

$\Rightarrow x_1 \cdot x_2 = 3^{-\sqrt{2}} \cdot 3^{\sqrt{2}} = 3^0 = 1.$ Javobi: C.

41. $3^2 \cdot 3^4 \cdot 3^6 \cdot \ldots \cdot 3^{2n} = \left(\frac{1}{81}\right)^{-5}$ tenglamani yeching.

A) 4 B) 8 C) 12 D) 10 E) 7

Yechilishi: $3^2 \cdot 3^4 \cdot 3^6 \cdot \ldots \cdot 3^{2n} = \left(\frac{1}{3^4}\right)^{-5} \Rightarrow$

$$\Rightarrow 3^{2+4+6+\cdots+2n} = 3^{20} \Rightarrow 2 + 4 + 6 + \cdots + 2n = 20 \Rightarrow$$

$$\Rightarrow 2(1 + 2 + 3 + \cdots + n) = 20 \Rightarrow$$

$$\Rightarrow 1 + 2 + 3 + \cdots + n = 1 \Rightarrow S_n = \frac{1+n}{2} \cdot n \Rightarrow$$

$$\Rightarrow 10 = \frac{n + n^2}{2} \Rightarrow n^2 + n - 20 = 0;$$

$n_{1,2} = -\frac{1}{2} \pm \sqrt{\frac{1}{4} + 20} = -\frac{1}{2} \pm \frac{9}{2} \Rightarrow \begin{cases} n_1 \neq -5; \\ n_2 = 4. \end{cases}$ Javobi: A.

42. $\log_{2\sqrt{2}} 512$ ni hisoblang.

A) 8 B) 6 C) 4 D) 10 E) 12

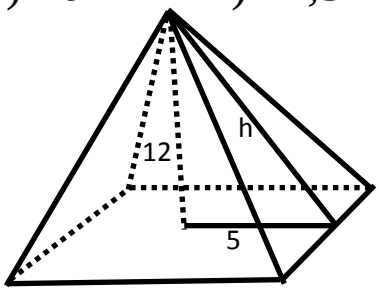
Yechilishi: $\log_{2\sqrt{2}} 512 = \log_{8^{\frac{1}{2}}} 8^3 = 6$. Javobi: B.

43. Muntazam to‘rtburchakli piramidaning balandligi 12 ga, asosining tomoni 10 ga teng. Piramidaning apofemasini toping.

A) 15 B) 13 C) 14 D) 16 E) 14,5

Yechilishi: $h^2 = 12^2 + 5^2 = 169 \Rightarrow$

$\Rightarrow h = 13.$



44. $y = -\frac{x}{3}, y = 0$ va $x = 3$ chiziqlar bilan chegaralangan yuzini toping.

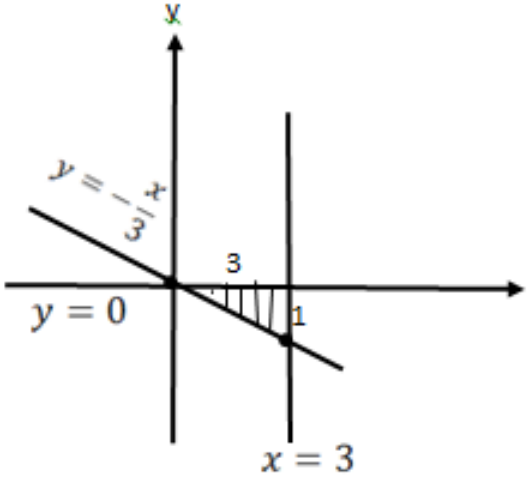
A) 2,5 B) 2 C) 1,5 D) $\frac{4}{3}$ E) $\frac{5}{3}$

Yechilishi: $\begin{cases} y = -\frac{1}{3}x; \\ y = 0; \\ x = 3. \end{cases}$

$S = -\int_0^3 \left(-\frac{1}{3}x\right) dx =$

$= \frac{1}{3} \cdot \frac{x^2}{2}\Big|_0^3 = \frac{1}{6} \cdot 3^2 = 1{,}5.$ *Yoki*

$S = \frac{1}{2} \cdot 3 \cdot 1 = 1{,}5.$ Javobi: C.



45. $sin2x + tgx = 2$ tenglamani yeching.

A) $-\frac{\pi}{4} + \pi k, k \epsilon Z$ B) $\frac{\pi}{4} + \pi k, k \epsilon Z$

C) $\frac{\pi}{6} + \frac{\pi}{2} k, k \epsilon Z$ D) $-\frac{\pi}{6} + \frac{\pi}{2} k, k \epsilon Z$ E) $\emptyset$

Yechilishi: $sin2x + tgx = 2; \begin{cases} sin2x = 1 \\ tgx = 1 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} 2x = \frac{\pi}{2} + 2\pi k, k\epsilon Z \\ x = \frac{\pi}{4} + \pi k, \ \ k\epsilon Z \end{cases} \Rightarrow \begin{cases} x = \frac{\pi}{4} + \pi k, k\epsilon Z; \\ x = \frac{\pi}{4} + \pi k. \end{cases} \Rightarrow$$

$\Rightarrow \frac{\pi}{4} + \pi k, k\epsilon Z.$ Javobi: B.

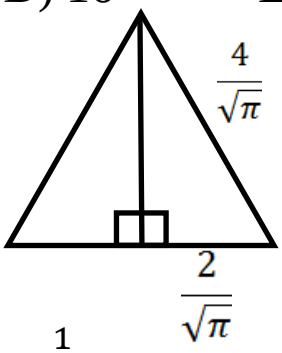
46. Konusning o‘q kesimi tomoni $\frac{4}{\pi}$ ga teng muntazam uchburchakdan iborat. Konus yon sirtining yuzini toping.

A) 6 B) 8 C) 12 D) 16 E) 18

Yechilishi: $S = \pi Rl =$

$= \pi \cdot \frac{2}{\sqrt{\pi}} \cdot \frac{4}{\sqrt{\pi}} = 8.$

Javobi: B.



47. Amallarni bajaring. $\frac{9}{5-\sqrt{7}} + \frac{22}{7+\sqrt{5}} - \frac{1}{\sqrt{7}+\sqrt{5}}.$

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

Yechilishi: $\frac{9}{5-\sqrt{7}} + \frac{22}{7+\sqrt{5}} - \frac{1}{\sqrt{7}+\sqrt{5}} =$

$$= \frac{9(5+\sqrt{7})}{25-7} + \frac{22(7-\sqrt{5})}{49-5} - \frac{\sqrt{7}-\sqrt{5}}{7-5} =$$

$$= \frac{5+\sqrt{7}}{2} + \frac{7-\sqrt{5}}{2} - \frac{\sqrt{7}-\sqrt{5}}{2} =$$

$= \frac{1}{2}(5 + \sqrt{7} + 7 - \sqrt{5} - \sqrt{7} + \sqrt{5}) = 6.$ Javobi: B.

48. $\frac{x^3-1}{x^4+x^2+1}$ kasrni qisqartiring.

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

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

Yechilishi: $\frac{x^3-1}{x^4+x^2+1}=\frac{x^3-1}{\frac{(x^2)^3-1}{x^2-1}}=\frac{(x^3-1)(x^2-1)}{x^6-1}=$

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

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

$=\frac{x-1}{x^2-x+1}$. Javobi: A.

49. m ning qanday qiymatida $x(x+a)(x+b)(x+a+b)+4m^2$ ifoda to‘la kvadrat bo‘ladi?

A) $\frac{a^2b^2}{4}$ B) $\pm\frac{ab}{2}$ C) $\pm\frac{a+b}{4}$ D) $\frac{ab^2}{2}$

E) $Bunday\ qiymat\ mavjud\ emas.$

Yechilishi: $x(x+a)(x+b)(x+a+b)+4m^2=$

$$=(x^2+ax)(x+b)(x+a+b)+(2m)^2=$$

$$=(x^3+bx^2+ax^2+abx)(x+a+b)+(2m)^2=$$

$$=[x^2(x+b+a)+abx](x+a+b)+(2m)^2=$$

$$=[(x+a+b)\cdot x]^2+(x+a+b)abx+(2m)^2=$$

$$=[(x+a+b)\cdot x]^2+ab(x+a+b)x+(2m)^2=$$

$$=\left[\left(x+a+b\right)x\pm\frac{ab}{2}\right)\Big]^2\Rightarrow\left(\frac{ab}{2}\right)^2=(2m)^2\Rightarrow$$

$\Rightarrow 2m=\pm\frac{ab}{2}\Rightarrow m=\pm\frac{ab}{2}$. Javobi: B.

50. $10x^2+20x-30<0$ tengsizlikning yechimlari to‘plamida $q=10x^2-20x-30$ qanday qabul qiladi?

A) $-40<q<120$ B) $q\epsilon R$ C) $q>0$

D) $0<q<30$ E) $q<0$

Yechilishi: $10x^2+20x-30<0\Rightarrow x^2+2x-3<0\Rightarrow$

$\Rightarrow x_{1,2}=-1\pm\sqrt{1+3}=-1\pm2\Rightarrow\begin{cases}x_1=-3\\x_2=1\end{cases}\Rightarrow(-3;1);$

$$q=10\cdot(-3)^2-20(-3)-30=90+30=120;$$

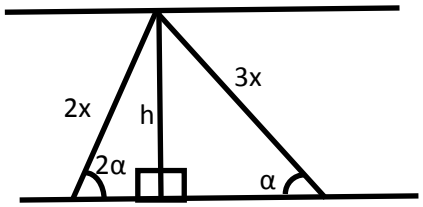
$q = 10 \cdot 1^2 - 20 \cdot 1 - 30 = -40;\ -40 < q < 120.$

Javobi: A.

51. Ikki parallel tekislik orasiga olingan kesmalarning nisbati 2:3 kabi bo‘lib, tekisliklar bilan nisbati 2 ga teng bo‘lgan burchaklar tashkil etadi. Shu burchklardan kattasini kosinusini toping.

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

Yechilishi: $h = 2xsin2\alpha;$



$h = 3xsin\alpha;\ \ 2x \cdot sin2\alpha = 3xsin\alpha \Rightarrow$

$\Rightarrow 2 \cdot sin2\alpha = 3sin\alpha \Rightarrow$

$\Rightarrow 2 \cdot 2sin\alpha cos\alpha = 3sin\alpha \Rightarrow$

$\Rightarrow 4cos\alpha = 3 \Rightarrow cos\alpha = \frac{3}{4};\ \ cos2\alpha = cos^2\alpha - sin^2\alpha =$

$= cos^2\alpha - 1 + cos^2\alpha = 2cos^2\alpha - 1 = 2 \cdot \left(\frac{3}{4}\right)^2 - 1 =$

$= \frac{9}{8} - 1 = \frac{1}{8}.$ Javobi: E.

52. $cos24° - cos84° - cos12° + sin42°$ ni hisoblang.

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

Yechilishi: $cos24° - cos84° - cos12° + sin42° =$

$$= cos24° + cos48° - cos84° - cos12° =$$

$$= 2cos\frac{24° + 48°}{2} \cdot cos\frac{24° - 48°}{2} - 2cos\frac{84° + 12°}{2} \cdot cos\frac{84° - 12°}{2} =$$

$$= 2cos36°cos12° - 2cos48°cos36° =$$

$$= 2cos36°(cos12° - cos48°) =$$

$$= 2cos36°\left[-2sin\frac{12° + 48°}{2} sin\frac{12° - 48°}{2}\right] =$$

$$= 2cos36°[-2sin30°\sin(-18°)] = 2cos36°sin18° =$$

$$= \frac{2cos36°sin18°cos18°}{cos18°} = \frac{cos36°sin36°}{cos18°} =$$

$= \frac{2cos36°sin36°}{2cos(90°-72°)} = \frac{sin72°}{2sin72°} = \frac{1}{2}$. Javobi: A.

53. Agar $16 \le x \le y \le z \le t \le 100$ bo‘lsa, $\frac{x}{y} + \frac{z}{t}$ ifodaning eng kichik qiymatini toping.

A) 0.9 B) 200 C) 0,8 D) 0,2 E) $topib\ bo'lmaydi$

Yechilishi: $16 \le x \le y \le z \le t \le 100$; $\frac{x}{y} + \frac{z}{t} = ?$;

$\frac{x}{y} + \frac{z}{t} = 2\sqrt{\frac{a}{b}} \Rightarrow \begin{cases} a = 16; \\ b = 100. \end{cases} \Rightarrow 2\sqrt{\frac{16}{100}} = 2 \cdot \frac{4}{10} = 0{,}8.$ Javobi: C.

54. $\sqrt{2^3\sqrt{5^3\sqrt{2^3\sqrt{5^3 \ldots}}}}$ ifodaning qiymatini toping.

A) 17 B) 12 C) 14 D) 41 E)20

Yechilishi: $a = \sqrt{2^3\sqrt{5^3\sqrt{2^3\sqrt{5^3 \ldots}}}}$;

$a^2 = 2^3\sqrt{5^3\sqrt{2^3\sqrt{5^3 \ldots}}}$; $a^4 = (2^3)^2 \cdot 5^3\sqrt{2^3\sqrt{5^3 \ldots}}$;

$a^4 = (2^2)^3 \cdot 5^3 \cdot a$; $a^3 = (4 \cdot 5)^3$; $a = 20$. Javobi: E.

55. $\begin{cases} x^{\sqrt{y}} = y, \\ y^{\sqrt{y}} = x^4 \end{cases}$ sistema ildizlarini ifodalovchi nuqtalar orasidagi masofani toping $(x > 0)$.

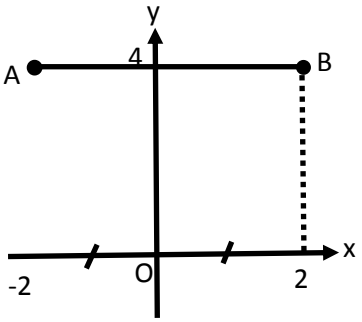
A) $\sqrt{7}$ B) 4 C) $\sqrt{10}$ D) $2\sqrt{2}$ E) 9

Yechilishi: $\begin{cases} x^{\sqrt{y}} = y \\ y^{\sqrt{y}} = x^4 \end{cases} \Rightarrow \begin{cases} x \ne 1 \\ y > 0 \\ y \ne 1 \end{cases} \Rightarrow \begin{cases} \sqrt{y}\lg x = \lg y \\ \sqrt{y}\lg y = 4\lg x \end{cases} \Rightarrow$

$\Rightarrow \sqrt{y} \cdot \sqrt{y}\lg x = 4\lg x \Rightarrow |y| = 4 \Rightarrow y = 4;$

$x^{\sqrt{4}} = 4 \Rightarrow x^2 = 2^2 \Rightarrow x = \pm 2;$

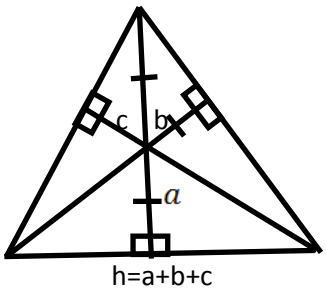
$A(-2;4), B(2;4) \Rightarrow \overrightarrow{AB} = \{4;0\};$
$\left|\overrightarrow{AB}\right| = \sqrt{16+0} = 4.$
Javobi: B.



56. Muntazam uchburchak ichidan olingan nuqtadan uchburchak tomonlarigacha bo‘lgan masofalar mos holda $\vec{a} = \{1;2;3\}, \vec{b} = \{1;2;1\}$ va $\vec{c} = \{2;3;2\}$ vektorlarning absolyut qiymatlariga teng bo‘lsa, uchburchak balandligini toping.

A) $2\sqrt{14} + \sqrt{6}$ B) 18 C) $\sqrt{6} + \sqrt{14}$ D) 16 E) $25\sqrt{2}$

Yechilishi: $|\vec{a}| = \sqrt{1+4+9} = \sqrt{14};$
$\left|\vec{b}\right| = \sqrt{1+4+1} = \sqrt{6};$
$|\vec{c}| = \sqrt{4+9+1} = \sqrt{14};$
$h = |\vec{a}| + \left|\vec{b}\right| + |\vec{c}| = 2\sqrt{14} + \sqrt{4}.$
Javobi: A.



57. $sin2x + sin4x = 0$ tenglama $[0; 2\pi]$ oraliqda nechta ildizga ega?

A) $\emptyset$ B) 7 C) 4 D) 8 E) 9

Yechilishi: $sin2x + sin4x = 0 \Rightarrow 2sin3x \cdot cosx = 0 \Rightarrow$

$$\Rightarrow \begin{cases} sin3x = 0 \\ cos3x = 0 \end{cases}$$

$$\Rightarrow \begin{cases} 3x = \pi k, \\ x = \frac{\pi}{2} + \pi k \end{cases} \Rightarrow \begin{cases} x = \frac{\pi}{3}k, & k \in Z; \\ x = \frac{\pi}{2} + \pi k, & k \in Z. \end{cases}$$

$$k=0\Rightarrow\begin{cases}x=0;\\ x=\dfrac{\pi}{2}.\end{cases}\quad k=1\Rightarrow\begin{cases}x=\dfrac{\pi}{3};\\ x=\dfrac{3\pi}{2}.\end{cases}\quad k=2\Rightarrow\begin{cases}x=\dfrac{2\pi}{3};\\ x=\dfrac{5\pi}{2}.\end{cases}$$

$$k=3\Rightarrow\{x=\pi;\ k=4\Rightarrow\left\{x=\frac{4\pi}{3};\ k=5\Rightarrow\right\{x=\frac{5\pi}{3};$$

$k=6\Rightarrow\{x=2\pi;$ $9\ ta\ ildizi\ bor.$ Javobi: E.

58. $f(x)=cos2x$ funksiyaga $\left(\frac{\pi}{4};f\left(\frac{\pi}{4}\right)\right)$ nuqtadan o‘tkazilgan urinma tenglamasini ko‘rsating.

A) $y=\frac{\pi}{2}-2x$ B) $y=\pi-3x$ C) $y=\frac{\pi}{2}+3x$

D) $\pi-2x$ E) $y=2\pi+3x$

Yechilishi: $f(x)=cos2x;\ x_0=\frac{\pi}{4};$

$$y_0=f\left(\frac{\pi}{4}\right)=cos2\cdot\frac{\pi}{4}=0;\ f'(x)=-2sin2x\Rightarrow$$

$$\Rightarrow k=f'\left(\frac{\pi}{4}\right)=-2sin2\cdot\frac{\pi}{4}=-2\cdot sin\frac{\pi}{2}=-2;$$

$$y-y_0=k(x-x_0)\Rightarrow y-0=-2\left(x-\frac{\pi}{4}\right)\Rightarrow$$

$\Rightarrow y=\frac{\pi}{2}-2x.$ Javobi: A.

59. $\vec{a}=\{3;4\}$ vektor yo‘nalishidagi birlik vektorni toping.

A) $\vec{e}(0{,}6;0{,}8)$ B) $\vec{e}(6;16)$ C) $\vec{e}(1;0)$

D) $\vec{e}(0;1)$ E) $\vec{e}(2;16)$

Yechilishi: $\vec{a}=\gamma\vec{e};\gamma=\frac{3}{0{,}6}=\frac{4}{0{,}8}=5\Rightarrow\sqrt{0{,}6^2+0{,}8^2}=$

Javobi: A.

60. $A(4;-7)$ nuqtadan o‘tuvchi va

$x^2 + y^2 + 4x - 2y - 11 = 0$ aylana bilan konsentrik bo‘lgan aylana tenglamasini ko‘rsating.

A)$(x+2)^2 + (y-1)^2 = 100$ B)$(x-1)^2 + (y+2)^2 = 100$

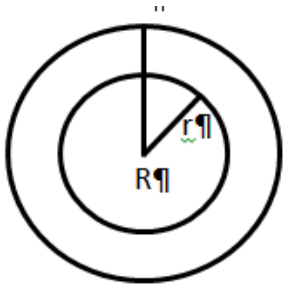
C)$(x+3)^2 + (y-1)^2 = 100$ D)$(x-3)^2 + (y-1)^2 = 100$

E) $(x-1)^2 + (y-3)^2 = 100$

Yechilishi: $A(4;-7)\epsilon(x+2)^2 + (y-1)^2 = 100$

$\Rightarrow x^2 + 4x + 2^2 - 2^2 + y^2 - 2y + 1^2 -$

$-1^2 - 11 = 0 \Rightarrow (x+2)^2 + (y-1)^2$



$r = 4;\ R = 10.$ Javobi: A.

61. Medianalari 9; 12 va 15 ga teng uchburchakning yuzini toping.

A) 50 B) 48 C) 75 D) 49 E) 72

Yechilishi: $m = \frac{m_a + m_b + m_c}{2}$;

$$S = \frac{4}{3}\sqrt{m(m-m_a)(m-m_b)(m-m_c)}$$

$$formulalardan\ foydalanamiz:\ m = \frac{12+9+15}{2}$$

$$= 18;$$

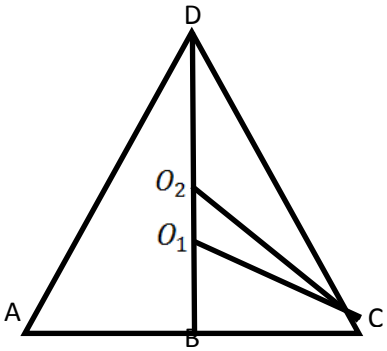
$$S = \frac{4}{3}\sqrt{18(18-12)(18-9)(18-15)} =$$

$= \frac{4}{3}\sqrt{18 \cdot 6 \cdot 9 \cdot 3} = \frac{4}{3} \cdot 54 = 72.$ Javobi: E.

62. Asosidagi burchagi α ga teng bo‘lgan teng yonli uchburchakka ichki va tashqi chizilgan aylanalar radiuslarining nisbatini toping.

A) $sin2\alpha \cdot tg\frac{\alpha}{2}$ B) $tg\alpha \cdot sin\frac{\alpha}{2}$ C) $cos\frac{\alpha}{2} \cdot ctg\alpha$

D) $sin2\alpha \cdot tg^2\frac{\alpha}{2}$ E) $cos2\alpha \cdot ctg^2\alpha$



Yechilishi: $\angle DAC = \angle ACD = \alpha;$

$\angle BCO_1 = \frac{\alpha}{2};\ r = O_1B;\ R = O_2D = O_2C;$

$\angle O_1DC = \angle O_1CD = \frac{\pi}{2} - \alpha;$

$$\angle O_1CO_2 = \alpha - \left(\frac{\alpha}{2} + \frac{\pi}{2} - \alpha\right) = \frac{3\alpha}{2} - \frac{\pi}{2};$$

$$\angle BCO_2 = \frac{\alpha}{2} + \frac{3\alpha}{2} - \frac{\pi}{2} = -\left(\frac{\pi}{2} - 2\alpha\right);$$

$$\frac{BO_1}{BC} = tg\frac{\alpha}{2} \Rightarrow r = BC \cdot tg\frac{\alpha}{2};$$

$$\frac{BC}{CO_2} = cos\left[-\left(\frac{\pi}{2} - 2\alpha\right)\right] = sin2\alpha;\ R = \frac{BC}{sin2\alpha};$$

$\frac{r}{R} = sin2\alpha \cdot tg\frac{\alpha}{2}$. Javobi: A.

63. $y = \lg sinx + \sqrt{-x^2 + 7x}$ funksiyaning aniqlanish sohasini toping.

A) $(0;\pi) \cup (2\pi;7]$ B) $(-1;1)$ C) $[0;7]$
D) $[0;\pi]$ E) $(0;\pi) \cup (\pi;2\pi)$

Yechilishi: $y = \lg sinx + \sqrt{-x^2 + 7x}$;

$$\begin{cases} sinx > 0 \\ -x^2 + 7x \geq 0 \end{cases} \Rightarrow \begin{cases} 0 < x < \pi \\ x(x-7) \leq 0 \end{cases} \Rightarrow \begin{cases} x = 0; \\ x = 7. \end{cases}$$

$\Rightarrow (0;\pi) \cup (2\pi;7]$.

Javobi: A.

64. Agar $ctg\alpha = \sqrt{3}$ bo‘lsa, $\frac{9}{sin^4\alpha + cos^4\alpha}$ ni hisoblang.

A) 5 B) 4,5 C) 81 D) 4 E) 14,4

Yechilishi: $ctg\alpha = \sqrt{3} \Rightarrow \alpha = 30°$;

$\frac{9}{\left(\frac{1}{2}\right)^4+\left(\frac{\sqrt{3}}{2}\right)^4} = \frac{9}{\frac{1}{16}+\frac{9}{16}} = 14{,}4.$ Javobi: E.

65. $x^2 - 4x\,arccos(x^2 - 4x + 5) < 0$ tengsizlikni yeching.

A) $\{2\}$ B) $(1;5)$ C) $(-2;3)$

D) $(arccos1;10)$ E) $yechimi\ yo'q$

Yechilishi: $x^2 - 4x\,arccos(x^2 - 4x + 5) < 0 \Rightarrow$

$\Rightarrow x^2 < 4x \cdot arccos[(x-2)^2 + 1];\ x^2 < 4x \cdot arccos1;$

$x^2 < 4x \cdot 0 \Rightarrow x^2 < 0$. $Munosabat\ buzildi$. Javobi: E.

66. Agar $\log_a 27 = b$ bo‘lsa, $\log_{\sqrt{3}} \sqrt[6]{a}$ ni toping.

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

Yechilishi: $\log_{\sqrt{3}} \sqrt[6]{a} = \log_{3^{\frac{1}{2}}} a^{\frac{1}{6}} = 2 \cdot \frac{1}{6}\log_3 a = \frac{1}{3}\log_3 a$;

$$\log_a 27 = b \Rightarrow 27 = a^b \Rightarrow \log_3 3^3 = b\log_3 a \Rightarrow$$

$$\Rightarrow 3 = b\log_3 a \Rightarrow \log_3 a = \frac{3}{b} \Rightarrow$$

$\Rightarrow \log_{\sqrt{3}} \sqrt[6]{a} = \frac{1}{3} \cdot \frac{3}{b} = \frac{1}{b}$. Javobi: A.

67. $y = 2 - |x|$ va $y = x^2$ funksiya grafiklari bilan chegaralangan figuraning yuzini toping.

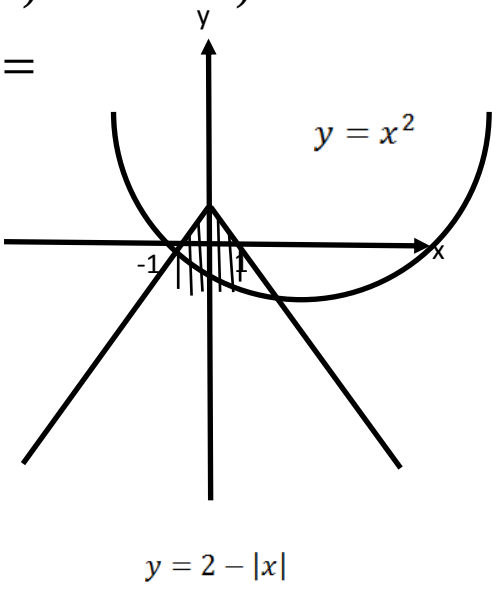
A) $\frac{7}{3}$ B) 2 C) 2,5 D) 4 E) 5

Yechilishi: $S = 2\int_0^1 (2 - x - x^2)dx =$

$=4x\Big|_0^1 - x^2\Big|_0^1 - \frac{2}{3}x^3\Big|_0^1 =$

$= 4 - 1 - \frac{2}{3} = \frac{7}{3}$.

Javobi: A.



68. a parametrning qanday qiymatlarida $ax^2+2(a+3)x+a+2=0$ tenglamaning ildizlari nomanfiy bo‘ladi?

A) $[-2{,}25;-2]$ B) $[-2{,}1;-1]$ C)$[1;2]$

D) $(-\infty;2]$ E) $Bunday\ qiymatlar\ yo'q$

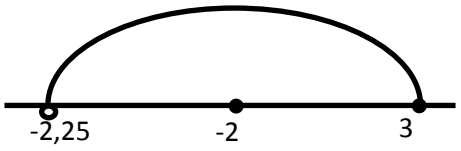
Yechilishi: $ax^2+2(a+3)x+a+2=0;\ Ildizlari\ nomanfiy\ bo'lishi\ uchun\ D>0, x_1+x_2>0,$

$x_1\cdot x_2\geq 0\ bo'lishi\ kerak.$

1) $D>0\Rightarrow [2(a+3)]^2-4a(a+2)>0\Rightarrow$

$\Rightarrow 4a^2+24a+36-4a^2-8a>0\Rightarrow$

$\Rightarrow 16a>-36\Rightarrow a>-2{,}25;$



2)$x_1+x_2>0\Rightarrow x_1+x_2=$

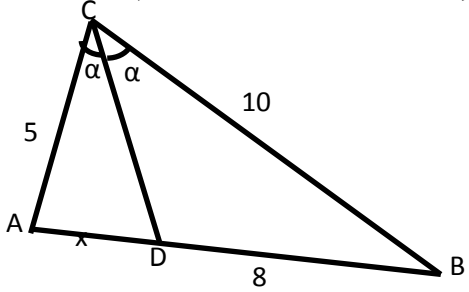
$=-\frac{2a+6}{a}>0\Rightarrow -2+\frac{6}{a}>0\Rightarrow$

$\Rightarrow \frac{6}{a}>2\Rightarrow a<3.$ 3) $x_1\cdot x_2\geq 0\Rightarrow \frac{a+2}{a}\geq 0\Rightarrow$

$\Rightarrow 1+\frac{2}{a}\geq 0\Rightarrow \frac{2}{a}\geq -1\Rightarrow a\geq -2.\ Demak, [-2{,}25;-2].$

Javobi: A.

69. $AC=5;\ BC=10;\ BD=8$ bo‘lsa, $CD=$?



A) $3\sqrt{2}$ B) $\sqrt{3}$ C) $\sqrt{5}$ D) 2 E) 3

Yechilishi: 1) $Bissektrissa\ xossasidan$:

$$\frac{5}{x}=\frac{10}{8}\Rightarrow x=4;\begin{cases}8^2=CD^2+10^2-2\cdot CD\cdot 10\cdot cos\alpha\\ 4^2=CD^2+5^2-2\cdot CD\cdot 5cos\alpha\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases}64=CD^2+100-20\cdot CD\cdot cos\alpha\\ 16=CD^2+25-10\cdot CD\cdot cos\alpha\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases}cos\alpha=\dfrac{CD^2+36}{20\cdot CD}\\ cos\alpha=\dfrac{CD^2+9}{10\cdot CD}\end{cases}\Rightarrow\frac{CD^2+36}{20\cdot CD}=\frac{CD^2+9}{10\cdot CD}\Rightarrow$$

$$\Rightarrow CD^2+36=2(CD^2+9)\Rightarrow CD^2+36=2CD^2+18\Rightarrow$$

$\Rightarrow CD^2=18\Rightarrow CD=3\sqrt{2}$. Javobi: A.

70. $\frac{|x-3|}{x^2-5x+6}\geq 2$ tengsizlikni yeching.

A) $\left[\frac{3}{2};2\right)$ B)$\left(\frac{5}{2};4\right)$

C) $Yechimi\ yo'q$ D)$[-10;10]$ E) $\left(\frac{5}{2};0\right)$

Yechilishi: $\frac{|x-3|}{x^2-5x+6}\geq 2$; 1) $x^2-5x+6\neq 0\Rightarrow$

$$\Rightarrow x_{1,2}=\frac{5}{2}\pm\sqrt{\frac{25}{4}-6}=\frac{5}{2}\pm\frac{1}{2}\Rightarrow\begin{cases}x_1=2\\ x_2=3\end{cases}\Rightarrow$$

$$\Rightarrow x^2-5x+6=(x-2)(x-3);$$

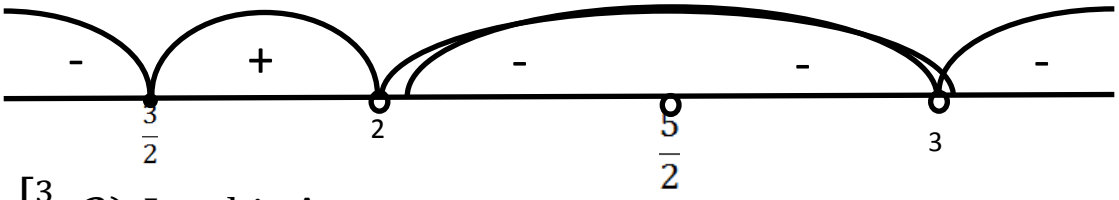
$$2)\ x-3\geq 0\Rightarrow\frac{x-3}{x^2-5x+6}-2\geq 0\Rightarrow$$

$$\Rightarrow\frac{x-3-2x^2+10x-12}{x^2-5x+6}\geq 0\Rightarrow\frac{-2x^2+11x-15}{x^2-5x+6}\geq 0\Rightarrow$$

$$\Rightarrow \frac{2x^2-11x+15}{x^2-5x+6} \le 0; 2x^2-11x+15=0 \Rightarrow \begin{cases} x_1=\frac{5}{2}; \\ x_2=3. \end{cases}$$

3) $x-3<0 \Rightarrow \frac{-x+3-2x^2+10x-12}{x^2-5x+6} \ge 0 \Rightarrow$

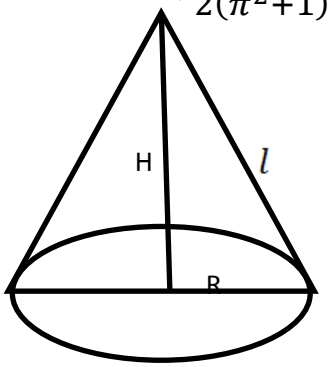
$$\Rightarrow \frac{2x^2-9x+9}{x^2-5x+6} \le 0;\ \ 2x^2-9x+9=0 \Rightarrow \begin{cases} x_1=\frac{3}{2}; \\ x_2=3. \end{cases}$$



$\left[\frac{3}{2}; 2\right)$.Javobi: A.

71. Asosining radiusi R ga teng bo‘lgan konusning yon sirti, asosi bilan o‘q kesimi yuzalarining yig‘indisiga teng. Konusning hajmini toping.

A) $\frac{2\pi^2R^3}{3(\pi^2-1)}$ B) $\frac{\pi R^3}{2(\pi^2-1)}$ C) $\frac{2(\pi^2+1)}{\pi R^3}$ D) $\frac{(\pi^2+1)\pi}{3}$ E) $\frac{2\pi R^3}{2(\pi^2+1)}$



Yechilishi: $S_{yon}=\pi Rl;\ S_{asos}=\pi R^2;$

$$S_{kesim}=\frac{1}{2}\cdot 2RH=RH;$$

$$\pi Rl=\pi R^2+RH \Rightarrow \pi l=\pi R+H \Rightarrow$$

$$\Rightarrow l=R+\frac{H}{\pi};\ \ l^2=H^2+R^2 \Rightarrow$$

$$\Rightarrow \left(R+\frac{H}{\pi}\right)^2=H^2+R^2 \Rightarrow R^2+2R\cdot\frac{H}{\pi}+\frac{H^2}{\pi^2}=$$

$$=H^2+R^2 \Rightarrow H^2-\frac{H^2}{\pi^2}=2R\frac{H}{\pi} \Rightarrow H^2\left(1-\frac{1}{\pi^2}\right)=\frac{2R}{\pi}H$$

$$\Rightarrow$$

$$\Rightarrow H \cdot \frac{\pi^2-1}{\pi^2} = \frac{2R}{\pi} \Rightarrow H = \frac{2R}{\pi} \cdot \frac{\pi^2}{\pi^2-1} = \frac{2\pi R}{\pi^2-1};$$

$V = \frac{1}{3}\pi R^2 H = \frac{\pi R^2}{3} \cdot \frac{2\pi^2 R^2}{3(\pi^2-1)}$. Javobi: A.

72. Quyidagilardan qaysi biri toq funksiya?

A) $y = \lg\frac{1+x}{1-x}$ B) $y = \lg x^3$ C) $y = \cos(x-a)$

D) $y = \frac{a^x+a^{-x}}{2}$ E) $Bunday\ funksiya\ yo'q$

Yechilishi: $y(-x) = cos[-x-\alpha] = cos[-(x-\alpha)] =$

$= \cos(x+\alpha)$; $y(-x) = \frac{a^{-x}+a^{-(-x)}}{2} = \frac{a^x+a^{-x}}{2}$;

$Bunday\ funksiya\ yo'q$. Javobi: E.

73. $y = \frac{\sqrt{\log_2 sinx}}{\sqrt{x^2-3x+2}}$ funksiyani aniqlanish sohasini toping.

A) $\frac{\pi}{2} + 2\pi n, n \neq 0, n\epsilon Z$ B) $\frac{\pi}{2} + 2\pi n,\ n\epsilon Z$

C) $\frac{\pi}{6} + 2\pi n, n\epsilon Z$ D) $-\frac{\pi}{4}; \frac{\pi}{4}$ E) $\frac{3\pi}{2} + 2\pi n, n\epsilon N$

Yechilishi: $y = \frac{\sqrt{\log_2 sinx}}{\sqrt{x^2-3x+2}} \Rightarrow \begin{cases} \log_2 sinx \geq 0 \\ x^2-3x+2 > 0 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} sinx \geq 2^0 \\ x_1 = 1 \\ x_2 = 2 \end{cases} \Rightarrow \begin{cases} sinx \geq 1 \\ x < 1; x > 2 \end{cases} \Rightarrow \begin{cases} sinx = 1; \ x = \frac{\pi}{2} + 2\pi n, n\epsilon Z \end{cases}$$

Javobi: B.

74. $\frac{2^{m+1}+2^{-m+1}}{(4^m+1)(3^{m+2}+3^{m+1})}$ kasrni qisqartiring.

A) 3^{-m-1} B) 3^{m-1} C) 6^{-m-1} D) 6^{-m} E) 6^{m-1}

Yechilishi: $\frac{2^{m+1}+2^{-m+1}}{(4^m+1)(3^{m+2}+3^{m+1})} = \frac{2^m \cdot 2+\frac{2}{2^m}}{(4^m+1)(3^m \cdot 3^2+3^m \cdot 3^1)} =$

$$= \frac{2\left(2^m+\frac{1}{2^m}\right)}{(4^m+1)\cdot 12\cdot 3^m} = \frac{2\cdot \frac{2^{2m}+1}{2^m}}{12\cdot 3^m(4^m+1)}$$

$$= \frac{\frac{2}{2^m}\cdot (4^m+1)}{12\cdot 3^m(4^m+1)} =$$

$$= \frac{2}{2^m} : (12\cdot 3^m) = \frac{2}{2^m\cdot 12\cdot 3^m} = \frac{1}{2^m\cdot 2\cdot 3\cdot 3^m} =$$

$= \frac{1}{2^{m+1}3^{m+1}} = \frac{1}{(2\cdot 3)^{m+1}} = 6^{-m-1}$. Javobi: C.

75. Agar a_n ketma-ketlik uchun

$a_1 = 0,\ a_2 = 1, \dots, a_{n+2} = a_{n+1} - a_n$ ekani ma'lum bo'lsa, a_{885} ni toping.

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

Yechilishi: $a_1 = 0,\ a_2 = 1, \dots, a_{n+2} = a_{n+1} - a_n;\ a_{885} = ?$;

$$n = 1 \Rightarrow a_{1+2} = a_{1+1} - a_1 \Rightarrow a_3 = a_2;$$

$$n = 2 \Rightarrow a_{2+2} = a_{2+1} - a_2 \Rightarrow a_4 = a_3 - a_2 =$$

$$= a_2 - a_2 = 0;$$

$$n = 3 \Rightarrow a_5 = a_4 - a_3 = 0 - 1 = -1;$$

$$n = 4 \Rightarrow a_6 = a_5 - a_4 = - - 1 - 0 = -1;$$

$$n = 5 \Rightarrow a_7 = a_6 - a_5 = -1 + 1 = 0;$$

$$n = 6 \Rightarrow a_8 = a_7 - a_6 = 0 - (-1) = 1;$$

$$n = 7 \Rightarrow a_9 = a_8 - a_7 = 1 - 0 = 1;$$

$$n = 8 \Rightarrow a_{10} = a_9 - a_8 = 1 - 1 = 0;$$

$$n = 9 \Rightarrow a_{11} = a_{10} - a_9 = 0 - 1 = -1;$$

$$n = 10 \Rightarrow a_{12} = a_{11} - a_{10} = -1 - 0 = -1;$$

$$\begin{cases} a_1 = 0 \\ a_2 = 1 \\ a_3 = 1 \end{cases} (1); \quad \begin{cases} a_4 = 0 \\ a_5 = -1 \\ a_6 = -1 \end{cases} (2); \quad \begin{cases} a_7 = 0 \\ a_8 = 1 \\ a_9 = 1 \end{cases} (3); \quad \begin{cases} a_{10} = 0 \\ a_{11} = -1 \\ a_{12} = -1 \end{cases} (4).$$

Javobi: A.

76. Gipotenuzasi c ga va o‘tkir burchaklari sinuslari yig‘indisi q ga teng bo‘lgan to‘g‘ri burchakli uchburchakning yuzini toping.

A) $\frac{1}{4}c^2(q^2-1)$ B) $\frac{1}{4}q^2(c^2-1)$ C) $\frac{1}{4}q^2(c^2+1)$

D) $\frac{1}{4}c^2(q^2+1)$ E) $\frac{1}{4}q^2(1-c^2)$

Yechilishi: 1) $\begin{cases} \frac{b}{c} = sin(90° - \alpha) = cos\alpha \\ \frac{a}{c} = sin\alpha \end{cases} \Rightarrow$

$\begin{cases} b = c \cdot cos\alpha \\ a = c \cdot sin\alpha \end{cases} \Rightarrow$

$$2) sin\alpha + \sin(90° - \alpha) = q \Rightarrow sin\alpha + cos\alpha = q \Rightarrow$$

$$\Rightarrow sin^2\alpha + cos^2\alpha + 2sin\alpha cos\alpha = q^2 \Rightarrow$$

$$\Rightarrow sin\alpha cos\alpha = \frac{q^2-1}{2}.$$

$S = \frac{1}{2} \cdot a \cdot b = \frac{1}{2} \cdot c \cdot sin\alpha \cdot c \cdot cos\alpha = \frac{1}{2}c^2 \cdot \frac{q^2-1}{2} = \frac{1}{4}c^2(q^2-1)$. Javobi: A.

77. $(x-y)^3 - (z-y)^3 + (z-x)^3$ ko‘phadni ko‘paytuvchilarga ajrating.

A) $3(x-y)(y-z)(z-x)$ B)$-3(x-y)(z-y)(x-z)$

C) $3(y-x)(y-z)(z-x)$ D) $-3(x-y)(y-z)(z-x)$

E) $ko'paytuvchilarga\ \ ajralmaydi$

Yechilishi: $(a-b)^3+(b-c)^3+(c-a)^3=$

$=3(a-b)(b-c)(c-a)\ \ formulga\ asosan,$

$(x-y)^3-(z-y)^3+(z-x)^3=$

$=(x-y)^3+(y-z)^3+(z-x)^3=$

$=3(x-y)(y-z)(z-x)$.Javobi: A.

78. To‘g‘ri tengsizlikni aniqlang.

A) $cos(sin\alpha)>0$ B) $cos2>0$ C) $-\frac{\pi}{2}+2\leq 0$

D) $|cos\alpha|+|sin\alpha|<1$ E) $sin5-tg4>0$

Yechilishi: $\cos(sin\alpha)>0;\ -1<sin\alpha<1.$ Javobi: A.

79. $cos5°\cdot cos55°\cdot cos65°$ ni hisoblang.

A) $\frac{\sqrt{6}+\sqrt{2}}{16}$ B) $\frac{\sqrt{6}-\sqrt{2}}{16}$ C) $\frac{\sqrt{2}+1}{8}$ D) $\frac{\sqrt{2}}{2}$ E)$\frac{\sqrt{3}}{2}$

Yechilishi: $cos5°\cdot cos55°\cdot cos65°=$

$=cos5°\cos(60°-5°)\cos(60°+5°)=\frac{1}{4}cos3\cdot 5°=$

$=\frac{1}{4}cos15°=\frac{1}{4}\cos(45°-30°)=$

$=\frac{1}{4}[cos45°cos30°+sin45°sin30°]=$

$=\frac{1}{4}\left[\frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2}+\frac{\sqrt{2}}{2}\cdot\frac{1}{2}\right]=\frac{1}{4}\left[\frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right]=\frac{\sqrt{6}+\sqrt{2}}{16}.$ Javobi: A.

80. $(|x_1-1|)^2+(|x_2|-2)^2+\cdots+(|x_n|-n)^2+\cdots=0$ tenglikni qanoatlantiradigan (x_n) arifmetik progressiya nechta?

A) 2 B) 1 C) n D) $2n$ E) n

Yechilishi: $(|x_1-1|)^2+(|x_2|-2)^2+\cdots+(|x_n|-n)^2+\cdots=0\Rightarrow$

$$\Rightarrow\begin{cases}|x_1|=1\\|x_2|=2\\---\\|x_n|=n\end{cases}\Rightarrow\begin{cases}x_1=\pm1;\\x_2=\pm2;\\---;\\x_n=\pm n.\end{cases}$$ $2\ ta$.Javobi: A.

81. Kasrning suratiga 2 qo‘shilsa, kasr 1 ga, maxrajiga uch qo‘shilsa, u $\frac{1}{2}$ ga teng bo‘ladi. Shu kasrning $\frac{3}{5}$ qismini toping.

A) $\frac{3}{7}$ B) $\frac{4}{7}$ C) $\frac{3}{5}$ D) $\frac{3}{4}$ E) $\frac{3}{10}$

Yechilishi: $\frac{m}{n}\cdot\frac{3}{5}=?$

$$\begin{cases}\frac{m+2}{n}=1\\\frac{m}{n+3}=\frac{1}{2}\end{cases}\Rightarrow\begin{cases}m+2=n\\2m=n+3\end{cases}\Rightarrow\begin{cases}n=m+2\\2m=m+2+3\end{cases}\Rightarrow$$

$$\Rightarrow\begin{cases}n=7\\m=5\end{cases}\Rightarrow\frac{m}{n}\cdot\frac{3}{5}=\frac{5}{7}\cdot\frac{3}{5}=\frac{3}{7}.$$ Javobi: A.

82. $(2x)^{\log_{2x}(x+4,5)^2}=25$ tenglamani yeching.

A) $yechimi\ yo'q$ B) 0,5 C) -9,5 D) 0,8 E) 2,4

Yechilishi: $(2x)^{\log_{2x}(x+4,5)^2}=25;$

$$\begin{cases} 2x > 0 \\ 2x \neq 1 \\ (x+4{,}5)^2 > 0 \\ (x+4{,}5)^2 = 25 \end{cases} \Rightarrow \begin{cases} x > 0 \\ x \neq \frac{1}{2} \\ x \neq -1 \\ |x+4{,}5| = 5 \Rightarrow \end{cases}$$

$$\Rightarrow \begin{cases} x+4{,}5 = -5 \\ x+4{,}5 = 5 \end{cases} \Rightarrow \begin{cases} x = -9{,}5; \\ x = 0{,}5. \end{cases}$$ Javobi: A.

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4-KITOB

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