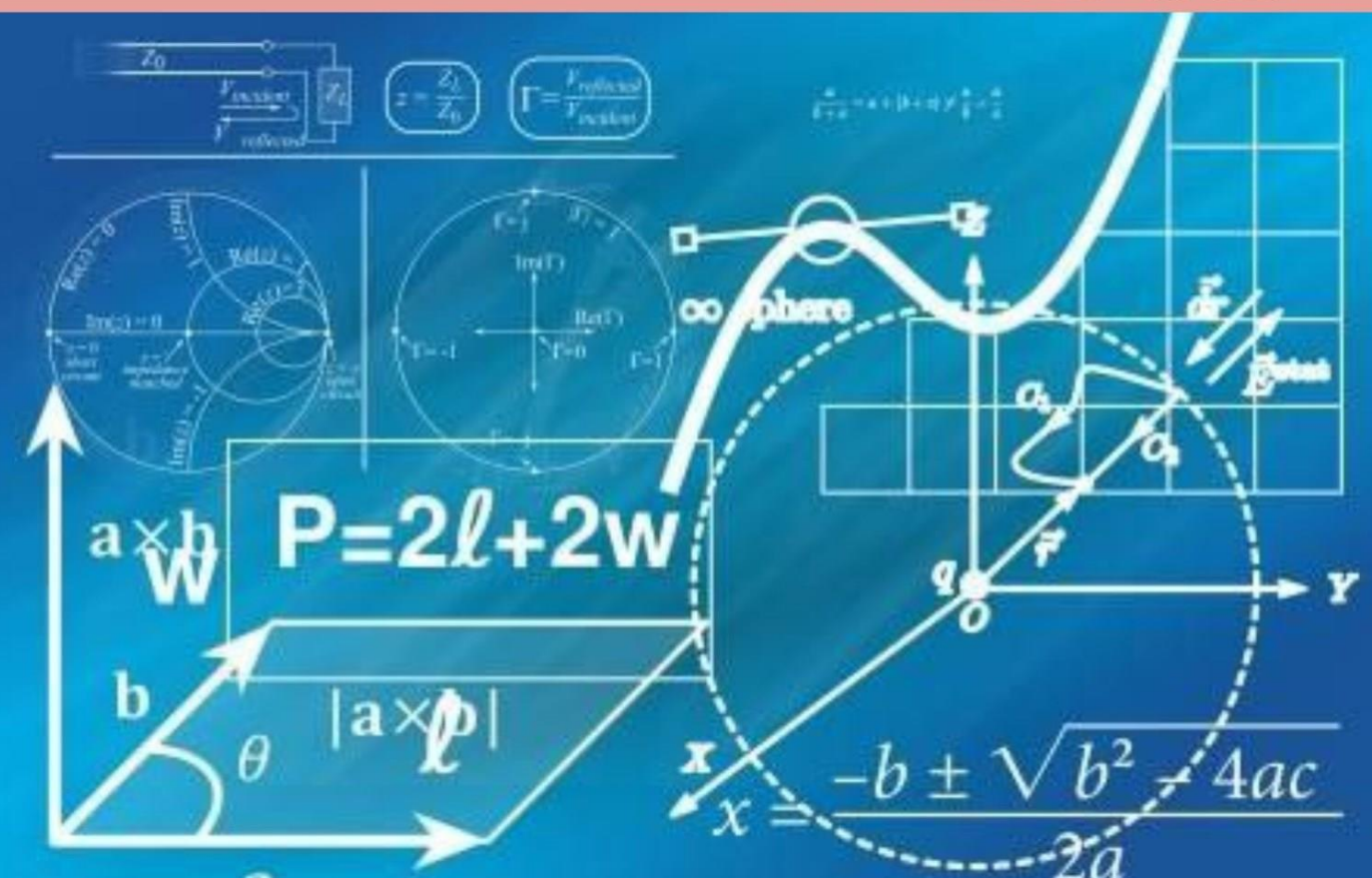# Pirnazar DAVRONOV

MATEMATIKADAN
MISOL VA MASALALAR YECHISH

2-KITOB

O'ZBEKISTON RESPUBLIKASI XALQ TA'LIMI VAZIRLAGI

SAMARQAND VILOYAT PEDAGOGLARNI YANGI
METODIKALARGA O'RGATISH MILLIY MARKAZI

Pirnazar **DAVRONOV**

MATEMATIKADAN
MISOL VA MASALALAR YECHISH

2-KITOB

Pirnazar Davronov. Matematikadan misol va masalalar yechish. Metodik qo'llanma. 2-kitob. – "Qamar media" nashriyoti. Toshkent – 2023-yil, 295 bet.

Taqrizchilar:

E.Mardanov – O'zbekiston-Finlandiya pedagogika instituti "Aniq fanlar" kafedrasi dotsenti;

A.Qudratova – Samarqand viloyati XTXQTMOHM, "Aniq va tabiiy fanlar" kafedrasi dotsenti;

M.Moshonov – Samarqand viloyati Nurobod tumani xalq ta'limi bo'limiga qarashli 21-maktab 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.

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, uzining hissasini qo‘shadigan insonlar hisoblanadi.

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

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

Bu salbiy oqibatning bosh sababi, aksariyat o‘qituvchilarning davlatimiz tomonidan chiqarilgan ta’lim to‘g‘risida qabul qilinayotgan qonunlar, farmonlar, qarorlar va

boshqa me'yoriy hujjatlardan behabarligi, o'qitadigan fani, uni o'qitish metodikasi, pedagogika, psixologiya fanlari yutuqlarini o'zlashtirib, ularni kasbiy-shaxsiy faoliyatiga qo'llash bo'yicha, o'z ustida, talab darajasida ishlamasligidan iborat.

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

Men, bunday ma'lumotni bergan o'qituvchilardan biriga "Aytaylik, sinfingizda 25 nafar o'quvchi bor, ulardan biri sizning 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 "yuq" deb javob berishadi. Shunday ekan, 50% dan ortiq o'quvchilarni savodsiz qoldirishni qanday baholaysizlar? O'sha bilimi past bolaning ota-onasi qariganda, o'zini eplay olmaydigan bu inson ularga qanday ko'maklashadi? Bu insonning zimmasiga tushadigan mamlakat yukini kim ko'taradi? kabi savollarimiz, o'qituvchilarga o'zining ta'sirini ko'rsatmoqda, o'ylantirib qo'ymoqda. Ularning aksariyat qismi, o'z ustimizda ishlab, o'quvchilarni yaxshi o'qitmasak bo'lmas ekan,- degan fikrlarga kelishmoqda.

Xalqimizda "Erni er qiladigan ham, qora yer qiladigan ham …"-degan naql bor. Shunga o'xshash, mamlakatni yuqori darajada rivojlantiradigan ham, taraqqiyotini susaytiradigan ham o'qituvchilar hisoblanadi. Chunki, mamlakat taraqqiyoti, undagi yetuk kadrlariga bog'liq. Bunday kadrlarni esa o'qituvchilar tayyorlab beradi. Demak, Ona Vatanimizning kelajakdagi

taraqqiyoti, bevosita uning oqituvchilari va murabbiy mutaxassislari kasbiy-shaxsiy faoliyatlarining natijadorligiga bog'liq.

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

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

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

Jahonda "Singapur mujizasi" iborasi ko'p ishlatiladi. Singapur davlati asoschisi Li Kuan Yuga, siz "Singapur mo'jizasi"ga qanday erishdingiz, - degan savol ko'p berilar ekan. Li Kuan Yuning javobi: "Men Singapurda mo'jiza yaratmadim. Men faqat Vatanim oldidagi burchimni bajardim,

xolos. Davlat byudjetini ta'limga yunaltirdim. Muallimni eng quyi tabaqadan Singapurdagi eng yuqori martabaga koʻtardim. Davlatdagi "moʻjiza"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 toʻgʻrisidagi chiqargan barcha farmonlari, qarorlari, Oliy Majlisga murojaatnomalari, xalq ta'limi xodimlari bilan muloqatlari mazmun mohiyati maktabgacha ta'limni, maktab ta'limini rivojlantirishga, oʻqituvchi va murabbiylarni kasbidan tashqari ishlardan, ortiqcha qogʻozbozliklardan ozod qilishga, ularning ijtimoiy, iqtisodiy mavqeni oshirishga qaratilgan. Jumladan, Oʻzbekiston Republikasi Prezidenti Shavkat Mirziyoyv huzurida 2019-yil 23-avgust kuni "Yoshlarni vatanparvarlik ruxida tarbiyalash va jamiyatda oʻqituvchi mavqeini oshirish" masalalariga bagʻishlab oʻtkazilgan videoselektr majlisi Bayonida "Oʻzbekiston Republikasi Prezidenti Administratsiyasi, Hukumati, barcha darajadagi davlat va xoʻjalik boshqaruv organlari, mahalliy hokimliklar rahbarlarining e'tibori maktab ta'limini rivojlantirish buyuk umummilliy maqsadga, umumxalq harakatlga aylanishi, ustozlarga yuksak hurmat-ehtirom koʻrsatish – jamiyatimizda oliy qadriyat darajasiga koʻtarilishi zarur ekanligi koʻrsatilsin".

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

Pirnazar DAVRONOV

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 2-kitob, 1998-yilda davlat test markazi tomonidan e’lon qilingan 12 ta axborotnomalarning 828 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 yulida umr bo‘yi o‘quvchi bo‘lib qolaylik, eng muhimi mustaqil izlanib, mustaqil o‘rganib, yangidan yangi g‘oyalarni o‘zlashtiraylik, ularni hayotga tatbiq etishda haqiqiy pragmatik bo‘lib, millatimizning koriga yaraydigan azmu shijoatli, g‘ayratu jasoratli, aqlu zakovatli, jamiyat, davlat va oila oldida o‘zining mas’uliyatini chuqur anglaydigan, erkin fikrlovchi, faol, ilmni, axloqni, mehnatni va haqiqatni sevadigan, kamtar insonlarni o‘qitib tayyorlab beraylik.

1998-YIL, 1-AXBOROTNOMA

1. $6798 : 103 < 54 + 6x < 9156 : 109$ tengsizlikning barcha natural yechimlarini toping.

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

   Yechilishi: $\frac{6798}{103} - 54 < 6x < \frac{9156}{109} - 54 \Rightarrow$

   $\Rightarrow \frac{6798 - 103 \cdot 54}{103} < 6x < \frac{9156 - 109 \cdot 54}{109} \Rightarrow$

   $\Rightarrow \frac{6798 - 5562}{103} < 6x < \frac{9156 - 5886}{109} \Rightarrow$

   $\Rightarrow \frac{1236}{103} < 6x < \frac{3270}{109} \Rightarrow 12 < 6x < 30 \Rightarrow$

   $\Rightarrow 2 < x < 5 \Rightarrow 3; 4$.   Javobi: C.

2. $2\frac{3}{5}$ va $\frac{1}{2}$ sonlar ayirmasining 10% ini toping.

    A) $0,22$ B) $0,3$ C) $0,021$ D) $0,03$ E) $0,21$

    Yechilishi: $\frac{13}{5} - \frac{1}{2} = \frac{26-5}{10} = \frac{21}{10} = 2,1.$

   $\frac{21}{10} \cdot 0,1 = \frac{21}{100} = 0,21.$ Javobi: E.

3. $19,9 \cdot 18 - 19,9 \cdot 16 + 30,1 \cdot 18 - 30,1 \cdot 16$ ni hisoblang.

    A) 98 B) 100 C) 10 D) 110 E) 102

   Yechilishi: $19,9(18 - 16) + 30,1(18 - 16) =$

   $= 2(19,9 + 30,1) = 100.$ Javobi: B.

4. $2,8x - 3(2x - 1) = 2,8 - 3,19x$ tenglamani yeching.

   A) -20   B) 20   C) -2   D) 200   E) 0,2

   Yechilishi: $2,8x - 3(2x - 1) = 2,8 - 3,19x \Rightarrow$

   $\Rightarrow 3,2x - 3,19x = 3 - 2,8 \Rightarrow 0,01x = 0,2 \Rightarrow$

   $\Rightarrow x = \frac{0,2}{0,01} = 20.$ Javobi: B.

5. $1\frac{1}{6} + 1\frac{5}{6}(1,854 : 1,8 - 1,5 \cdot 2,02)$ ni hisoblang.

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

Yechilishi: $1\frac{1}{6} + 1\frac{5}{6} \cdot (1,854 : 1,8 - 1,5 \cdot 2,02) =$

$$= \frac{7}{6} + \frac{11}{6} \cdot \left(\frac{1854}{1800} - 3 \cdot 1,01\right) = \frac{7}{6} + \frac{11}{6} \cdot \left(\frac{103}{100} - 3,03\right) =$$

$$= \frac{7}{6} + \frac{11}{6} \cdot \frac{103 - 303}{100} = \frac{7}{6} + \frac{11}{6}\left(-\frac{200}{100}\right) = \frac{7}{6} - \frac{11}{6} \cdot 2 =$$

$$= \frac{7}{6} - \frac{22}{6} = \frac{7-22}{6} = -\frac{15}{6} = -2\frac{1}{2}. \qquad \text{Javobi: C.}$$

6. $-3 < 2 - 5x < 1$ qo'shtengsizlikni yeching.

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

D) $(0,2; 1)$ E) $(1; 2)$

Yechilishi: $-3 < 2 - 5x < 1 \Rightarrow$

$\Rightarrow -3 - 2 < -5x < 1 - 2 \Rightarrow -5 < -5x < -1 \Rightarrow$

$\Rightarrow \frac{-5}{-5} > \frac{-5x}{-5} > \frac{-1}{-5} \Rightarrow 1 > x > 0,2 \Rightarrow (0,2; 1).$

Javobi: D.

7. $\left(\frac{2}{3} : 3 - 1\right) \cdot 1,5^2 - 0,25$ ni hisoblang.

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

Yechilishi: $\left(\frac{2}{3} \cdot \frac{1}{3} - 1\right) \cdot 1,5^2 - 0,25 = \frac{2-9}{9} \cdot 2,25 - 0,25 =$

$$= -\frac{7}{9} \cdot 2,25 - 0,25 = -\frac{15,75}{9} - 0,25 =$$

$$= -1,75 - 0,25 = -2. \qquad \text{Javobi: B.}$$

8. m ning qanday qiymatlarida $|m + 1| = m + 1$ tenglik o'rinli bo'ladi?

A) $m = -1$ B) $m \in R$ C) $m = 0$

D) $m > -1$ E) $m \geq -1$

Yechilishi: $|m + 1| = m + 1;$

1) $m + 1 \geq 0 \Rightarrow m + 1 = m + 1 \; ayniyat;$

2) $m + 1 < 0 \Rightarrow -m - 1 = m + 1 \Rightarrow 2m = -2 \Rightarrow$

$\Rightarrow m = -1;$

Demak, $m \geq -1.$ Javobi: E

Pirnazar DAVRONOV

9. $\dfrac{0,2^2 - 2 \cdot 0,06 + 0,3^2}{0,5 \cdot 0,9 - 0,5}$ ning qiymatini toping.

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

Yechilishi: $\dfrac{0,2^2 - 2 \cdot 0,06 + 0,3^2}{0,5 \cdot 0,9 - 0,5} = \dfrac{(0,2 - 0,3)^2}{0,5(0,9 - 1)} = \dfrac{(-0,1)^2}{0,5 \cdot (-0,1)} =$

$= \dfrac{0,01}{-0,05} = -\dfrac{1}{5} - 0,2.$ Javobi: C.

10. $a = 2,(4); b = 2,5 - \dfrac{1}{8}$ va $c = 1,2 : 0,5$ sonlarini kamayish

tartibida joylashtiring.

A) $a > b > c$ B) $a > c > b$ C) $b > a > c$
D) $c > a > b$ E) $c > b > a$

Yechilishi: $a = 2,(4);$

$b = 2,5 - \dfrac{1}{8} = 2,5 - 0,125 = 2,375;$

$c = \dfrac{1,2}{0,5} = \dfrac{12}{5} = 2\dfrac{2}{5} = 2,4;$

$a > c > b.$ Javobi: B.

11. $\dfrac{2n-3}{n+1}$ ifoda n ning nechta natural qiymatida butun son
bo'ladi?

A) 4   B) 3   C) 2   D) 1   E) hech bir qiymatida

Yechilishi: $\dfrac{2n-3}{n+1} = 2 - \dfrac{5}{n+1};$ $n = 4$ da.   Javobi: D.

12. Bir son ikkinchi sondan 6 ga ortiq. Ularning o'rta
arifmetigi 20 ga teng. Shu sonlarning kattasini toping.

A) 23   B) 27   C) 33   D) 26   E) 34

Yechilishi: 1-son-----$x + 6$;   2-son------x;

$\dfrac{x + 6 + x}{2} = 20 \Rightarrow 2x + 6 = 40 \Rightarrow 2x = 34 \Rightarrow x = 17 \Rightarrow$

$x + 6 = 17 + 6 = 23.$ Javobi: A.

13. $\dfrac{5}{6} + 2 \cdot (0,63 : 0,6 - 1,6)$ ni hisoblang.

A) $\dfrac{19}{10}$ B) $-1\dfrac{1}{6}$ C) $-\dfrac{4}{15}$ D) $-1\dfrac{4}{15}$ E) $\dfrac{8}{15}$

Yechilishi: $\dfrac{5}{6} + 2 \cdot \left(\dfrac{0,63}{0,6} - 1,6 \right) = \dfrac{5}{6} + 2 \cdot \left(\dfrac{63}{60} - 1,6 \right) =$

$= \dfrac{5}{6} + 2 \cdot \dfrac{63 - 1,6 \cdot 60}{60} = \dfrac{5}{6} + \dfrac{63 - 96}{30} = \dfrac{5}{6} + \dfrac{-33}{30} =$

$$= \frac{25-33}{30} = -\frac{8}{30} = -\frac{4}{15}.$$ Javobi: C.

14. $a\,(b-c) + b\,(c-a) - c\,(b-a)$ ni soddalashtiring.

A) $-2ac$ B) $2ab$ C) 0 D) 2 E) $2bc - 2ac$

Yechish: $a(b-c) + b(c-a) - c(b-a) =$
$= ab - ac + bc - ab - bc + ac = 0.$ Javobi: C.

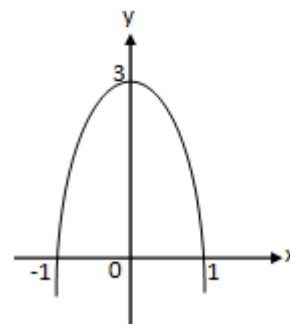15. $y = \sqrt{|x| - 3} + \dfrac{1}{\sqrt{10-x}}$ funksiyaning aniqlanish sohasini toping.

A) $[-3; 10]$ B) $[3;10)$ C) $(3;10) \cup \{-3\}$

D) (-10;3]   E) $(-\infty; -3] \cup [3; 10)$

Yechilishi: $\begin{cases} |x| - 3 \ge 0 \\ 10 - x > 0 \end{cases} \Rightarrow \begin{cases} |x| \ge 3 \\ x < 10 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} \begin{cases} x \ge 3 \\ x < 10 \end{cases} \\ \begin{cases} x \le -3 \\ x < 10 \end{cases} \end{cases} \Rightarrow (-\infty; -3] \cup [3; 10).$$ Javobi: E.

16. Rasmda qanday funksiyaning grafigi tasvirlangan?

A) $y = 3x - x^2$ B) $y = 3x^2 - 3$

C) $y = 3(1 - x^2)$ D) $y = 3x + x^2$

E) $y = 3x^2 + 3$

Yechilishi: $y = ax^2 + bx + c;$

1) $(x; y) = (0; 3) \Rightarrow 3 = a \cdot 0^2 + b \cdot 0 + c \Rightarrow c = 3;$

2) $(x; y) = (-1; 0) \Rightarrow ax^2 + bx + 3 = 0 \Rightarrow x = -1 ;$
$\Rightarrow a \cdot (-1)^2 + b \cdot (-1) + 3 = 0 \Rightarrow a - b + 3 = 0;$

3) $(x; y) = (1; 0) \Rightarrow x = 1 \Rightarrow$
$\Rightarrow a \cdot 1^2 + b \cdot 1 + 3 = 0 \Rightarrow a - b + 3 = 0;$

$\begin{cases} a - b + 3 = 0 \\ a + b + 3 = 0 \end{cases} \Rightarrow \begin{cases} 2a + 6 = 0 \\ -2b = 0 \end{cases} \Rightarrow \begin{cases} a = -3; \\ b = 0. \end{cases}$

4) $y = -3x^2 + 0 \cdot x + 3 \Rightarrow y = 3 - 3x^2 \Rightarrow$
$\Rightarrow y = 3(1 - x^2).$ Javobi: C.

17.   Agar $f(x) = 5 + ax^2$ va $q(x) = b - x$ funksiyalar $x = 0$ va $x = 1$ da bir xil qiymatlar qabul qilsa, a va b ning qiymatini toping.

A) $a = -1, b = 5$ B) $a = 1, b = -5$
C) $a = 5, b = -1$ D) $a = -5, b = 1$
E) $a = -1, b = -5$

Yechilishi: $x = 0 \Rightarrow \begin{cases} f(0) = 5 + a \cdot 0^2 = 5 \\ g(0) = b - 0 = b \end{cases} \Rightarrow b = 5;$

$x = 1 \Rightarrow \begin{cases} f(1) = 5 + a \\ g(1) = b - 1 \end{cases} \Rightarrow 5 + a = b - 1 \Rightarrow a = -1;$

Demak, $a = -1; b = 5.$ Javobi: A.

18. $2a^2 b - 3a + 10ab^2 - 15b$ ko'phadni ko'paytuvchilarga ajrating.

A) $(2ab + 3)(a - 5b)$ B) $(a + 5b)(2ab - 3)$
C) $(ab + 3)(2a - 5b)$ D) $(2a^2 + b)(b - 5a)$
E) $(ab + 5)(2a - 3b)$

Yechilishi: $2a^2 b - 3a + 10ab^2 - 15b = a(2ab - 3) + 5b(2ab - 3) = (a + 5b)(2ab - 3).$ Javobi: B.

19. a va b ning qanday qiymatida $\frac{1}{x^2-5x-6} = \frac{a}{x-6} + \frac{b}{x+1}$ tenglik ayniyat bo'ladi?

A) $a = 1, b = 1$ B) $a = \frac{1}{7}, b = -\frac{1}{7}$ C) $a = 1, b = 1$
D) $a = -\frac{1}{7}, b = \frac{1}{7}$ E) $a = -1, b = 7$

Yechilishi: $\frac{1}{x^2-5x-6} = \frac{a}{x-6} + \frac{b}{x+1}$

1) $x^2 - 5x - 6 = 0 \Rightarrow x_{1,2} = \frac{5}{2} \pm \sqrt{\frac{25}{4} + 6} = \frac{5}{2} \pm \frac{7}{2};$

$x_1 = -1; x_2 = 6 \Rightarrow x^2 - 5x - 6 = (x + 1)(x - 6)$

2) $\frac{a}{x-6} + \frac{b}{x+1} = \frac{ax+a+bx-6b}{(x+1)(x-6)}$

3) $ax + a + bx - 6b = 1 \Rightarrow (a + b)x + (a - 6b) = 1 \Rightarrow (a + b)x + (a - 6b) = 0 \cdot x + 1 \Rightarrow$

14

$$\Rightarrow \begin{cases} a+b=0 \\ a-6b=1 \end{cases} \Rightarrow \begin{cases} a=-b \\ 7b=-1 \end{cases} \Rightarrow \begin{cases} a=\frac{1}{7}; \\ b=-\frac{1}{7}; \end{cases}$$ Javobi: B.

20. m ning qanday qiymatlarida $m(mx-1)=9x+3$ tenglama cheksiz ko'p yechimga ega?

A) $m=0$ B) $m=3$ C) $m=-3$

D) $m=-1$ E) $m\in\emptyset$

Yechilishi: $m(mx-1)=9x+3 \Rightarrow m^2x-m=9x+3 \Rightarrow$

$$\Rightarrow \begin{cases} m^2x=9x \\ -m=3 \end{cases} \Rightarrow \begin{cases} m=\pm3 \\ m=-3 \end{cases} \Rightarrow m=-3.$$ Javobi: C.

21. $\left(\dfrac{4a}{4-a^2}-\dfrac{a-2}{4+2a}\right)\cdot\dfrac{4}{a+2}-\dfrac{a}{2-a}$ ni soddalashtiring.

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

Yechilishi: $\left(\dfrac{4a}{4-a^2}-\dfrac{a-2}{4+2a}\right)\cdot\dfrac{4}{a+2}-\dfrac{a}{2-a}=$

$$=\left(\dfrac{2\cdot 4a}{(2-a)(2+a)}-\dfrac{(2-a)(a-2)}{2(2+a)}\right)\cdot\dfrac{4}{a+2}-\dfrac{a}{2-a}=$$

$$=\dfrac{8a-(a-2)(2-a)}{2(2-a)(2+a)}\cdot\dfrac{4}{a+2}-\dfrac{a}{2-a}=$$

$$=\dfrac{8a+(2-a)(2-a)}{2(2-a)(2+a)}\cdot\dfrac{4}{a+2}-\dfrac{a}{2-a}=\dfrac{a^2+4a+4}{(2-a)(2+a)}\cdot\dfrac{2}{a+2}-\dfrac{a}{2-a}=$$

$$=\dfrac{(a+2)^2}{(2-a)(a+2)}\cdot\dfrac{2}{a+2}-\dfrac{a}{2-a}=\dfrac{2}{2-a}-\dfrac{a}{2-a}=1.$$ Javobi: D.

22. $\begin{cases} \dfrac{y-5}{4}<\dfrac{2y+3}{3} \\ \dfrac{4y+1}{2}<\dfrac{y-4}{3} \end{cases}$ tengsizliklar sistemasi nechta butun yechimga ega?

A) 6   B) 5   C) 4   D) 3   E) 1

Yechilishi: $\begin{cases} \dfrac{y-5}{4}<\dfrac{2y+3}{3} \\ \dfrac{4y+1}{2}<\dfrac{y-4}{3} \end{cases} \Rightarrow \begin{cases} 3y-15<8y+12 \\ 12y+3<2y-8 \end{cases} \Rightarrow$

$$\begin{cases} -15-12<8y-3y \\ 12y-2y<-8-3 \end{cases} \Rightarrow \begin{cases} -27<5y \\ 10y<-11 \end{cases} \Rightarrow \begin{cases} y>-5,4; \\ y<-1,1; \end{cases}$$

Javobi: C.

23. Agar $\begin{cases} |x| + y = 2 \\ 3x + y = 4 \end{cases}$ bo'lsa, $x+y$ ning qiymatlarini toping.

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

Yechilishi: $\begin{cases} |x| + y = 2 \\ 3x + y = 4 \end{cases} \Rightarrow \begin{cases} \pm x + y = 2 \\ 3x + y = 4 \end{cases};$

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

$\Rightarrow \begin{cases} y = 1; \\ x = 1; \end{cases}$

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

$\begin{cases} y = 2 + x \\ x = 0,5 \end{cases} \Rightarrow \begin{cases} y = 2,5; \\ x = 0,5; \end{cases}$ chet ildizlar.

$(x, y) = (1; 1) \Rightarrow x + y = 1 + 1 = 2;$

$\Rightarrow (x, y) = (0,5; 2,5) \Rightarrow x + y = 0,5 + 2,5 = 3;$

Javobi: D.

24. Agar $A(1; -2)$ nuqta $y = x^2 + px + q$ parabolaning uchi bo'lsa, p va q ning qiymatini toping.

A) *p=2, q=-1* B) *p=4, q=2* C) *p=q=-2* D) *p=1, q=-2* E) *p=-2, q=-1*

Yechilishi: $y = x^2 + px + q;$ $A(1; -2)$

$y' = 2x + p \Rightarrow y' = 0 \Rightarrow 2x + p = 0 \Rightarrow x = -\frac{p}{2},$

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

$1 = -\frac{p}{2} \Rightarrow 2 = -p \Rightarrow p = -2;$

$y = x^2 + px + q \Rightarrow -2 = 1^2 + (-2) \cdot 1 + q \Rightarrow$

$\Rightarrow q = -2 - 1 + 2 \Rightarrow q = -1.$ Javobi: E.

25. a ning qanday qiymatlarida $\begin{cases} 3|x| + y = 2 \\ |x| + 2y = a \end{cases}$ sistema yagona yechimga ega?

16

A) $a=0$ B) $a>0$ C) $a=2$ D) $a=-2$ E) $a=4$

Yechilishi: $\begin{cases} 3|x| + y = 2 \\ |x| + 2y = a \end{cases}$

1-usul. $x = 0 \Rightarrow \begin{cases} y = 2 \\ 2y = a \end{cases} \Rightarrow \begin{cases} y = 2; \\ a = 4; \end{cases}$

2-usul. 1) $x > 0 \Rightarrow \begin{cases} 3x + y = 2 \\ x + 2y = a \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} y = 2 - 3x \\ x + 2(2 - 3x) = a \end{cases} \Rightarrow \begin{cases} y = 2 - 3x \\ x + 4 - 6x = a \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} y = 2 - 3x \\ 5x = 4 - a \end{cases} \Rightarrow \begin{cases} y = 2 - 3 \cdot \frac{4-a}{5} \\ x = \frac{4-a}{5} \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = \frac{4-a}{5} \\ y = \frac{10-12+3a}{5} \end{cases} \Rightarrow \begin{cases} x = \frac{4-a}{5}; \\ y = \frac{3a-2}{5}; \end{cases}$

2) $x < 0 \Rightarrow \begin{cases} -3x + y = 2 \\ -x + 2y = a \end{cases} \Rightarrow \begin{cases} y = 2 + 3x \\ x = 2y - a \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} y = 2 + 3x \\ x = 2(2 + 3x) - a \end{cases} \Rightarrow \begin{cases} y = 2 + 3x \\ x = 4 + 6x - a \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} y = 2 + 3x \\ 5x = a - 4 \end{cases} \Rightarrow \begin{cases} y = 2 + 3 \cdot \frac{a-4}{5} \\ x = \frac{a-4}{5} \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = \frac{a-4}{5} \\ x = \frac{10+3a-12}{5} \end{cases} \Rightarrow \begin{cases} x = \frac{a-4}{5} \\ y = \frac{3a-2}{5} \end{cases} \Rightarrow$

$\Rightarrow \frac{4-a}{5} = \frac{a-4}{5} \Rightarrow 4 - a = a - 4 \Rightarrow 2a = 8 \Rightarrow a = 4.$

Javobi: E.

26. Geometrik progressiyaning maxraji -2 ga, dastlabki beshta hadining yig'indisi 5,5 ga teng. Progressiyaning beshinchi hadini toping.

    A) 4   B) -8   C) 8   D) -16   E) 16

Yechilishi: $q = -2$; $S_5 = 5,5$; $a_5 = ?$

$$5,5 = \frac{a_1[(-2)^5 - 1]}{-2 - 1} \Rightarrow 5,5 = \frac{a_1(-32 - 1)}{-3} \Rightarrow -16,5 =$$

$$= a_1(-33) \Rightarrow a_1 = \frac{-16,5}{-33} = \frac{165}{330} = \frac{1}{2} \Rightarrow a_1 = \frac{1}{2} \Rightarrow a_5 = \frac{1}{2} \cdot$$

$$(-2)^4 = \frac{1}{2} \cdot 16 = 8. \qquad \text{Javobi: C.}$$

27. Arifmetik progressiyaning dastlabki 16 ta hadlari yig'indisi 840 ga, oxirgi hadi $a_{16} = 105$ ga teng. Shu progressiyaning ayirmasini toping.

A) 9   B) 7   C) 15   D) 5   E) 11

Yechish: 1) $a_{16} = a_1 + 15d \Rightarrow 105 = a_1 + 15d \Rightarrow$

$\Rightarrow a_1 = 105 - 15d$;

2) $840 = \frac{105 - 15d + 105}{2} \cdot 16 \Rightarrow 840 = (210 - 15d) \cdot 8 \Rightarrow$

$\Rightarrow 210 - 15d = 105 \Rightarrow 15d = 105 \Rightarrow 3d = 21 \Rightarrow$

$\Rightarrow d = 7.$

Javobi: B

28. Agar $f(x) = e^x + 5x$ bo'lsa, $f'(ln3)$ ni hisoblang.

A) 8   B) 5   C) $e^3 + 5$ D) e^3 E) 9

Yechish: $f(x) = e^x + 5x$; $f'(ln3) = ?$

$f'(x) = e^x + 5$; $f'(ln3) = e^{ln3} + 5 = 3 + 5 = 8.$

Javobi: A.

29. $f(x) = x^3 + 2,5x^2 - 2x$ funksiyaning maksimum nuqtasidagi qiymatini hisoblang.

A) -8   B) 6   C) 10,5   D) -12   E) 14

Yechilishi: $f(x) = x^3 + 2,5x^2 - 2x \Rightarrow$

$\Rightarrow f'(x) = 3x^2 + 5x - 2 \Rightarrow f'(x) = 0 \Rightarrow$

$\Rightarrow 3x^2 + 5x - 2 = 0 \Rightarrow D = 25 + 24 = 49 \Rightarrow$

$\Rightarrow x_1 = \frac{-5 - 7}{6} = -2, \; x_2 = \frac{-5 + 7}{6} = \frac{1}{3} \Rightarrow$

$\Rightarrow f(-2) = (-2)^3 + 2,5 \cdot (-2)^2 - 2 \cdot (-2) =$

$= -8 + 10 + 4 = 6. \qquad \text{Javobi: B.}$

30. $y = 0,5\cos x$ funksiyaning $[-\frac{\pi}{4}, \frac{3\pi}{4}]$ kesmadagi eng kichik qiymatini toping.

   A) $-\frac{1}{2}$ B) -1   C) 0   D) $-\frac{\sqrt{2}}{8}$ E) $-\frac{\sqrt{2}}{4}$

   Yechilishi: $y' = -\frac{1}{2}\sin x \Rightarrow -\frac{1}{2}\sin x = 0 \Rightarrow$
   $\Rightarrow \sin x = 0 \Rightarrow x = \pi n, \ n \in Z.$
   $n = -1 \Rightarrow x = -\pi \notin [-\frac{\pi}{4}; \frac{3\pi}{4}];$
   $n = 0 \Rightarrow x = 0 \in [-\frac{\pi}{4}; \frac{3\pi}{4}];$
   $n = 1 \Rightarrow x = \pi \notin [-\frac{\pi}{4}; \frac{3\pi}{4}];$
   $y(0) = 0,5\cos 0 = \frac{1}{2} \cdot 1 = \frac{1}{2};$
   $y\left(-\frac{\pi}{4}\right) = 0,5\cos\left(-\frac{\pi}{4}\right) = \frac{1}{2} \cdot \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{4};$
   $y\left(\frac{3\pi}{4}\right) = \frac{1}{2}\cos\frac{3\pi}{4} = \frac{1}{2}\cos\left(\frac{\pi}{2} + \frac{\pi}{4}\right) =$
   $= -\frac{1}{2}\sin\frac{\pi}{4} = -\frac{1}{2} \cdot \frac{\sqrt{2}}{2} = -\frac{\sqrt{2}}{4}.$ Javobi: E.

31. $y = e^{1-3x}$ funksiyaning boshlang'ich funksiyasini toping.

   A) $-3e^x + C$ B) $e^{1-3x} + C$ C) $-3e^{1-3x} + C$
   D) $-\frac{1}{3}e^{1-3x} + C$ E) $-\frac{1}{3}e^x + C$

   Yechilishi: $y = e^{1-3x}$; $\int a^x dx = a^x \ln a + C.$
   $F(x) = \int e^{1-3x} dx = -\frac{1}{3}e^{1-3x} + C.$ Javobi: D.

32. $\int_0^{2\pi} |\sin x| dx$ ni hisoblang.

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

   Yechilishi: $\int_0^{2\pi} |\sin x| dx = \int_0^{\pi} \sin x \, dx - \int_{\pi}^{2\pi} \sin x \, dx =$
   $= -\cos x \big|_0^{\pi} + \cos x \big|_0^{2\pi} =$
   $= -[\cos\pi - \cos 0] + \cos 2\pi - \cos\pi =$
   $= -(-1 - 1) + 1 - (-1) = -(-2) + 1 + 1 = 4.$

Javobi: B.

33. $\dfrac{log_2^2 14 + log_2 14 \cdot log_2 7 - 2log_2^2 7}{log_2 14 + 2log_2 7}$ ni soddalashtiring.

A) 2   B) $log_2 7$ C) $-log_2 7$ D) 1   E) -2,5

Yechilishi:

$\dfrac{log_2^2 14 + log_2 14 \cdot log_2 7 - 2log_2^2 7}{log_2 14 + 2log_2 7} =$

$= \dfrac{log_2^2 14 + log_2 14 \cdot log_2 \frac{14}{2} - 2log_2^2 \frac{14}{2}}{log_2 14 + 2log_2 7} =$

$= \dfrac{log_2^2 14 + log_2 14 \, (log_2 14 - log_2 2) - 2 \, (log_2 14 - log_2 2)^2}{log_2 14 + 2(log_2 14 - 1)} =$

$= \dfrac{log_2^2 14 + log_2 14 \, (log_2 14 - 1) - 2 \, (log_2 14 - 1)^2}{log_2 14 + 2(log_2 14 - 1)} =$

$= \dfrac{2log_2^2 14 - log_2 14 - 2log_2^2 14 + 4log_2 14 - 2}{3log_2 14 - 2} = \dfrac{3log_2 14 - 2}{3log_2 14 - 2} = 1.$

Javobi: D.

34. $6^{x-2} - \left(\dfrac{1}{6}\right)^{3-x} + 36^{\frac{x-1}{2}} = 246$ tenglamani yeching.

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

Yechilishi: $6^{x-2} - \left(\dfrac{1}{6}\right)^{3-x} + 36^{\frac{x-1}{2}} = 246 \Rightarrow$

$\Rightarrow 6^{x-2} - 6^{x-3} + 6^{x-1} = 246 \Rightarrow$

$\Rightarrow 6^{-2} \cdot 6^x - 6^{-3} \cdot 6^x + 6^{-1} \cdot 6^x = 246 \Rightarrow$

$\Rightarrow 6^x \left(\dfrac{1}{36} - \dfrac{1}{216} + \dfrac{1}{6}\right) = 246 \Rightarrow$

$\Rightarrow 6^x \cdot \dfrac{6-1+36}{216} = 246 \Rightarrow 41 \cdot 6^x = 246 \cdot 216 \Rightarrow$

$\Rightarrow 6^x = 6^4 \Rightarrow x = 4.$ Javobi: E.

35. $\sqrt[3]{2\sqrt{6} - 5} \cdot \sqrt[6]{49 + 20\sqrt{6}}$ ni hisoblang.

A) 1   B) -1   C) $4\sqrt{6}$ D) 2   E) $-2\sqrt{6}$

Yechilishi: $\sqrt[3]{2\sqrt{6} - 5} = \sqrt[6]{\left(2\sqrt{6} - 5\right)^2} = \sqrt[6]{49 - 20\sqrt{6}};$

U holda $\sqrt[3]{2\sqrt{5} - 5} \cdot \sqrt[6]{49 + 20\sqrt{6}} =$

$= \sqrt[6]{49 - 20\sqrt{6}} \cdot \sqrt[6]{49 + 20\sqrt{6}} =$

$$\sqrt[6]{(49 - 20\sqrt{6}) \cdot (49 + 20\sqrt{6})} = \sqrt[6]{49^2 - (20\sqrt{6})^2} =$$
$$= \sqrt[6]{2401 - 2400} = 1. \qquad \text{Javobi: A.}$$

36. Teng yonli uchburchakning asosi 16 ga, balandligi 4 ga teng. Shu uchburchakka tashqi chizilgan aylananing radiusini toping.

A) $2\sqrt{5}$ B) 5   C)10   D)6.5   E) $4\sqrt{5}$

Yechilishi: AB=16, CD=4 $\Rightarrow$

$$\Rightarrow S = \frac{1}{2} \cdot AB \cdot CD = 32.$$
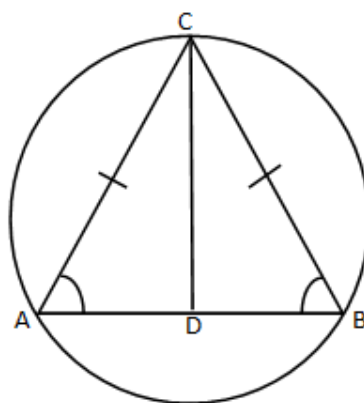$$R = \frac{a \cdot b \cdot c}{4 \cdot S}, \quad r = \frac{2S}{a+b+c};$$
$$CB^2 = CD^2 + DB^2 =$$
$$= CD^2 + \left(\frac{AB}{2}\right)^2 =$$
$$= 4^2 + \left(\frac{16}{2}\right)^2 = 16 + 64 = 80 \Rightarrow$$
$$CB = \sqrt{80};$$
$$R = \frac{16 \cdot \sqrt{80} \cdot \sqrt{80}}{4 \cdot 32} = \frac{16 \cdot 80}{4 \cdot 32} = 10. \qquad \text{Javobi: C.}$$

37. Teng yonli trapetsiyaning dioganali uning o'tkir burchagini teng ikkiga bo'ladi. Agar trapetsiyaning perimetri 48 ga, katta asosi 18 ga teng bo'lsa, uning o'rta chizig'ini toping.

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

Yechilishi: P=48; AB=18;
∠DAC=∠BAC, MN=?
AB ∥ CD $\Rightarrow$ ∠CAB =
∠ACD $\Rightarrow$ AD = CD;
2AD + CD + AB = 48 $\Rightarrow$
$\Rightarrow$ 2AD + AD + 18 = 48 $\Rightarrow$
$\Rightarrow$ 3AD = 30 $\Rightarrow$ AD = 10 $\Rightarrow$
$\Rightarrow$ CD = 10 $\Rightarrow$ MN =

21
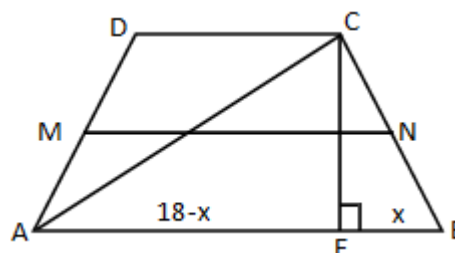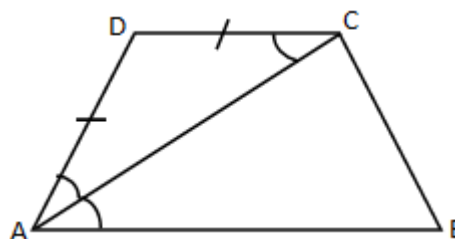
$$= \frac{AB+CD}{2} = \frac{18+10}{2} = 14.$$

Javobi: A.

38. To'g'ri burchakli uchburchakning gipotinuzasi 25 ga, katetlaridan biri 10 ga teng. Ikkinchi katetning gipotenuzadagi proyeksiyasini toping.

A) 14   B)15,5   C) 18

D) 20,4   E) 21

Yechilishi: $CA^2 = 25^2 - 10^2 = 525,$

$$CA = \sqrt{525}; \quad h = \frac{ab}{c};$$

$$h = \frac{\sqrt{525} \cdot 10}{25} = 2 \cdot \sqrt{\frac{525}{25}} = 2 \cdot \sqrt{21};$$

$$CD^2 = AC^2 - AD^2 = \left(\sqrt{525}\right)^2 - \left(2\sqrt{21}\right)^2 =$$

$$= 525 - 84 = 441 \Rightarrow CD = 21. \qquad \text{Javobi: E.}$$
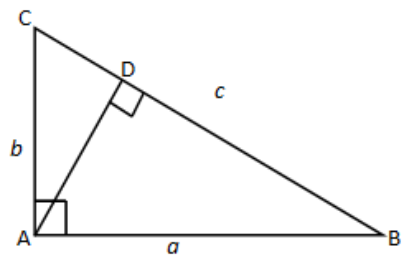
39. Ikkita parallel to'g'ri chiziqni uchinchi to'g'ri chiziq kesib o'tganda, hosil bo'lgan ichki bir tomonli burchaklardan biri ikkinchisidan $60°$ kichik. Shu burchaklardan kattasini toping.

A) $120°$ B) $110°$ C) $118°$ D) $130°$ E) $100°$

Yechish: $x + (x - 60°) = 180° \Rightarrow$

$\Rightarrow 2x = 240° \Rightarrow x = 120°.$
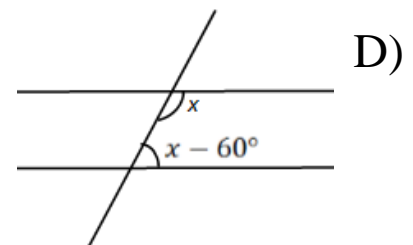
Javobi: A.

40. Teng yonli uchburchakning perimetri 14 ga teng. Asosi yon tomonidan 3 marta kichik. Uchburchakning yuzini toping.

A) $4\sqrt{2}$ B) $8\sqrt{2}$ C) $\sqrt{35}$ D) 12   E) $2\sqrt{35}$

Yechish: $P = 14; \quad AB = \frac{1}{3}BC;$

$P = 2BC + AB \Rightarrow$

$\Rightarrow 14 = 2BC + \frac{1}{3}BC \Rightarrow$

$\Rightarrow 42 = 6BC + BC \Rightarrow 7BC = 42 \Rightarrow$

22
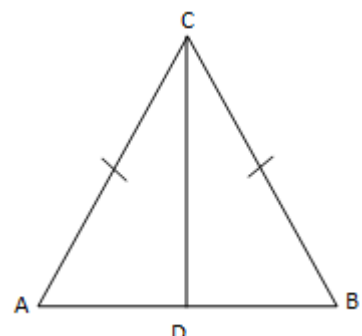
$$\Rightarrow BC = 6 \Rightarrow AB = 2;$$

$$CD^2 = BC^2 - DB^2 = 36 - \left(\frac{AB}{2}\right)^2 = 36 - \left(\frac{2}{2}\right)^2 = 35;$$

$$CD = \sqrt{35}; \quad S = \frac{1}{2} \cdot 2 \cdot \sqrt{35} = \sqrt{35};$$

Javobi: C.

41. Doiraning radiusi r ga teng. $90°$ li yoyga mos keladigan segmentning yuzini toping.

A) $\frac{\pi r^2}{8}$ B) $\frac{r^2}{2}(\pi - 2)$ C) $\frac{\pi r^2}{4}$
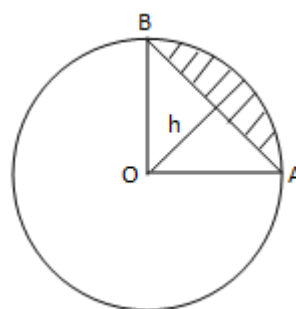
D) $\frac{r^2}{8}(\pi - 2)$ E) $\frac{r^2}{4}(\pi - 2)$

Yechilishi: $\angle AOB = 90°;$

$$S_{sektor} = \frac{\pi r^2 n°}{360°} = \frac{\pi r^2 90°}{360°} = \frac{\pi r^2}{4};$$

$$S_\Delta = \frac{1}{2}rr = \frac{1}{2}r^2;$$

$$S_{segment} = \frac{\pi r^2}{4} - \frac{1}{2}r^2 = \frac{\pi r^2 - 2r^2}{4} = \frac{r^2}{4}(\pi - 2). \quad \text{Javobi: E.}$$

42. Uchburchakning asosi 22 ga, yon tomonlari 13 va 19 ga teng. Asosiga tushirilgan medianasini toping.

A) 18   B) 12   C) 16   D) 13   E) 14

Yechilishi: $m_a = \frac{1}{2}\sqrt{2b^2 + 2c^2 - a^2};$

$$m_{22} = \frac{1}{2}\sqrt{2(13^2 + 19^2) - 22^2} =$$

$$= \frac{1}{2}\sqrt{2(169 + 361) - 484} =$$

$$= \frac{1}{2}\sqrt{1060 - 484} = \frac{1}{2} \cdot 24 = 12.$$
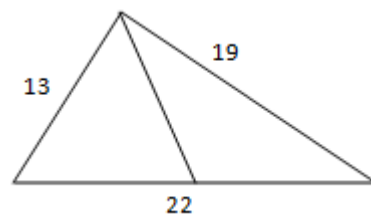
Javobi: B.

43. Radiusi 5 ga teng bo'lgan aylana yoyining uzunligi radiusi 2 ga teng aylana uzunligiga teng bo'lsa, hosil bo'lgan markaziy burchakni toping.
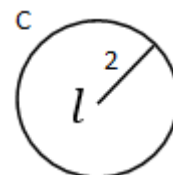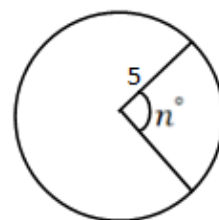
A) $120°$ B) $150°$ C) $144°$

D) $135°$ E) $148°$

Yechilishi: $C = 2\pi R = 2\pi \cdot 2 = 4\pi$;

$l = C \Rightarrow \quad l = 4\pi$;

$l = \dfrac{\pi R n^{\circ}}{180^{\circ}} \Rightarrow \quad 4\pi = \dfrac{\pi \cdot 5 \cdot n^{\circ}}{180^{\circ}} \Rightarrow$

$\Rightarrow 5\pi n^{\circ} = 4 \cdot 180 \cdot \pi \Rightarrow$

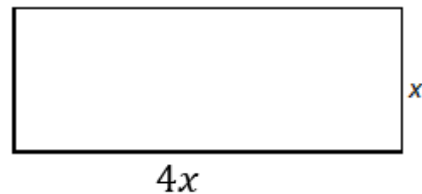$\Rightarrow n^{\circ} = \dfrac{4 \cdot 180}{5} = 144^{\circ}$. Javobi: C.

44. To'g'ri to'rtburchakning yuzi 400 ga, tomonlarining nisbati 4:1 ga teng. To'rtburchakning perimetrini hisoblang.

A) 100   B) $100\sqrt{2}$ C) 200   D) $50\sqrt{2}$ E) 120

Yechilishi: $S = 400$,

$4x : x = 4 : 1$;

$S = x \cdot 4x = 4x^2 \Rightarrow$

$\Rightarrow 4x^2 = 400 \Rightarrow x^2 = 100 \Rightarrow x = 10$;

$P = 2(4x + x) = 10x = 10 \cdot 10 = 100$.   Javobi: A.

45. To'g'ri burchakli uchburchakning burchaklaridan biri 60° ga teng. Bu uchburchakka romb shunday ichki chizilganki, 60° li burchak umumiy, rombning qolgan uchlari uchburchakning tomonlarida yotadi. Agar rombning tomoni $\dfrac{\sqrt{12}}{5}$ ga teng bo'lsa, berilgan uchburchakning katta katetini toping.

A) 1,8   B) 2,4   C) $\dfrac{3\sqrt{3}}{5}$ D) $\dfrac{6\sqrt{3}}{5}$ E) 2,2

Yechilishi: $CM = CN = MD = ND = \dfrac{\sqrt{12}}{5}$, $AB = ?$
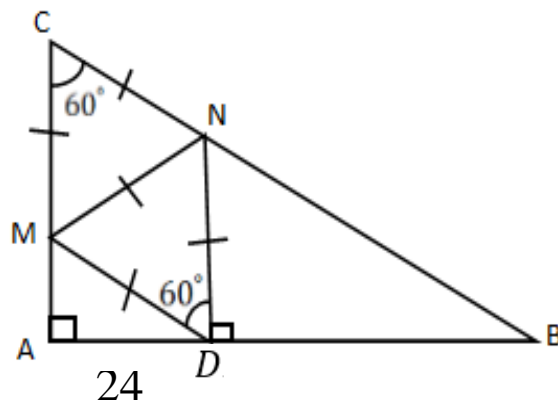
$\angle MCN = \angle CNM =$
$= \angle CMN = 60^{\circ}$;
$\angle DMN = \angle MND =$
$= \angle MDN = 60^{\circ}$;
$\angle CMD = 120^{\circ} \Rightarrow$
$\Rightarrow \angle AMD = 60^{\circ} \Rightarrow$

24

$\angle ADM = 30^{°} \Rightarrow$

$\Rightarrow AM = \frac{1}{2}MD = \frac{1}{2} \cdot \frac{\sqrt{12}}{5} = \frac{\sqrt{12}}{10};$

$\frac{AD}{MD} = \cos 30^{°} \Rightarrow AD = \frac{\sqrt{3}}{2}MD = \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{12}}{5} = \frac{3}{5};$

$\begin{cases} \angle ADM = 30^{°} \\ \angle MDN = 60^{°} \end{cases} \Rightarrow \begin{cases} \angle NDB = 90^{°} \\ \angle DNB = 60^{°} \\ \angle DBN = 30^{°} \end{cases} \Rightarrow \frac{BD}{ND} = ctg\,30^{°} \Rightarrow$

$\Rightarrow BD = \frac{\sqrt{12}}{5} \cdot \sqrt{3} = \frac{\sqrt{36}}{5} = \frac{6}{5};$

$AB = AD + DB = \frac{3}{5} + \frac{6}{5} = \frac{9}{5} = 1{,}8.$ Javobi: A.

46. $\vec{a}$ va $\vec{b}$ vektorlar $45^{°}$ li burchak tashkil qiladi va $\vec{a} \cdot \vec{b} = 4.$ Shu vektorlarga qurilgan uchburchakning yuzini hisoblang.

A) 4   B) $2\sqrt{2}$ C) $4\sqrt{2}$ D) 2   E) 8

Yechilishi: $(\vec{a} {}^{\wedge} \vec{b}) = 45^{°};$ $\vec{a} \cdot \vec{b} = 4;$

$\vec{a} \cdot \vec{b} = |\vec{a}| \cdot |\vec{b}| \cdot \cos 45^{°} \Rightarrow 4 = |\vec{a}| \cdot |\vec{b}| \cdot \frac{\sqrt{2}}{2} \Rightarrow$

$\Rightarrow |\vec{a}| \cdot |\vec{b}| = \frac{8}{\sqrt{2}} = 4\sqrt{2}, \Rightarrow |\vec{a}| \cdot |\vec{b}| = 4\sqrt{2};$

$S_{To'rtburchak} = \left|[\vec{a} \cdot \vec{b}]\right| = |\vec{a}| \cdot |\vec{b}| \cdot \sin 45^{°} = 4\sqrt{2} \cdot \frac{\sqrt{2}}{2} = 4.$

$S_{\Delta} = \frac{1}{2}\left|[\vec{a} \cdot \vec{b}]\right| = \frac{1}{2} \cdot 4 = 2.$ Javobi: D.

47. Agar $\vec{a} = 2\vec{i} + 3\vec{j}$ va $\vec{b} = 2\vec{j}$ bo'lsa, $\vec{p} = 2\vec{a} - 3\vec{b}$ vektorning koordinatalarini ko'rsating.
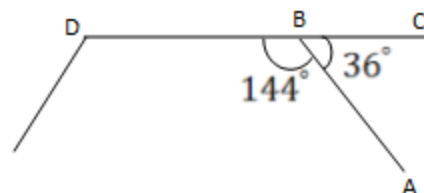
A) (-4;12)   B) (-4;0)   C) (4;0)   D) (2;-6)   E) (-2;4)

Yechilishi: $\vec{a} = 2\vec{i} + 3\vec{j};$ $\vec{b} = 2\vec{j};$ $\vec{p} = 2\vec{a} - 3\vec{b};$

$\vec{a} = \{2; 3\};$ $\vec{b} = \{0; 2\};$

$\vec{p} = 2 \cdot \{2; 3\} - 3 \cdot \{0; 2\} = \{4; 6\} - \{0; 6\} =$

$= \{4 - 0; 6 - 6\} = \{4; 0\}.$

Javobi: C.

48. Tashqi burchagi $36°$ ga teng bo'lgan muntazam ko'pburchakning nechta tomoni bor?

A) 8   B)10   C) 12   D) 15   E) 18

Yechilishi: $\angle ABC = 36°$,

$\angle ABD = 144°$;

$144\,n = 180\,(n-2) \Rightarrow n = 10$;

Shunga o'xshash, qavariq ko'pburchak tashqi burchaklari yig'indisining $360°$ ga tengligi e'tiborga olinsa

$n = 360°:36° = 10.$ Javobi: B.

49. z ning qanday qiymatlarida $\vec{c} = 2\vec{i} - 9\vec{j} + z\vec{k}$ vektorning uzunligi 11 ga teng bo'ladi?

A) $z = 6$ B) $z = \pm6$ C) $z = 4$ D) $z = \pm5$ E) $z = 7$

Yechilishi: $\vec{c} = \{2; -9; z\}$; $|\vec{c}| = 11$;

$11 = \sqrt{2^2 + (-9)^2 + z^2} \Rightarrow 121 = 85 + z^2 \Rightarrow$

$\Rightarrow z_{1,2} = \pm6.$ Javobi: B.

50. Tekislikdan a masofada joylashgan nuqtadan tekislikka ikkita og'ma tushirildi. Og'malarning har biri bilan tekisliklar orasidagi burchak $45°$ ga teng. Agar og'malar orasidagi burchak $60°$ ga teng bo'lsa, og'malarning uchlaridagi masofa qancha?

A) $2a$ B) $a\sqrt{3}$ C) $a\sqrt{2}$

D) $1,5a$ E) $2a\sqrt{2}$
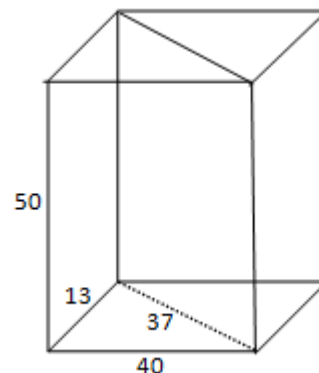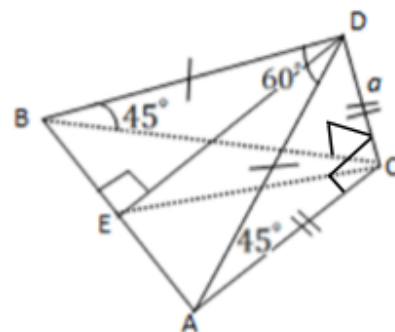
Yechilishi: $\frac{CD}{AD} = \sin 45° \Rightarrow$

$\Rightarrow AD = a\sqrt{2}$;

$\frac{AE}{AD} = \sin 30° \Rightarrow$

$\Rightarrow AE = \frac{1}{2} \cdot a\sqrt{2}$;

$AB = 2AE = a\sqrt{2}.$ Javobi: C.

51. To'g'ri prizmaning balandligi 50 ga, asosining tomonlari 13; 37 va 40 ga teng. Prizmaning to'la sirtini toping.

A) 2730   B) 3900   C) 4500   D) 4740   E)4980

Yechilishi: $S_T = S_{yon} + 2 \cdot S_{asos}$;

$p = \frac{40+13+37}{2} = 45$;

$S_{asos} = \sqrt{45\,(45-40)(45-37)(45-13)} =$

$= \sqrt{9 \cdot 5 \cdot 5 \cdot 4 \cdot 2 \cdot 32} =$

$= 3 \cdot 5 \cdot 2 \cdot 8 = 240$;

$S_{yon} = P_{asos} \cdot H =$

$= 50\,(40 + 37 + 13) =$

$= 50 \cdot 90 = 4500$;

$S_T = 4500 + 2 \cdot 240 = 4980$.
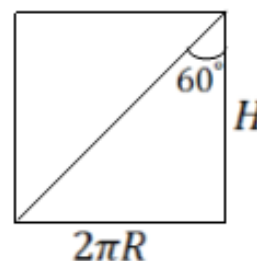
   Javobi: E.

52. Silindirning balandligi H ga teng. Uning yon sirti yoyilganda yasovchisi dioganali bilan $60°$ li burchak tashkil qiladi. Silindirning hajmini toping.

A) $\frac{3H^3}{4\pi}$ B) $6\pi H^3$ C) $\frac{3H^3}{2\pi}$ D) $\frac{4}{3}\pi H^3$ E) $\frac{9H^3}{4\pi}$

Yechilishi: $\frac{2\pi R}{H} = tg\,60° \Rightarrow R = \frac{\sqrt{3}H}{2\pi}$;

$V = \pi R^2 H = \pi \left(\frac{\sqrt{3}H}{2\pi}\right)^2 H =$

$\pi \cdot \frac{3H^2}{4\pi^2} H = \frac{3H^3}{4\pi}$;   Javobi: A.

53. Konusning o'q kesimi teng tomonli uchburchakdan, silindirniki esa kvadratdan iborat. Agar ularning to'la sirtlari tengdosh bo'lsa, hajmlarining nisbatini toping.

A) 2:3   B) 1:3   C) 1:$\sqrt{2}$ D) $\sqrt{2}$:$\sqrt{3}$ E) $2\sqrt{2}$:$\sqrt{3}$
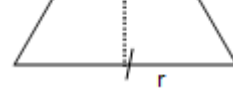
Yechilishi: $S_{T.k} = S_{yon} + S_{asos} =$

$= \pi r l + \pi r^2 = \pi r \cdot 2r + \pi r^2 = 3\pi r^2$;

$S_{T.s} = 2\pi R H + 2S_{asos} =$

$= 2\pi R \cdot 2R + 2\pi R^2 = 6\pi R^2$;

$S_{T.k} = S_{T.s} \Rightarrow 3\pi r^2 = 6\pi R^2 \Rightarrow$

$$\Rightarrow r^2 = 2R^2 \Rightarrow r = R\sqrt{2};$$

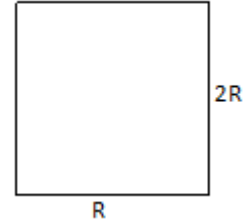$$h^2 = 4r^2 - r^2 = 3r^2 \Rightarrow h = r\sqrt{3} \Rightarrow h = R\sqrt{6};$$

$$V_k = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \cdot 2R^2 \cdot R\sqrt{6} = \frac{2\pi R^3}{3}\sqrt{6};$$

$$V_s = \pi R^2 H = \pi R^2 \cdot 2R = 2\pi R^3;$$

$$V_k : V_s = \frac{2\pi R^3 \sqrt{6}}{3} : 2\pi R^3 = \frac{2\sqrt{6}\pi R^3}{6\pi R^3} =$$

$$= \frac{\sqrt{6}}{3} = \sqrt{\frac{2}{3}} = \frac{\sqrt{2}}{\sqrt{3}}. \qquad \text{Javobi: D.}$$

54. Agar $tg\,\alpha = -\frac{1}{4}$ bo'lsa, $\frac{2\cos^2\alpha - \sin 2\alpha}{2\sin^2\alpha - \sin 2\alpha}$ ni hisoblang.

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

  Yechilishi: $tg\,\alpha = -\frac{1}{4};\quad ctg\,\alpha = \frac{1}{tg\,\alpha}$

$$\frac{2\cos^2\alpha - \sin 2\alpha}{2\sin^2\alpha - \sin 2\alpha} = \frac{2\cos^2\alpha - 2\sin\alpha\cos\alpha}{2\sin^2\alpha - 2\sin\alpha\cos\alpha} = \frac{2\cos\alpha(\cos\alpha - \sin\alpha)}{2\sin\alpha(\sin\alpha - \cos\alpha)} =$$

$$= -\frac{\cos\alpha(\sin\alpha - \cos\alpha)}{\sin\alpha(\sin\alpha - \cos\alpha)} = -ctg\,\alpha = -\frac{1}{-\frac{1}{4}} = 4. \qquad \text{Javobi: B.}$$

55. $\frac{3\sin^2\alpha + \cos^4\alpha}{1 + \sin^2\alpha + \sin^4\alpha}$ ni soddalashtiring.

  A) $2\sin\alpha$ B) 2   C) $ctg^2\alpha$ D) 1   E) 3

  Yechilishi: $\frac{3\sin^2\alpha + \cos^4\alpha}{1 + \sin^2\alpha + \sin^4\alpha} = \frac{3\sin^2\alpha + (1 - \sin^2\alpha)^2}{1 + \sin^2\alpha + \sin^4\alpha} =$

$$\frac{3\sin^2\alpha + 1 - 2\sin^2\alpha + \sin^4\alpha}{1 + \sin^2\alpha + \sin^4\alpha} = \frac{1 + \sin^2\alpha + \sin^4\alpha}{1 + \sin^2\alpha + \sin^4\alpha} = 1. \quad \text{Javobi: D.}$$

56. $\frac{\sin 2x}{tg\,x - 1} = 0$ tenglamani yeching.

  A) $\frac{\pi k}{2}, k \in Z$ B) $\frac{\pi}{2} + \pi k, k \in Z$ C) $2\pi k, k \in Z$

  D) $\pi + 2\pi k, k \in Z$ E) $\pi k, k \in Z$

  Yechilishi: $\frac{\sin 2x}{tg\,x - 1} = 0 \Rightarrow \begin{cases} \sin 2x = 0 \\ tg\,x - 1 \neq 0 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} \sin 2x = 0 \\ tg\,x \neq 1 \end{cases} \Rightarrow \begin{cases} 2\sin x \cdot \cos x = 0 \\ \cos x \neq 0 \end{cases} \Rightarrow x \neq \frac{\pi}{4} + \pi n \Rightarrow$$

$$\Rightarrow \sin x = 0 \Rightarrow x = \pi n, n \in Z.$$

  Javobi: E.

57. $8sin^2 \frac{15\pi}{16} \cdot cos^2 \frac{17\pi}{16} - 1$ ni hisoblang.

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

Yechilishi: $8sin^2 \frac{15\pi}{16} \cdot cos^2 \frac{17\pi}{16} - 1 =$

$= 8\left[sin\frac{15\pi}{16} \cdot cos\frac{17\pi}{16}\right]^2 - 1 =$

$= 8\left[sin\left(\pi - \frac{\pi}{16}\right) \cdot cos\left(\pi + \frac{\pi}{16}\right)\right] =$

$= 8\left[sin\frac{\pi}{16}\left(-cos\frac{\pi}{16}\right)\right]^2 - 1 = 8\left[-sin\frac{\pi}{16}cos\frac{\pi}{16}\right]^2 - 1 =$

$= 8\left[-\frac{sin\left(\frac{\pi}{16}-\frac{\pi}{16}\right)+sin\left(\frac{\pi}{16}+\frac{\pi}{16}\right)}{2}\right]^2 - 1 = 8\left[-\frac{1}{2}sin\frac{\pi}{8}\right]^2 - 1 =$

$= 8 \cdot \frac{1}{4}sin^2\frac{\pi}{8} - 1 =$

$= 2sin^2\frac{\pi}{8} - 1 = 2 \cdot \frac{1}{2}\left[1 - cos\frac{\pi}{4}\right] - 1 =$

$= 1 - \frac{\sqrt{2}}{2} - 1 = -\frac{\sqrt{2}}{2}.$ Javobi: A.

58. $\frac{sin2\alpha+2sin\alpha \cdot cos2\alpha}{1+cos\alpha+cos2\alpha+cos3\alpha}$ ni soddalashtiring.

A) $2tg\alpha$ B) $2sin\alpha$ C) $4tg\alpha$ D) $ctg\alpha$ E) $tg\alpha$

Yechilishi: $\frac{sin2\alpha+2sin\alpha cos2\alpha}{1+cos\alpha+cos2\alpha+cos3\alpha}$;

$\frac{2sin\alpha cos\alpha+2sin\alpha cos2\alpha}{sin^2\alpha+cos^2\alpha+cos^2\alpha-sin^2\alpha+cos\alpha+cos3\alpha} =$

$= \frac{2sin\alpha(cos\alpha+cos2\alpha)}{2cos^2\alpha+2cos\frac{\alpha+3\alpha}{2}cos\frac{\alpha-3\alpha}{2}} = \frac{2sin\alpha(cos\alpha+cos2\alpha)}{2cos^2\alpha+2cos\alpha cos2\alpha} =$

$= \frac{2sin\alpha(cos\alpha+cos2\alpha)}{2cos\alpha(cos\alpha+cos2\alpha)} = tg\alpha.$

Javobi: E.

59. $cos x \cdot cos 4x - cos 5x = 0$ tenglama $[0; \pi]$ kesmada nechta ildizga ega?

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

Yechilishi: $cos x \cdot cos 4x - cos 5x = 0$;

$\frac{1}{2}[cos(4x - x) + cos(4x + x)] - cos5x = 0 \Rightarrow$

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

$$\Rightarrow \frac{1}{2}\cos 3x - \frac{1}{2}\cos 5x = 0 \Rightarrow$$

$$\Rightarrow \frac{1}{2}\left[-2\sin\frac{3x-5x}{2}\sin\frac{3x+5x}{2}\right] = 0 \Rightarrow$$

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

$$\Rightarrow \begin{cases} \sin x = 0 \\ \sin 4x = 0 \end{cases} \Rightarrow \begin{cases} x = \pi n \\ 4x = \pi n \end{cases} \Rightarrow \begin{cases} x = \pi n; \\ x = \frac{\pi n}{4}; \end{cases}$$

$$n = 0 \Rightarrow \begin{cases} x = 0, o'rinli; \\ x = 0, chet\ ildiz; \end{cases} \quad n = 1 \Rightarrow \begin{cases} x = \pi, o'rinli; \\ x = \frac{\pi}{4}, o'rinli; \end{cases}$$

$$n = 2 \Rightarrow \begin{cases} x = 2\pi, chet\ ildiz; \\ x = \frac{\pi}{2}, o'rinli; \end{cases} \quad n = 3 \Rightarrow$$

$$\Rightarrow \begin{cases} x = 3\pi, chet\ ildiz; \\ x = \frac{3\pi}{4}, o'rinli; \end{cases} \quad n = 4 \Rightarrow \begin{cases} x = 4\pi, chet\ ildiz; \\ x = \pi, o'rinli; \end{cases}$$

Yechimlar, $0, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi.$ Javobi: E.

60. $1 - 2\cos 2x > sin^2 2x$ tengsizlikni yeching.

A) $\left(\frac{\pi}{2} + \pi k;\ \pi + \pi k\right), k \in Z$

B) $\left(\frac{\pi}{3} + 2\pi k; \frac{2\pi}{3} + 2\pi k\right), k \in Z$

C) $\left(\frac{\pi}{4} + \pi k;\ \frac{3\pi}{4} + \pi k\right), k \in Z$

D) $\left(-\frac{\pi}{2} + \pi k; \frac{\pi}{2} + \pi k\right), k \in Z$

E) $\left(-\frac{\pi}{3} + 2\pi k;\ \frac{\pi}{3} + 2\pi k\right), k \in Z$

Yechilishi: $1 - 2\cos 2x > sin^2 2x \Rightarrow$

$$\Rightarrow 1 - 2\cos 2x > 1 - cos^2 2x \Rightarrow$$

$$\Rightarrow cos^2 2x - 2cos2x > 0 \Rightarrow cos2x(cos2x - 2) > 0 \Rightarrow$$

$$\Rightarrow \begin{cases} cos2x - 2 < 0 \\ cos2x < 0 \end{cases} \Rightarrow 2\pi k + \frac{\pi}{2} < 2x < \frac{3\pi}{2} + 2\pi k \Rightarrow$$

$$\Rightarrow \pi k + \frac{\pi}{4} < x < \frac{3\pi}{4} + \pi k, k\epsilon Z.$$ Javobi: C.

1998-YIL, 2-AXBOROTNOMA

1. $\dfrac{1,8}{\left(4\frac{2}{5}\cdot 6\frac{1}{3}-2\frac{1}{3}\cdot 4,4\right)\cdot\frac{5}{22}}$ ni hisoblang.

A)0,4   B)4,5   C)4,2   D)4,4   E)0,45

Yechilishi: $\dfrac{1,8}{\left(4\frac{2}{5}\cdot 6\frac{1}{3}-2\frac{1}{3}\cdot 4,4\right)\cdot\frac{5}{22}}=\dfrac{1,8}{\left(\frac{22}{5}*\frac{19}{3}*\frac{5}{22}-\frac{7}{3}*4,4*\frac{5}{22}\right)}=\dfrac{1,8}{\frac{19}{3}-\frac{7}{3}}=$

$=\dfrac{1,8}{\frac{12}{3}}=\dfrac{1,8}{4}=\dfrac{18}{40}=\dfrac{9}{20}=0,45.$ Javobi: E.

2. 8 va 12 sonlari eng kichuk umumiy karralisining natural bo'luvchilari nechta?

A)6   B)7   C)8   D)9   E)10

Yechilishi: $8=2^3;$ $12=2^2\cdot 3;$

8	2
4	2
2	2
1	

12	2
6	2
3	3
1	

$(8;12)=2^3\cdot 3=24;$

2 ning natural bo'luvchilarini toppish uchun 2^3 va 3 ning daraja ko'rsatkichlariga 1qo'shilib ko'paytiriladi.

24	2
12	2
6	2
3	3
1	

$24=2^3\cdot 3\Rightarrow(3+1)(1+1)=8.$

Javobi: C.

3. Quyidagi sonlarning qaysi biri 15 ga qoldiqsiz bo'linmaydi?

A)6525   B)3105   C)4620   D)6145   E)1245

Yechilishi: 5 va 3 ga bo`linsa 15 ga ham bo'linadi.

Javobi: D.

4. Hovuzdagi suv 2 ta quvur orqali chiqariladi. Birinchi quvur to'la hovuzni 30 minutda, ikkal quvur birgalikda uni 18 minutda bo'shatadi. Ikkinvhi quvur to'la hovuzni necha minutda bo'shatadi?

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

Yechilishi: $\left(\frac{1}{30} + \frac{1}{x}\right) 18 = 1 \Rightarrow \frac{1}{30} + \frac{1}{x} = \frac{1}{18} \Rightarrow$

$\Rightarrow 18x + 30 \cdot 18 = 30x \Rightarrow 12x = 30 \cdot 18 \Rightarrow 45.$

 Javobi: D.

5. 100 kishidan iborat turistlar guruhida 70 kishi ingliz tilini, 45 kishi nemis tilini va 23 kishi ikkala tilni biladi. Ikkala tilni ham bilmaydigan turistlar necha foizni tashkil etadi.

A)6   B)12   C)8   D)10   E)14

Yechilishi: $100 = 70 + 45 - 23 + x \Rightarrow$

$\Rightarrow 100 = 92 + x \Rightarrow x = 8.$ Ikkala tilni ham bilmaydiganlar 8%.   Javobi: C.

6. Agar kamayuvchi 16 ta va ayriluvchini 20 ta orttirilsa, ayirma qanday o`zgaradi?

A) 4 ta kamayadi   B) 36ta ortadi   C) 36ta kamayadi

D) 4ta ortadi   E) 26ta kamayadi

Yechilishi: $x - y = z;$

$x + 16 - (y + 20) = x + 16 - y - 20 = x - y - 4;$

$x - y - 4 = z - 4.$ Javobi: A.

7. A va B pristanlar orasidagi masofa 96 km. A pristandan oqim bo'ylab sol jo'natildi. Xuddi shu paytda B

pristandan oqimga qarshi motorli qayiq jo'nadi va 4 soatdan keyin sol bilan uchrashdi. Agar daryo daryo oqimi tezligi 3km/soat bo'lsa, qaysining turg'un suv dagi tezligini toping.

A)20km/s   B)19km/s   C)17km/s   D)24km/s   E)21km/s
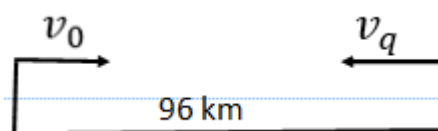
Yechilishi: $v_0 = v_s = 3;$

$v_q - v_0$—qayiqning oqimga qarshi tezligi. U holda

$4v_0 + 4(v_q - v_o) = 96 \Rightarrow 4 \cdot 3 + 4(v_q - 3) = 96 \Rightarrow$

$\Rightarrow v_q = 24.$ Javobi: D.

8. $\frac{x^3 - 8}{x^2 + 2x + 4} - \frac{x^2 - 4}{x - 2}$ ni soddalashtiring.

A) 4   B) $2x$ C) $-2x$ D) 0   E) -4

Yechilishi: $\dfrac{x^3-2^3}{x^2+2x+4} - \dfrac{x^2-2^2}{x-2} =$

$= \dfrac{(x-2)(x^2+2x+4)}{x^2+2x+4} - \dfrac{(x-2)(x+2)}{x-2} = x - 2 - x - 2 = -4.$

Javobi: E.

9. $p^2 - 16pq + 64q^2 - 12$ ning eng kichik qiyamatini toping.

A) -10 B) -12 C) -11 D) -13 E) -8

Yechilishi: $p^2 - 16pq + 64q^2 - 12 =$

$= p^2 - 2 \cdot 8pq + (8q)^2 - 12 = (p - 8q)^2 - 12.$

Javobi: B.

10.   Agar $(ax^2 - bx) + (bx^2 + ax) = -12x$ ayniyat bo'lsa a va b ni qiymatini toping.

A) $a = -6;\ b = -6$ B) $a = 8;\ b = -8$

C) $a = -6;\ b = 6$ D) $a = 6;\ b = -6$

E) $a = 6;\ b = 6$

Yechilishi: $(ax^2 - bx) + (bx^2 + ax) = -12x \Rightarrow$

$\Rightarrow ax^2 + bx^2 + ax - bx = -12x \Rightarrow$

$\Rightarrow (a + b)x^2 + (a - b)x = 0 \cdot x^2 - 12x \Rightarrow$

$\Rightarrow \begin{cases} a + b = 0 \\ a - b = -12 \end{cases} \Rightarrow \begin{cases} a = -b \\ -b - b = -12 \end{cases} \Rightarrow \begin{cases} a = -b \\ -2b = -12 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} a = -6; \\ b = 6. \end{cases}$ Javobi: C.

11. y_1 va y_2 $y^2 + my + n = 0$ tenglamalar ildizlari. y_1 va y_2 ning har birini 4 taga orttirib, ildizlari hosil bo'lgan sonlar teng bo'lgan kvadrat tenglama tuzildi. Agar uning ozod hadi $n -$ 24 (n – dastlabki tenglamaning ozod hadi) ga teng bo'lsa, m nechaga teng?

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

Yechilishi: $1) y^2 + my + n = 0 \Rightarrow \begin{cases} y_1 + y_2 = -m \\ y_1 \cdot y_2 = n \end{cases}$

$2) y_1 + 4;\ y_2 + 4; \quad [x^2 + px + q = (x - x_1)(x - x_2) = 0]$

$[y - (y_1 + 4)][y - (y_2 + 4)] = 0 \Rightarrow$

$\Rightarrow y^2 - y(y_2 + 4) - y(y_1 + 4) + (y_1 + 4)(y_2 + 4) = 0 \Rightarrow$

$\Rightarrow y^2 - [y_1 + 4 + y_2 + 4]y + (y_1 + 4)(y_2 + 4) = 0 \Rightarrow$

$\Rightarrow y^2 - (y_1 + y_2 + 8)y + y_1 y_2 + 4y_1 + 4y_2 + 16 = 0$

$\begin{cases} y_1 + y_2 = -m \\ y_1 \cdot y_2 = n \\ (y_1 + 4)(y_2 + 4) = n - 24 \end{cases}$ ekanligini hisobga olsak,

$y_1 y_2 + 4(y_1 + y_2) + 16 = n - 24 \Rightarrow$

$\Rightarrow n + 4 \cdot (-m) + 16 = n - 24 \Rightarrow$

$\Rightarrow n - 4m + 16 = n - 24 \Rightarrow 4m = 40 \Rightarrow m = 10.$

Javobi: B.

12. Quyidagi keltirilgan funksiyalardan qaysi birining grafigi rasmdagi paraboladan iborat?
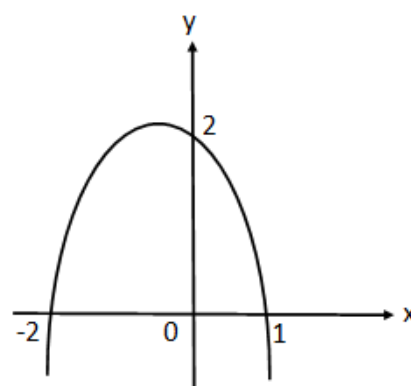
A) $y = (x + 2)(x + 1)$

B) $y = (x - 2)(1 - x)$

C) $y = (x + 2)(x - 1)$

D) $y = (x + 2)(1 - x)$

E) $y = (2 - x)(1 - x)$

Yechilishi: Grafikdan $A(-2; 0), B(1; 0), C(0; 2)$.

Bu nuqtalarning koordinatalari $y = (x + 2)(1 - x)$ funksiyani qanoatlantiradi.

Bundan tashqari $x_1 = -2, \ x_2 = 1$ va parabola shoxining pastga qaragani e'tiborga olinsa,

$y = -(x - x_1)(x - x_2) = -(x + 2)(x - 1) =$

$= (x + 2)(1 - x).$ Javobi: D.

13. $x^5 - 16x > 0$ tengsizlikning eng kichik butun musbat va eng kata butun manfiy yechimlari ko'paytmasini toping.

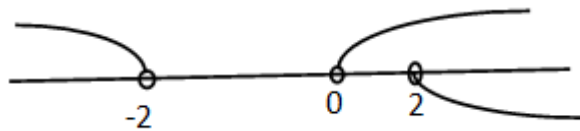A) -5   B) -4   C) -6   D) -2   E) -3

Yechilishi: $x^5 - 16x > 0 \Rightarrow x(x^4 - 16) > 0$;

$a) \begin{cases} x > 0 \\ x^4 - 16 > 0 \end{cases};$ $b) \begin{cases} x < 0 \\ x^4 - 16 < 0 \end{cases};$
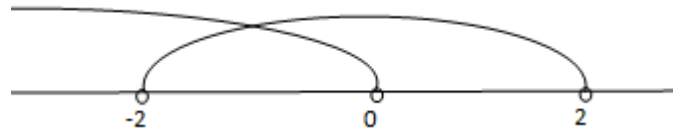
$a) \begin{cases} x > 0 \\ x^4 > 16 \end{cases} \Rightarrow \begin{cases} x > 0 \\ x^4 > 2^4 \end{cases} \Rightarrow \begin{cases} x > 0 \\ |x| > 2 \end{cases} \Rightarrow \begin{cases} x > 0 \\ x > 2 \\ x < -2 \end{cases} \Rightarrow$

$(2; \infty) \Rightarrow x = 3;$

b) $\begin{cases} x < 0 \\ x^4 < 16 \end{cases} \Rightarrow \begin{cases} x < 0 \\ x^4 < 2^4 \end{cases} \Rightarrow \begin{cases} x < 0 \\ |x| < 2 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x < 0 \\ -2 < x < 2 \end{cases} \Rightarrow (-2; 0) \Rightarrow x = -1.$

$(-1) \cdot 3 = -3;$ Javobi: E.

14. Koordinata o'qlari $\frac{x}{5} + \frac{y}{12} = 1$ to'g'ri chiziqdan qanday uzunlikdagi kesma ajratadi?

A)12,5   B)13   C)14

D) 13,5   E) 11,5

Yechilishi:

$\frac{x}{a} + \frac{y}{b} = 1 \Rightarrow \frac{x}{5} + \frac{y}{12} = 1;$

$A(5; 0); \quad B(0; 12);$

$\overrightarrow{AB} = \{0 - 5; 12 - 0\} = \{-5; 12\};$

$|\overrightarrow{AB}| = \sqrt{(-5)^2 + 2^2} = \sqrt{25 + 144} = \sqrt{169} = 13;$

Yoki $AB^2 + OA^2 + OB^2 = 169 \Rightarrow AB = 13.$

Javobi: B.

15. $|z|z^4 - 27|z^2| = 0$ tenglamani yeching.

A) 0; 3   B) 3; -3 C) 0; ± 9 D) -3; 0; 3   E) ± 9

Yechilishi: $|z|z^4 - 27|z^2| = 0;$
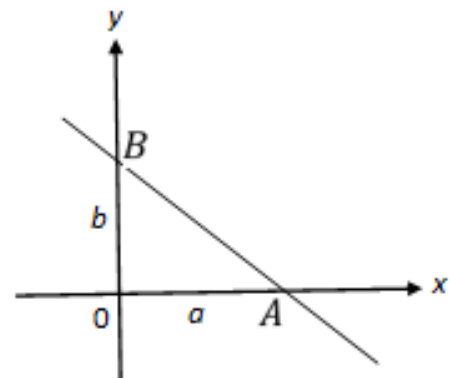
1) $z \geq 0 \Rightarrow z \cdot z^4 - 27 \cdot z^2 = 0 \Rightarrow z^5 - 27z^2 = 0 \Rightarrow$

$\Rightarrow z^2(z^3 - 27) = 0 \Rightarrow$

$\Rightarrow \begin{cases} z^2 = 0 \\ z^3 - 27 = 0 \end{cases} \Rightarrow \begin{cases} z = 0 \\ z^3 = 3^3 \end{cases} \Rightarrow \begin{cases} z = 0; \\ z = 3; \end{cases}$

2) $z < 0 \Rightarrow -z \cdot z^4 - 27 \cdot z^2 = 0 \Rightarrow$

$\Rightarrow -z^5 - 27z^2 = 0 \Rightarrow z^2(z^3 + 27) = 0 \Rightarrow$

$$\Rightarrow \begin{cases} z^2 = 0 \\ z^3 = -27 \end{cases} \Rightarrow \begin{cases} z = 0 \\ z^3 = -(3^3) \end{cases} \Rightarrow \begin{cases} z = 0; \\ z = -3. \end{cases}$$

1) va 2) dan: $z = -3; 0; 3.$ Javobi: D.

16. Agar $m^2 - mn = 48$ va $n^2 - mn = 52$ bo'lsa, $m - n$ nechiga teng?

A)10 B) 8 C) ± 10 D) ± 8 E) 9

Yechilishi: $\dfrac{\overset{m^2-mn=48}{+\;n^2-mn=52}}{m^2-2mn+n^2=100} \Rightarrow$

$\Rightarrow (m - n)^2 = 100 \Rightarrow$

$\Rightarrow \sqrt{(m - n)^2} = \sqrt{100} \Rightarrow |m - n| = 10 \Rightarrow$

$\Rightarrow \pm(m - n) = 10 \Rightarrow m - n = \pm 10.$ Javobi: C.

17. Quyidagi tengsizliklardan qaysi biri $3x - a > b - 2x$ tengsizlikka teng kuchli emas?

A)$5x - a > b$ B)$6x - 2a > 2b - 4x$

C)$3x > a + b - 2x$ D) $5x > a + b$ E) $a - 3x > 2x - b$

Yechilishi: $3x - a > b - 2x$

A) $5x - a > b \Rightarrow 3x + 3x - a > b \Rightarrow 3x - a > b - 2x;$

B) $6x - 2a > 2b - 4x \Rightarrow 2(3x - a) > 2(b - 2x) \Rightarrow$

$\Rightarrow 3x - a > b - 2x;$

C) $3x > a + b - 2x \Rightarrow 3x - a > b - 2x;$

D) $5x > a + b \Rightarrow 3x + 2x > a + b \Rightarrow 3x - a > b - 2x;$

E) $a - 3x > 2x - b \Rightarrow -3x + a > -b + 2x \Rightarrow$

$\Rightarrow 3x - a > b - 2x.$ Javobi: E.

18. Arifmetik progressiyada $S_{20} - S_{19} = -30$ va $d = -4$ bo'lsa, a_{25} ning qiymatini toping.

A) -40 B) -50 C) -48 D) -56 E) -42

Yechilishi: $S_{20} - S_{19} = 30; d = -4; a_{25} =?$

$S_n - S_{n-1} = a_n;$

$a_{25} = a_{20} + 5d = -30 - 20 = -50.$ Javobi: B.

19. Geometrik progresiyada $S_6 - S_5 = -128$ va $q = -2$ b_8 ning qiymatini toping.

A) 512 B) 256 C)-512 D) -256 E) 1024

Yechilishi: $b_n = S_n - S_{n-1} \Rightarrow b_6 = -128;$

$\qquad b_8 = b_6 \cdot q^2 = -128 \cdot (-2)^2 = -128 \cdot 4 = -512.$

Javobi: A.

20. $\dfrac{1}{2+\sqrt{3}} + \dfrac{2}{\sqrt{3}-1}$ ni hisoblang.

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

Yechilishi: $\dfrac{1}{2+\sqrt{3}} + \dfrac{2}{\sqrt{3}-1} = \dfrac{\sqrt{3}-1+4+2\sqrt{3}}{(2+\sqrt{3})(\sqrt{3}-1)} = \dfrac{3\sqrt{3}+3}{2\sqrt{3}-2+3-\sqrt{3}} =$

$= \dfrac{3(\sqrt{3}+1)}{\sqrt{3}+1} = 3.$ Javobi: B.

21. Agar $\sqrt{x^4 + 9x^2} = -4x$ tenglamaning katta ildizi x_0 bo`lsa, $x_0 + 10$ nechaga teng?

    A) 10   B) 12   C) 20   D) 15   E) 18

Yechilishi: $\sqrt{x^4 + 9x^2} = -4x \Rightarrow x^4 - 9x^2 = 16x^2 \Rightarrow$

$\Rightarrow x^4 - 25x^2 = 0 \Rightarrow x^2(x^2 - 25) = 0 \Rightarrow$

$$\Rightarrow \begin{cases} x^2 = 0 \\ x^2 - 25 = 0 \end{cases} \Rightarrow \begin{cases} x = 0 \\ x = \pm 5 \end{cases} \Rightarrow \begin{cases} x_1 = -5 \\ x_2 = 0 \\ x_3 = 5 \; chet \; ildiz \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x_1 = -5 \\ x_2 = 0 \end{cases} \Rightarrow x_0 + 10 = 0 + 10 = 10. \quad \text{Javobi: A.}$$

22. $\arccos\left(-\dfrac{\sqrt{2}}{2}\right) - arctg\dfrac{1}{\sqrt{3}}$ ni hisoblang.

    A) $-75°$ B) $75°$ C) $-105°$ D) $165°$ E) $105°$

Yechilishi: $cosx = a \Rightarrow x = arccosa \Rightarrow$

$\Rightarrow x = arccos\left(-\dfrac{\sqrt{2}}{2}\right); \quad x = 135°; \; arctg\dfrac{1}{\sqrt{3}} = 30°;$

U holda $135° - 30° = 105°.$ Javobi: E.

23. $p = sin189°$, $q = cos42°$, va $r = cos88°$ sonlarini kamayish tartibida yozing.

    A) $q > p > r$ B) $p > q > r$ C) $p > r > q$

    D) $r > q > p$ E) $q > r > p$

Yechilishi: $p = sin\,189° = sin(180° + 9°) = -sin\,9°;$

$q = cos\,42° = cos(90° - 48°) = sin\,48°;$

$r = \cos 88° = \cos(90° - 2°) = \sin 2°.$
Burchak kattaligi ortgan sari, $sinx$ funksiyaning qiymati ortib boradi.
$q > r > p.$ Javobi: E.

24. Quyidagi sonlardan qaysi biri manfiy?

A) $\dfrac{\sin 80°}{\sin 149°}$ B) $\dfrac{\cos 98°}{\cos 265°}$ C) $\dfrac{\cos 300°}{\sin 316°}$

D) $tg40° \cdot tg189°$ E) $\dfrac{ctg\,110°}{ctg\,324°}$

Yechilishi: A) $\dfrac{\sin 80°}{\sin 149°} = +$

B) $\dfrac{\cos 98°}{\cos 265°} = \dfrac{-}{-} = +$

C) $\dfrac{\cos 300°}{\sin 316°} = \dfrac{+}{-} = -$ Demak, Javobi: C.

D) $tg40° \cdot tg189° = (+) \cdot (+) = +$

E) $\dfrac{ctg\,110°}{ctg\,324°} = \dfrac{-}{-} = +$

25. $p = \dfrac{1}{\sin^2 x} - ctg^2 x;\ q = tgx\,tg(270° - x)\ (x \neq \dfrac{k\pi}{2}, k \in Z);$
$r = \cos^2(270° - x) + \cos^2 x$ va
$l = \sin 42°\cos 48° + \sin 48°\cos 42°$ sonlardan qaysi biri qolgan uchtasiga teng emas?

A) p B) q C) r D) l E) hech qaysi

Yechilishi: $p = \dfrac{1}{\sin^2 x} - ctg^2 x = \dfrac{1}{\sin^2 x} - \dfrac{\cos^2 x}{\sin^2 x} =$
$= \dfrac{1}{\sin^2 x} \cdot (1 - \cos^2 x) = 1;$
$q = tgx \cdot tg(270° - x) = tgx \cdot ctgx = 1;$
$r = \cos^2(270° - x) + \cos^2 x = [-sinx]^2 + \cos^2 x = 1;$
$l = \sin 42°\cos 48° + \sin 48°\cos 42° = \sin 90° = 1;$
Hammasi bir biriga teng. Demak, Javobi: E.

26. $2\cos^2 x - 1 = -\dfrac{1}{2}$ tenglamani yeching.

A) $(-1)^k \dfrac{\pi}{6} + \dfrac{\pi}{2}k;\ k \in Z$ B) $(-1)^{k+1} \dfrac{\pi}{6} + k\pi;\ k \in Z$

C) $\pm \dfrac{\pi}{6} + k\pi;\ k \in Z$ D) $\pm \dfrac{\pi}{3} + k\pi;\ k \in Z$

E) $\pm \dfrac{2\pi}{3} + k\pi; k \in Z$

Yechilishi: $2cos^2x - 1 = -\dfrac{1}{2} \Rightarrow$

$\Rightarrow 2cos^2x - sin^2x - cos^2x = -\dfrac{1}{2} \Rightarrow$

$\Rightarrow cos^2 - sin^2x = -\dfrac{1}{2} \Rightarrow cos2x = -\dfrac{1}{2} \Rightarrow$

$\Rightarrow 2x = \pm\left(\pi - arccos\dfrac{1}{2}\right) + 2k\pi \Rightarrow$

$\Rightarrow 2x = \pm\left(\pi - \dfrac{\pi}{3}\right) + 2k\pi \Rightarrow x = \pm\dfrac{2\pi}{3} + 2k\pi \Rightarrow$

$\Rightarrow x = \pm\dfrac{2\pi}{6} + k\pi \Rightarrow x = \pm\dfrac{\pi}{3} + k\pi; \ k \in Z.$ Javobi: D.

27. $cosx + \cos(120° - x) = b$ tenglama yechimga ega
bo'ladigan b ning barcha qiymatlarini toping.
A) $0 \le b \le 1$ B) $-1 \le b \le 1$ C) $-1 < b < 1$
D) $b \le 1$ E) $0 < b < 1$
Yechilishi: $cosx + \cos(120° - x) = b \Rightarrow$
$\Rightarrow cosx + \cos 120 °cosx + sin120°sinx =$
$= cosx + \cos(90° + 30°)\, cosx + \sin(90° + 30°)\, sinx =$
$= cosx - sin30°cosx + cos30°sinx =$
$= cosx - \dfrac{1}{2}cosx + \dfrac{\sqrt{3}}{2}sinx = \dfrac{1}{2}cosx + \dfrac{\sqrt{3}}{2}sinx =$
$= cosxcos60° + sinxsin60° = \cos\left(x - \dfrac{\pi}{3}\right) \Rightarrow$
$\Rightarrow \cos\left(x - \dfrac{\pi}{3}\right) = b \Rightarrow -1 \le b \le 1.$ Javobi: B.

28. $|sinx + 1| > 1{,}5$ tengsizlik x ning $(0; \pi)$ kesmaga tegishli
qanday qiymatlarida o'rinli bo'ladi?
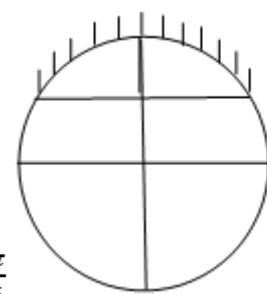A) $\dfrac{\pi}{6} \le x \le \dfrac{5\pi}{6}$ B) $\dfrac{\pi}{6} < x < \dfrac{5\pi}{6}$ C) $\dfrac{\pi}{3} < x < \dfrac{2\pi}{3}$
D) $\dfrac{\pi}{3} \le x \le \dfrac{2\pi}{3}$ E) $0 < x < \dfrac{\pi}{6}$
Yechilishi: $|\sin x + 1| \ge 1{,}5 \ \ x \in (0; \pi);$
$|\sin x + 1| \ge \dfrac{3}{2} \Rightarrow$

$\dfrac{5\pi}{6}$ $\dfrac{\pi}{6}$

$\dfrac{1}{2}$

Pirnazar DAVRONOV

$$\Rightarrow \begin{cases} \sin x \geq \frac{1}{2} \\ \sin x \leq -2{,}5 \end{cases} \Rightarrow$$

$$\Rightarrow \sin x \geq \frac{1}{2} \Rightarrow$$

$$\Rightarrow \frac{\pi}{6} + 2\pi k \leq x \leq \frac{5\pi}{6} + 2\pi k, \ k\epsilon Z.$$

Javobi: B.

29. $\frac{x^{-3}+8}{x^{-2}-2x^{-1}+4}$ ning $x = 0{,}5$ dagi qiymatini hisoblang.

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

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

$$= \frac{1+8x^3}{x^3} \cdot \frac{x^2}{1-2x+4x^2} = \frac{1+8x^3}{x(1-2x+4x^2)} = \frac{1+(2x)^3}{x(1-2x+4x^2)}$$

$$= \frac{(1+2x)(1-2x+4x^2)}{x(1-2x+4x^2)} = \frac{1}{x} + 2 = 4. \quad \text{Javobi: C.}$$

30. Quyidagi sonlardan qaysi biri 1 dan katta?

   $a = 0{,}7^{2,3} \cdot 0{,}3^{0,8}; \quad b = 3{,}2^{-4,2} \cdot 1{,}2^{-0,8};$

   $c = 0{,}7^{-1,2} \cdot 0{,}6^{0,4}; \ \ d = 0{,}6^{0,4} \cdot 0{,}3^{0,6}; e = 0{,}4^0 \cdot 3{,}5^{-1,3};$

   A) a B) b C) c D) d E) e

   Yechilishi: Surati maxrajidan katta kasr, 1 dan katta

   bo'ladi: $a = 0{,}7^{2,3} \cdot 0{,}3^{0,8} = \left(\frac{7}{10}\right)^{\frac{23}{10}} \cdot \left(\frac{3}{10}\right)^{\frac{8}{10}} =$

$$= \sqrt[10]{\left(\frac{7}{10}\right)^{23}} \cdot \sqrt[10]{\left(\frac{3}{10}\right)^8} = \sqrt[10]{\frac{7^{23}}{10^{23}} \cdot \frac{3^8}{10^8}} = \sqrt[10]{\frac{7^{23}\cdot 3^8}{10^{31}}} < 1;$$

$$b = 3{,}2^{-4,2} \cdot 1{,}2^{-0,8} = \left(\frac{32}{10}\right)^{-\frac{42}{10}} \cdot \left(\frac{12}{10}\right)^{-\frac{8}{10}} =$$

$$= \frac{1}{\left(\frac{32}{10}\right)^{\frac{42}{10}}} \cdot \frac{1}{\left(\frac{12}{10}\right)^{\frac{8}{10}}} = \frac{1}{\sqrt[10]{\left(\frac{32}{10}\right)^{42}}} \cdot \frac{1}{\sqrt[10]{\left(\frac{12}{10}\right)^{8}}} =$$

$$= \frac{1}{\sqrt[10]{\frac{32^{42}}{10^{42}}}} \cdot \frac{1}{\sqrt[10]{\frac{12^{8}}{10^{8}}}} = \frac{1}{\frac{\sqrt[10]{32^{42}}}{\sqrt[10]{10^{42}}}} \cdot \frac{1}{\frac{\sqrt[10]{12^{8}}}{\sqrt[10]{10^{8}}}} =$$

40

$$= \frac{\sqrt[10]{10^{42}}}{\sqrt[10]{32^{42}}} \cdot \frac{\sqrt[10]{10^{8}}}{\sqrt[10]{12^{8}}} < 1;$$

$$c = 0,7^{-1,2} \cdot 0,6^{0,4} = \left(\frac{7}{10}\right)^{-\frac{12}{10}} \cdot \left(\frac{6}{10}\right)^{-\frac{4}{10}} =$$

$$= \frac{1}{\left(\frac{7}{10}\right)^{\frac{12}{10}}} \cdot \frac{1}{\left(\frac{6}{10}\right)^{\frac{4}{10}}} = \frac{1}{\sqrt[10]{\left(\frac{7}{10}\right)^{12}}} \cdot \frac{1}{\sqrt[10]{\left(\frac{6}{10}\right)^{4}}} =$$

$$= \frac{1}{\frac{\sqrt[10]{7^{12}}}{\sqrt[10]{10^{12}}}} \cdot \frac{1}{\frac{\sqrt[10]{6^{4}}}{\sqrt[10]{10^{4}}}} = \frac{\sqrt[10]{10^{12}}}{\sqrt[10]{7^{12}}} \cdot \frac{\sqrt[10]{10^{4}}}{\sqrt[10]{6^{4}}} > 1; \quad \text{Javobi: C.}$$

31. $2^{-4x^2+2} - 3 \cdot 2^{-4x^2} = 2^{-16}$ tenglamaning kichik ildizini toping.

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

Yechilishi: $2^{-4x^2} \cdot 2^2 - 3 \cdot 2^{-4x^2} = 2^{-16}$;

$$\frac{4}{2^{4x^2}} - 3 \cdot \frac{1}{2^{4x^2}} = \frac{1}{2^{16}};$$

$4 \cdot 2^{16} - 3 \cdot 2^{16} = 2^{4x^2} \Rightarrow 2^{16} = 2^{4x^2} \Rightarrow 16 = 4x^2 \Rightarrow$
$x^2 = 4 \Rightarrow x = \pm 2 \Rightarrow x = -2.$ Javobi: C.

32. $\left(\frac{4}{9}\right)^x \cdot \left(\frac{3}{2}\right)^x > \left(\frac{2}{3}\right)^6 \cdot \left(\frac{2}{3}\right)^{-2x}$ tengsizlikning eng katta butun yechimini toping.

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

Yechilishi: $\left(\frac{2^2}{3^2}\right)^x \cdot \left(\frac{3}{2}\right)^x > \left(\frac{2}{3}\right)^6 \cdot \left(\frac{2}{3}\right)^{-2x} \Rightarrow$

$$\Rightarrow \left(\frac{2}{3}\right)^{2x} \cdot \left(\frac{3}{2}\right)^x > \left(\frac{2}{3}\right)^{6-2x} \Rightarrow \frac{2^{2x}}{3^{2x}} \cdot \frac{3^x}{2^x} > \left(\frac{2}{3}\right)^{6-2x} \Rightarrow$$

$$\frac{(2^x)^2}{(3^x)^2} \cdot \frac{3^x}{2^x} > \left(\frac{2}{3}\right)^{6-2x} \Rightarrow \left(\frac{2}{3}\right)^x > \left(\frac{2}{3}\right)^{6-2x} \Rightarrow$$

$\Rightarrow x < 6 - 2x \Rightarrow 3x < 6 \Rightarrow x < 2.$ Javobi: D.

33. Agar $\log_a 256 = 2,4$ bo`lsa, $\log_a 4 - \log_a 2$ ni hisoblang.

A) 0,2   B) 0,4   C) 0,15   D) 0,28   E) 0,3

Yechilishi: $\log_a 256 = 2,4 \Rightarrow \log_a 2^8 = 2,4 \Rightarrow$
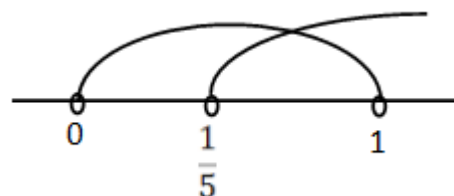$\Rightarrow 8\log_a 2 = 2,4 \Rightarrow \log_a 2 = 0,3.$
$\Rightarrow \log_a 4 - \log_a 2 = \log_a 2.$ Javobi: E.

34. $\log_p 15 < \log_p 10$ va $\log_{5p} 8 > \log_{5p} 6$ tengsizliklar o'rinli bo'ladigan p ning barcha qiymatlarini toping.

    A) $0 < p < 1$ B) $p > \dfrac{1}{5}$ C) $p > 1$

    D) $\dfrac{1}{5} < p < 1$ E) $p < 1$

    Yechilishi: $\log_p 15 < \log_p 10$

    $\log_{5p} 8 > \log_{5p} 6$

    1) $\log_p 15 < \log_p 10 \Rightarrow \begin{cases} 15 > 1 \\ 0 < p < 1 \end{cases}$

    2) $\log_{5p} 8 > \log_{5p} 6 \Rightarrow \begin{cases} 8 > 1 \\ 5p > 1 \Rightarrow p > \dfrac{1}{5}. \end{cases}$

    Demak, $\dfrac{1}{5} < p < 1.$ Javobi: D.

35. $2^{\log_2(x^3+4x+1)} = 8x + 1$ tenglamani yeching.

    A) $0; -2$ B) $0; -2; 2$ C) $0; 2$ D) $-2; 2$ E) $0; 1; 2$

    Yechilishi: $2^{\log_2(x^3+4x+1)} = 8x + 1 \Rightarrow 8x + 1 \Rightarrow$

    $\Rightarrow \begin{cases} x^3 + 4x + 1 > 0 \\ x^3 + 4x + 1 = 8x + 1 \end{cases} \Rightarrow x^3 - 4x = 0 \Rightarrow$

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

    $\Rightarrow \begin{cases} x = 0 \\ x^2 = 4 \end{cases} \Rightarrow \begin{cases} x = 0 \\ |x| = 2 \end{cases} \Rightarrow \begin{cases} x = 0 \\ x = \pm 2 \end{cases} \Rightarrow$

    $\Rightarrow \begin{cases} x = 0 \\ x = -2 \\ x = 2 \end{cases} \Rightarrow \begin{cases} x = 0; \\ x = 2. \end{cases}$ Javobi: C.

36. $(\log_3 27 - \log_3 9) \cdot (\log_3 48 + \log_3 \dfrac{1}{16}) + \log_3 81$ ni hisoblang.

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

    Yechilishi: $(\log_3 27 - \log_3 9) \cdot (\log_3 48 + \log_3 \dfrac{1}{16}) +$

    $+ \log_3 81 = \log_3 \dfrac{27}{9} \cdot \log_3 48 \cdot \dfrac{1}{16} + \log_3 3^4 =$

    $= \log_3 3 \cdot \log_3 3 + 4 \log_3 3 = 1 \cdot 1 + 4 \cdot 1 = 5.$ Javobi: D.

37. $\log_{0,2}(x^4 + 2x^2 + 1) > \log_{0,2}(6x^2 + 1)$ tengsizlikning barcha manfiy yechimlar to'plamini ko'rsating.

A) $(-2; 2)$ B) $(-2; 0)$ C) $(-\infty; -2) \cup (0; 2)$

D) $(-\infty; -2)$ E) $(0; 2)$

Yechilishi: $\log_{0,2}(x^4 + 2x^2 + 1) > \log_{0,2}(6x^2 + 1) \Rightarrow$

$$\begin{cases} x^4 + 2x^2 + 1 > 0 \\ 6x^2 + 1 > 0 \\ x^4 + 2x^2 + 1 < 6x^2 + 1 \end{cases}$$ Dastlabki ikki tengsizlik x ning
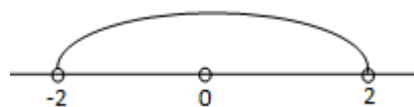
har qanday qiymatida o'rinli.

U holda

$\Rightarrow x^4 + 2x^2 + 1 < 6x^2 + 1 \Rightarrow$

$\Rightarrow x^4 - 4x^2 < 0 \Rightarrow x^2(x^2 - 4) < 0 \Rightarrow$

$\Rightarrow \begin{cases} x^2 = 0 \\ x^2 - 4 < 0 \end{cases} \Rightarrow \begin{cases} x = 0 \\ x^2 < 4 \end{cases} \Rightarrow |x| < 2 \Rightarrow -2 < x < 2.$

$(-2; 0)$.   Javobi: B.

38. $y = \dfrac{arcsin2x}{\ln(x+1)}$ funksianing aniqlanish sohasini toping.

A) $\left(-\dfrac{1}{2}; \dfrac{1}{2}\right)$ B) $\left[-\dfrac{1}{2}; \dfrac{1}{2}\right]$ C) $\left(0; \dfrac{1}{2}\right)$

D) $\left(0; \dfrac{1}{2}\right]$ E) $\left[-\dfrac{1}{2}; 0\right) \cup \left(0; \dfrac{1}{2}\right]$

Yechilishi: $y = \dfrac{arcsin2x}{\ln(x+1)}$

1) $-1 \le 2x \le 1 \Rightarrow -\dfrac{1}{2} \le x \le \dfrac{1}{2}$;

2) $\ln(x + 1) \ne 0 \Rightarrow x + 1 \ne 1 \Rightarrow x \ne 0$;

3) $x + 1 > 0 \Rightarrow x > -1$;

$\left[-\dfrac{1}{2}; 0\right) \cup \left(0; \dfrac{1}{2}\right]$.   Javobi: E.

39. Quyidagi funksiyalardan qaysi biri juft?

A) $y = x|x|$ B) $y = arcsin\dfrac{x}{2}$ C) $y = 5arctgx$

D) $y = \dfrac{x^2}{cos3x}$ E) $y = x^3|sinx|$

Yeshilishi: $x = -x \Rightarrow y(-x) = \dfrac{(-x)^2}{cos3(-x)} = \dfrac{x^2}{cos3x}$.

Javobi: D.

40. $f(x) = -\frac{1}{3}x^3 - \frac{1}{6}x$ funksiyaning $[-1; 1]$ kesmadagi eng katta va eng kichik qiymatlari yig'indisini hisoblang.

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

Yechilishi: $f(x) = -\frac{1}{3}x^3 - \frac{1}{6}x$ $[-1; 1]$ Kiritik nuqta yo'q;

$f'(x) = -x^2 - \frac{1}{6} \Rightarrow -x^2 - \frac{1}{6} = 0 \Rightarrow x^2 \neq -\frac{1}{6};$

Kritik nuqta mavjud emas.

$x = -1 \Rightarrow f(-1) = -\frac{1}{3}(-1)^3 - \frac{1}{6} \cdot (-1) = \frac{1}{3} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2};$

$x = 1 \Rightarrow f(1) = -\frac{1}{3} - \frac{1}{6} = -\frac{3}{6} = -\frac{1}{2}.$

Demak, $\frac{1}{2} - \frac{1}{2} = 0.$ Javobi: B.

41. Moddiy nuqta $S(t) = lnt + \frac{1}{16}t$ qonuniyat bo'yicha to'g'ri chiziqli xarakatlanayapti. Xarakat boshlangan qancha vaqt o'tgach , nuqtaning tezligi $\frac{1}{8}$ m/s ga teng bo'ladi?

A) $15s$ B) $17s$ C) $16s$ D) $14s$ E) $18s$

Yechilishi: $v = S'(t) \Rightarrow v = \frac{1}{t} + \frac{1}{16} \Rightarrow \frac{1}{8} = \frac{1}{t} + \frac{1}{16} \Rightarrow$

$\Rightarrow 2t = 16 + t \Rightarrow t = 16.$ Javobi: C.

42. $f(x) = -\frac{\sqrt{3}}{2}x^2 + 1$ funksianing grafigiga $x_0 = \frac{1}{3}$ nuqtada o'ktazilgan urinmaning $0X$ o'qi bilan tashkil qilgan burchagini toping.

A) $30°$ B) $45°$ C) $90°$ D) $75°$ E) $60°$

Yechilishi: $f'(x) = -\sqrt{3}x \Rightarrow k = f'(x_0) = tg\alpha \Rightarrow$

$\Rightarrow k = -\sqrt{3} \cdot \frac{1}{3} = -\frac{\sqrt{3}}{3} \Rightarrow tg\alpha = -\frac{\sqrt{3}}{3} \Rightarrow \alpha = 150°.$

Javobi: D.

43. $F(x) = e^x - \frac{1}{3}\sin 3x + ctgx + c$ funksiya quyidagi funksiyalardan qaysi birining boshlang'ich funksiyasi?

44

A) $f(x) = F'(x) = e^x - \cos 3x - \dfrac{1}{\sin^2 x}$

B) $f(x) = F'(x) = e^x + \cos 3x - \dfrac{1}{\sin^2 x}$

C) $f(x) = F'(x) = e^x - \cos 3x + \dfrac{1}{\sin^2 x}$

D) $f(x) = F'(x) = e^x + \cos 3x + \dfrac{1}{\sin^2 x}$

E) $f(x) = F'(x) = e^x - \cos 3x - \dfrac{1}{\cos^2 x}$

Yechilishi: $f(x) = F'(x) = e^x - \cos 3x - \dfrac{1}{\sin^2 x}$.

Javobi: A.

44. $\int_0^{\frac{\pi}{6}} \sin 2x \, dx$ ni hisoblang.

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

Yechilishi: $\int_0^{\frac{\pi}{6}} \sin 2x \, dx = -\dfrac{1}{2} \cos 2x \Big|_0^{\frac{\pi}{6}} =$

$= -\dfrac{1}{2}\left[\cos 2 \cdot \dfrac{\pi}{6} - \cos 2 \cdot 0\right] = -\dfrac{1}{2}\left(\dfrac{1}{2} - 1\right) = \dfrac{1}{4}.$ 　 Javobi: B.

45. Uchburchakning ikkita tashqi burchagi yig'indisi $240°$ ga teng. Uning shu burchaklarga qo'shni bo'lmagan ichki burchagini toping.

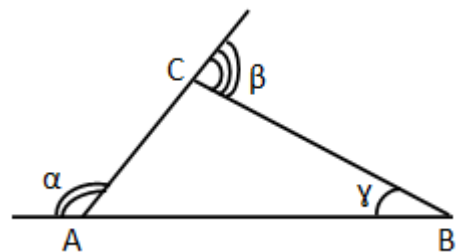A) $30°$ 　　　 B) $45°$ 　　　 C) $90°$ 　　　 D) $75°$ 　　　 E) $60°$

Yechilishi: $\alpha + \beta + \gamma = 360°$;
$\alpha + \beta = 240°$.
$240° + \gamma = 360° \Rightarrow \gamma = 120° \Rightarrow$
$\Rightarrow \angle ABC = 60°$.
Javobi: E.

46. To'g'ri burchakli uchburchakka kvadrat shunday ichki chizilganki, to'g'ri burchak ular uchun umumiy. Kvadratning bir uchi gipotenuzaning o'rtasida yotadi. Agar gipotenuzaning uzunligi $24\sqrt{2}$ ga teng bo'lsa, kvadratning perimetrini toping.
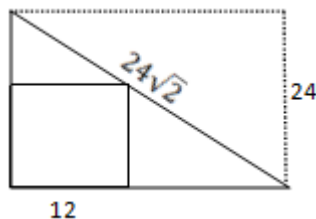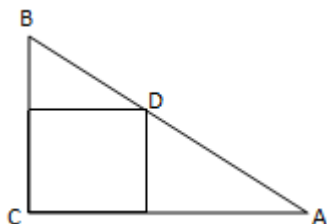
A) 36 　　　 B) 48 　　　 C) 42 　　　 D) 28 　　　 E) 32

Yechilishi: $AD = BD$ $AB = 24\sqrt{2}$

$P_{kvadrat} = 4 \cdot 12 = 48.$ Javobi: B.

47. Aylanaga ichki chizilgan muntazam olti burchakning tomoni 20 ga teng. Shu aylanaga kvadrat ham ichki chizilgan. Kvadratga ichki chizilgan doiraning yuzini toping.

A) 400π B)300π C)150π D) 200π E) 250π

Yechilishi: $a = 20;$ $180(n-2) \Rightarrow 180 \cdot (6-2) = 720;$

$720 : 6 = 120° \Rightarrow R = 20 \Rightarrow d = 40;$

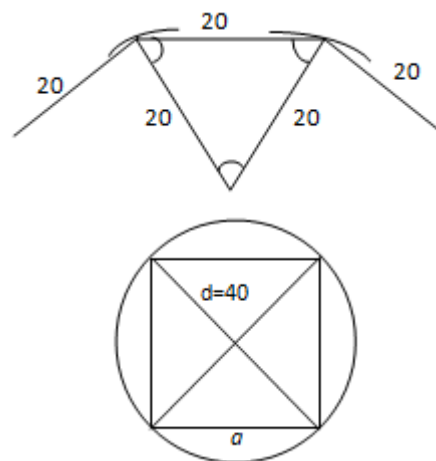$d = a\sqrt{2} \Rightarrow 40 = a\sqrt{2} \Rightarrow$

$\Rightarrow a = \dfrac{40}{\sqrt{2}} = \dfrac{40\sqrt{2}}{2} =$

$= 20\sqrt{2} - kvadrat\ tomon$

$a = 20\sqrt{2} \Rightarrow r = 10\sqrt{2};$

$S_{doira} = \pi r^2 = \pi \cdot \left(10\sqrt{2}\right)^2 = 200\pi.$

Javobi: D.

48. Muntazam uchburchakning yuzi $25\sqrt{3}$ ga teng. Uning tomonini toping.

A) 15   B) 20   C) 10   D) 12   E) 8

Yechilishi: $S = \dfrac{a^2\sqrt{3}}{4} \Rightarrow 25\sqrt{3} = \dfrac{a^2\sqrt{3}}{4} \Rightarrow a = 10.$
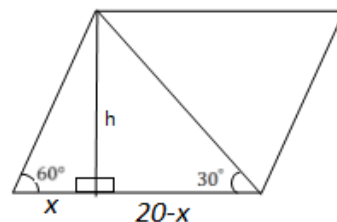
Javobi: C.

49. Parallelogrammning o'tkir burchagi $60°$ ga teng. Uning kichik diagonali katta tomoni bilan $30°$ li burchak tashkil qiladi. Parallelogrammning katta tomoni 20 ga teng. Uning yuzini toping.

A) $100\sqrt{2}$ B) 85 C) $95\sqrt{3}$ D) $100\sqrt{3}$ E) $110\sqrt{3}$

Yechilishi:

$$\begin{cases} \dfrac{h}{x} = tg\,60° \Rightarrow h = x \cdot \sqrt{3} \\ \dfrac{h}{20-x} = tg\,30° \Rightarrow h = (20 - x)\dfrac{\sqrt{3}}{3} \end{cases} \Rightarrow$$

$$\Rightarrow \sqrt{3}x = \frac{20\sqrt{3}}{3} - \frac{\sqrt{3}}{3}x \Rightarrow$$

$$3\sqrt{3}x = 20\sqrt{3} - \sqrt{3} \Rightarrow 4\sqrt{3}x = 20\sqrt{3} \Rightarrow x = 5 \Rightarrow$$

$$\Rightarrow h = 5\sqrt{3} \Rightarrow S = 100\sqrt{3}. \quad \text{Javobi: D.}$$

50. Romning balandligi 5 ga, diagonallarining ko'paytmasi 80 ga teng. Uning perimetrini toping.

A) 32   B) 16   C) 24

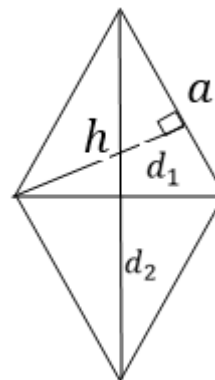D) 28   E) 20

Yechilishi:

$h = 5; \; d_1 d_2 = 80. \; P = ?$

$S = \dfrac{1}{2}d_1 d_2 = 40;$

$S = a \cdot h \Rightarrow 40 = a \cdot 5 \Rightarrow a = 8$
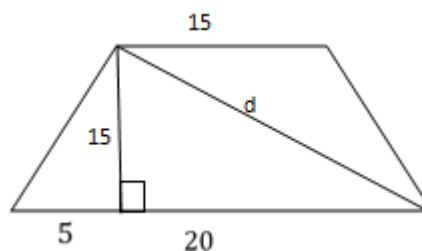
$P = 4 \cdot 8 = 32.$ Javobi: A.

51. Teng yonli trapetsiyaning asoslari 15 va 25 ga balandligi esa 15 ga teng. Trapetsiyaning diagonalarini toping.

A) 35   B) 28   C) 25   D) 30   E) 20

Yechilishi: $d^2 = 20^2 + 15^2 =$

$= 400 + 225 = 625 \Rightarrow$

$d = 25.$ Javobi: C.

52. Radiusi 5 ga teng aylananing markazida 4 ga teng masofada joylashgan nuqta orqali diametrga perpendikular vatar o'tkazilgan. Shu vatarning uzunligini toping.
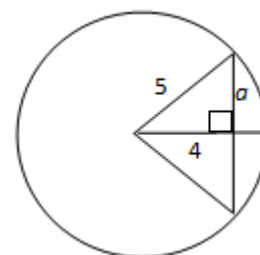
A) 8   B) 6   C) 7   D) 8   E) 4

Yechilishi: $a^2 = 5^2 - 4^2 = 25 - 16 = 9 \Rightarrow$

$\Rightarrow a = 3 \Rightarrow 2a = 6.$

    Javobi: B.

53. To'rtburchakning $M(2; -4)$; $N(-4; 0)$ va $P(2; -2)$ uchlari berilgan. Agar $\overrightarrow{MN} = 4\overrightarrow{QP}$ bo'lsa, Q ucining koordinatalarini toping.

    A) $(-7; 1)$ B) $(3,5; -3)$ C) $(-7; -1)$

    D) $(7; 1)$ E) $(6; -1)$

    Yechilishi: $M(2; -4)$; $N(-4; 0)$; $P(2; -2)$; $Q(x; y)$;
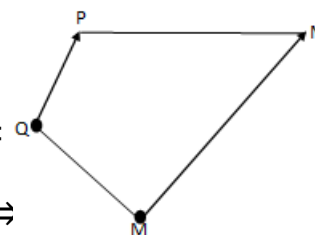
    $\overrightarrow{MN} = 4\overrightarrow{QP}$;

    $\overrightarrow{MN} = \{-4 - 2; 0 - (-4)\} = \{-6; 4\}$;

    $\overrightarrow{QP} = \{2 - x; -2 - y\}$;

    $\{-6; 4\} = 4\{2 - x; -2 - y\} \Rightarrow \{-6; 4\} =$

    $= \{8 - 4x; -8 - 4y\} \Rightarrow \begin{cases} 8 - 4x = -6 \\ -8 - 4y = 4 \end{cases} \Rightarrow$

    $\Rightarrow \begin{cases} 4x = 14 \\ 4y = -12 \end{cases} \Rightarrow \begin{cases} x = \dfrac{14}{4} \\ y = -3 \end{cases} \Rightarrow \begin{cases} x = \dfrac{7}{2} \\ y = -3 \end{cases} \Rightarrow (3,5; -3)$.

    Javobi: B.

54. Quyidagi nuqatlardan qaysi biri yz tekisligida yotadi?

    A) $(2; -3; 0)$ B) $(2; 0; -5)$ C) $(1; 0; -4)$

    D) $(0; 9; -7)$ E) $(1; 0; 0)$

    Yechilishi: $x = 0 \Rightarrow D) (0; 9; -7)$.   Javobi: D.

55. $\vec{a} = \{2; 5\}$ va $\vec{b} = \{m; -6\}$ vektorlar m ning qanday qiymatlarida perpendikulyar bo'ladi?

    A) 14   B) 16   C) 15   D) -15 E) -14

    Yechilishi: $\vec{a} = \{2; 5\}$; $\vec{b} = \{m; -6\} \Rightarrow \vec{a} \perp \vec{b} \Rightarrow$

    $\Rightarrow \vec{a} \cdot \vec{b} = 0 \Rightarrow \Rightarrow \{2; 5\} \cdot \{m; -6\} = 0 \Rightarrow 2m - 30 =$

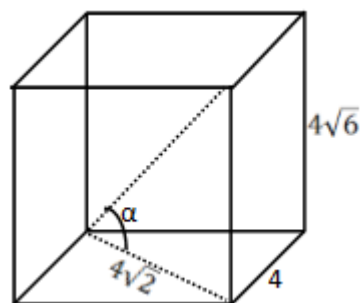 $= 0 \Rightarrow m = 15$.

    Javobi: C.

56. Muntazam ko'pburchakli prizma asosining tomonlari 4 ga, balandligi $4\sqrt{6}$ ga teng. Prizmaning dioganali asos tekisligi bilan qanday burchakda xosil bo'ladi?

    A) $30°$ B) $45°$ C) $35°$ D) $75°$ E) $60°$

Yechilishi: $\frac{4\sqrt{6}}{4\sqrt{2}} = tg\ \alpha \implies$

$\implies tg\alpha = \sqrt{3} \implies$

$\implies \alpha = 60°.$ Javobi: E.

57. Muntazam ko`pburchakli piramidaning balandligi 9 ga, dioganal kesimining yuzi 36 ga teng. Piramidaning hajmini toping.

A) 84   B) 96   C) 48   D) 72   E) 112

Yechilishi: $SO = 9;\ S_{ABS} = \frac{1}{2} AB \cdot SO \implies$

$\implies 36 = \frac{1}{2} \cdot AB \cdot 9 \implies AB = 8;$

$AB = a\sqrt{2} = 8 \implies$

$\implies a = \frac{8}{\sqrt{2}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2} \implies$

$\implies a^2 = 32;$

$V = \frac{1}{3} \cdot S_{asos} \cdot H = \frac{1}{3} \cdot 32 \cdot 9 = 96.$

Javobi: B.
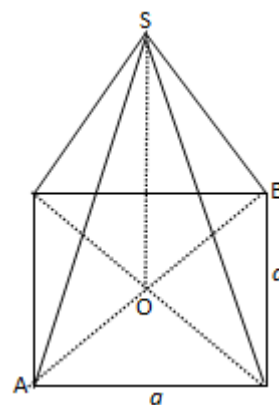
1998-YIL, 3-AXBOROTNOMA

1. Berilgan to'rtta sonning har biriga 3 ni qo'shib, so'ngra ularning har birini 2 ga ko'paytirib chiqqach, hosil bo'lgan sonlar yig'indisi 70 ga teng bo'ladi. Berilgan sonlar yig'indisi nechaga teng?

   A) 18   B) 19   C)23   D) 21   E) 20

   Yechilishi:

   $2(x + 3) + 2(y + 3) + 2(z + 3) + 2(t + 3) = 70 \Rightarrow$
   $\Rightarrow 2(x + y + z + t + 12) = 70 \Rightarrow x + y + z + t = 23.$

     Javobi: C.

2. 7 ni berilgan songa ko'paytirganda , hosil bo'lgan son ….36 ko'rinishida bo'lsa, berilgan son quyidagilardan qaysi biri ko'rinishida bo'lishi mumkin?

   A) …18   B) ….98   C)….52   D) ….48   E) ….78

   Yechilishi:

   A)$…18 \cdot 7 = \cdots 26$ B) $….98 \cdot 7 = \cdots 86$

   C) $….52 \cdot 7 = \cdots 64$ D) $….48 \cdot 7 = \cdots 36$

   E) $…78 \cdot 7 = \cdots 46.$ Javobi: D.

3. Berilgan $p = 1018978560,\ q = 89761194416\ va$
   $r = 987610734$ sonlaridan qaysilari 16 ga qoldiqsiz bo'linadi?

   A) hech qaysisi   B) p C) q D) r E) p va q

   Javobi: E.

4. $0,0015 \cdot 0,016$ ko'paytma quyidagi sonlardan qaysi biriga teng emas?

   A) $2,4 \cdot 10^{-5}$ B)$240 \cdot 10^{-7}$ C) $24 \cdot 10^{-6}$

   D) $0,24 \cdot 10^{-4}$ E) $0,0024 \cdot 10^{-3}$

   Yechilishi: $0,0015 \cdot 0,016 = 0,000024$

A) $2,4 \cdot 10^{-5} = 0,000024$ B) $240 \cdot 10^{-7} = 0,0000240$ …
E) $0,0024 \cdot 10^{-3} = 0,0000024$.   Javobi: E.

5. $a = \frac{5}{11}, b = \frac{3}{7}$ va $c = \frac{6}{13}$ bo'lsa, a, b,c ni o'sish
    tartibida joylashtiring.
         A) *a; b; c* B) *b; a; c* C) *b; c; a* D) *c; b; a* E) *c; b; a*
    Yechilishi: Suratlari teng, maxraji katta kasr kichik bo'ladi
    $a = \frac{5}{11} = \frac{30}{66};$ $b = \frac{3}{7} = \frac{30}{70};$ $c = \frac{6}{13} = \frac{30}{65}$ ⇒
    ⇒ $b; a; c$.   Javobi: B.

6. Ishchining maoshi dastlab 20 % ga, so'ngra yana 20 % ga
    oshirilgan bo'lsa, uning maoshi necha foizga oshgan?
    A) 40   B) 50   C) 42   D) 44   E) 46
    Yechilishi: Maosh x so'm
    1) 20 % ⇒ $0,2x$; $x + 0,2x = 1,2x$
    2) yana   20 % ga ⇒ $1,2x \cdot 0,2 = 0,24x$
    $1,2x + 0,24x = 1,44x$ ⇒   44%.   Javobi: D.

7. $4\frac{3}{5}$ *soni* $2\frac{1}{2}$ marta oshirilgan bo'lsa, u qanday
    ko'paygan?
    A) 6,6   B) 6   C) 7   D) 6,5   E) 6,9
    Yechilishi: $\frac{23}{5} \cdot \frac{5}{2} = \frac{23}{2}$;
    $\frac{23}{2} - \frac{23}{5} = \frac{5 \cdot 23 - 2 \cdot 23}{10} = \frac{3 \cdot 23}{10} = \frac{69}{10} = 6,9$.   Javobi: E.

8. $3\frac{1}{3} \cdot 2\frac{1}{4} \cdot (-\frac{1}{2}) \cdot \frac{4}{5}$ ni hisoblang.
    A) 3   B) -3   C) 2,5   D) -2,5   E) -4
    Yechilishi: $-\frac{10}{3} \cdot \frac{9}{4} \cdot \frac{1}{2} \cdot \frac{4}{5} = -3$.   Javobi: B.

9. $27048 \cdot 27044 - 27047 \cdot 27043$ ni hisoblang.
    A) 60491   B) 58051   C) 57091   D) 54091   E) 56091
    Yechilishi: $27048 \cdot 27044 - 27047 \cdot 27043 =$
    $= (27047 + 1)(27043 + 1) - 27047 \cdot 27043 =$
    $= 27047 \cdot 27043 + 27047 + 27043 +$
    $+1 - 27047 \cdot 27043 =$

$$= 27047 + 27043 + 1 = 54091. \qquad \text{Javobi: D.}$$

10. $A(0; -2)$, $B(2; -1)$ va $C(4; -2)$ nuqtalardan o'tuvchi parabola qaysi funksiyaning grafigi hisoblanadi?

A) $y = -\frac{1}{2}x^2 + 2x - 3$ B) $y = -\frac{1}{4}x^2 + x - 2$

C) $y = -\frac{1}{4}x^2 + x - 3$ D) $y = -\frac{1}{3}x^2 + \frac{4}{3}x - \frac{7}{3}$

E) $y = -\frac{1}{2}x^2 + 2x - 2$

Yechilishi: $A(0; -2)$, $B(2; -1)$ va $C(4; -2)$;

A) $y = -\frac{1}{4}x^2 + x - 2$;

$A(0; -2) \Rightarrow -2 = -\frac{1}{4} \cdot 0^2 + 0 - 2 \Rightarrow -2 = -2$;

$B(2; -1) \Rightarrow -1 = -\frac{1}{4} \cdot 2^2 + 2 - 2 \Rightarrow -1 = -1$;

$C(4; -2) \Rightarrow -2 = -\frac{1}{4} \cdot 4^2 + 4 - 2 \Rightarrow -2 = -2$.

Javobi: B.

11. $x^3 + 2nx^2 + mx + 5$ ko'phad $x^2 - 1$ ga qoldiqsiz bo'linadi. $m + n$ ni toping.

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

Yechilishi: $x^m \pm a^m$ soni $x \pm a$ soniga qoldiqsiz bo'linadi. (Bezu teoremasi)

Ayniyat: $x^3 + 2nx^2 + mx + 5 = (x^2 - 1)(x - 5) =$

$= x^3 - 5x^2 - x + 5 \Rightarrow$

$$\Rightarrow \begin{cases} 2n = -5 \\ m = -1 \end{cases} \Rightarrow \begin{cases} n = -\frac{5}{2} \\ m = -1 \end{cases} \Rightarrow m + n = -\frac{7}{2}. \quad \text{Javobi: C.}$$

12. $\frac{(-x^2+x-1)(x^2+x-2)}{x^2-7x+12} \geq 0$ tengsizlikning butun yechimlari nechta?

A) 4   B) 1   C) 2   D) 3   E) cheksiz ko'p

Yechish: $\frac{(-x^2+x-1)(x^2+x-2)}{x^2-7x+12} \geq 0$ bunda, $\frac{(x^2-x+1)(x^2+x-2)}{x^2-7x+12} \leq 0$;

$x^2 - x + 1 > 0$ har doim musbat, chunki $D < 0$.

$\dfrac{(x^2+x-2)}{x^2-7x+12} \le 0$, $\dfrac{(x+2)(x-1)}{(x-3)(x-4)} \le 0$ bu tengsizlikning

yechimi intervallar usuli yordamida ishlasak,

$[-2;1] \cup (3;4)$ bu intervaldagi butun sonlar

 -2, -1, 0, 1.   Javobi: A.

13. k ning $kx^2 + 4x + k + 1 > 0$ tengsizlik yechimga ega

bo'lmaydigan butun qiymatlari orasidan eng kattasini

toping.

A) Eng kattasi yo'q

B) bu munosabat k ning biror qiymatida o'rinli emas

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

Yechilishi: $kx^2 + 4x + (k+1) > 0 \Rightarrow$

$\Rightarrow D < 0 \Rightarrow 4^2 - 4k(k+1) < 0 \Rightarrow$

$\Rightarrow 16 - 4k^2 - 4k < 0 \Rightarrow$

$\Rightarrow k^2 + k - 4 > 0$ da yechim mavjud emas:

$k_{1,2} = -\dfrac{1}{2} \pm \sqrt{\dfrac{1}{4} + 4} = -\dfrac{1}{2} \pm \dfrac{\sqrt{17}}{2} \Rightarrow$

$k_1 = -\dfrac{1}{2} - \dfrac{\sqrt{17}}{2} = -\dfrac{1+\sqrt{17}}{2} = -\dfrac{1+4,12}{2} = -2,56$

$k_2 = -\dfrac{1}{2} + \dfrac{\sqrt{17}}{2} = \dfrac{-1+\sqrt{17}}{2} = \dfrac{-1+4.12}{2} = 1,56.$

Demak, $(-\infty; -2,56) \cup (1,56; \infty)$.   Javobi: A.

14. $(k^2 - 4k + 2)x = k - x - 3$ yoki $(k+2)x - 1 = k + x$

tenglama cheksiz ko'p yechimga ega bo'ladigan k ning

nechta qiymati mavjud?

A) 0   B) 1   C)2   D)3   E) cheksiz ko'p

Yechilishi: 1) $(k^2 - 4k + 2)x = k - x - 3 \Rightarrow$

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

$\Rightarrow \begin{cases} k = 1 \\ k = 3 - \text{ayniyatga aylantiradi.} \end{cases}$

2) $\begin{cases} k + 2 = 1 \\ k = -1 \end{cases} \Rightarrow \begin{cases} k = -1 \\ k = -1 - \text{ayniyatga aylantiradi.} \end{cases}$

Pirnazar DAVRONOV

1) va 2) lardan $k = -1; 3.$ Javobi: C.

15. $\begin{cases} x + 1 < 2x - 4 \\ 3x + 1 < 2x + 10 \end{cases}$ tengsizliklar sistemasining butun yechimlari yig'indisini toping.

A) 9   B) 5   C) 20   D) 21   E) 19

Yechilishi: $\begin{cases} x + 1 < 2x - 4 \\ 3x + 1 < 2x + 10 \end{cases} \Rightarrow \begin{cases} x > 5 \\ x < 9 \end{cases} \Rightarrow (5; 9) \Rightarrow$
$\Rightarrow 6 + 7 + 8 = 21.$ Javobi: D.

16. $\begin{cases} 3x + 4y = 11 \\ 5x - 2y = 1 \end{cases} \Rightarrow x = ?$

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

Yechilishi: $\dfrac{+\begin{smallmatrix} 3x+4y=11 \\ 5x-2y=1 \end{smallmatrix}}{13x=13 \Rightarrow x=1.}$ Javobi: D.

17. $\begin{cases} x^2 + y^2 = 20 \\ xy = 8 \end{cases}, (x + y)^2 = ?$

A) 30   B) 34   C) 42   D) 40   E) 36

Yechilishi: $+\begin{cases} x^2 + y^2 = 20 \\ 2xy = 16 \end{cases} \Rightarrow x^2 + 2xy + y^2 = 36 \Rightarrow$
$\Rightarrow (x + y)^2 = 36.$ Javobi: E.

18. $2|x + 3| \leq |x - 1|$ tengsizlikning butun yechimlari nechta?

A) cheksiz ko'p   B) 5   C) 6   D) 10   E) 12

Yechilishi: $2|x + 3| \leq |x - 1| \Rightarrow 2|x + 3| - |x - 1| \leq 0;$
$\begin{cases} x + 3 \geq 0 \Rightarrow 2(x + 3) - |x - 1| \leq 0; \\ x + 3 < 0 \Rightarrow -2(x + 3) - |x - 1| \leq 0; \end{cases}$
$\Rightarrow \begin{cases} 2x + 6 - |x - 1| \leq 0 \\ -2x - 6 - |x - 1| \leq 0 \end{cases} \Rightarrow x - 1 \geq 0 \Rightarrow$
$\Rightarrow \begin{cases} 2x + 6 - (x - 1) \leq 0 \\ -2x - 6 - (x - 1) \leq 0 \end{cases} \Rightarrow \begin{cases} 2x + 6 - x + 1 \leq 0; \\ -2x - 6 - x + 1 \leq 0; \end{cases}$
$x - 1 < 0 \Rightarrow \begin{cases} 2x + 6 + x - 1 \leq 0 \\ -2x - 6 + x - 1 \leq 0 \end{cases} \Rightarrow \begin{cases} 3x \leq -5 \\ x \geq -7 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} x \le -7 \\ 3x \ge -5 \\ 3x \le -5 \\ x \ge -7 \end{cases} \Rightarrow \begin{cases} x \le -7 \\ x \ge -\frac{5}{3} \\ x \le -\frac{5}{3} \\ x \ge -7 \end{cases} \Rightarrow \left[-7; -\frac{5}{3}\right].$$

Demak, -7, -6 , -5, -4, -3, -2.   Javobi: C.

19. $x^2 + |x| - 2 = 0$ tenglamaning nechta ildizi bor?

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

Yechilishi: $x^2 + |x| - 2 = 0 \Rightarrow \begin{cases} x^2 + x - 2 = 0 \\ x^2 - x - 2 = 0 \end{cases}$

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

$= -\frac{1}{2} \pm \frac{3}{2} \Rightarrow \begin{cases} x_1 = -2 \ chet \ ildiz; \\ x_2 = 1. \end{cases}$

2) $x^2 - x - 2 = 0 \Rightarrow x_{1,2} = \frac{1}{2} \pm \sqrt{\frac{1}{4} + 2} = \frac{1}{2} \pm \frac{3}{2} \Rightarrow$

$\Rightarrow \begin{cases} x_1 = -1; \\ x_2 = 2 \ chet \ ildiz. \end{cases}$ Javobi: C.

20. Birinchi hadi 1 ga, o'n birinchi hadi 13 ga teng bo'lgan arifmetik progressiyaning oltinchi hadini toping.

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

Yechilishi: $1, \ldots , 13 \Rightarrow a_1 = 1; \ a_{11} = 13.$

$a_6 = \frac{a_1 + a_{11}}{2} = \frac{1+13}{2} = 7.$ Javobi: D.

21. Geometrik progressiyaning maxraji 3 ga, dastlabki to'rtta hadlari yig'indisi 80 ga teng. Uning to'rtinchi hadini hisoblang.

A) 24   B) 32   C) 54   D) 27   E) 57

Yechilishi: $q = 3 ; \ S_4 = 80; \ a_4 =?$

$$80 = \frac{a_1(3^4 - 1)}{3 - 1} \Rightarrow 2 \cdot 80 = 80 \cdot a_1 \Rightarrow a_1 = 2 \Rightarrow$$

$\Rightarrow a_4 = 2 \cdot 3^3 = 54.$ Javobi: C.

22. $f(x) = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 2x + 1$

$$\begin{cases} \dfrac{f'(x)\cdot(x+3)}{x^2-x-6} \geq 0 \\ \quad x \leq 4 \end{cases}$$ tengsizliklar sistemasining butun
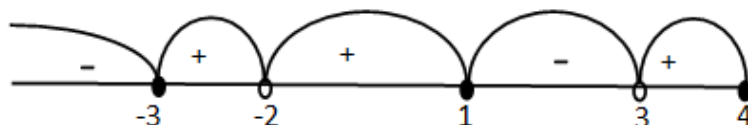
yechimlari nechta?

A) 6   B) 5   C) 4   D) 7   E) cheksiz ko'p

Yechilishi: $f'(x) = \dfrac{1}{3}\cdot 3x^2 + \dfrac{1}{2}\cdot 2x - 2 = x^2 + x - 2$

$$\begin{cases} \dfrac{(x^2+x-2)\cdot(x+3)}{x^2-x-6} \geq 0; \\ \quad x \leq 4; \end{cases} \quad x^2 + x - 2 = (x-1)(x+2);$$

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

U holda $\begin{cases} \dfrac{(x-1)(x+2)(x+3)}{(x-3)(x+2)} \geq 0 \\ \quad x \leq 4 \end{cases} \Rightarrow \begin{cases} x = 1; \\ x = -3; \\ x \neq -2; \\ x \neq 3; \\ x \leq 4. \end{cases}$

Demak, $x = -3; -1; 0; 1; 4.$ Javobi: B.

23. $f(x) = \dfrac{\sqrt{x}-1}{\sqrt{x}}, \quad f'(1) =?$

A) aniqlanmagan   B) 2   C) 1   D) $\dfrac{1}{2}$ E) 3

Yechlishi: $f'(x) = \dfrac{(\sqrt{x}-1)'\cdot \sqrt{x}-(\sqrt{x}-1)\cdot(\sqrt{x})'}{(\sqrt{x})^2} =$

$= \dfrac{\dfrac{1}{2\sqrt{x}}\cdot \sqrt{x}-(\sqrt{x}-1)\cdot \dfrac{1}{2\sqrt{x}}}{x} = \dfrac{\dfrac{1}{2\sqrt{x}}(\sqrt{x}-\sqrt{x}+1)}{x} = \dfrac{1}{2x\sqrt{x}}.$

$f'(1) = \dfrac{1}{2\cdot 1\cdot \sqrt{1}} = \dfrac{1}{2}.$

Javobi: D.

24. k ning qanday qiymatlarida

$$\begin{cases} (k^2 - k - 1)x + 2{,}5y - 5 = 0 \\ \quad 2x + y + k = 0 \end{cases}$$ sistemaning birorta ham

yechimi bo'lmaydi?

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

Yechilishi: $\begin{cases} (k^2 - k - 1)x + 2,5y - 5 = 0 \\ 2x + y + k = 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} a_1x + b_1y = c_1 \\ a_2x + b_2y = c_2 \end{cases} \Rightarrow \begin{cases} (k^2 - k - 1)x + 2,5y = 5 \\ 2x + y = -k \end{cases} \Rightarrow$

$\Rightarrow \dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$;   bo'lsa yechim bo'lmaydi.

$\dfrac{k^2 - k - 1}{2} = \dfrac{2,5}{1} \neq \dfrac{5}{-k} \Rightarrow k^2 - k - 1 = 5 \Rightarrow$

$\Rightarrow k^2 - k - 6 = 0$; $k_1 = -2$; $k_2 = 3$;

$\dfrac{2,5}{1} \neq \dfrac{5}{-k} \Rightarrow k \neq -2$.   Javobi: C.

25. $y = \dfrac{1}{3}x^3 + \dfrac{1}{2}x^2 - 6x$ funksiyaning $[-1; \ 3]$ kesmadagi eng katta qiymatini toping.

A) $6\dfrac{5}{6}$ B) $6\dfrac{1}{6}$ C) 6   D) 6,5   E) $6\dfrac{2}{3}$

Yechilishi: $y' = x^2 + x - 6 \Rightarrow x_{1,2} = -\dfrac{1}{2} \pm \sqrt{\dfrac{1}{4} + 6} =$

$= -\dfrac{1}{2} \pm \dfrac{5}{2} \Rightarrow \begin{cases} x_1 = -\dfrac{1}{2} - \dfrac{5}{2} = -3 \\ x_2 = -\dfrac{1}{2} + \dfrac{5}{2} = 2 \end{cases} \Rightarrow \begin{cases} x_1 = -3 \\ x_2 = 2 \end{cases};$

1) $x_1 = -3 \notin [-1; 3]$;

2) $x_2 = 2 \in [-1 \ ; 3]$;

$y'(0) = -6 < 0$; $y'(3) = 9 + 3 - 6 = 6 > 0$; Demak,

$x = 2$ minimum nuqta.

$x = -1 \Rightarrow y(-1) = \dfrac{1}{3} \cdot (-1)^3 + \dfrac{1}{2} \cdot (-1)^2 - 6 \cdot (-1) =$

$= \dfrac{-2 + 3 + 36}{6} = \dfrac{37}{6} = 6\dfrac{1}{6}$;

$x = 3 \Rightarrow y(3) = \dfrac{1}{3} \cdot 3^3 + \dfrac{1}{2} \cdot 3^2 - 6 \cdot 3 =$

$= \dfrac{9}{2} - 9 = -\dfrac{9}{2} = -4,5$;

$x = 2 \Rightarrow y(2) = \dfrac{1}{3} \cdot 2^3 + \dfrac{1}{2} \cdot 2^2 - 6 \cdot 2 =$

$$= \frac{8+6-36}{3} = -\frac{22}{3} = -7\frac{1}{3}. \qquad \text{Javobi: B.}$$

26. $y = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 6x$ funksiyaning grafigiga o'tkazilgan urinma x ning qanday qiymatlarida $y = 6x - 1$ to'g'ri chiziqqa parallel bo'ladi?

A) -3 va 2   B) -4 va 3   C) -2 va 1

D) -5 va 4   E) -6 va 5

Yechilishi: $y = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 6x \Rightarrow y' = x^2 + x - 6;$

$u: y = 6x - 1 \Rightarrow \vec{u} = \{1; \ 6\} \Rightarrow k = 6;$

$f'(x_0) = k;$

$y'(x_0) = k = 6 \Rightarrow 6 = x_0^2 + x_0 - 6 \Rightarrow x_0^2 + x_0 - 12 = 0;$

$$x_{0_{1,2}} = -\frac{1}{2} \pm \sqrt{\frac{1}{4} + 12} = -\frac{1}{2} \pm \frac{7}{2};$$

$$\Rightarrow \begin{cases} x_{0_1} = -\frac{1}{2} - \frac{7}{2} = -4; \\ x_{0_2} = -\frac{1}{2} + \frac{7}{2} = 3. \end{cases} \qquad \text{Javobi: B.}$$

27. $\dfrac{1}{cos^2(\frac{x}{3}+1)}$ ning boshlang'ich funksiyasini toping.

A) $\frac{1}{3}tg\left(\frac{x}{3}+1\right) + C$ B) $3tg\left(\frac{x}{3}+1\right) + C$

C) $-\frac{1}{3}tg\left(\frac{x}{3}+1\right) + C$ D) $-3tg\left(\frac{x}{3}+1\right) + C$

E) $3tg\frac{x}{3} + C$

Yechilishi: $f(x) = \dfrac{1}{cos^2\left(\frac{x}{3}+1\right)}; \quad F(x) = ?$

$$F(x) = \int f(x)dx = \int \frac{1}{cos^2(\frac{x}{3}+1)} dx = 3tg\left(\frac{x}{3}+1\right) + C.$$

Javobi: B.

28. $y = 0, x = 1$ va $x = 4$ to'g'ri chiziqlar hamda $A(1; -3), B(3; -2)$ va $C(5; -3)$ nuqtalardan o'tuvchi parabola bilan chegaralangan figuraning yuzini toping.

A)7 B) 7,25 C) 6,75 D) 6,5 E) 6,85

Yechilishi: $y = ax^2 + bx + c$;

$A(1; -3) \Rightarrow -3 = a \cdot 1^2 + b \cdot 1 + c \Rightarrow a + b + c = -3$;

$B(3; -2) \Rightarrow -2 = a \cdot 3^2 + b \cdot 3 + c \Rightarrow$

$\Rightarrow 9a + 3b + c = -2$;

$C(5; -3) \Rightarrow -3 = a \cdot 5^2 + b \cdot 5 + c \Rightarrow$

$\Rightarrow 25a + 5b + c = -3$;

$$\begin{cases} c = -3 - a - b \\ 9a + 3b - 3 - a - b + 2 = 0 \\ 25a + 5b - 3 - a - b + 3 = 0 \end{cases} \Rightarrow \begin{cases} c = -3 - a - b \\ 8a + 2b - 1 = 0 \\ 24a + 4b = 0 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} c = -3 - a + 6a \\ 8a - 12a - 1 = 0 \\ b = -6a \end{cases} \Rightarrow \begin{cases} c = 5a - 3 \\ 4a = -1 \\ b = -6a \end{cases} \Rightarrow \begin{cases} c = -\dfrac{17}{4} \\ a = -\dfrac{1}{4} \\ b = \dfrac{3}{2} \end{cases} \Rightarrow$$

$y = -\dfrac{1}{4}x^2 + \dfrac{3}{2}x - \dfrac{17}{4}$ — parabola.

x	-2	-1	0	1	2	3	4	5
y	-8,25	-6	-4,25	-3	-2,25	-2	-2,25	-3

$y = (-2) = -\dfrac{1}{4} \cdot 4 - \dfrac{3}{2} \cdot 2 - \dfrac{17}{4} = -1 - 3 - \dfrac{17}{4} =$

$= \dfrac{-4-12-17}{4} = -\dfrac{33}{4} = -8{,}25$;

$y(-1) = -\dfrac{1}{4} \cdot -1\dfrac{3}{2} - \dfrac{17}{4} = \dfrac{-1-6-17}{4} = -\dfrac{24}{4} = -6$;

$y(0) = -\dfrac{17}{4} = -4{,}25$;

$y(1) = -\dfrac{1}{4} + \dfrac{3}{2} - \dfrac{17}{4} = \dfrac{-1+6-17}{4} = -\dfrac{12}{4} = -3$;

$y(2) = -\dfrac{1}{4} \cdot 4 + \dfrac{3}{2} \cdot 2 - \dfrac{17}{4} = -1 + 3 - \dfrac{17}{4} =$

$\dfrac{-4+12-17}{4} = -\dfrac{9}{4} = -2{,}25$;

$y(3) = -\dfrac{1}{4} \cdot 9 + \dfrac{9}{2} - \dfrac{17}{4} = -\dfrac{9}{4} + \dfrac{9}{2} - \dfrac{17}{4} =$

$= \dfrac{-9+18-17}{4} = -\dfrac{8}{4} = -2$.

$$y(4) = -\frac{1}{4} \cdot 16 + 6 - \frac{17}{4} = 2 - \frac{17}{4} = -\frac{9}{4} = -2{,}25;$$

$$x = -\frac{b}{2a} = -\frac{3}{2} : 2 \cdot \left(-\frac{1}{4}\right) = \frac{3}{2} : \frac{1}{2} =$$

$$3;$$

$$y = -\frac{b^2 - 4ac}{4a} = -\frac{\frac{9}{4} - 4 \cdot \frac{1}{4} \cdot \frac{17}{4}}{4 \cdot \left(-\frac{1}{4}\right)} = -2;$$

$$(3; -2);$$

$$y = 0; \quad x = 1; \quad x = 4;$$

$$S = \left|-\int_a^b f(x)dx\right| =$$

$$= \left|-\int_1^4 \left[-\frac{1}{4}x^2 + \frac{3}{2}x - \frac{17}{4}\right]dx\right| =$$

$$= \left|\int_1^4 \left(\frac{1}{4}x^2 - \frac{3}{2}x + \frac{17}{4}\right)dx\right| =$$

$$= \left|\left[\frac{1}{4} \cdot \frac{x^2}{3} - \frac{3}{2} \cdot \frac{x^2}{2} + \frac{17}{4}x\right]_1^4\right| =$$

$$= \left|\left[\frac{1}{12} \cdot x^3 - \frac{3}{4} \cdot x^2 + \frac{17}{4}x\right]_1^4\right| =$$

$$= \left|\frac{1}{12}(4^3 - 1^3) - \frac{3}{4}(4^2 - 1^2) + \frac{17}{4}(4 - 1)\right| =$$

$$\left|\frac{63}{12} - \frac{45}{4} + \frac{51}{4}\right| = \frac{63 + 18}{12} = \frac{81}{12} = 6{,}75. \qquad \text{Javobi: C.}$$
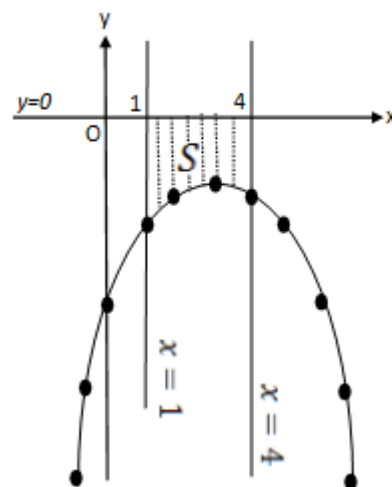
29. $v(t) = (t^2 + t)\frac{m}{sek}$ tezlik bilan to'g'ri chiziq bo'ylab harakatlanayotgan moddiy nuqta dastlabki 6 sek vaqt oralig'ida qancha masofani bosib o'tadi?

A) 80   B) 85   C)90   D) 96   E) 94

Yechilishi: $(S)' = v; \qquad S = v \cdot t;$

$$S(t) = \int v(t)dt = \int (t^2 + t)dt = \frac{t^3}{3} + \frac{t^2}{2} S(t) = \frac{t^3}{3} + \frac{t^2}{2};$$

$$S(6) = \frac{6^3}{3} + \frac{6^2}{2} = 72 + 18 = 90. \qquad \text{Javobi: C.}$$

30. $a = log_{36}108$ bo'lsa, $log_2 3$ ni a orqali ifodalang.

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

Yechilishi: $a = log_{36}108, \; log_2 3;$

60

$$a = log_{36}36 \cdot 3 = log_{36}36 + log_{36}3 = 1 + \frac{log_2 3}{log_2 36} =$$

$$= 1 + \frac{log_2 3}{log_2 6^2} = 1 + \frac{log_2 3}{2 log_2 6} = 1 + \frac{log_2 3}{log_2 2 \cdot 3} =$$

$$= 1 + \frac{log_2 3}{2(log_2 2 + log_2 3)} = 1 + \frac{log_2 3}{2(1 + log_2 3)} =$$

$$= 1 + \frac{log_2 3}{2 + 2log_2 3} \Rightarrow a = 1 + \frac{log_2 3}{2 + 2log_2 3} \Rightarrow$$

$$\Rightarrow 2 + 2log_2 3 + log_2 3 = 2a + 2alog_2 3 \Rightarrow$$

$$\Rightarrow 2a \log_2 3 - 3 \log_2 3 = 2 - 2a \Rightarrow$$

$$log_2 3 \cdot (2a - 3) = 2(1 - a) \Rightarrow log_2 3 = \frac{2(1-a)}{2a-3}.$$

Javobi: C.

31. $|x^2 - 6x + 8|^{x-6} = |x^2 - 6x + 8|$ tenglamaning nechta ildizi bor?

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

Yechilishi: $|x^2 - 6x + 8|^{x-6} = |x^2 - 6x + 8|$;

1) $x - 6 = 1 \Rightarrow x = 7$

2) $\frac{|x^2-6x+8|^{x-6}}{|x^2-6x+8|} = 1 \Rightarrow |x^2 - 6x + 8|^{x-7} = 1 \Rightarrow$

$$\Rightarrow \sqrt[x-7]{|x^2 - 6x + 8|} = \sqrt[x-7]{1} \Rightarrow |x^2 - 6x + 8| = 1 \Rightarrow$$

$$\Rightarrow \pm(x^2 - 6x + 8) = 1 \Rightarrow$$

1) $x^2 - 6x + 8 = 1 \Rightarrow x^2 - 6x + 7 = 0 \Rightarrow$

$x_1 = 3 - \sqrt{2}; \quad x_3 = 3 + \sqrt{2};$

2) $-(x^2 - 6x + 8) = 1 \Rightarrow -x^2 + 6x - 8 = 1 \Rightarrow$

$$\Rightarrow x^2 - 6x + 9 = 0 \Rightarrow (x - 3)^2 = 0 \Rightarrow x_4 = 3.$$

Bulardan: $\begin{cases} x_1 = 7; \\ x_2 = 3 - \sqrt{2}; \\ x_3 = 3 + \sqrt{2}; \\ x_4 = 3. \end{cases}$ Javobi: D.

32. $log_5(3 - x) - log_5 12 < 0$ tengsizlikni qanoatlantiradigan butun sonlar nechta?

A) cheksiz ko'p   B) 5   C) 10   D) 11   E) 13

Pirnazar DAVRONOV

Yechilishi: $log_5(3 - x) - log_5 12 < 0 \Rightarrow$

$\Rightarrow log_5 \dfrac{3-x}{12} < 0 \Rightarrow$

$\Rightarrow \begin{cases} \dfrac{3-x}{12} > 0 \\ \dfrac{3-x}{12} < 1 \end{cases} \Rightarrow \begin{cases} 3 - x > 0 \\ \dfrac{3-x}{12} - 1 < 0 \end{cases} \Rightarrow \begin{cases} x < 3 \\ \dfrac{3-x-12}{12} < 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x < 3 \\ \dfrac{-x-9}{12} < 0 \end{cases} \Rightarrow \begin{cases} x < 3 \\ -x - 9 < 0 \end{cases} \Rightarrow \begin{cases} x < 3 \\ x > -9 \end{cases} \Rightarrow (-9; 3).$

Javobi: D.

33. $log_3^2 x - 3log_3 x + 2 = 0$ tenglamaning ildizlari yig'indisini toping.

   A) 6   B) 3   C) 12   D) 15   E) 18

   Yechilishi: $log_3^2 x - 3log_3 x + 2 = 0 \Rightarrow log_3 x = y;$

   $y^2 - 3y + 2 = 0 \Rightarrow y_{1,2} = \dfrac{3}{2} \pm \sqrt{\dfrac{9}{4} - 2} = \dfrac{3}{2} \pm \dfrac{1}{2};$

   $y_1 = 1; y_2 = 2;$
   $\begin{cases} log_3 x = 1 \\ log_3 x = 2 \end{cases} \Rightarrow \begin{cases} x = 3 \\ x = 9 \end{cases} \Rightarrow 3 + 9 = 12.$ Javobi: C.

   34.
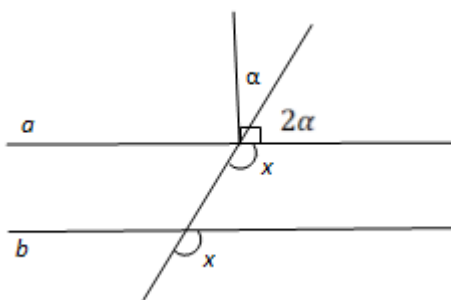
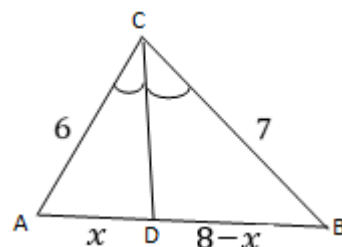   A) $130°$ B) $135°$ C) $140°$ D) $125°$ E) $120°$

   Yechilishi: $3\alpha = 90 \Rightarrow \alpha = 30°; \; 2\alpha = 60,$
     $x = 180° - 60° = 120°.$ Javobi: E.

35. $CD - $ bessiktrisa, $AC = 6, CB = 7, AB = 8.$ $AD = ?$

   A) 3   B) 5   C) $\dfrac{49}{13}$

   D) $\dfrac{48}{13}$ E) $\dfrac{47}{13}$

Yechilishi:

CD − bessiktrisa, AC = 6, CB = 7,

AB = 8.   AD =? $\dfrac{a}{a_1} = \dfrac{b}{b_1}$

$\dfrac{6}{x} = \dfrac{7}{8-x}$ $\Rightarrow 6(8 - x) = 7x \Rightarrow 48 - 6x = 7x \Rightarrow$

$\Rightarrow 13x = 48 \Rightarrow x = \dfrac{48}{13}.$ Javobi: D.

36. $CB = 5,\ CD = 1{,}6,\ AB^2 =?$

A)14   B)16   C) 17   D) 18   E) 15

Yechilishi:

$CB = 5,\ CD = 1{,}6,\ AB^2 =?$
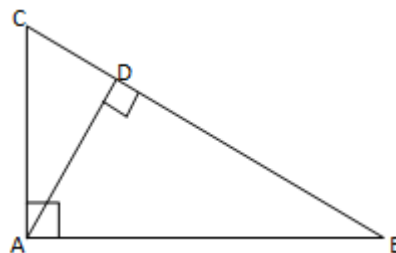
1-usul. $AD^2 = CD \cdot BD =$

$= 1{,}6 \cdot 3{,}4 = 5{,}44;$

$AB^2 = AD^2 + BD^2 =$

$= 5{,}44 + 11{,}56 = 17;$

2-usul. $AB^2 = BC \cdot BD = 5 \cdot 3{,}4 = 17.$ Javobi: D.

37. $BD = 54,\ BC = 24,\ AB =?$

    A) 40   B) 32   C) 38

    D) 36   E) 42

Yechilishi: $BD = 54,\ BC = 24,\ AB =?$

$BD \cdot BC = AB^2 \Rightarrow$

$\Rightarrow AB^2 = 54 \cdot 24 = 6 \cdot 9 \cdot 6 \cdot 4 \Rightarrow$

$\Rightarrow AB = 6 \cdot 3 \cdot 2 = 36.$

    Javobi: D.
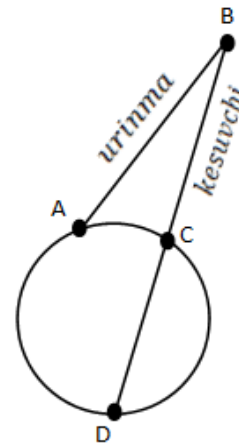
38. ABC uchburchakda $\angle A = 30^{\circ}$, $AB = \sqrt{3}$, $AC = 4$.
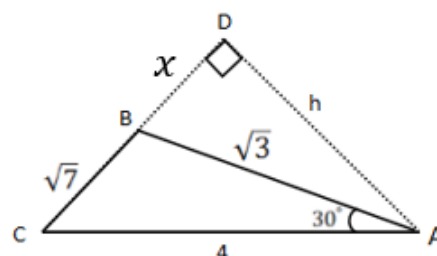A uchidan tushirilgan balandlik uzunligini toping.

A) $\dfrac{3}{7}\sqrt{21}$ B) $\dfrac{2}{7}\sqrt{21}$ C) $\dfrac{4}{7}\sqrt{21}$ D) $\dfrac{\sqrt{21}}{7}$ E) $\dfrac{1}{2}\sqrt{21}$

Yechilishi:

$\angle CAB = 30^{\circ},\ AB = \sqrt{3}$;

$AC = 4;\ BD = x;\ h =?$

$$BC^2 = \left(\sqrt{3}\right)^2 + 4^2 - 2\sqrt{3} \cdot 4 \cos 30^2 =$$

$$= 3 + 16 - 8\sqrt{3} \cdot \frac{\sqrt{3}}{2} =$$

$$= 19 - 12 = 7 \implies BC = \sqrt{7};$$

ΔADB dan $h^2 = (\sqrt{3})^2 - x^2 = 3 - x^2;$

ΔADC dan $h^2 = 4^2 - \left(x + \sqrt{7}\right)^2 = 16 - x^2 - 2\sqrt{7}x - 7 =$

$$= 9 - x^2 - 2\sqrt{7}x;$$

$$3 - x^2 = 9 - x^2 - 2\sqrt{7}x \implies 2\sqrt{7}x = 6 \implies x = \frac{3}{\sqrt{7}};$$

$$h^2 = 3 - x^2 = 3 - \left(\frac{3}{\sqrt{7}}\right)^2 = 3 - \frac{9}{7} = \frac{12}{7} = 1\frac{5}{7} \implies$$

$$\implies h^2 = \frac{12}{7} \implies h = \frac{2\sqrt{3}}{\sqrt{7}} = \frac{2\sqrt{3} \cdot \sqrt{7}}{\sqrt{7} \cdot \sqrt{7}} = \frac{2}{7}\sqrt{21}. \qquad \text{Javobi: B.}$$
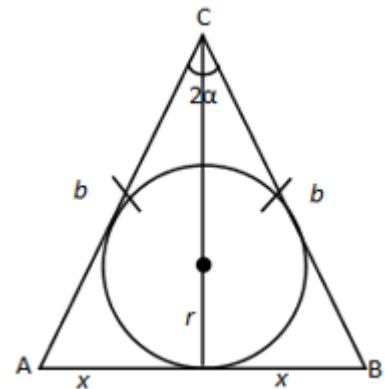
39. Teng yonli uchburchakning yon tomoni b ga, uchidagi burchagi 2α ga teng. Unga ichki chizilgan aylananing radiusi quyidagilardan qaysi biriga teng?

A) $b\sin\alpha \cdot tg\left(\frac{\pi}{4} - \frac{\alpha}{2}\right)$　　B) $b\cos\alpha \cdot tg\left(\frac{\pi}{4} - \frac{\alpha}{2}\right)$

C) $b\sin\alpha \cdot ctg\left(\frac{\pi}{4} - \frac{\alpha}{2}\right)$　　D) $b\cos\alpha \cdot ctg\left(\frac{\pi}{4} - \frac{\alpha}{2}\right)$

E) $b\sin\alpha \cdot \cos\frac{\alpha}{2}$

Yechilishi: $\frac{x}{b} = \sin\alpha \implies x = b\sin\alpha,$

$$AB = 2b\sin\alpha, \quad S_\Delta = \frac{1}{2} \cdot b^2 \sin 2\alpha;$$

$$r = \frac{2S}{a+b+c} = \frac{2 \cdot \frac{b^2}{2} \cdot \sin 2\alpha}{2b\sin\alpha + 2b} = \frac{b^2 \sin 2\alpha}{2b\,(\sin\alpha + 1)} = \frac{b\sin\alpha}{2(\sin\alpha + 1)} =$$

$$= \frac{b \cdot 2\sin\alpha\cos\alpha}{2(\sin\alpha + 1)} = \frac{b\sin\alpha\cos\alpha}{\sin\alpha + 1} =$$

$$= b\sin\alpha \cdot \frac{\cos^2\frac{\alpha}{2} - \sin^2\frac{\alpha}{2}}{\sin^2\frac{\alpha}{2} + 2\sin\frac{\alpha}{2}\cos\frac{\alpha}{2} + \cos^2\frac{\alpha}{2}} =$$

$$= b\sin\alpha \cdot \frac{\left(\cos\frac{\alpha}{2} - \sin\frac{\alpha}{2}\right)\left(\cos\frac{\alpha}{2} + \sin\frac{\alpha}{2}\right)}{\left(\cos\frac{\alpha}{2} + \sin\frac{\alpha}{2}\right)^2} =$$

64

$$= b \sin \alpha \cdot \frac{\cos\frac{\alpha}{2}-\sin\frac{\alpha}{2}}{\cos\frac{\alpha}{2}+\sin\frac{\alpha}{2}} =$$

$$= b \sin \alpha \cdot \frac{1-tg\frac{\alpha}{2}}{1+tg\frac{\alpha}{2}} = b \sin \alpha \, tg \left(\frac{\pi}{4} - \frac{\alpha}{2}\right). \quad \text{Javobi: A.}$$

40. Aylanaga tashqi chizilgan teng yonli trapetsiyaning asoslari 54 va 24 sm. Trapetsiyaning balandligi necha sm?
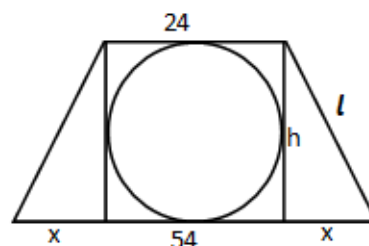
A) 42   B) 40   C) 32   D) 36   E) 38

Yechilishi:

$24 + 54 = 2l \Rightarrow 2l = 78 \Rightarrow l = 39;$

$2x + 24 = 54 \Rightarrow 2x = 30 \Rightarrow x = 15;$

$h^2 = 39^2 - 15^2 =$

$= 1521 - 225 = 1296 \Rightarrow$

$\Rightarrow h = 36.$

Javobi: D.

41. $y = 1$ ga nisbatan $y = 2x + 1$ ga simmetrik bo'lgan to'g'ri chiziqning tenglamasini toping.

A) $y = 2x - 1$ B) $y = 2x + 1$ C) $y = 1 - 2x$

D) $y = 2x$ E) $y = -2x$

Yechilishi: 1) $y = 2x + 1$ va $y = 1$ to'g'ri chiziqlarning kesishish nuqtasi topiladi:

$\begin{cases} y = 2x + 1 \\ y = 1 \end{cases} \Rightarrow 2x + 1 = 1 \Rightarrow x = 0.$ Demak, $O'(0; 1);$

2) $y = 2x + 1$ to'g'ri chiziqda yotuvchi ixtiyoriy nuqta olinadi. Masalan, $x = 1$ bo'lsa, $y = 2 \cdot 1 + 1 = 3,$ ya'ni $A(1; 3)$ bo'ladi;

3) $A(1; 3)$ nuqtaning $y = 1$ to'g'ri chiziqqa nisbatan simmetrik nuqtasi $A'(1; -1)$ topiladi;
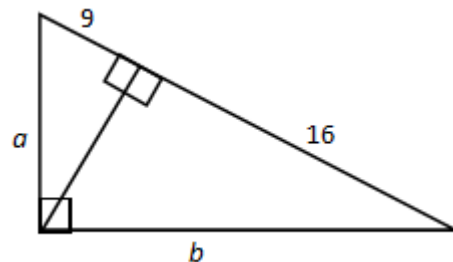
4) O' va A' nuqtalardan o'tuvchi to'g'ri chiziq tenglamasi hosil qilinadi:

$$\frac{x-x_1}{x_2-x_1} = \frac{y-y_1}{y_2-y_1} \Rightarrow \frac{x-0}{1-0} = \frac{y-1}{-1-1} \Rightarrow y = 1 - 2x.$$

Javobi: C.

42. To'g'ri burchakli uchburchak katetlarining gipotenuzadagi proyeksiyalari 9 va 16 ga teng. Uchburchakka ichki chizilgan aylananing radiusi qancha?

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

Yechilishi: $h^2 = 9 \cdot 16 \Rightarrow$

$\Rightarrow h = \sqrt{9 \cdot 16} = 3 \cdot 4 = 12;$

$a^2 = 12^2 + 9^2 = 144 + 81 =$

$= 225 \Rightarrow a = 15;$

$b^2 = 16^2 + 12^2 = 256 + 144 = 400 \Rightarrow b = 20;$

$S_\Delta = \dfrac{1}{2} ab = \dfrac{1}{2} \cdot 15 \cdot 20 = 150;$

$r = \dfrac{2S}{a+b+c} = \dfrac{2 \cdot 150}{15+20+25} = \dfrac{300}{60} = 5.$ Javobi: A.

43. Uchlari $A(0; 0)$, $B(4; 3)$ va $C(6; 8)$ nuqtalarda bo'lgan uchburchakning A burchagini toping.

A) $\arccos 0,9$ B) $\dfrac{\pi}{18}$ C) $\dfrac{\pi}{36}$

D) $\arccos 0,96$ E) $\arccos 0.94$

Yechilishi: $A =?$ $\overrightarrow{AC} = \{6; 8\};$

$\overrightarrow{AB} = \{4; 3\};$

$\cos \angle A = \dfrac{\overrightarrow{AC} \cdot \overrightarrow{AB}}{|\overrightarrow{AC}| \cdot |\overrightarrow{AB}|} =$

$= \dfrac{24+24}{\sqrt{36+64} \cdot \sqrt{16+9}} =$

$= \dfrac{48}{50} = 0,96;$

$\angle A = \arccos 0,96.$
          Javobi: D.
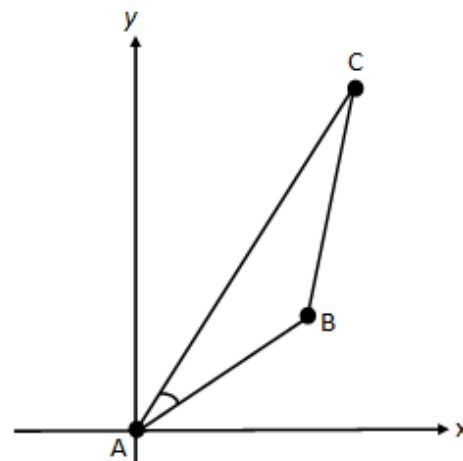
44. k ning qanday qiymatlarida $kx + 3y + 5 = 0$ va $(k + 1)x - 2y - 1 = 0$ to'g'ri chiziqlar parallel bo'ladimi?

66

A) -3va 5   B) $\frac{3}{5}$ C) -5va 3   D) -3 va 2   E) $-\frac{3}{5}$

Yechilishi: $kx + 3y + 5 = 0; (k + 1)x - 2y - 1 = 0;$

$\frac{A_1}{A_2} = \frac{B_1}{B_2};$ $\frac{k}{k+1} = \frac{3}{-2} \Rightarrow -2k = 3k + 3 \Rightarrow$

$\Rightarrow 3k + 2k = -3 \Rightarrow 5k = -3 \Rightarrow k = -\frac{3}{5}.$ Javobi: E.

45. Kichik dioganali $12\sqrt{3}$ bo'lgan muntazam oltiburchakka tashqi chizilgan aylananing radiusini toping.
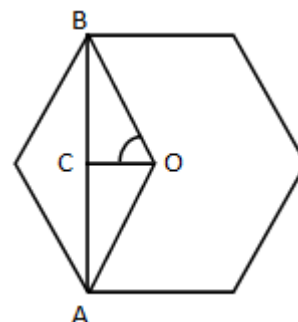
A) $4\sqrt{3}$ B) $6\sqrt{3}$ C) 12

D) 14   E)$8\sqrt{3}$

Yechish: $AB = 12\sqrt{3} \Rightarrow BC =$

$= 6\sqrt{3}. \ BO = R =?$

$\angle COB = 60°; \ \frac{CB}{BO} = \sin 60° \Rightarrow \frac{6\sqrt{3}}{R} = \frac{\sqrt{3}}{2} \Rightarrow R = 12.$

Javobi: C.

46. Muntazam oltiburchakka tashqi chizilgan aylananing radiusi $5\sqrt{3}$ ga teng. Uning parallel tomonlari orasidagi masofa topilsin.
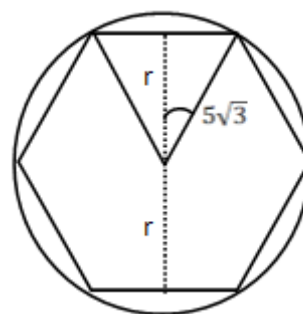
A) 10   B) 12   C) 15

D) 16   E) 17

Yechilishi: $\frac{r}{5\sqrt{3}} = \cos 30° \Rightarrow$

$\Rightarrow r = 5 \cdot \sqrt{3} \cdot \frac{\sqrt{3}}{2} = \frac{15}{2} \Rightarrow$

$\Rightarrow 2r = 15.$ Javobi: C.

47. Asoslari 8 va 12 ga teng bo'lgan teng yonli trapetsiyaning dioganallari o'zaro perpendikulyar. Trapetsiyaning yuzini hisoblang.

A) 100   B) 64   C) 144   D) 52   E) 76

Yechilishi:

$S = \frac{1}{2} \cdot d_1 \cdot d_2 \sin\alpha, \ \alpha = (d_1^\wedge d_2);$

Pirnazar DAVRONOV

$$\frac{CE}{OC} = \cos 45° \Rightarrow \frac{4}{OC} = \frac{\sqrt{2}}{2} \Rightarrow$$
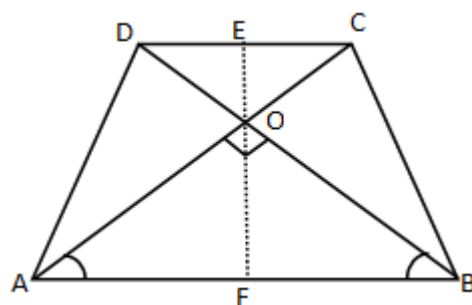$$\Rightarrow OC = \frac{8}{\sqrt{2}} \Rightarrow OC = 4\sqrt{2};$$
$$\frac{BF}{OB} = \cos 45° \Rightarrow \frac{6}{OB} = \frac{\sqrt{2}}{2} \Rightarrow$$
$$\Rightarrow OB = 6\sqrt{2};$$
$$d_1 = d_2 = 4\sqrt{2} + 6\sqrt{2} = 10\sqrt{2};$$
$$S = \frac{1}{2} \cdot 200 \cdot 1 = 100.$$

Javobi: A.

48. Uzunliklari 10 va 15 sm bo'lgan ikki kesmaning uchlari o'zaro parallel tekisliklarda yotadi. Birinchi kesmaning tekislikdagi proyeksiyasi $\sqrt{19}$ sm bo'lsa, ikkinchi kesmaning proyeksiyasi necha sm bo'ladi?

A) 12   B) 11   C) 10
D) 13   E) 9

Yechish: $AB = 15\ sm,\ A_1B_1 = 10\ sm,$
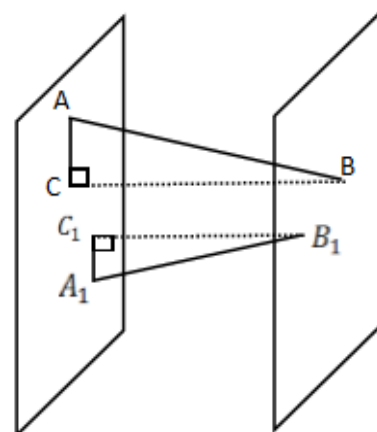$A_1C_1 = \sqrt{19},\ AC = ?$
$CB = C_1B_1;$
$\Delta A_1C_1B_1$ dan
$C_1B_1^2 = A_1B_1^2 - A_1C_1^2 =$
$= 100 - 19 = 81 \Rightarrow$
$C_1B_1 = 9,\ \Delta ACB$ dan
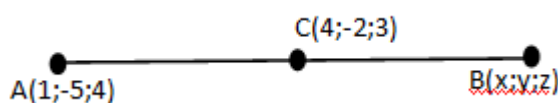$AC^2 = AB^2 - CB^2 = 225 - 81 = 144,\ AC = 12.$

Javobi: A.

49. Agar kesmaning bir uchi $A(1; -5; 4)$, o'rtasi $C(4; -2; 3)$ nuqtada bo'lsa, ikkinchi uchining koordinatalari qanday bo'ladi?

A) (6;5;3) B) (7; -1;2) C) (7;1;2) D) (5;4;6) E) (7;3;1)

Yechilishi:

68

$$\begin{cases} 4 = \frac{1+x}{2} \\ -2 = \frac{-5+y}{2} \\ 3 = \frac{4+z}{2} \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x + 1 = 8 \\ -5 + y = -4 \\ 4 + z = 6 \end{cases} \Rightarrow \begin{cases} x = 7; \\ y = 1; \\ z = 2. \end{cases}$$ Javobi: C.

50. Prizmaning asosi tomoni $2\sqrt{5}$ bo'lgan muntazam oltiburchakdan, yon yoqlari kvadratlardan iborat. Prizmaning katta dioganalini toping.

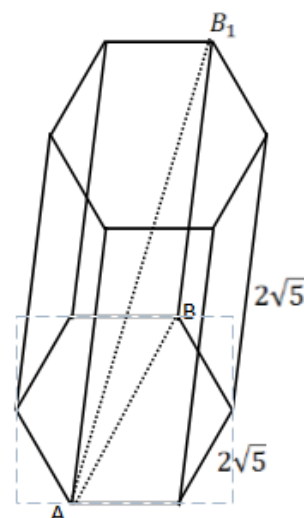   A) $4\sqrt{5}$ B) 10   C) $3\sqrt{5}$
    D) 12   E) 11

    Yechilishi: $AB = 2R = 4\sqrt{5}$; $AB_1 = ?$

    $AB_1^2 = \left(4\sqrt{5}\right)^2 + \left(2\sqrt{5}\right)^2 =$
    $= 16 \cdot 5 + 4 \cdot 5 = 100,$
    $AB_1 = 10.$
    Javobi: B.

51. Konus asosining radiusi 6 ga teng, yasovchi asos tekisligi bilan $30°$ li burchak tashkil etadi. Asos markazidan yasovchigacha bo'lgan masofani toping.

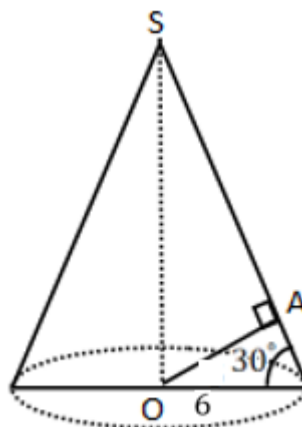   A) 4   B) 3   C) 2,5   D) $3\sqrt{3}$ E) $2\sqrt{3}$

    Yechish: $OA = ?$
    $\frac{OA}{R} = \sin 30° \Rightarrow$
    $\Rightarrow OA = R \sin 30° \Rightarrow$
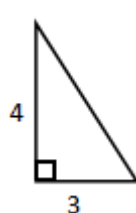 $\Rightarrow OA = 6 \cdot \frac{1}{2} = 3;$
    Javobi: B.

52. Rasmda ko'rsatilgan uchburchakning to'g'ri chiziq atrofida aylanishidan hosil bo'lgan jismning hajmini toping.

A) 12π B) $24\,\pi$ C) $20\,\pi$
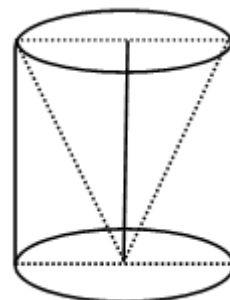D) $16\,\pi$ E) $22\,\pi$

Yechilishi:

$V_s = S_{asos} \cdot H = \pi \cdot R^2 \cdot H =$
$= \pi \cdot 3^2 \cdot 4 = 36\pi;$
$V_k = \frac{1}{3}\pi R^2 H = \frac{1}{3}\pi \cdot 3^2 \cdot 4 = 12\pi;$
$V = V_r - V_k = 36\pi - 12\pi = 24\pi;$

Javobi: B.

53. $\dfrac{\sin 36^\circ}{\sin 12^\circ} - \dfrac{\cos 36^\circ}{\cos 12^\circ} = ?$

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

Yechilishi: $\dfrac{\sin 36^\circ}{\sin 12^\circ} - \dfrac{\cos 36^\circ}{\cos 12^\circ} = \dfrac{\sin 36^\circ \cdot \cos 12^\circ - \cos 36^\circ \cdot \sin 12^\circ}{\sin 12^\circ \cdot \cos 12^\circ} =$
$= \dfrac{\sin(36^\circ - 12^\circ)}{\sin 12^\circ \cdot \cos 12^\circ} = \dfrac{\sin 24^\circ}{\frac{1}{2} \cdot 2 \cdot \sin 12^\circ \cdot \cos 12^\circ} = \dfrac{\sin 24^\circ}{\frac{1}{2}\sin 24^\circ} = 2.$

Javobi: A.

54. $\dfrac{4 \cdot \sin 40^\circ \cdot \sin 50^\circ}{\cos 10^\circ} = ?$

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

Yechilishi: $\dfrac{4 \cdot \sin 40^\circ \cdot \sin 50^\circ}{\cos 10^\circ} = \dfrac{4 \cdot \frac{1}{2} \cdot [\cos(40^\circ - 50^\circ) - \cos(40^\circ + 50^\circ)]}{\cos 10^0} =$
$= \dfrac{2[\cos(-10^\circ) - \cos 90^\circ]}{\cos 10^\circ} = \dfrac{2\cos 10^\circ}{\cos 10^\circ} = 2.$ Javobi: B.

55. $y = tg\, 3x + ctg\, 2x$ funksiya x ning qanday qiymatlarida aniqlanmagan?

A) $x = k \cdot \dfrac{\pi}{2},\ \ k \in Z$ B) $x = \dfrac{\pi}{6} + \dfrac{n}{3}\pi, n \in Z$
C) $x = \dfrac{\pi}{2} + \dfrac{n}{3}\pi, n \in Z$ D) $x = k \cdot \dfrac{\pi}{4}, k \in Z$
E) To'g'ri javob keltirilmagan

Yechish: $y = tg\,3x + ctg\,2x = \dfrac{\sin 3x}{\cos 3x} + \dfrac{\cos 2x}{\sin 2x} =$

$= \dfrac{\sin 3x \sin 2x + \cos 3x \cos 2x}{\cos 3x \sin 2x} = \dfrac{\cos(3x - 2x)}{\cos 3x \sin 2x} = \dfrac{\cos x}{\cos 3x \sin 2x}$
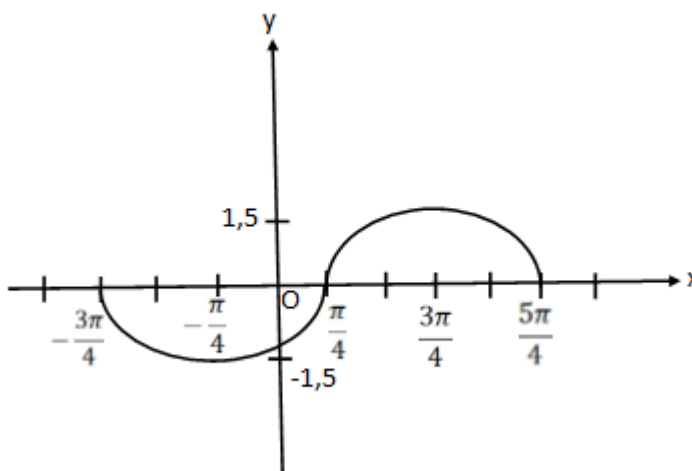
$\dfrac{0}{0}$ $yoki\ cos3x \cdot sin2x = 0$ bo'lsa, yechim mavjud bo'lmaydi;

$$\begin{cases} \cos x = 0 \\ \cos 3x = 0 \\ \sin 2x = 0 \end{cases} \Rightarrow \begin{cases} x = \dfrac{\pi}{2} + \pi n \\ 3x = \dfrac{\pi}{2} + \pi n \\ 2x = \pi n \end{cases} \Rightarrow \begin{cases} x = \dfrac{\pi}{2} + \pi n; \\ x = \dfrac{\pi}{6} + \dfrac{\pi n}{3}; \\ x = \dfrac{\pi n}{2}. \end{cases}$$

Javobi: E.

56. Rasmda quyidagi funksiyalardan qaysi birining grafigi tasvirlangan?

A) $-1{,}5\sin\left(2x + \dfrac{\pi}{4}\right)$

B) $-1{,}5\sin\left(2x - \dfrac{\pi}{4}\right)$

C) $1{,}5\sin\left(x + \dfrac{\pi}{4}\right)$

D) $1{,}5\sin\left(x - \dfrac{\pi}{4}\right)$

E) $-1{,}5\sin\left(x - \dfrac{\pi}{4}\right)$

Yechilishi:
$$\begin{cases} x = -\dfrac{3\pi}{4} \Rightarrow y = 0; \\ x = -\dfrac{\pi}{4} \Rightarrow y = -1{,}5; \\ x = \dfrac{\pi}{4} \Rightarrow y = 0; \\ x = \dfrac{3\pi}{4} \Rightarrow y = 1{,}5; \\ x = \dfrac{5\pi}{4} \Rightarrow y = 0; \end{cases}$$

Tekshirish: D) $y = 1{,}5\sin\left(x - \dfrac{\pi}{4}\right)$;

1) $x = -\dfrac{3\pi}{4} \Rightarrow 0 = 1{,}5\sin\left(-\dfrac{3\pi}{4} - \dfrac{\pi}{4}\right) = 1{,}5\sin(-\pi) = 0$;

Pirnazar DAVRONOV

2) $x = -\frac{\pi}{4} \Rightarrow -1.5 = 1{,}5\sin\left(-\frac{\pi}{4} - \frac{\pi}{4}\right) =$

$= 1{,}5\sin\left(-\frac{\pi}{2}\right) = -1{,}5\,;$

3) $x = \frac{\pi}{4} \Rightarrow 0 = 1{,}5\sin\left(\frac{\pi}{4} - \frac{\pi}{4}\right) = 0\,;$

4) $x = \frac{3\pi}{4} \Rightarrow 1{,}5 = 1{,}5\sin\left(\frac{3\pi}{4} - \frac{\pi}{4}\right) = 1{,}5\sin\frac{\pi}{2} = 1{,}5\,;$

5) $x = \frac{5\pi}{4} \Rightarrow 0 = 1{,}5\sin\left(\frac{5\pi}{4} - \frac{\pi}{4}\right) = 1{,}5\sin\pi = 0.$

Javobi: D.

57. $\arcsin\left(\sin\frac{5\pi}{8}\right) + \arccos\left(\cos\frac{8\pi}{7}\right) =?$

A) $\frac{99\pi}{56}$ B) $\frac{83\pi}{56}$ C) $\frac{85\pi}{56}$ D) $\frac{69\pi}{56}$ E) $\frac{13\pi}{15}$

Yechilishi: $\arcsin\left(\sin\frac{5\pi}{8}\right) + \arccos\left(\cos\frac{8\pi}{7}\right) =$

$= \arcsin\left[\sin(\pi - \frac{3\pi}{8})\right] + \arccos\left[\cos(\pi + \frac{\pi}{7})\right] =$

$= \arcsin\left(\sin\frac{3\pi}{8}\right) + \arccos\left(-\cos\frac{\pi}{7}\right) = \arcsin\left(\sin\frac{3\pi}{8}\right) +$

$+\pi - \arccos\left(\cos\frac{\pi}{7}\right) = \frac{3\pi}{8} + \pi - \frac{\pi}{7} = \frac{21\pi + 56\pi - 8\pi}{56} = \frac{69\pi}{56}.$

Javobi: D.

58. $\dfrac{\cos 2x}{\frac{\sqrt{2}}{2} + \sin x} = 0$ tenglamaning $[0\,;4\pi]$ kesmada nechta ildizi bor?

A) 8   B) 6   C) 4   D) 2   E) 12

Yechilishi: $\dfrac{\cos 2x}{\frac{\sqrt{2}}{2} + \sin x} = 0 \Rightarrow \begin{cases} \cos 2x = 0 \\ \frac{\sqrt{2}}{2} + \sin x \neq 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 2x = \frac{\pi}{2} + k\pi \\ \sin x \neq -\frac{\sqrt{2}}{2} \end{cases} \Rightarrow \begin{cases} x = \frac{\pi}{4} + \frac{k\pi}{2} \\ x \neq (-1)^{k+1}\arcsin\frac{\sqrt{2}}{2} + k\pi \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = \frac{\pi}{4} + \frac{k\pi}{2}, \ k\epsilon Z; \\ x \neq (-1)^{k+1}\frac{\pi}{4} + k\pi, \ k\epsilon Z. \end{cases}$

$$k = 0 \Rightarrow \begin{cases} x = \dfrac{\pi}{4}; \\ x \neq -\dfrac{\pi}{4}. \end{cases}$$

$$k = 1 \Rightarrow \begin{cases} x = \dfrac{\pi}{4} + \dfrac{\pi}{2} = \dfrac{3\pi}{4}; \\ x \neq \dfrac{\pi}{4} + \pi \neq \dfrac{5\pi}{4}. \end{cases}$$

$$k = 2 \Rightarrow \begin{cases} x = \dfrac{\pi}{4} + \pi = \dfrac{5\pi}{4}; \\ x \neq -\dfrac{\pi}{4} + 2\pi \neq \dfrac{7\pi}{4}; \end{cases}$$

$$k = 3 \Rightarrow \begin{cases} x = \dfrac{\pi}{4} + \dfrac{3\pi}{2} = \dfrac{7\pi}{4}; \\ x \neq \dfrac{\pi}{4} + 3\pi = \dfrac{13\pi}{4}; \end{cases}$$

$$k = 4 \Rightarrow \begin{cases} x = \dfrac{\pi}{4} + 2\pi = \dfrac{9\pi}{4}; \\ x \neq (-1)^5 \dfrac{\pi}{4} + 4\pi = -\dfrac{\pi}{4} + 4\pi = \dfrac{15\pi}{4}; \end{cases}$$

$$k = 5 \Rightarrow \begin{cases} x = \dfrac{\pi}{4} + \dfrac{9\pi}{2} = \dfrac{11\pi}{4}; \\ x \neq \dfrac{\pi}{4} + 5\pi \neq \dfrac{21\pi}{4}. \end{cases}$$

$$x = \dfrac{\pi}{4}; \ \dfrac{3\pi}{4}; \ \dfrac{5\pi}{4}; \ \dfrac{11\pi}{4}.$$

Javobi: C.

59. $\sin 2x = (\cos x - \sin x)^2$ tenglamaning $[\,0\,;2\pi]$ kesmada nechta ildizi bor?

A) 4   B) 8   C) 2   D) 1   E) 3

Yechilishi: $\sin 2x = (\cos x - \sin x)^2 \Rightarrow$

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

$\Rightarrow \sin 2x = 1 - \sin 2x \Rightarrow 2\sin 2x = 1 \Rightarrow$

$\Rightarrow \sin 2x = \dfrac{1}{2} \Rightarrow 2x = (-1)^k \dfrac{\pi}{6} + k\pi \Rightarrow$

$\Rightarrow x = (-1)^k \dfrac{\pi}{12} + \dfrac{k\pi}{2};$

$$k = 0 \Rightarrow x = \frac{\pi}{12}; \qquad k = 1 \Rightarrow x = -\frac{\pi}{12} + \frac{\pi}{2} = \frac{5\pi}{12};$$

$$k = 2 \Rightarrow x = \frac{\pi}{12} + \pi = \frac{13\pi}{12};$$

$$k = 3 \Rightarrow x = -\frac{\pi}{12} + \frac{3\pi}{2} = \frac{17\pi}{12}.$$

Javobi: A.

60. $sin^2x - \frac{1}{2}\sin 2x - 2cos^2x \geq 0 \ (x \in [0\,;2\pi])$ tengsizlik x ning qanday qiymatlarida o'rinli?

A) $\left[arctg2; \frac{3\pi}{4}\right] \cup \left[\pi + arctg2; \frac{7\pi}{4}\right]$

B) $\left[arctg2; \frac{3\pi}{4}\right]$ C) $\left[\pi + arctg2; \frac{7\pi}{4}\right]$

D) $\left[\frac{3\pi}{4}; \pi + arctg\,2\right]$ E) $\left[\frac{7\pi}{4}; 2\pi\right]$

Yechilishi: $sin^2x - \frac{1}{2}\sin 2x - 2cos^2x \geq 0 \ (x \in [0\,;2\pi])$;

$sin^2x - \sin x \cdot \cos x - 2cos^2x \geq 0; \ \cos x \neq 0;$

$tg^2x - tgx - 2 \geq 0 ; tg\,x = y;$

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

$$y_1 = \frac{1}{2} - \frac{3}{2} = -1 ; \qquad y_2 = 2;$$

$$tgx = -1 ; \ x = -\frac{\pi}{4} + \pi k ; \ tgx = 2; \ x = arctg2 + \pi k;$$

$$\begin{cases} -\frac{\pi}{2} + \pi k < x \leq -\frac{\pi}{4} + \pi k; \\ arctg2 + \pi k \leq x < \frac{\pi}{2} + \pi k; \end{cases}$$

Endi $[0\,;2\pi]$ dagi yechimini ko'rsatamiz:

$$\begin{cases} arctg2 \leq x \leq \frac{3\pi}{4} \\ \pi + arctg2 \leq x \leq \frac{7\pi}{4} \end{cases} \Rightarrow$$

$$\Rightarrow \left[arctg2 ; \frac{3\pi}{4}\right] \cup \left[\pi + arctg2; \frac{7\pi}{4}\right]. \qquad \text{Javobi: A.}$$

1998-YIL, 4-AXBOROTNOMA

1. $(1,6^2 - 2,2 \cdot \frac{3}{11}): 1,4$ ni hisoblang.

   A) 1,4   B) 1,2   C) 1,5   D) 1,6   E) 1,8

   Yechilishi: $\left(1,6^2 - 2,2 \cdot \frac{3}{11}\right): 1,4 = \left[\left(\frac{16}{10}\right)^2 - \frac{22}{10} \cdot \frac{3}{11}\right]: \frac{14}{10} =$

   $= \left[\left(\frac{8}{5}\right)^2 - \frac{11}{5} \cdot \frac{3}{11}\right] \cdot \frac{5}{7} = \left[\frac{64}{25} - \frac{3}{5}\right] \cdot \frac{5}{7} = \frac{64-15}{25} \cdot \frac{5}{7} = \frac{7}{5} = 1,4.$

   Javobi: A.

2. Ikki xonali son bilan uning raqamlari o'rinlarini almashtirishdan hosil bo'lgan son   yig'indisi quyidagilardan qaysi biriga qoldiqsiz bo'linadi?

   A) 3   B) 11   C) 9   D) 4   E) 7

   Yechilishi: $xy + yx = 10x + y + 10y + x =$
   $= 11(x + y).$ Javobi: B.

3. $\frac{1}{\sqrt{1}+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \cdots + \frac{1}{\sqrt{1599}+\sqrt{1600}}$ ifodaning   qiymatini hisoblang.

   A) 52   B) 41   C) 39   D) 34   E) 28

   Yechilishi: $\frac{1}{\sqrt{1}+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \cdots + \frac{1}{\sqrt{1598}+\sqrt{1599}} +$

   $+ \frac{1}{\sqrt{1599}+\sqrt{1600}} = \frac{\sqrt{1}-\sqrt{2}}{1-2} + \frac{\sqrt{2}-\sqrt{3}}{2-3} + \cdots + \frac{\sqrt{1598}-\sqrt{1599}}{1598-1599} +$

   $\frac{\sqrt{1599}-\sqrt{1600}}{1599-1600} = -\sqrt{1} + \sqrt{2} - \sqrt{2} + \sqrt{3} - \cdots - \sqrt{1598} +$

   $+\sqrt{1599} - \sqrt{1599} + \sqrt{1600} = -\sqrt{1} + \sqrt{1600} =$

   $= -1 + 40 = 39.$ Javobi: C.

4. Massasi 300 g va konsentratsiyasi 15 % bo'lgan eritma massasi 500 g va konsentratsiyasi 9% bo'lgan eritma bilan aralashtirildi. Hosil   bo'lgan aralashmaning konsentratsiyasini toping.

A) 12,75   B) 11,75   C) 12,25   D) 11,25   E) 10,75

Yechilishi: $300 - 15\% \Rightarrow 300 \cdot 0,15 = 45g$;

$500 - 9\% \Rightarrow 500 \cdot 0,09 = 45g$;

$300 + 500 = 800g$ $45 + 45 = 90g$

$800 \ g - - - -100\%$

$\ \ 90g - - - -x\%$

$800x = 90 \cdot 100 \Rightarrow x = \dfrac{90}{8} \Rightarrow x = 11,25.$

Javobi: D.

5. Agar $x - y = 5$ va $xy = 7$ bo'lsa, $x^3y + xy^3$ ning qiymati qancha bo'ladi?

A) 162   B) 271   C) 354   D) 216   E) 273

Yechilishi: $\begin{cases} x - y = 5 \\ xy = 7 \end{cases} \Rightarrow \begin{cases} x^2 - 2xy + y^2 = 25 \\ xy = 7 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x^2 + y^2 = 39 \\ xy = 7 \end{cases} \Rightarrow$

$x^3y + xy^3 = xy(x^2 + y^2) = 39 \cdot 7 = 273.$

Javobi: E.

6. x , y raqamlar ; xy va $8y$ esa ikki xonali sonlar. Agar $xy \cdot 6 = 8y$ bo'lsa, $x + y$ ning qiymati qanchaga teng bo'ladi?

A) 9   B) 4   C) 6   D) 8   E) 5

Yechilishi: $xy \cdot 6 = 8y \Rightarrow (10x + y) \cdot 6 = 8 \cdot 10 + y$;

$60x + 6y = 80 + y$;

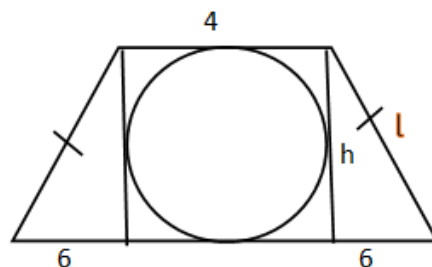$60x + 5y = 80 \Rightarrow \begin{cases} x = 1; \\ y = 4. \end{cases}$ Javobi: E.

7. Teng yonli trapetsiyaning asoslari 4 va 16 ga teng. Shu trapetsiyaga ichki chizilgan doiraning yuzini hisoblang.

A) 20π B) $25 \ \pi$ C) $36 \ \pi$

D) $16 \ \pi$ E) $\dfrac{25}{4} \ \pi$

Yechilishi: $2l = 16 + 4 \Rightarrow l = 10$;

76

$h^2 = 10^2 - 6^2 \Rightarrow h = 8 \Rightarrow$

$\Rightarrow h = 2R \Rightarrow R = 4;$

$S_{doira} = \pi R^2 = 16\pi.$ \qquad Javobi: D.

8. Agar $a \neq 0$ bo'lsa, $|a + b| - |b|$ ifodaning qiymati:

   A) $a > b$ bo'lganda musbat bo'ladi

   B) $a < b$ bo'lganda manfiy bo'ladi

   C) $a = b$ bo'lganda musbat bo'ladi

   D) $a < 0$ bo'lganda manfiy bo'ladi

   E) $To'g'ri\ javob\ berilmagan$

   Yechilishi: $a \neq 0, |a + b| - |b|$; \quad Javobi: C.

9. $\dfrac{\left(\frac{1}{49}\right)^{-\frac{1}{2}} - \left(\frac{1}{8}\right)^{-1/3}}{64^{2/3}}$ ni hisoblang.

   A) $\dfrac{3}{4}$ \qquad B) $\dfrac{5}{16}$ \qquad C) $\dfrac{2}{5}$ \qquad D) $\dfrac{4}{7}$ \qquad E) $\dfrac{5}{6}$

   Yechilishi: $\dfrac{\left(\frac{1}{49}\right)^{-\frac{1}{2}} - \left(\frac{1}{8}\right)^{-\frac{1}{3}}}{64^{\frac{2}{3}}} = \dfrac{49^{\frac{1}{2}} - 8^{\frac{1}{3}}}{\sqrt[3]{64^2}} = \dfrac{\sqrt{49} - \sqrt[3]{8}}{\sqrt[3]{64^2}} = \dfrac{7 - \sqrt[3]{2^3}}{\sqrt[3]{(4^3)^2}} =$

   $= \dfrac{7 - 2}{\sqrt[3]{(4^2)^3}} = \dfrac{5}{16}.$

   Javobi: B.

10. Qavariq yigirmaburchakning diagonallari nechta?

    A) 170 \qquad B) 40 \qquad C) 200 \qquad D) 160 \qquad E) 120

    Yechilishi:

    $\dfrac{n(n-3)}{2} \Rightarrow 170$ ta. \qquad Javobi: A.

11. Agar x natural son bo'lsa, quyidagi sonlardan qaysi biri albatta juft son bo'ladi?

    A) $\dfrac{x(x+1)(x+2)}{2}$ \qquad B) $\dfrac{x(x+1)(x+2)}{3}$ \qquad C) $\dfrac{x}{2}$

    D) $\dfrac{x(x+1)(x+2)}{4}$ \qquad E) $\dfrac{x(x+1)(x+2)}{6}$

    Yechilishi: Maxraji toq son bo'lgan. Chunki kasrning suratidagi ketma-ket kelgan uchta natural sondan albatta bittasi maxrajidagi songa bo'linadi.

Javobi: B.

12. Piramidaning hajmi 25 ga, unga ichki chizilgan sharning radiusi 1,5 ga teng. Piramidaning to'la sirtini toping.

A) 20   B) 15   C) 25   D) 30   E) 50

Yechilishi: $V_p = 25, \ r = 1,5;$ $S_{to'lasirti} = ?$

$V_p = \dfrac{S_{to'lasirti} \cdot r_{shar}}{3} \Rightarrow 3V_p = S_{to'lasirti} \cdot r \Rightarrow$

$\Rightarrow S_{to'lasirti} = \dfrac{3V_p}{r} = \dfrac{3 \cdot 25}{1,5} = \dfrac{750}{15} = 50.$ Javobi: E.

13. Agar $5^x + 5^{-x} = 7$ bo'lsa, $25^x + 25^{-x}$ ning qiymati qancha bo'ladi?

A) 47   B) 49   C) 51   D) 29   E) 38

Yechilishi: $5^x + 5^{-x} = 7;$ $5^{2x} + 5^{-2x} = ?$

$(5^x + 5^{-x})^2 = 7^2 \Rightarrow (5^x)^2 + 2 \cdot 5^x \cdot 5^{-x} + 5^{-2x} = 49 \Rightarrow$

$\Rightarrow 5^{2x} + 2 \cdot 5^{x-x} + 5^{-2x} = 49 \Rightarrow$

$\Rightarrow 5^{2x} + 5^{-2x} + 2 \cdot 5^0 = 49 \Rightarrow 5^{2x} + 5^{-2x} = 49 - 2 \Rightarrow$

$\Rightarrow 5^{2x} + 5^{-2x} = 47.$ Javobi: A.

14. Birinchi quvur hovuzni 2 soatda to'ldiriladi, ikkinchisi esa uch marta tezroq. Ikkala quvurlar birgalikda hovuzni qancha vaqtda to'ldiradi?

A) 45 min   B) 40 min   C) $\dfrac{1}{2}$ soat

D) 25 min   E) 35 min

Yechilishi: $2s = 120 min;$

$120 : 3 = 40 min;$

$\left(\dfrac{1}{120} + \dfrac{1}{40}\right)x = 1 \Rightarrow \dfrac{4}{120}x = 1 \Rightarrow 4x = 120 \Rightarrow x = 30 min.$

Javobi: C.

15. $\dfrac{5^{lg20}}{20^{lg5+1}}$ ni hisoblang.

A) 0,25   B) 0,1   C) 0,2   D) 0,05   E) 0,01

Yechilishi: $\dfrac{5^{lg\,20}}{20^{lg\,5+1}} = \dfrac{5^{lg\,20}}{20^{lg\,5} \cdot 20} = \dfrac{1}{20} = 0,05.$

Javobi: D.

16. $\arccos(\sin\frac{\pi}{8})$ ni hisoblang.

A)$1 - (\frac{\pi}{8})^2$ B)$\frac{5\pi}{8}$ C)$\frac{7\pi}{8}$ D)$\frac{\pi}{8}$ E)$\frac{3\pi}{8}$

Yechilishi: $x = \arccos\left(\sin\frac{\pi}{8}\right);$

$cosx = cosarccos\left(\sin\frac{\pi}{8}\right) \Rightarrow cosx = \sin\frac{\pi}{8} \Rightarrow$

$\Rightarrow \sin\left(\frac{\pi}{2} - x\right) = \sin\frac{\pi}{8} \Rightarrow \frac{\pi}{2} - x = \frac{\pi}{8} \Rightarrow x = \frac{\pi}{2} - \frac{\pi}{8} = \frac{3\pi}{8}.$

Javobi: E.

17. Agar $tg\alpha = 3$ bo'lsa, $\dfrac{3\sin\alpha}{5\sin^3\alpha + 10\cos^3\alpha}$ ning qiymati qanchaga teng bo'ladi?

A)$\frac{16}{39}$ B)$\frac{4}{9}$ C)$\frac{8}{15}$ D)$\frac{15}{32}$ E)$\frac{18}{29}$

Yechilishi: $tg\alpha = 3 \Rightarrow \alpha = arctg3.$

$$\frac{3\sin\alpha}{5\sin^3\alpha + 10\cdot\cos^3\alpha} = \frac{3\sin arctg3}{5[\sin arctg3]^3 + 10[\cos arctg3]^3} =$$

$$= \frac{3\cdot\frac{3}{\sqrt{1+3^2}}}{5[\frac{3}{\sqrt{10}}]^3 + 10[\frac{1}{\sqrt{10}}]^3} = \frac{\frac{9}{\sqrt{10}}}{5\cdot\frac{3^3}{(\sqrt{10})^3} + 10\cdot\frac{1}{(\sqrt{10})^3}} = \frac{\frac{9}{\sqrt{10}}}{\frac{5\cdot3^3}{(\sqrt{10})^3} + \frac{10}{(\sqrt{10})^3}} =$$

$$\frac{\frac{9}{\sqrt{10}}}{\frac{5\cdot27+10}{10\sqrt{10}}} = \frac{9}{\sqrt{10}}\cdot\frac{10\sqrt{10}}{5(27+2)} = \frac{18}{29}. \qquad \text{Javobi: E.}$$

18. $tg^{100}x + ctg^{100}x$ yig'indining neg kichik qiymatini toping.

A) 4   B) 0   C) 2   D) 1   E) 100

Yechilishi: $y = tg^{100}x + ctg^{100}x \Rightarrow$

$\Rightarrow y' = 100tg^{99}x\cdot\frac{1}{\cos^2 x} - 100ctg^{99}x\cdot\frac{1}{\sin^2 x} \Rightarrow y' = 0 \Rightarrow$

$\Rightarrow tg^{99}x\cdot\frac{1}{\cos^2 x} = ctg^{99}x\cdot\frac{1}{\sin^2 x} \Rightarrow tg^{99}x\cdot\frac{\sin^2 x}{\cos^2 x} = \frac{1}{tg^{99}x} \Rightarrow$

$\Rightarrow tg^{99}x\cdot tg^2 x\cdot tg^{99}x = 1 \Rightarrow tg^{200}x = 1 \Rightarrow$

$\Rightarrow tgx = \pm1 \Rightarrow x = \pm\frac{\pi}{4};$

$y = \left(tg\frac{\pi}{4}\right)^{100} + \left(ctg\frac{\pi}{4}\right)^{100} = 1^{100} + 1^{100} = 1 + 1 = 2.$

Javobi: C.

19) $\angle MNO = 35^{\circ}; \quad \angle MEO = 25^{\circ}; \ \angle NOE-?$

A)105°   B) 120°   C) 150°
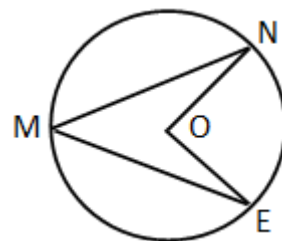
D) 135°   E) 140°

Yechilishi: $\angle NOE = x; \ \angle NME = \frac{x}{2}$:

$35° + 25° + \frac{x}{2} + 360° - x = 360° \Rightarrow$

$\Rightarrow 60° - \frac{x}{2} = 0 \Rightarrow x = 120°.$

Javobi: B.

20. Agar x va z orasida $x^2 + z^2 + x + z + \frac{1}{2} = 0$

munosabat o'rinli bo'lsa, $x \cdot z$ ning qiymati qancha bo'ladi?

A) 0,25   B) 0,4   C) 0,5   D) 1   E) -0,8

Yechilishi: $x + z^2 + x + z + \frac{1}{2} = 0 \Rightarrow$

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

$\Rightarrow \left(x + \frac{1}{2}\right)^2 + \left(z + \frac{1}{2}\right)^2 - \frac{1}{4} - \frac{1}{4} + \frac{1}{2} = 0 \Rightarrow$

$\Rightarrow \left(x + \frac{1}{2}\right)^2 + \left(z + \frac{1}{2}\right)^2 = 0 \Rightarrow \begin{cases} \left(x + \frac{1}{2}\right)^2 = 0 \\ \left(z + \frac{1}{2}\right)^2 = 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} \pm\left(x + \frac{1}{2}\right) = 0 \\ \pm\left(z + \frac{1}{2}\right) = 0 \end{cases} \Rightarrow \begin{cases} x + \frac{1}{2} = 0 \\ z + \frac{1}{2} = 0 \end{cases} \Rightarrow \begin{cases} x = -\frac{1}{2} \\ z = -\frac{1}{2} \end{cases} \Rightarrow$

$\Rightarrow x \cdot z = -\frac{1}{2} \cdot \left(-\frac{1}{2}\right) = \frac{1}{4} = 0,25.$ Javobi: A.

21. Nolga teng bo'lmagan x, y, z sonlar ko'rsatilgan tartibda ishorasi o'zgaruvchi geometrik progressiyani, $x + y; \ y + z; \ z + x$ sonlar esa arifmetik progressiyani tashkil etadi. Geometrik progressiyaning maxrajini toping.

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

Yechilishi: $x, y, z \Rightarrow$

1) $x, \quad y = qx; \quad z = x \cdot q^2 \Rightarrow \frac{y}{x} = q; \ \frac{z}{x} = q^2$

2) $x + y; \ y + z; \quad z + x.$

$\frac{x+y+(z+x)}{2} = y + z \Rightarrow x + y + z + x = 2y + 2z \Rightarrow$

$\Rightarrow 2x = y + z \Rightarrow 2 = \frac{y}{x} + \frac{z}{x} \Rightarrow 2 = q + q^2 \Rightarrow$

$\Rightarrow q^2 + q - 2 = 0 \Rightarrow$

$\Rightarrow q_{1,2} = -\frac{1}{2} \pm \sqrt{\frac{1}{4} + 2} = -\frac{1}{2} \pm \frac{3}{2}; q = -2.$ Javobi: A.

22. k ning qanday qiymatida $|\ln(x + 15)| = -(x + k)^2$ tenglama yechimga ega bo'ladi?

A) -15   B) 14   C) 15   D) 10   E) $-e$

Yechilishi: $|\ln(x + 15)| = -(x + k)^2 \Rightarrow$

$\Rightarrow |\ln(x + 15)| + (x + k)^2 = 0 \Rightarrow \begin{cases} \ln(x + 15) = 0 \\ (x + k)^2 = 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x + 15 = e^\circ \\ x + k = 0 \end{cases} \Rightarrow \begin{cases} x + 15 = 1 \\ x = -k \end{cases} \Rightarrow \begin{cases} x = -14 \\ -14 = -k \end{cases} \Rightarrow k = 14.$

Javobi: B.

23. $\sqrt{x + 2} > x$ tengsizlikni qanoatlantiruvchi butun sonlar nechta?

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

Yechilishi: $\sqrt{x + 2} > x$ $\qquad \begin{aligned} &\sqrt{x + 2} \geq 0; \\ &x + 2 \geq 0 \Rightarrow x \geq -2; \end{aligned}$

1) $x = -2 \Rightarrow \sqrt{-2 + 2} > -2 \Rightarrow 0 > -2;$

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

3) $x = 0 \Rightarrow \sqrt{0 + 2} > 0 \Rightarrow \sqrt{2} > 0;$

4) $x = 1 \Rightarrow \sqrt{1 + 2} > 1 \Rightarrow \sqrt{3} > 1;$

$x = 2 \Rightarrow \sqrt{2 + 2} > 2 \Rightarrow 2 = 2;$

Demak, $x = -2; -1; 0; 1.$

Javobi: C.

24. $|x^2 - 8x + 7| = -7 + 8x - x^2$ tenglamaning barcha natural yechimlari yig'indisini toping

   A) 8   B) 40   C) 25   D) 28   E) aniqlab bo'lmaydi

   Yechilishi: $|x^2 - 8x + 7| = -x^2 + 8x - 7 \Rightarrow$

   $\Rightarrow \begin{cases} x^2 - 8x + 7 = -x^2 + 8x - 7 \ Tenglama; \\ -x^2 + 8x - 7 = -x^2 + 8x - 7 \ Ayniyat; \end{cases}$

   $2x^2 - 16x + 14 = 0 \Rightarrow x^2 - 8x + 7 = 0 \Rightarrow$

   $\Rightarrow x_{1,2} = 4 \pm \sqrt{16 - 7} = 4 \pm 3 \Rightarrow \begin{cases} x_1 = 1; \\ x_2 = 7; \end{cases}$

   Ayniyat e'tiborga olinsa, $x \in [1; 7]$ bo'ladi. U holda

   $1 + 2 + 3 + 4 + 5 + 6 + 7 = 28$.

   Javobi: D.

25. Agar $x^2 + x - 1 = 0$ tenglamaning ildizlari x_1 va x_2 bo'lsa, $x_1^3 + x_2^3$ ning qiymati qanchaga teng bo'ladi?

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

   $x^2 + x - 1 = 0 \Rightarrow x_{1,2} = -\dfrac{1}{2} \pm \sqrt{\dfrac{1}{4} + 1} = -\dfrac{1}{2} \pm \dfrac{\sqrt{5}}{2} \Rightarrow$

   $\Rightarrow \begin{cases} x_1 = -\dfrac{1}{2} - \dfrac{\sqrt{5}}{2} = \dfrac{-1-\sqrt{5}}{2} = -\dfrac{1+\sqrt{5}}{2} \\ x_2 = -\dfrac{1}{2} + \dfrac{\sqrt{5}}{2} = -\dfrac{1-\sqrt{5}}{2} \end{cases} \Rightarrow \begin{cases} x_1 = -\dfrac{1+\sqrt{5}}{2}; \\ x_2 = -\dfrac{1-\sqrt{5}}{2}; \end{cases}$

   $x_1^3 + x_2^3 = \left[-\dfrac{1+\sqrt{5}}{2}\right]^3 + \left[-\dfrac{1+\sqrt{5}}{2}\right]^3 = -\dfrac{(1+\sqrt{5})^3}{8} - \dfrac{(1-\sqrt{5})^3}{8} =$

   $= -\dfrac{1}{8}\left[(1+\sqrt{5})^3 + (1-\sqrt{5})^3\right] =$

   $= -\dfrac{1}{8}\left[1 + 3 \cdot 1^2 \cdot \sqrt{5} + 3 \cdot 1 \cdot \left(\sqrt{5}\right)^2 + \left(\sqrt{5}\right)^3 + 1 - \right.$

   $\left. -3 \cdot 1^2 \cdot \sqrt{5} + 3 \cdot 1 \cdot \left(\sqrt{5}\right)^2 - \left(\sqrt{5}\right)^3\right] =$

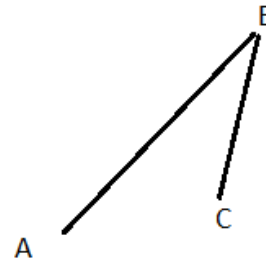 $= -\dfrac{1}{8} \cdot 32 = -4$.   Javobi: E.

26. A va B nuqtalar orasidagi masofa 500 metrga, B va C nuqtalar orasidagi masofa esa 300 metrga

teng. A va C nuqtalar orasidagi masofa qanchaga teng?

A) 1300 	 B) 800 	 C) 200

 D) 700 	 E) aniqlab bo'lmaydi

Yechilishi: C nuqtaning AB to'g'ri chiziqqa nisbatan joylashgan o'rni aniq emas.

Javobi: E.

27. $(3x^2 + 7x + 13)\left(x - \dfrac{1}{\pi}\right)^2 \log_{1-x^2}\left(x^2 + \dfrac{1}{x^2}\right) \geq 0$

tengsizlikni qanoatlantiruvchi musbat sonlar nechta?

A) 4 	 B) 2 	 C) 3 	 D) 1 	 E) Bunday sonlar yo'q

Yechilishi:

$(3x^2 + 7x + 13)\left(x - \dfrac{1}{\pi}\right)^2 \log_{1-x^2}\left(x^2 + \dfrac{1}{x^2}\right) \geq 0;$

1) $3x^2 + 7x + 13 \Rightarrow \begin{cases} a = 3 > 0; \\ D < 0. \end{cases}$

2) $\left(x - \dfrac{1}{\pi}\right)^2 \geq 0 \Rightarrow x \geq \dfrac{1}{\pi};$

3) $\log_{1-x^2}\left(x^2 + \dfrac{1}{x^2}\right) \Rightarrow \begin{cases} 1 - x^2 \neq 1 \\ 1 - x^2 > 0 \\ x^2 + \dfrac{1}{x^2} > 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x^2 \neq 0 \\ x^2 < 1 \\ doimo\ o'rinli \end{cases} \Rightarrow \begin{cases} |x| \neq 0 \\ |x| < 1 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x \neq 0 \\ -1 < x < 1 \end{cases} \Rightarrow x\epsilon(-1; 0) \cup (0; 1).$

2) va 3) dan $\left[\dfrac{1}{\pi}; 1\right)$. Demak, $x = \dfrac{1}{\pi}$.   Javobi: D.

28. Muntazam uchburchakning ichidagi ixtiyoriy nuqtadan uning tomonlarigacha bo'lgan masofalar yig'indisi $\sqrt{3}$ ga teng. Uchburchakning yuzini toping.

A) 4   B) 3   C) $\sqrt{3}$

D) $\frac{3\sqrt{3}}{4}$ E) aniqlab bo'lmaydi

Yechilishi: Ixtiyoriy nuqtasidan balandliklar kesish nuqtasini olish mumkin.

$AB = BC = AC;$

$OP + ON + OM = \sqrt{3};$

$OP = \frac{1}{3}PC; \ OC = \frac{2}{3}PC.$

$OP = ON = OM = 3OP = \sqrt{3} \Rightarrow$

$\Rightarrow OP = \frac{\sqrt{3}}{3}; \quad \frac{1}{3}PC = \frac{\sqrt{3}}{3} \Rightarrow PC = \sqrt{3}. \ \Delta APC$ dan

$AC^2 = PC^2 + \left(\frac{AC}{2}\right)^2 = \left(\sqrt{3}\right)^2 + \frac{AC^2}{4} = 3 + \frac{AC^2}{4} \Rightarrow$

$\Rightarrow 4AC^2 = 12 + AC^2 \Rightarrow 3AC^2 = 12 \Rightarrow AC^2 = 4 \Rightarrow$

$\Rightarrow AC = 2;$

$S_\Delta = \frac{1}{2} \cdot AB \cdot PC = \frac{1}{2} \cdot 2 \cdot \sqrt{3} = \sqrt{3}.$ Javobi: C.

29. $cos\ 92° \cdot \cos 2° + 0.5 \cdot \sin 4° + 1$ ni hisoblang.

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

Yechilishi: $cos92° \cdot cos2° + 0{,}5 \cdot sin4° + 1 =$

$= \cos(90° + 2°) \cdot cos2° + \frac{1}{2}sin2 \cdot 2° + 1 =$

$= -sin2°cos2° + \frac{1}{2} \cdot 2sin2°cos2° + 1 =$

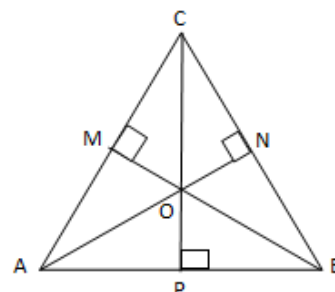$= -sin2°cos2° + sin2°cos2° + 1 = 1$

Javobi: B.

30. $log_3(\frac{4x-9}{2x+5} + 1.5) < 1$ tengsizlikning yechimlari orasida nechta butun son bor?

A) 16   B) 15   C) 14   D) 10   E) 8

Yechilishi: $log_3 \left(\frac{4x-9}{2x+5} + 1{,}5\right) < 1;$

1) $\frac{4x-9}{2x+5} + \frac{3}{2} > 0 \Rightarrow \frac{8x-18+6x+15}{4x+10} > 0 => \frac{14x-3}{4x+10} > 0;$

$$a) \begin{cases} 14x - 3 \neq 0 \\ 4x + 10 \neq 0 \end{cases} \Rightarrow \begin{cases} 14x \neq 3 \\ 4x \neq -10 \end{cases} \Rightarrow \begin{cases} x \neq \frac{3}{14} \\ x \neq -2,5 \end{cases} \Rightarrow$$

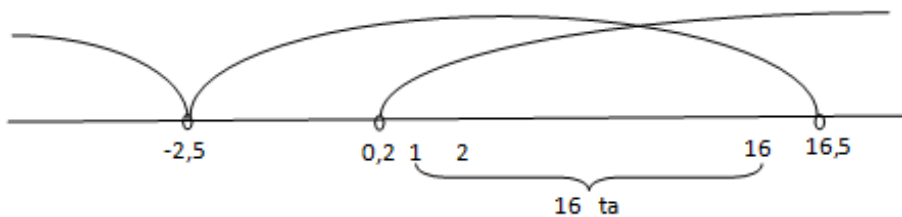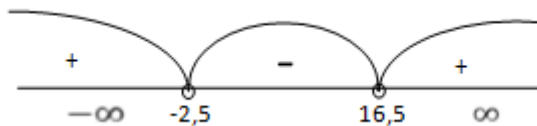$$\Rightarrow \begin{cases} x \neq 0,2 \\ x \neq -2,5 \end{cases} \Rightarrow$$

2) $\frac{4x-9}{2x+5} + \frac{3}{2} < 3 \Rightarrow \frac{4x-9}{2x+5} + \frac{3}{2} - 3 < 0 \Rightarrow \frac{4x-9}{2x+5} - \frac{3}{2} < 0 \Rightarrow$

$$\Rightarrow \frac{8x-18-6x-15}{4x+10} < 0 \Rightarrow \frac{2x-33}{4x+10} < 0;$$

$$\begin{cases} 2x - 33 \neq 0 \\ 4x + 10 \neq 0 \end{cases} \Rightarrow \begin{cases} x \neq \frac{33}{2} \\ 4x \neq -10 \end{cases} \Rightarrow \begin{cases} x \neq 16,5; \\ x \neq -2,5; \end{cases}$$

1) va 2) dan

Javobi: A.

31. $\sqrt{3 - \sqrt{5}} \cdot (3 + \sqrt{5}) \cdot (\sqrt{10} - \sqrt{2})$ ni hisoblang.

A) 8　　　B) 4　　　C) 10　　　D) 1　　　E) 2

Yechilishi: $\sqrt{3 - \sqrt{5}} \cdot (3 + \sqrt{5}) \cdot (\sqrt{10} - \sqrt{2});$

1) $\sqrt{3 - \sqrt{5}} = \sqrt{\frac{3 + \sqrt{9-5}}{2}} = \sqrt{\frac{3-2}{2}} = \sqrt{\frac{5}{2}} - \sqrt{\frac{1}{2}} =$

$$= \frac{\sqrt{5}}{\sqrt{2}} - \frac{1}{\sqrt{2}} = \frac{\sqrt{5}-1}{\sqrt{2}};$$

2) $\sqrt{10} - \sqrt{2} = \sqrt{5} \cdot \sqrt{2} - \sqrt{2} = \sqrt{2}(\sqrt{5} - 1);$

3) $\frac{\sqrt{5}-1}{\sqrt{2}} \cdot \sqrt{2}(\sqrt{5} - 1) = (\sqrt{5} - 1)^2 = 5 - 2\sqrt{5} + 1 =$

$$= 6 - 2\sqrt{5} = 2(3 - \sqrt{5});$$

Pirnazar DAVRONOV

4) $\left(3+\sqrt{5}\right)\cdot 2\cdot\left(3-\sqrt{5}\right)=2\cdot(9-5)=2\cdot 4=8.$

Javobi: A.

32. Ikki tomonining yig'indisi 1,6 ga va ular orasidagi burchagi $150°$ ga teng bo'lgan uchburchaklar ichida yuzasi eng katta bo'lgan uchburchakning yuzini toping.

A) $\frac{2}{5}$ B) $\frac{4}{25}$ C) $\frac{4}{9}$ D) $\frac{25}{36}$ E) $\frac{3}{4}$

Yechilishi: $a+b=1{,}6;\ b=1{,}6-a;$

$S_\Delta=\frac{1}{2}a\cdot b\cdot Sin150°;$

$S_\Delta=\frac{1}{2}a\cdot(1{,}6-a)\cdot Sin(90°+60°)=$

$=\frac{1}{2}(1{,}6a-a^2)\cdot cos60°=$

$=\frac{1}{2}(1{,}6a-a^2)\cdot\frac{1}{2}=\frac{1{,}6}{4}a-\frac{1}{4}a^2=$

$=\frac{2}{5}a-\frac{1}{4}a^2;$

$S_\Delta{}'=\frac{2}{5}-\frac{1}{2}a\Rightarrow S_\Delta{}'=0\Rightarrow\frac{2}{5}-\frac{a}{2}=0\Rightarrow\frac{a}{2}=\frac{2}{5}\Rightarrow a=\frac{4}{5};$

$b=1{,}6-a=1{,}6-\frac{4}{5}=\frac{8{,}0-4}{5}=\frac{4}{5};$

$S_\Delta=\frac{1}{2}a\cdot b\cdot sin\alpha=\frac{1}{2}\cdot\frac{4}{5}\cdot\frac{4}{5}\cdot sin150°=\frac{1}{2}\cdot\frac{4}{5}\cdot\frac{4}{5}\cdot\frac{1}{2}=\frac{4}{25}.$

Javobi: B.

33. $2x^4-7x^2+2=0$ tenglamaning ildizlari yig'indisini toping.

A) 7   B) 3,5   C) 0   D) 2   E) aniqlab bo'lmaydi

Yechilishi: $2x^4-7x^2+2=0;\qquad x^2=y;$

$2y^2-7y+2=0\Rightarrow y_{1,2}=\frac{7\pm\sqrt{49-4\cdot 2\cdot 2}}{2\cdot 2}=\frac{7\pm\sqrt{33}}{4};$

$y_1=\frac{7-\sqrt{33}}{4};\qquad y_2=\frac{7+\sqrt{33}}{4};$

$x^2=\frac{7-\sqrt{33}}{4}\Rightarrow|x_{1,2}|=\sqrt{\frac{7-\sqrt{33}}{4}}=\frac{\sqrt{7-\sqrt{33}}}{2}\Rightarrow$

$\Rightarrow x_1=-\frac{\sqrt{7-\sqrt{33}}}{2};\ x_2=\frac{\sqrt{7-\sqrt{33}}}{2};$

$$x^2_{3,4} = \frac{7+\sqrt{33}}{4} \Rightarrow |x_{3,4}| = \sqrt{\frac{7+\sqrt{33}}{4}} = \frac{\sqrt{7+\sqrt{33}}}{2}$$

$$x_{3,4} = \pm\frac{\sqrt{7+\sqrt{33}}}{2} \Rightarrow \begin{cases} x_3 = -\dfrac{\sqrt{7+\sqrt{33}}}{2}; \\ x_4 = \dfrac{\sqrt{7+\sqrt{33}}}{2}; \end{cases}$$

$$x_1 = -\frac{1}{2}\sqrt{7-\sqrt{33}} = -\frac{1}{2}\left[\sqrt{\frac{7+\sqrt{49-33}}{2}} - \sqrt{\frac{7-\sqrt{16}}{2}}\right] =$$

$$= -\frac{1}{2}\left[\sqrt{\frac{11}{2}} - \sqrt{\frac{3}{2}}\right] = \sqrt{\frac{3}{8}} - \sqrt{\frac{11}{8}};$$

$$x_2 = \frac{1}{2}\sqrt{7-\sqrt{33}} = \frac{1}{2}\left[\sqrt{\frac{7+\sqrt{49-33}}{2}} - \sqrt{\frac{7-\sqrt{16}}{2}}\right] =$$

$$= \frac{1}{2}\left[\sqrt{\frac{11}{2}} - \sqrt{\frac{3}{2}}\right] = \sqrt{\frac{11}{8}} - \sqrt{\frac{3}{8}};$$

$$x_3 = -\frac{1}{2}\sqrt{7+\sqrt{33}} = -\frac{1}{2}[\sqrt{\frac{7+\sqrt{49-33}}{2}} + \sqrt{\frac{7-4}{2}} =$$

$$= -\frac{1}{2}\left[\sqrt{\frac{11}{2}} + \sqrt{\frac{3}{2}}\right] = -\sqrt{\frac{11}{8}} - \sqrt{\frac{3}{8}};$$
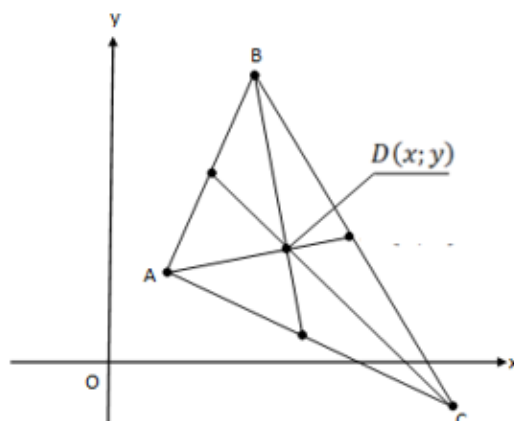
$$x_4 = \frac{1}{2}[\sqrt{\frac{1}{2}}\left[\sqrt{\frac{11}{2}} + \sqrt{\frac{3}{2}}\right] = \sqrt{\frac{11}{8}} + \sqrt{\frac{3}{8}};$$

$$x_1 + x_2 + x_3 + x_4 =$$

$$= \sqrt{\frac{3}{8}} - \sqrt{\frac{11}{8}} + \sqrt{\frac{11}{8}} - \sqrt{\frac{3}{8}} - \sqrt{\frac{11}{8}} - \sqrt{\frac{3}{8}} + \sqrt{\frac{11}{1}} + \sqrt{\frac{3}{8}} = 0.$$

Javobi: C.

34. Uchburchakning uchlari (1 ;2); (3; 4) va (5; -1) nuqtalarda joylashgan. Shu uchburchak medianalarining kesishgan nuqtasi koordinatalarini toping.
A) (2 ; 3)   B) (3 ; 2)

C) $(3 ; 3)$ D) $(3; \frac{5}{3})$ E) $(\frac{10}{3} ; \frac{7}{3})$

Yechilishi:

$A(1; 2), B(3; 4); C(5; -1)$ $D(x; y) =?$

$$x = \frac{x_1 + x_2 + x_3}{3} = 3; \qquad y = \frac{y_1 + y_2 + y_3}{3} = \frac{5}{3}.$$

Javobi: D.

35. $y = \sqrt{\lg(\cos x)}$ funksiyaning aniqlanish sohasiga tegishli nuqtalardan nechtasi $[-10\pi ; 10\pi]$ kesmaga tegishli?

A) Cheksiz ko'p   B) 10   C) 21   D) 5   E) 11

Yechilishi: $y = \sqrt{\lg \cos x} \Rightarrow \begin{cases} \lg \cos x \geq 0; \\ \cos x > 0; \end{cases}$

1) $\lg \cos x \geq 0 \Rightarrow \begin{cases} 10 > 1 \\ \cos x = 1 \end{cases} \Rightarrow \cos x = 1 \Rightarrow x = 2\pi;$

2) $\cos x > 0 \Rightarrow -\frac{\pi}{2} + \pi n < x < \frac{\pi}{2} + 2\pi n;$

x ning bu qiymatlarida kvadrat ildiz osti manfiy bo'lib qoladi. Demak, $x = 2\pi n.$ $n\epsilon[-5; 5].$ Javobi: E.

36. Qirrasi 1 ga teng bo'lgan kub tomonlarining markazlari tutashtirildi. Hosil bo'lgan jismning hajmini toping.

A) $\frac{1}{6}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$

D) $\frac{1}{4}$ E) $\frac{1}{8}$

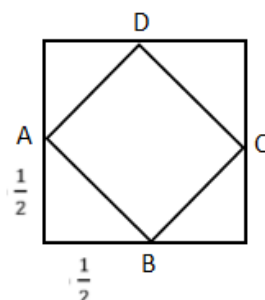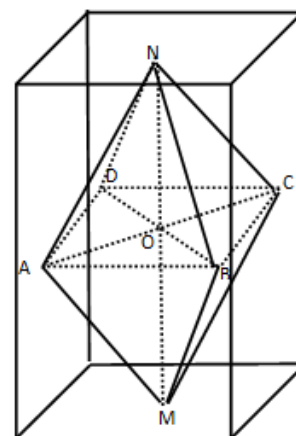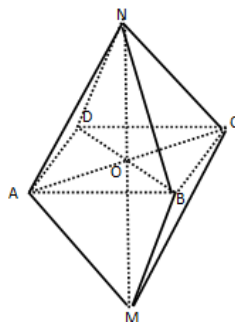Yechilishi: $MN = 1 \Rightarrow ON = \frac{1}{2};$

$AB^2 = \left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^2 = \frac{1}{2};$

$V = \frac{1}{3} S_{ABCD} \cdot ON =$

$= \frac{1}{3} - \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{12};$

$2V = \frac{1}{6}.$

Javobi: A.

37. $\vec{a} = \{-2; 1; 4)$ vektor va $M(1; 0; -1)$ nuqta berilgan. Agar $2\vec{a} + 3\overrightarrow{MN} = 0$ bo'lsa, N nuqtaning koordinatalarini toping

A) $-\frac{1}{3}$; $\frac{2}{3}$; $\frac{3}{5}$ B) $\frac{2}{3}$; $-\frac{7}{3}$; $-\frac{11}{3}$ C) $\frac{2}{3}$; $-\frac{3}{7}$; $-\frac{11}{3}$

D) $\frac{7}{3}$; $-\frac{2}{3}$; $-\frac{11}{3}$ E) $-\frac{2}{3}$; $\frac{3}{7}$; $-\frac{3}{4}$

Yechilishi: $\vec{a} = \{-2; 1; 4\}$; $M(1; 0; -1)$; $N(x; y; z)$;

$\overrightarrow{MN} = \{x - 1; y;\ z + 1\}$;

$2\vec{a} + 3\overrightarrow{MN} = 0 \Rightarrow 2\{-2; 1; 4\} + 3\{x - 1; y; z + 1\} = 0 \Rightarrow$

$\Rightarrow \{-4; 2; 8\} + \{3x - 3; 3y; 3z + 3\} = 0 \Rightarrow$

$\Rightarrow \{3x - 3; 3y; 3z + 3\} = -\{-4; 2; 8\} \Rightarrow$

$\Rightarrow \{3x - 3; 3y; 3z + 3\} = \{4; -2; -8\} \Rightarrow$

$$\Rightarrow \begin{cases} 3x - 3 = 4 \\ 3y = -2 \\ 3z + 3 = -8 \end{cases} \Rightarrow \begin{cases} 3x = 7 \\ 3y = -2 \\ 3z = -11 \end{cases} \Rightarrow \begin{cases} x = \frac{7}{3}; \\ y = -\frac{2}{3}; \\ z = -\frac{11}{3}. \end{cases}$$

Javobi: D.

38. $y = ln^2 x - lnx$ funksiyaning OX o'qi bilan kesishish nuqtalaridan hamda funksiya grafigining eng quyi nuqtasini tutashtirishdan hosil bo'lgan uchburchakning yuzini hisoblang.

A) $\frac{e^2 - 1}{2}$ B) $\frac{e - 1}{4}$ C) $\frac{e - 1}{8}$ D) $\frac{e}{4}$ E) $\frac{e + 1}{2}$

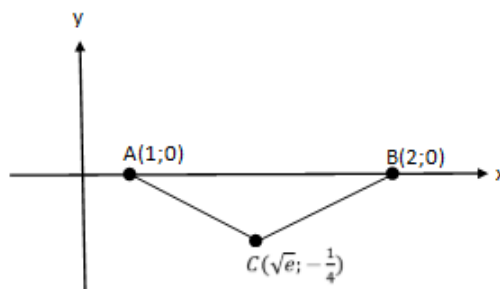Yechilishi: $\begin{cases} y = ln^2 x - lnx \\ (Ox): y = 0 \end{cases} \Rightarrow ln^2 x - lnx = 0 \Rightarrow$

$\Rightarrow lnx(lnx - 1) = 0 \Rightarrow$

$\Rightarrow \begin{cases} lnx = 0 \\ lnx = 1 \end{cases} \Rightarrow \begin{cases} x = 1 \\ x = e \end{cases} \Rightarrow$

$\Rightarrow A(1; 0),\ B(e; 0)$.

2) $y' = 2lnx \cdot \frac{1}{x} - \frac{1}{x} = \frac{1}{x}(2ln$

$\Rightarrow \frac{1}{x}(2lnx - 1) = 0 \Rightarrow \frac{1}{x} \neq 0 \Rightarrow 2lnx - 1 = 0 \Rightarrow$

A(1;0)   B(2;0)

$C(\sqrt{e}; -\frac{1}{4})$

$$\Rightarrow 2lnx = 1 \Rightarrow lnx = \frac{1}{2} \Rightarrow x = e^{\frac{1}{2}} \Rightarrow x = \sqrt{e};$$

$$y = \left(lne^{\frac{1}{2}}\right)^2 - lne^{\frac{1}{2}} = \left[\frac{1}{2}lne\right]^2 - \frac{1}{2}lne = \frac{1}{4} - \frac{1}{2} = \frac{1-2}{4} = -\frac{1}{4}$$
$$\Rightarrow$$
$$\Rightarrow C\left(\sqrt{e}; -\frac{1}{4}\right). \qquad AB = e - 1; \qquad h = \frac{1}{4};$$
$$S_\Delta = \frac{1}{2} \cdot AB \cdot h = \frac{1}{2} \cdot (e-1) \cdot \frac{1}{4} = \frac{1}{8}(e-1). \qquad \text{Javobi: C.}$$

39. x ning nechta natural qiymatida $\dfrac{\sqrt{6-x}}{log_{\frac{1}{3}}(x-3)} \geq 0$

tengsizlik o'rinli bo'ladi?
A) Bunday qiymatlar yo'q   B) 1   C) 2   D) 3   E) 4

Yechilishi: $\dfrac{\sqrt{6-x}}{log_{\frac{1}{3}}(x-3)} \geq 0 \Rightarrow \begin{cases} \sqrt{6-x} \geq 0 \\ log_{\frac{1}{3}}(x-3) > 0 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} 6-x \geq 0 \\ x-3 > 0 \\ 0 < \frac{1}{3} < 1 \\ 0 < x-3 < 1 \end{cases} \Rightarrow \begin{cases} x \leq 6 \\ x > 3 \\ 3 < x < 4 \end{cases} \Rightarrow (3;4).$$

Javob: A.

40. Agar sferaning radiusi 50 % orttirilsa, sfera sirtining yuzi necha foizga ko'payadi?
A) 125   B) 100   C) 150   D) 75   E) 225
Yechilishi: $R \to 50\% \Rightarrow R_1 = R + 0,5R = 1,5R;$
$S = 4\pi R^2 \Rightarrow S_1 = 4\pi R_1{}^2; \qquad R_1{}^2 = (1,5R)^2 = 2,25R^2;$
$S_1 = 4\pi \cdot 2,25R^2 = 2,25S; \qquad 225 - 100 = 125\%.$
Javobi: A.

41. $f(x) = 1 - 2x$ funksiya berilgan. Agar $f(\varphi(x)) = x$ bo'lsa, $\varphi(x)$ funksiyani toping.
A) $\frac{1-x}{2}$ B) $\frac{x+1}{2}$ C) $\frac{x-1}{2}$ D) $\frac{2x-1}{4}$ E) $\frac{1-2x}{3}$
Yechilishi: $f(x) = 1 - 2x; f(\varphi(x)) = x; \varphi(x) =?$
$f(\varphi(x)) = 1 - 2 \cdot \varphi(x) \Rightarrow x = 1 - 2\varphi(x) \Rightarrow$

$\Rightarrow \ 1 - x = \ 2 \cdot \varphi(x) \Rightarrow \varphi(x) = \dfrac{1-x}{2}.$ Javob: A.

42. Uzunligi $1; 3 ; 5; 7; 9$ ga teng bo'lgan kesmalar berilgan. Bu kesmalar berilgan. Bu kesmalardan tomonlari har xil bo'lgan nechta turli uchburchak yasash mumkin?

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

     Yechilishi: $S_5{}^3 = \dfrac{5!}{3!(5-3)!} = \dfrac{3! \cdot 4 \cdot 5}{3! \cdot 2!} = \dfrac{4 \cdot 5}{1 \cdot 2} = 10$ Bunda

     $a + b > c,$ bo'lishni e'tiborga olinadi.

     Javobi: B.

43. a ning qanday qiymatlarida

     $\int_0^2 (t - log_2 a)dt = 2log_2\left(\dfrac{2}{a}\right)$ tenglik o'rinli bo'ladi?

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

     D) $a \in (-1; \ 1)$ E) $a \in (4; \ 32)$

     Yechilishi: $\int_0^2 (t - \log_2 a)dt = 2 \log_2\left(\dfrac{2}{a}\right);$

     1) $\begin{cases} a > 0 \\ \dfrac{2}{a} > 0 \end{cases} \Rightarrow a > 0 \Rightarrow a \in (0; +\infty);$

     2) $\int_0^2 tdt - log_2 a \int_0^2 dt = \dfrac{t^2}{2}\Big|_0^2 - t log_2 a\Big|_0^2 =$

     $= \dfrac{1}{2} \cdot 2^2 - 2 \cdot log_2 a = 2 \cdot (1 - log_2 a);.$

     3) $2(1 - log_2 a) = 2 log_2\left(\dfrac{2}{a}\right) \Rightarrow log_2\left(\dfrac{2}{a}\right) + log_2 a = 1 \Rightarrow$

     $\Rightarrow log_2 \dfrac{2}{a} \cdot a = 1 \Rightarrow 1 = 1.$ Demak, $a \epsilon (0; \infty).$

     Javobi: C.

44. O'tmas burchakli uchburchakning tomonlari butun sonlardan iborat va ular ayirmasi 5 ga teng bo'lgan arifmetik progressiyani tashkil etadi. Shu uchburchak eng kichik tomonining eng katta qiymati nechaga teng bo'lishi mumkin?

     A) 5   B) 10   C) 15   D) 14   E) 16

     Yechilishi: $a, \ a + 5, \ a + 10.$

$\alpha > 90° \Rightarrow a^2 + b^2 < c^2; \qquad a^2 + (a + 5)^2 < (a + 10)^2;$
$a^2 + a^2 + 10a + 25 < a^2 + 20a + 100;$
$a^2 - 10a - 75 < 0;$
$a_{1,2} = 5 \pm \sqrt{25 + 75} = 5 \pm 10 \Rightarrow a = 15.$
Javobi: C.

45. $y = kx^2 - 2kx + 3$ va $y = 2 - kx$ funksiyalarning grafiklari k ning nechta butun qiymatlarida kesishmaydi?

A) 3   B) 2   C) cheksiz ko'p   D) 4   E) 5

Yechilishi: $\begin{cases} y = kx^2 - 2kx + 3 \\ \quad\; y = 2 - kx \end{cases} \Rightarrow$

$\Rightarrow kx^2 - 2kx + 3 = 2 - kx \Rightarrow kx^2 - kx + 1 = 0;$
$D = b^2 - 4ac = (-k)^2 - 4 \cdot k \cdot 1 = k^2 - 4k =$
$= k(k - 4) < 0 \Rightarrow \begin{cases} k = 0 \\ k = 4 \end{cases} \Rightarrow (0; 4). \quad k = 1; 2; 3.$

Javobi: A.

46. $x^{\sqrt{x}} = \sqrt{x^x}$ tenglamaning ildizlari yig'indisini toping.

A) 5   B) 10   C) 11   D) 4   E) 8

Yechilishi: $x^{\sqrt{x}} = \sqrt{x^x} \Rightarrow \begin{cases} x \neq 0; \\ x > 0; \\ x = 1; \end{cases}$

$x^{\sqrt{x}} = x^{\frac{x}{2}} \Rightarrow \sqrt{x} = \frac{x}{2} \Rightarrow x = \frac{x^2}{4} \Rightarrow x^2 = 4x \Rightarrow$
$\Rightarrow x^2 - 4x = 0 \Rightarrow x(x - 4) = 0 \Rightarrow$
$\begin{cases} x = 0 \\ x = 4 \end{cases} \Rightarrow \begin{cases} x_1 = 1 \\ x_2 = 4 \end{cases} \Rightarrow x_1 + x_2 = 5.$ Javobi: A.

47. Uzunliklari har xil bo'lgan 8 ta yog'och berilgan. Ularning o'rtacha uzunligi 10 dm ga teng. Shu yog'ochlarga yana bitta yog'och qo'shildi. Natijada ularning o'rtacha uzunligi 12 dm ga teng bo'ladi. Qo'shilgan yog'ochning uzunligini aniqlang.

A) 18   B) 22   C) 32   D) 28   E) 26

Yechilishi: $\begin{cases} \dfrac{a_1 + a_2 + \cdots + a_7 + a_8}{8} = 10 \\ \dfrac{a_1 + a_2 + \cdots + a_8 + a_9}{9} = 12 \end{cases} \Rightarrow$

$$\Rightarrow \quad - \quad \underset{a_9 = 108 - 80}{\underline{\begin{array}{c} a_1 + a_2 + \cdots a_8 + a_9 = 12 \cdot 9 \\ a_1 + a_2 + \cdots + a_7 + a_8 = 10 \cdot 8 \end{array}}} \quad \Rightarrow a_9 = 28.$$

Javobi: D.

1998-YIL, 5-AXBOROTNOMA

1. 312 va 12 sonlarining umumiy bo'luvchilari nechta?

   A) 2   B) 4   C) 3

   B)D) 6   E) 1

   Yechilishi:

   $(312; 12) = 2^2 \cdot 3 \Rightarrow (2+1)(1+1) = 6.$ Javobi: D.

2. $\sqrt[3]{9 + \sqrt{73}} \cdot \sqrt[3]{9 - \sqrt{73}}$ ni hisoblang.

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

   Yechilishi: $\sqrt[3]{9 + \sqrt{73}} \cdot \sqrt[3]{9 - \sqrt{73}} =$

   $= \sqrt[3]{\left(9 + \sqrt{73}\right)\left(9 - \sqrt{73}\right)} = \sqrt[3]{81 - 73} = \sqrt[3]{8} = 2.$

   Javobi: A.

3. Paxtadan 30 % tola olinsa, 60 tonna olish uchun qancha paxta kerak?

   A) 100   B) 400   C) 200   D) 300   E) 180

   Yechilishi: $\begin{matrix} x ------ 100\% \\ 60 ------ 30\% \end{matrix} \Rightarrow 30x = 60 \cdot 100 \Rightarrow x = 200.$

   Javobi: C.

4. $0,(8) + 0,(7)$ ni hisoblang.

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

   Yechilishi: $0,(8) + 0,(7) =?$

   $0,(8) + 0,(7) = \frac{8}{9} + \frac{7}{9} = \frac{15}{9} = 1\frac{2}{3}.$ Javobi: B.

5. $\dfrac{1000^{10}}{(700-200)^{12}} \cdot 500^2$ ni hisoblang.

   A) 512   B) 1000   C) 2048   D) 1024   E) 500
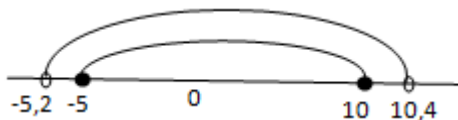
   Yechilishi: $\dfrac{1000^{10}}{(700-200)^{12}} \cdot 500^2 =$

$$= \frac{(500 \cdot 2)^{10}}{500^{12}} \cdot 500^2 = \frac{500^{10} \cdot 2^{10}}{500^{10}} = 2^{10} = 1024.$$

Javobi: D.

6. -5,2 bilan 10,4 orasida nechta butun son bor?

A)16　　　B) 10　　　C) 15　　　D)12　　　E) 11

Yechilishi: 　　　Javobi: A.

7. $\dfrac{15^{\frac{2}{3}} \cdot 3^{\frac{1}{3}}}{5^{-\frac{1}{3}}}$ ni hisoblang.

A) 45　　　B) 15　　　C) 5　　　D) 3　　　E) 30

Yechilishi: $\dfrac{15^{\frac{2}{3}} \cdot 3^{\frac{1}{3}}}{5^{-\frac{1}{3}}} = \dfrac{3^{\frac{2}{3}} \cdot 5^{\frac{2}{3}} \cdot 3^{\frac{1}{3}}}{5^{-\frac{1}{3}}} = 3^{\frac{2}{3}+\frac{1}{3}} \cdot 5^{\frac{2}{3}+\frac{1}{3}} = 15.$

Javobi: B.

8. 50 dan kichik tub sonlar nechta?

A) 10　　　B) 15　　　C) 17　　　D) 9　　　E) 16

Yechilishi:

$2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47.$

　　15 ta.　　　　Javobi: B.

9. $\dfrac{\big|4-5|4-6|+4|3-6|\big|}{\big|3-4|7-5|\big|}$ ni hisoblang.

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

Yechilishi: $\dfrac{\big|4-5|4-6|+4|3-6|\big|}{\big|3-4|7-5|\big|} = \dfrac{\big|4-5|-2|+4|-3|\big|}{\big|3-4|2|\big|} =$

$= \dfrac{|4-5\cdot2+4\cdot3|}{|3-4\cdot2|} = \dfrac{|4-10+12|}{|3-12|} = \dfrac{6}{5} = 1\dfrac{1}{5}.$　　　Javobi: E.

10. $\sqrt{19 - 8\sqrt{3}}$ ni hisoblang.

A) $4 - \sqrt{3}$　　　B) $4 + \sqrt{3}$　　　C) $3 + \sqrt{3}$

D) $3\sqrt{3}$　　　E) $4 - \sqrt{6}$

Yechilishi: $\sqrt{19 - \sqrt{64 \cdot 3}} = \sqrt{19 - \sqrt{192}} =$

$= \sqrt{\dfrac{19 + \sqrt{361 - 192}}{2}} - \sqrt{\dfrac{19 - \sqrt{361 - 192}}{2}} =$

Pirnazar DAVRONOV

$$= \sqrt{\frac{19+\sqrt{169}}{2}} - \sqrt{\frac{19-\sqrt{169}}{2}} = \sqrt{\frac{19+13}{2}} - \sqrt{\frac{19-13}{2}} =$$
$$= \sqrt{16} - \sqrt{3} = 4 - \sqrt{3}. \qquad \text{Javobi: A.}$$

11. Raqamlarining yig'indisidan 3 marta katta, raqamlari kvadratlarining yig'indisi esa 53 ga teng bo'lgan ikki xonali sonning kvadratini toping.

   A) 2500   B) 961   C) 529   D) 7056   E) 729

   Yechilishi: $3(x+y) = xy \Rightarrow [xy = 10 \cdot x + y]$;

   $x^2 + y^2 = 53$; $3x + 3y = 10x + y \Rightarrow 7x = 2y \Rightarrow$

   $$\Rightarrow y = \frac{7x}{2} \Rightarrow x^2 + \left(\frac{7x}{2}\right)^2 = 53 \Rightarrow$$

   $$x^2 + \frac{49x^2}{4} = 53 \Rightarrow 4x^2 + 49x^2 = 212 \Rightarrow x^2 = 4 \Rightarrow$$

   $$\Rightarrow x_{1,2} = \pm 2 \Rightarrow y_{1,2} = \pm 7 \Rightarrow \begin{cases} (x_1; y_1) = (-2; -7) \\ (x_2; y_2) = (2; 7) \end{cases} \Rightarrow$$

   $$\Rightarrow (xy)^2 = (27)^2 = 729. \qquad \text{Javobi: E.}$$

12. $\dfrac{1}{1-\frac{1}{1-2^{-1}}} + \dfrac{1}{1+\frac{1}{1+2^{-1}}}$ ni hisoblang.

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

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

   $$= \frac{1}{1-\frac{1}{\frac{1}{2}}} + \frac{1}{1+\frac{1}{\frac{3}{2}}} = \frac{1}{1-2} + \frac{1}{1+\frac{2}{3}} = -1 + \frac{3}{5} = -\frac{2}{5}. \qquad \text{Javobi: C.}$$

13. k ning qanday qiymatida $y = \sqrt{kx^2 + 2x - 1}$ funksiya $\left(-1; \frac{1}{3}\right)$ oraliqda aniqlanmagan?

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

   Yechilishi: Berilgan funksiya $\left(-1; \frac{1}{3}\right)$ oraliqda aniqlangan deb olinib, k ning funksiya oraliqda aniqlanmaydigan qiymati topiladi.

   $$x_1 = -1; \quad x_2 = \frac{1}{3}; \quad y = \sqrt{f(x)} \Rightarrow$$

$$\Rightarrow f(x) = x^2 + \frac{2}{k}x - \frac{1}{k} \Rightarrow x_1 \cdot x_2 = -\frac{1}{k} \Rightarrow$$

$$\Rightarrow -1 \cdot \frac{1}{3} = -\frac{1}{k} \Rightarrow -\frac{1}{3} = -\frac{1}{k} \Rightarrow k = 3. \qquad \text{Javobi: C.}$$

14. $f(x) = 5sinx + 6$ funksiyaning eng katta qiymatini toping.

   A) -1   B) 11   C) 1   D) 6   E) 7

   Yechilishi: $f(x) = 5sinx + 6$; $-1 \leq sinx \leq 1$.

   Javobi: B.

15. Juft funksiyalarni toping.

   $y_1 = 3^x + 3^{-x}, \qquad y_2 = 3x^5 + x^3,$

   $y_3 = \sqrt{20 - x + x^2} + \sqrt{20 + x + x^2},$

   $y_4 = log_3 4x + 1, \quad y_5 = x^2 + lg|x|.$

   A) y_1, y_2 B) y_1, y_4 C) y_2

   D) y_1, y_3, y_5 E) y_2, y_3, y_5

   Yechilishi: 1) $y_1 = 3^x + 3^{-x} \Rightarrow x = -x \Rightarrow$

   $\Rightarrow y_1 = 3^{-x} + 3^{-(-x)} = 3^{-x} + 3^x;$

   2) $y_2(x) = 3x^5 + x^3;$

   $x = -x \Rightarrow y_2(-x) = 3(-x)^5 + (-x)^3 = -(x^5 + x^3);$

   $x = -x \Rightarrow y_2(-x)$ toq funksiya;

   3) $y_3(x) = \sqrt{20 - x + x^2} \cdot \sqrt{20 + x + x^2};$

   $x = -x \Rightarrow y_3(-x) =$

   $= \sqrt{20 - (-x) + (-x)^2} \cdot \sqrt{20 + (-x) + (-x)^2} =$

   $= \sqrt{20 + x + x^2} \cdot \sqrt{20 - x + x^2};$

   $x = -x \Rightarrow y_3(x) = y_3(-x)$ Juft funksiya;

        4) $4x > 0 \Rightarrow x > 0;$

        5) $y_5(x) = x^2 + lg|x|;$

        $x = -x \Rightarrow y_5(-x) = (-x)^2 + lg|-x| = x^2 + lg|x|;$

        $y_5(x) = y_5(-x)$ juft funksiya;

        $y_1, y_2, y_5.$ Javobi: D.

16. $14 \leq 2^n < 64$ qo'sh tengsizlikni qanoatlantiruvchi natural sonlar nechta?

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

Yechilishi: $14 \le 2^n < 64$;

$n = 4$; 5 qanoatlantiradi.   Javobi: A.

17. $\left(a^{1/2} - b^{1/2}\right)\left(a + a^{1/2}b^{1/2} + b\right)$ ni soddalashtiring, so'ng a va b lar daraja ko'rsatkichlarining yig'indisini hisoblang.

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

Yechilishi: $\left(a^{1/2} - b^{1/2}\right)\left(a + a^{1/2}b^{1/2} + b\right) =$

$= (\sqrt{a})^3 - \left(\sqrt{b}\right)^3 = a^{\frac{3}{2}} - b^{\frac{3}{2}} \Rightarrow \frac{3}{2} + \frac{3}{2} = 3.$ Javobi: E.

18. $\dfrac{(5b^{\frac{1}{4}}+10)(b^{\frac{3}{4}}-2b^{1/2})}{b-4b^{1/2}}$ ni soddalashtiring.

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

Yechilishi: $\dfrac{(5b^{\frac{1}{4}}+10)(b^{\frac{3}{4}}-2b^{1/2})}{b-4b^{1/2}} =$

$= \dfrac{5\left(b^{\frac{1}{4}}+2\right)\left(b^{\frac{1}{4}}\cdot b^{\frac{1}{2}}-2b^{\frac{1}{2}}\right)}{b^{\frac{1}{2}}\cdot b^{\frac{1}{2}}-4b^{\frac{1}{2}}} = \dfrac{5b^{\frac{1}{2}}\left(b^{\frac{1}{4}}+2\right)\left(b^{\frac{1}{4}}-2\right)}{b^{\frac{1}{2}}\left(b^{\frac{1}{2}}-4\right)} =$

$= \dfrac{5\left(b^{\frac{1}{2}}-4\right)}{b^{\frac{1}{2}}-4} = 5.$ Javobi: D.

19. $(a^2 - 1)x + 3 = 0$ tenglama yechimga ega bo'lmaydigan a ning barcha qiymatlari yig'indisini hisoblang.

A) 1   B) 2   C) 0   D) -1   E) -2

Yechilishi: $(a^2 - 1)x + 3 = 0 \Rightarrow (a^2 - 1)x = -3 \Rightarrow$

$\Rightarrow x = -\dfrac{3}{a^2-1} \Rightarrow a^2 - 1 \ne 0 \Rightarrow$

$\Rightarrow a^2 \ne 1 \Rightarrow a \ne \pm 1; \; a \ne \pm 1 \Rightarrow \begin{cases} a_1 = -1 \\ a_2 = 1 \end{cases} \Rightarrow$

$\Rightarrow a_1 + a_2 = -1 + 1 = 0.$ Javobi: C.

20. a ning qanday qiymatlarida $\begin{cases} ax - y = 0 \\ x + y = 10 \end{cases}$ tenglamalar sistemasi yechimga ega bo'lmaydi?

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

    Yechilishi: $\begin{cases} ax - y = 0 \\ x + y = 10 \end{cases} \Rightarrow \dfrac{a}{1} = \dfrac{-1}{1} \Rightarrow a = -1.$

Javobi: A.

21. $x^2 + 4x - 5 = 0$ tenglamaning ildizlari x_1 va x_2 bo'lsa, $x_1^3 \cdot x_2^3$ ni hisoblang.

    A) 124   B) -125   C) 130   D) 5   E) -124

    Yechilishi: $x^2 + 4x - 5 = 0$;

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

$$\Rightarrow x_1^3 \cdot x_2^3 = (-5)^3 \cdot 1^3 = -125. \qquad \text{Javobi: B.}$$

22. Agar $\begin{cases} x^2 - 2xy + y^2 = 9 \\ xy = 10 \end{cases}$ bo'lsa, $|x + y|$ ni hisoblang.

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

    Yechilishi: $\begin{cases} x^2 - 2xy + y^2 = 9 \\ xy = 10 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} (x - y)^2 = 9 \\ x \cdot y = 10 \end{cases} \Rightarrow \begin{cases} \sqrt{(x - y)^2} = \sqrt{9} \\ x \cdot y = 10 \end{cases} \Rightarrow$$

$$\Rightarrow \dfrac{+\overset{x^2 - 2xy + y^2 = 9}{\tfrac{4xy}{}}}{x^2 + 2xy + y^2 = 49} \Rightarrow (x + y)^2 = 49 \Rightarrow |x + y| = 7.$$

Javobi: A.

23. $|x - 7| \leq 1$ tengsizlikning eng kichik natural yechimini toping.

    A) 5   B) 7   C) 8   D) 6   E) 1

    Yechilishi: $|x - 7| \leq 1 \Rightarrow -1 \leq x - 7 \leq 1 \Rightarrow$

$$\Rightarrow -1 + 7 \leq x \leq 1 + 7 \Rightarrow 6 \leq x \leq 8.$$

Javobi: D.

Pirnazar DAVRONOV

24. Arifmetik progressiyaning hadlari $a_1, a_2, \ldots, a_n$ ayirmasi esa $d \neq -1, 0, 1$ bo'lsa, $(a_2 - a_1) + (a_3 - a_2)^2 + (a_4 - a_3)^3 + \cdots + (a_{n+1} - a_n)^n$ ni hisoblang.

A) $\frac{d^n - 1}{d - 1}$ 　　 B) $\frac{d(d^n - 1)}{d - 1}$ 　　 C) $\frac{d^n}{d - 1}$

D) $\frac{d(d^n + 1)}{d + 1}$ 　　 E) $\frac{d(d^n - 1)}{d + 1}$

Yechilishi: $a_1, a_2, \ldots a_n$; 　$d \neq -1; 0; 1$.

$(a_2 - a_1) + (a_3 - a_2)^2 + (a_4 - a_3)^3 + \cdots +$

$+(a_{n+1} - a_n)^n = d + d^2 + d^3 + \cdots + d^n \Rightarrow \begin{cases} b_1 = d; \\ q = d. \end{cases}$

$S_n = \frac{b_1(q^n - 1)}{q - 1} = \frac{d(d^n - 1)}{d - 1}$. 　　 Javobi: B.

25. x ning qanday qiymatlarida $f(x) = \sin x$ va $g(x) = 5x + 3$ funksiyalar uchun $f'(x) < g'(x)$ tengsizlik bajariladi?

A) $(-\infty; 5)$ 　　 B) $\left(2\pi n; \frac{\pi}{2} + 2\pi n\right)$, $n \in Z$

C) $(-\infty; \infty)$ 　　 D) $(0; \infty)$ 　　 E) $(-\infty; 0)$

Yechilishi: $f'(x) = \cos x$; 　$g'(x) = 5$;

$[f(x) = \sin x$; 　$g(x) = 5x + 3]$;

$f'(x) < g'(x) \Rightarrow \cos x < 5$; 　$x \in (-\infty; +\infty)$.

Javobi: C.

26. $y = \sin^2 x + \cos^2 x$ funksiyaning hosilasini toping.

A) $2\sin 2x$ 　 B) 0 　 C) $4\sin x$ 　 D) $\sin 4x$ 　 E) 1

Yechilishi: $y = \sin^2 x + \cos^2 x \Rightarrow y = 1 \Rightarrow y' = 0$.

Javobi: B.

27. $y = x^2 - 2x + 5$ funksiyaning $[0; 1]$ kesmadagi eng katta qiymatini toping.

A) 5 　　 B) 4 　　 C) -2 　　 D) 0 　　 E) 6

Yechilishi: $y = x^2 - 2x + 5$; 　$[0; 1]$;

$y' = 2x - 2 \Rightarrow y' = 0 \Rightarrow 2x - 2 = 0 \Rightarrow x = 1$;

100

$x = 0 \Rightarrow y(0) = 0^2 - 2 \cdot 0 = 5;$

$x = 1 \Rightarrow y(1) = 1^2 - 2 \cdot 1 + 5 = 4.$

Javobi: A.

28. $y = 2(2x + 5)^4$ ning boshlang'ich funksiyasini toping.

A) $Y = (2x + 5)^5 + C$ B) $\frac{(2x+5)^5}{3} + C$

C) $Y = \frac{(2x+5)^5}{4} + C$ D) $Y = \frac{(2x+5)^5}{5} + C$

E) $Y = 4(2x + 5)^3 + C$

Yechilishi: $y = 2(2x + 5)^4 \Rightarrow Y = \int 2(2x + 5)^4 dx =$

$= 2 \cdot \frac{1}{2} \cdot \frac{(2x+5)^5}{5} + C = \frac{(2x+5)^5}{5} + C.$ Javobi: D.

29. $log_3 5 = a,$ $log_3 2 = b$ bo'lsa, $log_6 45$ ni a va b orqali ifodalang.

A) $\frac{b+2}{a+2}$ B) $\frac{2+a}{1+b}$ C) $\frac{a}{1+b}$ D) $\frac{b}{a+1}$ D) $\frac{1+a}{b+2}$

Yechilishi: $\log_3 5 = a;$ $\log_3 2;$

$\log_6 45 = \frac{\log_3 45}{\log_3 6} = \frac{\log_3 9 \cdot 5}{\log_3 2 \cdot 3} = \frac{2 \log_3 3 + \log_3 5}{\log_3 2 + \log_3 3} = \frac{2+a}{b+1}.$

Javobi: B.

30. $\left(\frac{4}{5}\right)^x = 4$ tenglamaning yechimi qaysi oraliqqa tegishli?

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

D) $(-1; 0)$ E) $(1; 2)$

Yechilishi: $\left(\frac{4}{5}\right)^x = 4 \Rightarrow \left(\frac{4}{5}\right)^x = \left(\frac{4}{5}\right)^{\log_{\frac{4}{5}} 4} \Rightarrow$

$\Rightarrow x = \log_{\frac{4}{5}} 4 \Rightarrow \log_{\frac{4}{5}} 4 < -1 \Rightarrow x < -1 \Rightarrow (-\infty; -1).$

Javobi: A.

31. $y = a^x$ funksiya uchun qaysi mulohaza noto'g'ri?

A) Aniqlanish sohasi – barcha haqiqiy sonlar to'plami

B) Qiymatlari to'plami – barcha musbat haqiqiy sonlar to'plami

C) Grafigi (0; 1) nuqtadan   o'tadi

D) Aniqlanish sohasida   uzluksiz

E) Aniqlanish   sohasida har doim   o'suvchi

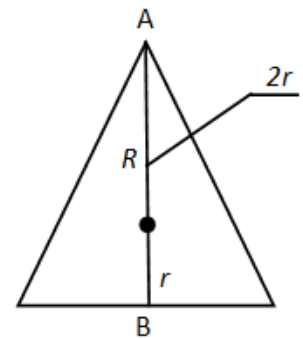Yechilishi: $y = a^x; \; 0 < a < 1$
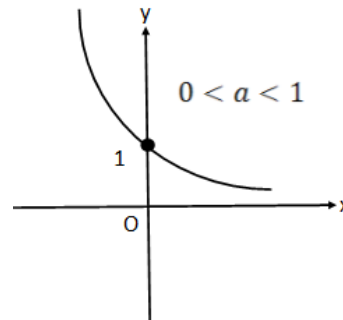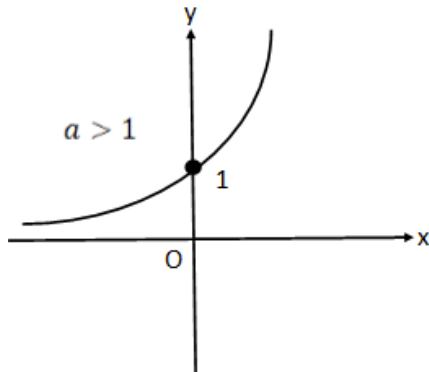
$0 < a < 1$ da kamayuvchi.　　　　Javobi: E.

32. Muntazam uchburchakka ichki chizilgan aylananing radiusi r bo'lsa, unga tashqi chizilgan aylana uzunligini toping.

A) $2\pi r$　　B) $3\pi r$　　C) $4\pi r$

 D) $5\pi r$　　E) $8\pi r$

Yechilishi: $r = \dfrac{1}{3}AB; \;\; R = \dfrac{2}{3}AB;$

$AB = 3r \Rightarrow R = \dfrac{2}{3} \cdot 3r \Rightarrow R = 2r;$

$l = 2\pi R = 2\pi \cdot 2r = 4\pi r.$　　Javobi: C.

33. Uchburchakning tomonlari 3, 5   va   6 ga teng. 5 ga teng bo'lgan tomon qarshisidagi burchakning kosinusini   toping.

A) $-\dfrac{1}{2}$　　B) $\dfrac{5}{18}$　　C) $\dfrac{5}{9}$　　D) $\dfrac{1}{2}$　　E) $\dfrac{4}{9}$

Yechilishi: $5^2 = 3^2 + 6^2 - 2 \cdot 3 \cdot 6 cos\alpha \Rightarrow$

$\Rightarrow 25 = 45 - 36 cos\alpha \Rightarrow$

$\Rightarrow 36 cos\alpha = 20 \Rightarrow$

$\Rightarrow cos\alpha = \dfrac{20}{36} \Rightarrow cos\alpha = \dfrac{5}{9}.$

Javobi: C.

102
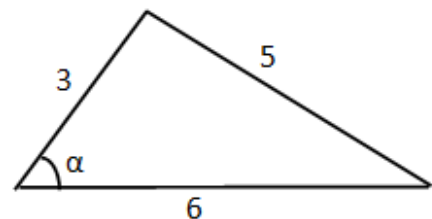
34. To'g'ri burchakli uchburchakning gipotenuzasi 6 ga, katetlaridan biri 4 ga teng. Shu katetning gipotenuzadagi proyeksiyasini toping.
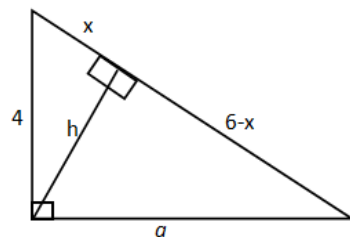
A) 3   B) $2\frac{1}{3}$ C) $2\frac{2}{5}$ D) $2\frac{2}{3}$ E) 2,5

Yechilishi: $4^2 = 6x \Rightarrow x = \frac{16}{6} = \frac{8}{3} = 2\frac{2}{3}.$

Javobi: D.

35. Chizmada $\angle DEB = 60°$, $BE = 3$ va $DE = 2$ (uchburchakning o'rta chizig'i) bo'lsa, AB ni toping.

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

Yechilishi: $\angle DEB = 60°$, $BE = 3$,

$DE = 2$, $AB = ?$

$DB = \frac{AB}{2};$

$\left(\frac{AB}{2}\right)^2 = 3^2 + 2^2 - 2 \cdot 3 \cdot 2 \cdot cos60° \Rightarrow$

$\Rightarrow \frac{AB^2}{4} = 13 - 12 \cdot \frac{1}{2} \Rightarrow$

$\Rightarrow AB^2 = 4 \cdot 7 \Rightarrow AB = 2\sqrt{7}.$ Javobi: E.
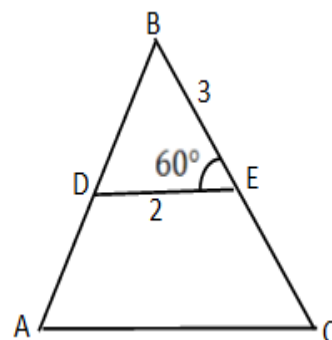
36. Kvadratning yuzi 25 ga teng bo'lsa, unga ichki chizilgan doiraning yuzini hisoblang.

A) 6π B) $6,25\pi$ C) $\frac{5\sqrt{2}}{2}\pi$ D) $6,16\pi$ E) $5\sqrt{7}\pi$

Yechilishi: $S = 25 \Rightarrow a = 5 \Rightarrow r = \frac{5}{2};$

$S = \pi r^2 = \pi \cdot \left(\frac{5}{2}\right)^2 = \frac{25}{4}\pi = 6,25\pi.$ Javobi: B.

37. $\vec{a} = \{2; \sqrt{2}\}$ va $\vec{b} = \{4; 2\sqrt{2}\}$ vektorlar orasidagi burchakni toping.

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

Yechilishi: $\vec{a} \cdot \vec{b} = \{2; \sqrt{2}\} \cdot \{4; 2\sqrt{2}\} = 8 + 2 \cdot 2 = 12;$

$$|\vec{a}| = \sqrt{2 + (\sqrt{2})^2} = \sqrt{6}; \quad |\vec{b}| = \sqrt{16 + 8} = 2\sqrt{6};$$

$$cos(\vec{a}^\wedge\vec{b}) = \frac{\vec{a}\cdot\vec{b}}{|\vec{a}|\cdot|\vec{b}|} = \frac{12}{\sqrt{6}\cdot 2\sqrt{6}} = 1 \Rightarrow (\vec{a}^\wedge\vec{b}) = 0.$$

Javobi: C.

38. Teng yonli trapetsiyaning yon tomoni 41 ga, balandligi 40 ga va o'rta chizig'I 45 ga teng. Trapetsiyaning katta asosini toping.

    A) 50   B) 54   C) 55   D) 60   E) 65

    Yechilishi: $AD = 41,\ DE = 40,$
    $MN = 45,\ AB =?$
    $AE^2 = AD^2 - DE^2 =$
    $= 1681 - 1600 = 81 \Rightarrow AE = 9;$
    $AB + CD = 2MN \Rightarrow$
    $\Rightarrow AB + CD = 90 \Rightarrow$
    $\Rightarrow CD = 90 - AB \Rightarrow AB = 2AE + CD \Rightarrow$
    $\Rightarrow AB = 2\cdot 9 + 90 - AB \Rightarrow 2AB = 108 \Rightarrow AB = 54.$

    Javobi: B.
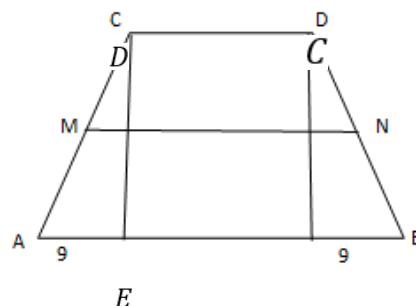
39. Muntazam olti burchakka tashqi chizilgan aylananing radiusi $\sqrt{3}$ bo'lsa, unga ichki chizilgan aylananing radiusini toping.

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

    Yechilishi: $a = R = \sqrt{3};$

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

    $$= 3 - \frac{3}{4} = \frac{9}{4} \Rightarrow r = \frac{3}{2} = 1,5.$$

    Javobi: A.
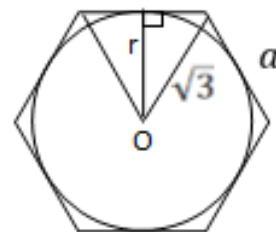
40. Perimetri $2p$ ga, dioganallarining yig'indisi m ga teng bo'lgan rombning yuzini toping.

    A) $\frac{m^2+p^2}{2}$ B) $\frac{m^2-p^2}{2}$ C) $\frac{m^2+p^2}{4}$

D) $\frac{m^2-p^2}{4}$ E) $\frac{m^2 p^2}{4}$

Yechilishi: $4a = 2p$; $S = \frac{1}{2}d_1 \cdot d_2$;
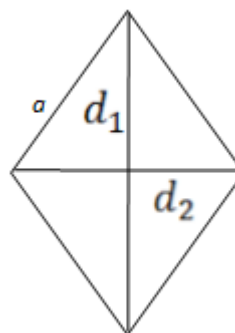
$d_1 + d_2 = m$; $S = ?$

$a = \frac{2p}{4} = \frac{p}{2}$; $(d_1 + d_2)^2 = m^2 \Rightarrow$

$\Rightarrow d_1^2 + 2d_1 d_2 + d_2^2 = m^2 \Rightarrow$

$\Rightarrow 2d_1 d_2 = m^2 - (d_1^2 + d_2^2)$;

$4a^2 = d_1^2 + d_2^2 \Rightarrow d_1^2 + d_2^2 = 4 \cdot \left(\frac{p}{2}\right)^2 = p^2 \Rightarrow$

$\Rightarrow 2d_1 d_2 = m^2 - p^2 \Rightarrow S = \frac{m^2-p^2}{4}$.   Javobi: D.

41. Markazi $(1; 1)$ nuqtada bo'lib, koordinatalar boshidan o'tuvchi aylananing tenglamasini tuzing.
A) $x^2 + y^2 - 2x - 2y = 1$ B) $x^2 + y^2 - x - 2y = 0$
C) $x^2 + y^2 - 2x - y = 0$ D) $x^2 + y^2 - 3x - 3y = 0$
E) $x^2 + y^2 - 2x - 2y = 0$

Yechilishi: $(x - a)^2 + (y - b)^2 = R^2 \Rightarrow$

$\Rightarrow (x - 1)^2 + (y - 1)^2 = R^2$;

$O(0; 0) \Rightarrow (0 - 1)^2 + (0 - 1)^2 = R^2 \Rightarrow$

$\Rightarrow R^2 = 2 \Rightarrow (x - 1)^2 + (y - 1)^2 = 2 \Rightarrow$

$x^2 - 2x + 1 + y^2 - 2y + 1 = 2 \Rightarrow$

$x^2 + y^2 - 2x - 2y = 0$.   Javobi: E.

42 α va β tekisliklar $45°$ burchak ostida kesishadi. α tekislikdagi A nuqtadan β tekislikgacha bo'lgan masofa 2 ga teng. A nuqtadan tekisliklarning kesishish chizig'igacha bo'lgan masofani toping.
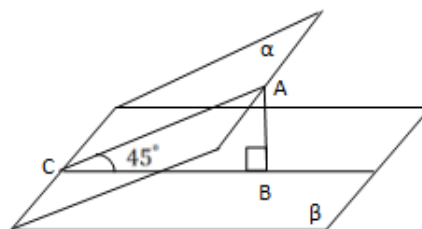A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $\sqrt{3}$ D) 1   E) $2\sqrt{3}$

Yechilishi: $\frac{AB}{AC} = sin45° \Rightarrow$

$\Rightarrow \frac{2}{AC} = \frac{\sqrt{2}}{2} \Rightarrow 4 = \sqrt{2}AC \Rightarrow$

$\Rightarrow AC = 2\sqrt{2}$.
Javobi: B.

43. x ning qanday qiymatlarida $\vec{a} = \{3; 1; 6\}$ va $\vec{b} = \{6; 3; x\}$ vektorlar parallel bo'ladi?

A) Barcha qiymatlarida   B) $\emptyset$ C) 18   D) 12   E) 6

Yechilishi: $\vec{a} = \gamma \vec{b} \Rightarrow \dfrac{3}{6} = \dfrac{1}{3} = \dfrac{6}{x} \Rightarrow \dfrac{1}{2} \neq \dfrac{1}{3} = \dfrac{6}{x}.$

Javobi: B.

44. To'rtburchakli muntazam prizmaning dioganali 22 ga, asosining yuzi 144 ga teng. Prizmaning balandligini toping.

A) 20   B) 14   C) 16   D) 26   E) 18

Yechilishi: $DB_1 = 22$; $S_{asos} = 144 \Rightarrow a = 12$;

$DB = 12\sqrt{2}$;

$BB_1 = DB_1{}^2 - DB^2 =$

$= 22^2 - \left(12\sqrt{2}\right)^2 =$

$= 484 - 288 = 196 \Rightarrow$

$\Rightarrow BB_1 = 14.$

Javobi: B.
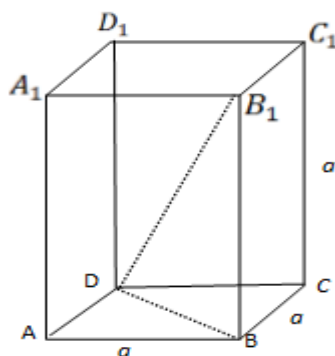
45. O'q kesimining yuzi 10 ga teng bo'lgan silindr yon sirtining yuzini toping.

A) 10π B) 20π C) 30π

D) 15π E) 12π

Yechilishi: $S_{yon} = 2\pi RH$;

$S_{kesim} = 2RH = 10 \Rightarrow$

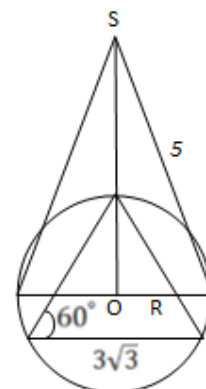$\Rightarrow 10 = 2RH \Rightarrow RH = 5$;

$S_{yon} = 2\pi \cdot 5 = 10\pi.$

Javobi: A.
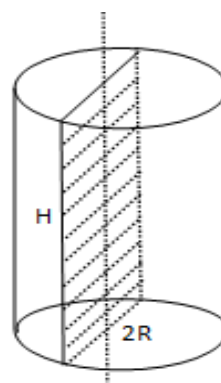
46. Konus asosiga tomoni $3\sqrt{3}$ bo'lgan muntazam uchburchak ichki chizilgan. Konus yasovchisi 5 bo'lsa, uning hajmini toping.

A) 8π B) 48π C) 36π

D) 12π E) 4π

Yechilishi: $R = \frac{a\sqrt{3}}{3} = \frac{3 \cdot \sqrt{3} \cdot \sqrt{3}}{3} = 3;$

$SO^2 = 5^2 - 3^2 = 16 \Rightarrow SO = 4;$

$V = \frac{1}{3}\pi R^2 H = \frac{1}{3}\pi \cdot 3^2 \cdot 4 = 12\pi.$

Javobi: D.

47. $\sin(arcsin\frac{\sqrt{2}}{2} - arccos\frac{\sqrt{2}}{2})$ ni hisoblang.

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

Yechilishi: $sin\left(arcsin\frac{\sqrt{2}}{2} - arccos\frac{\sqrt{2}}{2}\right) =$

$= sin\left(\frac{\pi}{4} - \frac{\pi}{4}\right) = sin0 = 0.$ Javobi: A.

48. Agar $\sin\alpha = \frac{3}{5}$ va $\frac{\pi}{2} < \alpha < \pi$ bo'lsa, $tg\alpha$ ni toping.

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

Yechilishi: $\alpha = arcsin\frac{3}{5};$

$tg\alpha = \frac{sin\alpha}{cos\alpha} = \frac{sinarcsin\frac{3}{5}}{cosarcsin\frac{3}{5}} = \frac{\frac{3}{5}}{\sqrt{1-\left(\frac{3}{5}\right)^2}} = \frac{\frac{3}{5}}{\sqrt{1-\frac{9}{25}}} = \frac{\frac{3}{5}}{\sqrt{\frac{16}{25}}} =$

$= \frac{3}{5} \cdot \frac{5}{4} = \frac{3}{4} \Rightarrow \frac{\pi}{2} < \alpha < \pi \Rightarrow tg\alpha = -\frac{3}{4}.$ Javobi: B.

49. $tg1° \cdot tg2° \cdot ... \cdot tg89°$ ni hisoblang.

A) 0   B) $\frac{1}{2}$ C) 1   D) hisoblab bo'lmaydi   E) $\sqrt{3}$

Yechilishi: $tg1° = ctg89°$ va $tg\alpha \cdot ctg\alpha = 1$ bo'lgani uchun: $tg1° \cdot tg2° \cdot ... \cdot tg89° =$

$= ctg89° \cdot ctg88° \cdot ... \cdot tg88° \cdot tg89° = 1.$

Javobi: C.

50. $4^{cos^2 x + 2\cos x} = 1$ tenglamani yeching.

A) $\pi n; \frac{\pi}{2} + 2\pi n, n \in Z$ B) $\frac{\pi}{2} + \pi n, n \in Z$

C) $\pi n; -\frac{\pi}{2} + 2\pi n, n \in Z$ D) $\frac{\pi}{2} + \pi n; 2\pi n, n \in Z$

E) $\frac{\pi}{2} + 2\pi n, n \in Z$

Yechilishi: $4^{cos^2 x + 2\cos x} = 1 \Rightarrow 4^{cos^2 x + 2cosx} = 4^0 \Rightarrow$

$\Rightarrow cos^2 x + 2cosx = 0 \Rightarrow cosx(cosx + 2) = 0 \Rightarrow$

$\Rightarrow \begin{cases} cosx = 0 \\ cosx + 2 = 0 \end{cases} \Rightarrow \begin{cases} cosx = 0 \\ cosx \neq -2 \end{cases} \Rightarrow x = \frac{\pi}{2} + \pi n.$

Javobi: B.

51. $\sin 5x \cos 4x + \cos 5x \sin 4x > \frac{1}{2}$ tengsizlikni yeching.

A) $\frac{\pi}{6} + 2\pi n < x < \frac{5\pi}{6} + 2\pi n, \ n \in Z$

B) $\frac{\pi}{54} + 2\pi n < x < \frac{5\pi}{54} + 2\pi n, \ n \in Z$

C) $\frac{\pi}{36} + \frac{2\pi n}{9} < x < \frac{5\pi}{36} + \frac{2\pi n}{9}, n \in Z$

D) $\frac{\pi}{36} + \frac{2\pi n}{9} < x < \frac{5\pi}{54} + \frac{2\pi n}{9}, n \in Z$
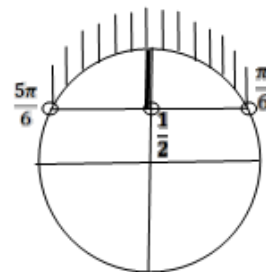
E) $\frac{\pi}{54} + \frac{2\pi n}{9} < x < \frac{5\pi}{54} + \frac{2\pi n}{9}, \ n \in Z$

Yechilishi: $sin5xcos4x + cos5xsin4x > \frac{1}{2} \Rightarrow$

$\Rightarrow sin(5x + 4x) > \frac{1}{2} \Rightarrow sin9x > \frac{1}{2} \Rightarrow$

$\Rightarrow 2\pi n + \frac{\pi}{6} < 9x < \frac{5\pi}{6} + 2\pi n, \ n\epsilon Z;$

$\Rightarrow \frac{\pi}{54} + \frac{2\pi n}{9} < x < \frac{5\pi}{54} + \frac{2\pi n}{9}, \ n \in Z.$

Javobi: E.

52. Ifodani soddalashtiring: $sin^2\alpha + cos^2\alpha + ctg^2\alpha.$

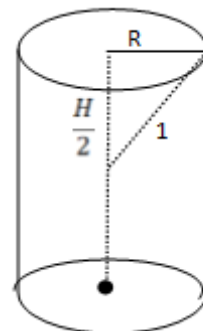A) $cos^2\frac{\alpha}{2}$ B) $\frac{cos2\alpha}{2}$ C) $tg\frac{\alpha}{2}$ D) $\frac{1}{sin^2\alpha}$ E) $\frac{1}{cos^2\alpha}$

Yechilishi: $sin^2\alpha + cos^2\alpha + ctg^2\alpha = 1 + ctg^2\alpha = \frac{1}{sin^2\alpha}.$

Javobi: D.

53. Radiusi 1 ga teng bo'lgan sferaga ichki chizilgan eng kata hajmli silindrning balandligini aniqlang.

A) $\frac{3\sqrt{3}}{4}$ B) $\frac{\sqrt{3}}{2}$ C) $\frac{2\sqrt{3}}{3}$

108

D) $\frac{\sqrt{2}}{3}$ E) $\frac{2\sqrt{5}}{3}$

Yechilishi: $R^2 = 1^2 - \left(\frac{H}{2}\right)^2 = 1 - \frac{H^2}{4}$;

$V_S = \pi R^2 H = \pi \cdot \left(1 - \frac{H^2}{4}\right) \cdot H =$

$= \pi H - \frac{\pi}{4} \cdot H^3 \Rightarrow V = \pi H - \frac{\pi}{4} \cdot H^3 \Rightarrow$

$\Rightarrow V' = \pi - \frac{\pi}{4} \cdot 3H^2 \Rightarrow V' = 0 \Rightarrow$

$\Rightarrow \pi - \frac{3\pi}{4} \cdot H^2 = 0 \Rightarrow \pi = \frac{3\pi H^2}{4} \Rightarrow \frac{3}{4} H^2 = 1 \Rightarrow$

$\Rightarrow 3H^2 = 4 \Rightarrow H^2 = \frac{4}{3} \Rightarrow H = \pm\frac{2}{\sqrt{3}} = \pm\frac{2\sqrt{3}}{3} \Rightarrow H = \frac{2\sqrt{3}}{3}.$

Javobi: C.

54. $y = 13 sin^2 3x$ funksiyaning eng kichik musbat
davrini toping.

A) $\frac{2\pi}{3}$ B) $\frac{\pi}{3}$ C) $\frac{13\pi}{2}$ D) $\frac{\pi}{4}$ E) $\frac{13\pi}{6}$

Yechilishi: $13 sin^2 3x = 13 \cdot \frac{1 - cos6x}{2} = \frac{13}{2} - \frac{13}{2} cos6x$;

$\frac{T}{|k|} = \frac{2\pi}{6} = \frac{\pi}{3}.$ Javobi: B.

55. Barcha nuqtalarining koordinatalari $x^2 + y^2 \leq 4x + 6y$ tengsizlikni qanoatlantiradigan tekis figuraning yuzini toping?

A) 13π B) 12π C) 9π D) 10π E) 18π

Yechilishi: $x^2 + y^2 \leq 4x + 6y \Rightarrow$

$\Rightarrow x^2 - 4x + y^2 - 6y \leq 0 \Rightarrow$

$\Rightarrow x^2 - 4x + 2^2 - 2^2 + y^2 - 6y + 3^2 - 3^2 \leq 0 \Rightarrow$

$\Rightarrow (x - 2)^2 + (y - 3)^2 - 4 - 9 \leq 0 \Rightarrow$

$\Rightarrow (x - 2)^2 + (y - 3)^2 \leq 13 \Rightarrow$

$\Rightarrow (x - 2)^2 + (y - 3)^2 \leq \left(\sqrt{13}\right)^2 \Rightarrow R = \sqrt{13} \Rightarrow$

$\Rightarrow S = \pi R^2 \Rightarrow S = \pi\left(\sqrt{13}\right)^2 \Rightarrow S = 13\pi.$ Javobi: A.

1998-YIL, 6-AXBOROTNOMA

1. Qandaydir sonni 1995 ga bo'lganda qoldiq ,1994 ga teng bo'lsa, shu sonni 5 ga bo'lgandagi qoldiqni toping.

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

   Yechilishi:

   $x = 1995 \cdot y + 1994 \Rightarrow 1995 \cdot y$ doimo 5 ga bo'linadi. 1994 ni 5 ga bo'lsak, 4 qoldiq qoladi. $1994 = 1990 + 4$.

   Javobi: A.

2. Agar $xy = 6$, $yz = 2$ va $xz = 3$ $(x > 0)$ bo'lsa xyz ni toping .

   A) -6   B) 6   C)5   D)12   E) -12

   Yechilishi: $\begin{cases} xy = 6 \\ yz = 2 \\ xz = 3 \\ x > 0 \end{cases} \Rightarrow y > 0, \; z > 0 \Rightarrow \begin{cases} y = \frac{6}{x} \\ \frac{6z}{x} = 2 \\ xz = 3 \end{cases} \Rightarrow$

   $\Rightarrow \begin{cases} y = \frac{6}{x} \\ 6z = 2x \\ xz = 3 \end{cases} \Rightarrow \begin{cases} y = \frac{6}{x} \\ z = \frac{2x}{6} \\ xz = 3 \end{cases} \Rightarrow \begin{cases} y = \frac{6}{x} \\ z = \frac{x}{3} \\ x_{1,2} = \pm 3 \end{cases} \Rightarrow \begin{cases} y = \frac{6}{3} \\ z = \frac{3}{3} \\ x = +3 \end{cases} \Rightarrow$

   $\Rightarrow \begin{cases} y = 2 \\ z = 1 \\ x = 3 \end{cases} \Rightarrow x \cdot y \cdot z = 2 \cdot 1 \cdot 3 = 6.$ Javobi: B.

3. Qisqarmaydigan oddiy kasirning maxraji suratidan 11 taga ko'p . Agar kasrning suratiga 167ni maxrajiga 13ni qo'shsak berilgan kasrga teskari kasr xosil bo'ladi, berilgan kasrning maxrajini toping.

   A)17   B) 15   C)13   D)14   E)16

   Yechilishi: 1) $\frac{x}{x+11}$;   2) $\frac{x+167}{x+11+13} = \frac{x+167}{x+24}$ $\Rightarrow$

   $\Rightarrow \frac{x}{x+11} = \frac{x+24}{x+167}$ $\Rightarrow$

$$\Rightarrow x^2 + 167x = x^2 + 24x + 11x + 24 \cdot 11 \Rightarrow$$
$$\Rightarrow 167\, x - 35x = 24 \cdot 11 \Rightarrow 132\, x = 24 \cdot 11 \Rightarrow$$
$$\Rightarrow 22x = 44 \Rightarrow x = 2 \Rightarrow x + 11 = 2 + 11 = 13.$$

Javobi: C.

4. $\dfrac{[(1,2:36)+0,3] \cdot 9}{0,2}$ ni hisoblang.

   A)148,5   B) 1,5   C)150   D)15   E)16

Yechilishi: $\dfrac{[(1,2:36)+0,3] \cdot 9}{0,2} = \dfrac{\left(\frac{1,2}{36}+0,3\right) \cdot 90}{2} = \dfrac{1,2+0,3 \cdot 36}{36} \cdot 45 =$

$= \dfrac{1,2+10,8}{36} \cdot 45 = \dfrac{12}{4} \cdot 5 = 15.$ Javobi: D.

5.   Agar $a > 0, b > 0, c < 0$ bolsa, to'g'ri tenglikni ko'rsating.

A) $\sqrt{a^2 \cdot b^2 \cdot c^2} = a|b|c$ B) $\sqrt{a^2 \cdot b^2 \cdot c^2} = abc$

C) $\sqrt{a^2 \cdot b^2 \cdot c^2} = |a|bc$ D) $\sqrt{a^2 \cdot b^2 \cdot c^2} = -ab|c|$

E) $\sqrt{a^2 \cdot b^2 \cdot c^2} = -abc$

Yechilishi: $a > 0\,, \; b > 0\,, c < 0.$

  $agar \; x < 0 \; bo'lsa, |x| = -x \Rightarrow$

$\Rightarrow \sqrt{a^2 b^2 c^2} = |a| \cdot |b| \cdot |c| = -abc.$ Javobi: E.

6.   Uchta sonning o'rta arifmetigi 17,4 ga teng. Agar sonlarning ikkitasi 17,5 va 21,6 bo'lsa uchinchi sonni toping.

 A) 12,1   B) -0,2   C) -8,4   D)13   E)13,1

Yechilishi: $\dfrac{x+17,5+21,6}{3} = 17,4 \Rightarrow x + 39,1 = 17,4 \cdot 3 \Rightarrow$

$\Rightarrow x = 52,2 - 39,1 = 13,1.$ Javobi: E.

7. 3^{20} ni 7 ga bo'lgandagi qoldiqni toping.

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

Yechilishi: $3^{20} = (3^5)^4 = 243^4 = (7 \cdot 34 + 5)^4 =$

$= \cdots + 5^4 \Rightarrow 5^4 = 625 \Rightarrow 625:7 \Rightarrow 625 = 89 \cdot 7 + 2$

Javobi: D.

8. $\left(1992\frac{3}{5} - 1990\frac{2}{3}\right) \cdot 1\frac{1}{29}$ ni hisoblang.

Pirnazar DAVRONOV

A) $-2\frac{14}{435}$ B) $\frac{14}{435}$ C)2 D) -2 E)$2\frac{1}{58}$

Yechilishi: $\left(1992\frac{3}{5} - 1990\frac{2}{3}\right) \cdot 1\frac{1}{29} =$

$= \left(1992 + \frac{3}{5} - 1990 - \frac{2}{3}\right) \cdot \frac{30}{29} =$

$= \left(2 + \frac{3}{5} - \frac{2}{3}\right) \cdot \frac{30}{29} = \frac{30+9-10}{15} \cdot \frac{30}{29} = \frac{29 \cdot 2}{1 \cdot 29} = 2.$ Javobi: C.

9. $\frac{\sqrt{32}+\sqrt{96}-\sqrt{50}}{\sqrt{72}}$ ni hisoblang.

A) 2 B)1 C)$\sqrt{2}$ D)$2\sqrt{2}$ E)0,9988207

Yechilishi: $\frac{\sqrt{32}+\sqrt{98}-\sqrt{50}}{\sqrt{72}} = \frac{\sqrt{16}\cdot\sqrt{2}+\sqrt{49}\cdot\sqrt{2}-\sqrt{25}\cdot\sqrt{2}}{\sqrt{36}\cdot\sqrt{2}} =$

$= \frac{\sqrt{16}\cdot\sqrt{2}+\sqrt{49}\cdot\sqrt{2}-\sqrt{25}\cdot\sqrt{2}}{\sqrt{36}\cdot\sqrt{2}} = \frac{4\sqrt{2}+7\sqrt{2}-5\sqrt{2}}{6\sqrt{2}} =$

$= \frac{6\sqrt{2}}{6\sqrt{2}} = 1.$ Javobi: B.

10. Agar $x^2+y^2 = 255$ va $x^2-y^2 = 63$ bo'lsa $|x| - |y|$ni toping.

A)3 B) 4 C)5 D)6 E) 7

Yechilishi: $\begin{cases} x^2 + y^2 = 255; \\ x^2 - y^2 = 63; \end{cases}$ $|x| - |y| =?$

$\begin{cases} x^2 + y^2 = 225 \\ x^2 - y^2 = 63 \end{cases} \Rightarrow \begin{cases} y^2 + 63 + y^2 = 225 \\ x^2 = y^2 + 63 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 2y^2 = 225 - 63 \\ x^2 = y^2 + 63 \end{cases} \Rightarrow \begin{cases} 2y^2 = 162 \\ x^2 = y^2 + 63 \end{cases} \Rightarrow \begin{cases} y^2 = 81 \\ x^2 = 144 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} \sqrt{y^2} = \sqrt{81} \\ \sqrt{x^2} = \sqrt{144} \end{cases} \Rightarrow \begin{cases} |y| = 9 \\ |x| = 12 \end{cases} \Rightarrow |x| - |y| = 12 - 9 = 3.$

Javobi: A.

11. Agar n va m natural sonlar

$\sqrt{2}(n - 5) + n^2 - 6mn + 5m = 0$

tenglamani qanoatlantirsa , $n - m$ ni toping.

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

Yechilishi: $\sqrt{2}\,(n-5) + n^2 - 6mn + 5m = 0 \Rightarrow$

$$\Rightarrow \begin{cases} \sqrt{2}\,(n-5) = 0 \\ n^2 - 6mn + 5m = 0 \end{cases} \Rightarrow \begin{cases} n = 5 \\ 25 - 6\cdot 5\cdot m + 5m = 0 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} n = 5 \\ 25m = 25 \end{cases} \Rightarrow \begin{cases} n = 5 \\ m = 1 \end{cases} \Rightarrow n - m = 5 - 1 = 4.$$

Javobi: E.

12. $\dfrac{x^{2\pi} - y^{2\pi}}{x^{\pi} + y^{\pi}}$ ni qisqartiring.

A) $x^2 + y^2$ B) $x^2 - y^2$ C) $x - y$ D) $x^{\pi} - y^{\pi}$ E)0

Yechilishi: $\dfrac{x^{2\pi} - y^{2\pi}}{x^{\pi} + y^{\pi}} = \dfrac{(x^{\pi})^2 - (y^{\pi})^2}{x^{\pi} + y^{\pi}} = \dfrac{(x^{\pi} + y^{\pi})(x^{\pi} - y^{\pi})}{x^{\pi} + y^{\pi}} =$

$= x^{\pi} - y^{\pi}$.   Javobi: D.

13. Juft funksiyani toping .

A) y= $\begin{cases} x, & x < 0 \\ -x, & x \geq 0 \end{cases}$ B) y= $\begin{cases} -x^2, & x < 0 \\ x^2 & x \geq 0 \end{cases}$ C) y= 4^x

D) $y = arccos x$ E) $y = x^4 + x^2 + x$

Yechilishi: $y(-x) = y(x)$ bo'lsa, funksiya juft bo'ladi.

$y(-x) = -(-x)^2 = -x^2;$ $y(-x) = (-x)^2 = x^2$.

Javobi: B.

14. Qaysi nuqta $y = x^3 + 5x - 2$ funksiyaga teskari funksiyaning grafigiga tegishli

A) (-2;1)   B) (0;-2)   C) (4;1)   D) (-8; 1)   E) (4;5)

Yechilishi: $y = x^3 + 5x - 2;$

$$C(4\,;1) = C(y\,;x) \Rightarrow \begin{cases} y = 4 \\ x = 1 \end{cases} \Rightarrow 4 = 1^3 + 5\cdot 1 - 2 \Rightarrow$$

$\Rightarrow 4 = 1 + 5 - 2 \Rightarrow 4 = 4.$ Javobi: C.

15. x(x$\in [0; \pi]$) ning qanday qiymatida $sin^2 x + cos x$ o'zining eng katta qiymatiga erishadi?

A) 0   B) $\dfrac{\pi}{3}$ C) $\dfrac{\pi}{6}$ D) $\dfrac{\pi}{4}$ E) $\dfrac{\pi}{12}$

Yechilishi: $x \in [0\,;\pi]$, $sin^2 x + \cos x$;

$y = sin^2 x + \cos x \Rightarrow y' = 2 sin x\,(sin x)' + (\cos x)' =$

$= 2 \sin x \cos x + (-\sin x) = 2 \sin x \cos x - \sin x \Rightarrow$

$\Rightarrow 2\sin x \cos x - \sin x = 0 \Rightarrow \sin x\,(2\cos x - 1) = 0 \Rightarrow$

$\Rightarrow \begin{cases} \sin x = 0 \\ 2\cos x - 1 = 0 \end{cases} \Rightarrow \begin{cases} x = \pi n \\ 2\cos x = 1 \end{cases} \Rightarrow \begin{cases} x = \pi n \\ \cos x = \frac{1}{2} \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = \pi n \\ x = \frac{\pi}{3} + 2\pi n \end{cases}$ *bular kritik nuqtalar.*

y' ning $x = \dfrac{\pi}{3}$ kritik nuqtaatrofidagi ishorasini aniqlaymiz

1) $x = 45° \Rightarrow y' = 2\sin x \cos x - \sin x \Rightarrow$

$\Rightarrow y'(45°) = 2\sin 45 \cdot \cos 45 - \sin 45 =$

$= 2 \cdot \dfrac{\sqrt{2}}{2} \cdot \dfrac{\sqrt{2}}{2} - \dfrac{\sqrt{2}}{2} = 2 \cdot \dfrac{2}{4} - \dfrac{\sqrt{2}}{2} = 1 - \dfrac{\sqrt{2}}{2} > 0;$

2) $x = 90° \Rightarrow y'(90°) = 2\sin 90 \cos 90 - \sin 90 =$

$= 2 \cdot 1 \cdot 0 - 1 = -1 < 0;$

y' kritik nuqtalardan o'tishda ishorasini "+" dan "-" ga o'zgartiradi.

Demak, $x = \dfrac{\pi}{3}$ maksimum nuqta.　　　Javobi: B.

16. Agar f(x) funksiyasi uchun $x \in (-\infty; \infty)$ da

$f(x + 3) = -\dfrac{1}{f(x+1)}$ tenglik bajarilsa, $\dfrac{f(4)}{f(0)}$ ni toping.

A)1　　　B) 2　　　C) 3　　　D) 4　　　E) 5

Yechilishi:　$x \in (-\infty; +\infty);$

$f(x + 3) = -\dfrac{1}{f(x+1)}, \quad \dfrac{f(4)}{f(0)} = ?$

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

$x = 1 \Rightarrow f(1 + 3) = -\dfrac{1}{f(1+1)} \Rightarrow f(4) = -\dfrac{1}{f(2)};$

$\begin{cases} f(0) = -\dfrac{1}{f(2)} \\ f(4) = -\dfrac{1}{f(2)} \end{cases} \Rightarrow \dfrac{f(4)}{f(0)} = 1.$　　　Javobi: A.

17. $y = 2^{x + \frac{1}{x}}$ funksiyaning qiymatlar sohasini toping.

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

　D) $[4;\infty)$　　　　E) $(0;\frac{1}{4}] \cup [4;\infty)$

Yechilishi: 1) $x \neq 0$, $x \in (-\infty; 0) \cup (0; \infty)$;

x ning har qanday qarama- qarshi qiymatlarida

$y \in \left(0; \dfrac{1}{4}\right] \cup [4; \infty)$ bo'ladi.

Masalan, $x = -1$ da, $y = \dfrac{1}{4}$; $x = 1$ da $y = 4$ bo'ladi.

Javobi: E.

18. $y = \dfrac{x^2}{2} - lnx$ funksiyaning o'sish oraliqlarini toping.

A)$[-1;0) \cup [1; \infty)$ B) $[1;\infty)$ C) $[-1;\infty)$

D) $(-\infty; 1] \cup [1; \infty)$ E) $[-1;1]$

Yechilishi: $y = \dfrac{x^2}{2} - \ln x \Rightarrow x > 0$;

$y' = \dfrac{1}{2} \cdot 2x - \dfrac{1}{x} = x - \dfrac{1}{x} \geq 0 \Rightarrow x - \dfrac{1}{x} \geq 0 \Rightarrow$

$\Rightarrow \dfrac{x^2 - 1}{x} \geq 0 \Rightarrow \begin{cases} \dfrac{x^2 - 1}{x} \geq 0 \\ x > 0 \end{cases} \Rightarrow x^2 - 1 \geq 0 \Rightarrow x^2 \geq 1 \Rightarrow$

$\Rightarrow |x| \geq 1 \Rightarrow \begin{cases} x \geq 1 \\ x \leq -1 \end{cases} \Rightarrow [1; \infty).$ Javobi: B.

19.   Agar $(x - 1)^2(x + 1)^3 + 3x - 1$ ifoda standart shakildagi ko'pxad ko'rinishida yozilsa koifsentlarning yigindisi nechiga teng bo'ladi.

A)10   B) 4   C)2   D)3   E) 1

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

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

$= [(x - 1)(x + 1)]^2 \cdot (x + 1) + 3x - 1 =$

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

$= (x^4 - 2x^2 + 1)(x + 1) + 3x - 1 =$

$= x^5 - 2x^3 + x + x^4 - 2x^2 + 1 + 3x - 1 =$

$= x^5 + x^4 - 2x^3 - 2x^2 + 4x \Rightarrow 1 + 1 - 2 - 2 + 4 = 2.$

Javobi: C.

20. $(x + \dfrac{1}{x})^2 - 2\left(x + \dfrac{1}{x}\right) - 3 = 0$ tenglama ildizlarining

ko'paytmasini toping.

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

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

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

$\Rightarrow y_{1,2} = 1 \pm \sqrt{1 + 3} = 1 \pm 2 \Rightarrow \begin{cases} y_1 = -1 \\ y_2 = 3 \end{cases} \Rightarrow$

1) $x + \frac{1}{x} = -1 \Rightarrow x^2 + 1 = -x \Rightarrow x^2 + x + 1 = 0 \Rightarrow$

$\Rightarrow D < 0;$

2) $x + \frac{1}{x} = 3 \Rightarrow x^2 + 1 = 3x \Rightarrow x^2 - 3x + 1 = 0 \Rightarrow$

$\Rightarrow x_{3,4} = \frac{3}{2} \pm \sqrt{\frac{9}{4} - 1} = \frac{3}{2} \pm \sqrt{\frac{5}{4}} = \frac{3}{2} \pm \frac{\sqrt{5}}{2} \Rightarrow \begin{cases} x_3 = \frac{3-\sqrt{5}}{2} \\ x_4 = \frac{3+\sqrt{5}}{2} \end{cases} \Rightarrow$

$\Rightarrow x_3 \cdot x_4 = \frac{3-\sqrt{5}}{2} \cdot \frac{3+\sqrt{5}}{2} = \frac{9-5}{4} = 1.$ Javobi: E.

21. $x^2 + ax - 2 = 0$ va $x^3 + ax^2 - 2 = 0$ tenglamalar umumiy ildizga ega bo'lsa a ni toping.

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

Yechilishi: $x^2 + ax - 2 = 0$; $x^3 + ax^2 - 2 = 0$;

1) $x_{1,2} = -\frac{a}{2} \pm \sqrt{\frac{a^2}{4} + 2} = -\frac{a}{2} \pm \frac{\sqrt{a^2+8}}{2}$;

$x_1 = -\frac{a}{2} - \frac{\sqrt{a^2+8}}{2}, \quad x_2 = -\frac{a}{2} + \frac{\sqrt{a^2+8}}{2};$

2) $(-\frac{a}{2} - \frac{\sqrt{a^2+8}}{2})^3 + a(-\frac{a}{2} - \frac{\sqrt{a^2+8}}{2})^2 - 2 = 0 \Rightarrow$

$\Rightarrow (-\frac{a}{2} - \frac{\sqrt{a^2+8}}{2})^2 \cdot \left(-\frac{a}{2} - \frac{\sqrt{a^2+8}}{2} + a\right) - 2 = 0 \Rightarrow$

$\Rightarrow (\frac{a}{2} + \frac{\sqrt{a^2+8}}{2})^2 \left(\frac{a}{2} - \frac{\sqrt{a^2+8}}{2}\right) - 2 = 0 \Rightarrow$

$\Rightarrow \left(\frac{a}{2} + \frac{\sqrt{a^2+8}}{2}\right)\left(\frac{a}{2} + \frac{\sqrt{a^2+8}}{2}\right)\left(\frac{a}{2} - \frac{\sqrt{a^2+8}}{2}\right) - 2 = 0 \Rightarrow$

$\Rightarrow \left(\frac{a}{2} + \frac{\sqrt{a^2+8}}{2}\right)\left(\frac{a^2}{4} - \frac{a^2+8}{4}\right) - 2 = 0 \Rightarrow$

$\Rightarrow \left(\dfrac{a}{2} + \dfrac{\sqrt{a^2+8}}{2}\right)\dfrac{a^2-a^2-8}{4} - 2 = 0 \Rightarrow$

$\Rightarrow \left(\dfrac{a}{2} + \dfrac{\sqrt{a^2+8}}{2}\right)(-2) - 2 = 0 \Rightarrow a + \sqrt{a^2+8} + 2 = 0 \Rightarrow$

$\Rightarrow \sqrt{a^2+8} = -2 - a \Rightarrow \left(\sqrt{a^2+8}\right)^2 = (-2-a)^2 \Rightarrow$

$\Rightarrow a^2 + 8 = 4 + 4a + a^2 \Rightarrow 8 = 4 + 4a \Rightarrow$

$\Rightarrow 4a = -4 + 8 \Rightarrow 4a = 4 \Rightarrow a = \dfrac{4}{4} \Rightarrow a = 1.$

Javobi: A.

22. $\dfrac{2x^2 - 5x + 3}{(10x - 5)(x - 1)} = 0$ tenglamani yeching .

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

Yechilishi: $\dfrac{2x^2 - 5x + 3}{(10x - 5)(x - 1)} = 0;$

1) $(10x - 5)(x - 1) \neq 0 \Rightarrow \begin{cases} 10x - 5 \neq 0 \\ x - 1 \neq 0 \end{cases} \Rightarrow \begin{cases} x \neq \dfrac{1}{2}; \\ x \neq 1; \end{cases}$

2) $2x^2 - 5x + 3 = 0 \Rightarrow x_{1,2} = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4 \cdot 2 \cdot 3}}{2 \cdot 2} =$

$= \dfrac{5 \pm \sqrt{25 - 24}}{4} = \dfrac{5 \pm 1}{4} \Rightarrow \begin{cases} x_1 = \dfrac{5-1}{4} = 1 \\ x_2 = \dfrac{5+1}{4} = \dfrac{3}{2} \end{cases} \Rightarrow x = \dfrac{3}{2}.$ Javobi: C.

23. $\dfrac{x^2 - 2x + 3}{x - 1} \geq 0$ tengsizlikni yeching.

A)$(1; \infty)$ B) $[1; \infty)$ C)$(-\infty; 1)$ D)$(-\infty; 1]$ E) $\emptyset$

Yechilishi: $\dfrac{x^2 - 2x + 3}{x - 1} \geq 0 \Rightarrow$ 1) $x - 1 \neq 0 \Rightarrow x \neq 1$

2)$x^2 - 2x + 3 = 0 \Rightarrow D < 0;$

Demak, $x - 1 > 0 \Rightarrow x > 1 \Rightarrow (1; \infty).$ Javobi: A.

24. $(\log_2 x)^2 - 4\log_2 x - 1 = 0$ tenglamaning ildizlari ko'paytmasini toping.

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

Yechilishi: $\log_2^2 x - 4\log_2 x - 1 = 0 \Rightarrow x > 0;$

1) $log_2x=y \Rightarrow y^2 - 4y - 1 = 0 \Rightarrow y_{1,2} = 2 \pm \sqrt{4+1} =$

$= 2 \pm \sqrt{5} \Rightarrow \begin{cases} y_1 = 2 - \sqrt{5}; \\ y_2 = 2 + \sqrt{5}; \end{cases}$

2) $log_2x = 2 - \sqrt{5} \Rightarrow x_1 = 2^{2-\sqrt{5}};$

$log_2x = 2 + \sqrt{5} \Rightarrow x_2 = 2^{2+\sqrt{5}};$

3) $x_1 \cdot x_2 = 2^{2-\sqrt{5}} \cdot 2^{2+\sqrt{5}} = 2^{2-\sqrt{5}+2+\sqrt{5}} = 2^4 = 16.$

Javobi: C.

25. $log_{0,2} log_4 x^2 - 5 < 0$ tengsizlikni yechimini ko'rsating.

A) (-3;3)   B)(-∞; −3) ∪ (3 ;∞)   C) (3 ;∞)

D)(-3;$\sqrt{-6}$)∪ ($\sqrt{2}$;3)   E) (-∞;-$\sqrt{5}$)∪ ($\sqrt{5}$;∞)

Yechilishi: $log_{0.2}log_4(x^2 - 5) < 0;$

1) $log_4(x^2 - 5) > 0 \Rightarrow \begin{cases} 4 > 1 \\ x^2 - 5 > 1 \end{cases} \Rightarrow$

$\Rightarrow x^2 > 6 \Rightarrow |x| > \sqrt{6} \Rightarrow \begin{cases} x > \sqrt{6}; \\ x < -\sqrt{6}; \end{cases}$

2) $\begin{cases} 0 < 0.2 < 1 \\ log_4(x^2 - 5) > 1 \end{cases} \Rightarrow x^2 - 5 > 4 \Rightarrow x^2 > 9 \Rightarrow$

$\Rightarrow |x| > 3 \Rightarrow \begin{cases} x > 3; \\ x < -3. \end{cases}$ 1) va

2) dan $(-\infty; -3) \cup (3; \infty).$ Javobi: B.

26. Arifmetik progresiyaning dastlabki n ta hadining yig'indisi $S_n = n^2$ bo'lsa uning o'ninchi xadini toping.

A)100   B) 15   C)23   D)19   E)121

Yechilishi: $S_n = n^2$; $a_{10} = ?$

$n = 1 \Rightarrow S_1 = 1^2 \Rightarrow S_1 = 1 \Rightarrow a_1 = 1;$

$n = 10 \Rightarrow S_{10} = 10^2 \Rightarrow S_{10} = 100;$

$S_{10} = \frac{a_1 + a_{10}}{2} \cdot 10 \Rightarrow 100 = (1 + a_{10}) \cdot 5 \Rightarrow$

$\Rightarrow 1 + a_{10} = 20 \Rightarrow a_{10} = 20 - 1 \Rightarrow a_{10} = 19.$

Javobi: D.

27. Agar geometrik progressiyada $b_1 + b_9 = 5$ va $b_1^2 + b_9^2 = 17$ bo'lsa , $b_4 \cdot b_6$ ni toping.

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

Yechilishi: $b_1 + b_9 = 5$ va $b_1^2 + b_9^2 = 17$, $b_4 \cdot b_6 = ?$

$(b_1 + b_9)^2 = 5^2 \Rightarrow b_1^2 + 2b_1 b_9 + b_9^2 = 25 \Rightarrow$

$\Rightarrow 2b_1 b_9 = 25 - 17 \Rightarrow 2b_1 b_9 = 8 \Rightarrow$

$\Rightarrow b_1 b_9 = 4$; $b_4 = b_1 q^3 \Rightarrow b_1 = \dfrac{b_4}{q^3}$; Shuningdek,

$b_9 = b_6 \cdot q^3 \Rightarrow \dfrac{b_4}{q^3} \cdot b_6 \cdot q^3 = 4 \Rightarrow b_4 \cdot b_6 = 4$. Javobi: A.

28. Qaysi nuqtada $y = x^3 - 2x^2 + 4$ va $y = x^3 - \ln x$ funksiyalarning grafiklariga o'tkazilgan urinmalar o'zaro parallel bo'ladi.

A)$x = 0,5$ B) $x = 2$ C) $x = -0,5$

D) $x = 3$ E) $x = \pm 0,5$

Yechilishi: $y = x^3 - 2x^2 + 4$, $y = x^3 - lnx \Rightarrow x > 0$

Burchak koeffitsiyentlari teng bo'lsa,

$\begin{cases} y' = 3x^2 - 4x \\ y' = 3x^2 - \dfrac{1}{x} \end{cases} \Rightarrow 3x^2 - 4x = 3x^2 - \dfrac{1}{x} \Rightarrow$

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

$\Rightarrow x^2 = \dfrac{1}{4} \Rightarrow \sqrt{x^2} = \sqrt{\dfrac{1}{4}} \Rightarrow |x| = \dfrac{1}{2} \Rightarrow x = \pm\dfrac{1}{2} \Rightarrow x = \dfrac{1}{2}$;

Javobi: A.

29. $x\cos x^2$ ning boshlang'ich funksiyasini ko'rsating.

A) $\dfrac{x^2}{2}\sin x^2 + C$ B) $-\dfrac{1}{2}\sin x^2 + C$ C)$\dfrac{1}{3}\sin x^2 + C$

D) $-\dfrac{1}{3}\sin x^2 + C$ E)$\dfrac{1}{2}\sin x^2 + C$

Yechilishi: $F(x) = ?$ $f(x) = x\cos x^2$

$F(x) = \int f(x)dx = \int x \cdot cosx^2 dx =$

$= \dfrac{1}{2}\int cosx^2 d(x^2) = \dfrac{1}{2}sinx^2 + c.$

Javobi: E.

30. $2^{x^2} \cdot 3^x = 6$ tenglamaning bitta ildizi 1 ga teng ikkinchi ildizini toping.

A) $-\log_2 6$ B) $\log_2 3$ C) $\log_3 6$ D) $\sqrt{2}$ E) $\sqrt{3}$

Yechilishi: $2^{x^2} \cdot 3^x = 6 \Rightarrow x^2 log_2 2 + x log_2 3 = log_2 6 \Rightarrow$

$\Rightarrow x^2 \cdot 1 + x log_2 3 = log_2 6 \Rightarrow x^2 + x log_2 3 - log_2 6 = 0;$

$x_1 = 1;$

$\begin{cases} x_1 + x_2 = -log_2 3 \\ x_1 x_2 = -log_2 6 \end{cases} \Rightarrow \begin{cases} 1 + x_2 = -log_2 3 \\ 1 * x_2 = -log_2 6 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x_2 = -1 - log_2 3 = -log_2 6; \\ \qquad x_2 = -log_2 6. \end{cases}$ Javobi: A.

31. $y = 2x^2 + bx + c$ parabolaning uchi (-3;5) nuqtada joylashgan bu funksiya nollarining o'rta arifmetigini toping.

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

Yechilishi: $y = 2x^2 + bx + c; \quad (-3; 5);$

$x = -\dfrac{b}{2a} \Rightarrow -3 = -\dfrac{b}{2 \cdot 2} \Rightarrow b = 12;$

$y = -\dfrac{b^2 - 4ac}{4a} \Rightarrow -5 = -\dfrac{12^2 - 4 \cdot 2 \cdot c}{4 \cdot 2} \Rightarrow -5 = -\dfrac{144 - 8c}{8} \Rightarrow$

$\Rightarrow -40 = -144 + 8c \Rightarrow 8c = 104 \Rightarrow c = \dfrac{104}{8} = 13 \Rightarrow$

$\Rightarrow y = 2x^2 + 12x + 13 \Rightarrow$

$\Rightarrow 2x^2 + 12x + 13 = 0 \Rightarrow x_{1,2} = \dfrac{-12 \pm \sqrt{144 - 4 \cdot 2 \cdot 13}}{2 \cdot 2} =$

$= \dfrac{-12 \pm \sqrt{144 - 104}}{4} = \dfrac{-12 \pm \sqrt{+40}}{4};$

$x_1 = \dfrac{-12 - \sqrt{+40}}{4}; \quad x_2 = \dfrac{-12 + \sqrt{+40}}{4};$

$\dfrac{x_1 + x_2}{2} = \dfrac{\dfrac{-12 - \sqrt{40}}{4} + \dfrac{-12 + \sqrt{40}}{4}}{2} =$

$= \dfrac{\frac{-24}{4}}{2} = \dfrac{-6}{2} = -3.$ Javobi: C.

32. Bir nuqtadan uchta to'ri chiziq o'tkazilgan $\alpha + \beta + \gamma$ ni toping.

A) 270°   B) 180°   C) 135°   D) 100°   E) 90°

Yechilishi:
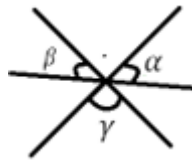
$\alpha + \beta + \gamma = 180°.$ Javobi: B.

33. Qo'shni burchaklar bissektrisalari orasidagi burchakni toping.

A) 80°   B) 70°   C) 60°   D) 100°   E) 90°

Yechilishi:

$\alpha = \angle MON$

$\angle AOB = x \Rightarrow \angle MOB = \frac{1}{2}\angle AOB = \frac{1}{2}x;$

$\angle BOC = 180 - x\angle BON =$

$= \frac{1}{2}\angle BOC = \frac{1}{2}(180 - x);$

$\angle MON = \angle MOB + \angle BON = \frac{1}{2}x + \frac{1}{2} \cdot 180 - \frac{1}{2}x = 90°.$
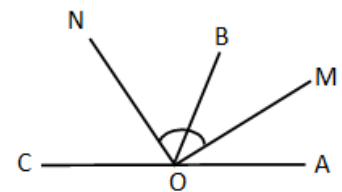
Javobi: E.

34. To'g'ri burchakli uchburchakning balandligi gipetenuzasi 2 va 18 ga teng bo'lgan kesmalarga ajratadi . Shu balandlikni toping.

A) 4   B) 5   C) 12

D) 6   E) $6\sqrt{2}$
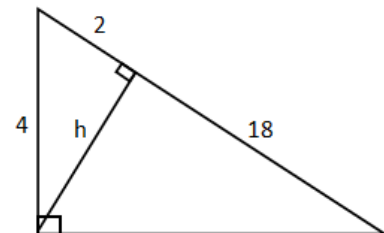
Yechilishi:

$h^2 = 2 \cdot 18 \Rightarrow h^2 = 36 \Rightarrow h = 6.$

Javobi: D.

35. Diaganallari 10 va 12 ga teng bo'lgan trapesiyaning yuzi eng ko'pi bilan nechaga teng bo'lishi mumkin.

A) 30   B) 120   C) 60   D) $60\sqrt{3}$ E) $60\sqrt{2}$

x Yechilishi: $S = \frac{1}{2}d_1 \cdot d_2 sinx =$

$= \frac{1}{2} \cdot 10 \cdot 12 \cdot sinx = 60 \cdot sinx;$

$$\Rightarrow S' = 60 \cdot cosx \Rightarrow S' = 0 \Rightarrow$$
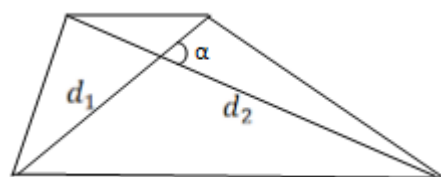
$$\Rightarrow 60 \cdot cosx = 0 \Rightarrow \begin{cases} 60 \neq 0 \\ cosx = 0 \end{cases} \Rightarrow x = \frac{\pi}{2} + k\pi, \ k\epsilon Z.$$

$$x \in \left[0; "+" \frac{\pi}{2}\right) \cup \left[\frac{\pi}{2}; "-" \pi\right)$$

Demak, $\frac{\pi}{2} max.$ U holda, $S = 60 \cdot sin\frac{\pi}{2} = 60.$

Javobi: C.

36. Rombning uchidan tushirilgan balandligi uning tomonini o'tkir burchagi uchidan boshlab hisoblanganda 3 va2 ga teng kesmalarga bo'ladi. Rombning yuzini toping.

    A)10   B) 20   C) 24   D) 18
    E) 15

    Yechilishi: Misr uchburchagiga asosan
    $h = 4; \ S = a \cdot h = 5 \cdot 4 = 20.$
    Javobi: B.
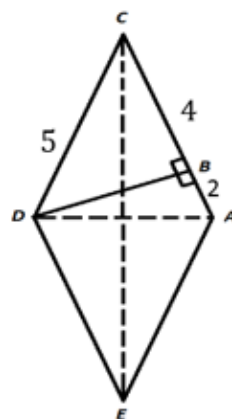
37. $\vec{a}$ va $\vec{b}$ birlik vektorlar orasidagi burchak $60°$ ga teng. $|\vec{a} + \vec{b}|$ ni toping.

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

    Yechilishi:

    $$(\hat{\vec{a}, \vec{b}}) = 60°, \ |\vec{a}| = |\vec{b}| = 1, \ |\vec{a} + \vec{b}| = ?$$

    $$|\vec{a} + \vec{b}|^2 = (\vec{a} + \vec{b})^2 = \vec{a}^2 + 2\vec{a} \cdot \vec{b} + \vec{b}^2 =$$

    $$= |\vec{a}|^2 + 2\vec{a} \cdot \vec{b} + \vec{b}^2 = 1^2 + 2\vec{a} \cdot \vec{b} + 1^2 =$$

    $$= 2 + |\vec{a}| \cdot |\vec{b}| \cos(\hat{\vec{a}, \vec{b}}) = 2 + 1 \cdot 1cos60° =$$

    $$= 2 + 1 = 3 \Rightarrow$$

    $$\Rightarrow |\vec{a} + \vec{b}|^2 = 3 \Rightarrow |\vec{a} + \vec{b}| = \sqrt{3}. \qquad \text{Javobi: D.}$$

38. $2x + 3y - 6 = 0$ to'g'ri chiziq va koordinata o'qlari bilan chegaralangan uchburchakning yuzini toping.

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

    Yechilishi:

$$2x + 3y = 6 \Rightarrow \frac{x}{3} + \frac{y}{2} = 1 \Rightarrow$$

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

$$\Rightarrow S = \frac{1}{2} \cdot a \cdot b = \frac{1}{2} \cdot 3 \cdot 2 = 3.$$
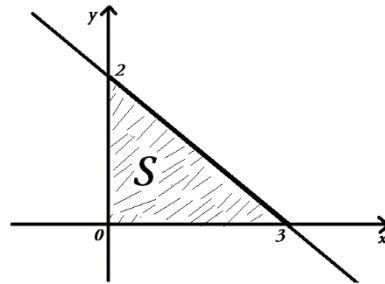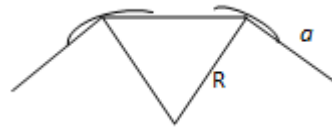
Javobi: C.

39.   Radusi R ga teng aylanaga ichki chizilgan muntazam oltiburchakning tomonini toping.

A) R   B) $\frac{2R}{\sqrt{3}}$ C) $\sqrt{3}R$ d) $\sqrt{2}R$ E) R/2

Yechilishi: $R = \dfrac{a}{2sin\frac{180°}{n}}$; $n = 6$;

$$\Rightarrow a = 2Rsin\frac{180°}{6} = 2Rsin30° =$$

$$= 2R \cdot \frac{1}{2} = R.$$

       Javobi: A.

40. Muntazam sakkiz burchakning   ichki burchaklari nimaga teng .

A)120°   B)130°   C) 150°   D) 135°   E) 225°

Yechilishi: $180(n - 2) \Rightarrow$

$$\Rightarrow 8\alpha = 180 \cdot (8 - 2) = 180 \cdot 6 = 1080 \Rightarrow$$

$$\Rightarrow \alpha = \frac{1080}{8} = 135°.$$

Javobi: D.

41. Og'ma prizmaning yon qirrasi 20 va asos tekisligi bilan 30° li burchak xosil qiladi. Prizmaning balandligini toping.

A)10   B)12   C)15

D)$10\sqrt{2}$ E)10 $\sqrt{2}$

Yechilishi:

$$AA_1 = 20; \qquad \angle A_1AC = 30°;$$

$$\frac{AC}{AA_1} = sin30° \Rightarrow AC = \frac{1}{2} \cdot 20 = 10.$$

Javobi: A.
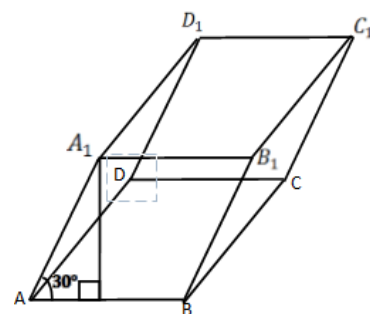
Pirnazar DAVRONOV

42. Piramidaning asos tomonidan 6 va 8 ga teng bo'lgan to'g'ri to'rtburchakdan iborat .Piramidaning xar bir yon qirrasi $5\sqrt{5}$ ga teng bo'lsa, uning balandligini toping.

   A) 5   B) 10   C) 100   D)25   E) 20

   Yechilishi:

   $SB = 5\sqrt{5}$ $SO =?$
   $DB^2 = 8^2 + 6^2 = 100 \Rightarrow$
   $\Rightarrow DB = 10 \Rightarrow OB = 5;$
   $SO^2 = SB^2 - OB^2 =$
   $= \left(5\sqrt{5}\right)^2 - 5^2 =$
   $= 25 \cdot 5 - 25 = 100 \Rightarrow$
   $\Rightarrow SO = 10.$ Javobi: B.
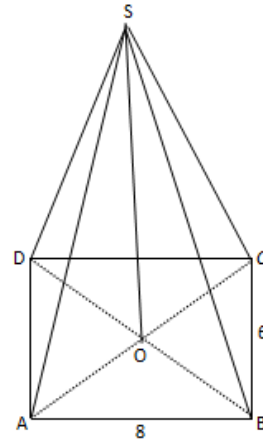
43. Slindirning balandligi 3 ga o'q kesimining diaganali 5 ga teng. Asosining radiusini toping.

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

   Yechilishi:

   $AC = OO_1 = H = 3, \ BC = 5 \Rightarrow$
   $\Rightarrow AB^2 = BC^2 - AC^2 = 25 - 9 = 16 \Rightarrow$
   $\Rightarrow AB = 4; \quad R = \dfrac{AB}{2} \Rightarrow R = 2.$
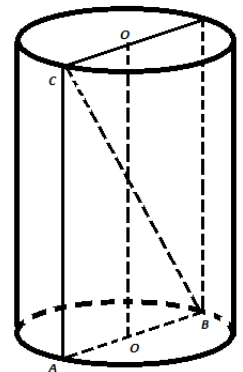
   Javobi: B.

44. Konusning yasovchisi 6 ga teng va u asos tekisligi bilan $30°$ li burchak xosil qiladi .Konusning hajmini toping.

   A) 9π B) 27π C) 81π D) $9\sqrt{3}\pi$ E)$27\sqrt{3}\pi$

   Yechilishi: $SA = 6; \ \angle OAS = 30°;$
   $SO = \dfrac{SA}{2} \Rightarrow SO = 3;$
   $\dfrac{OA}{SA} = cos30° \Rightarrow$
   $\Rightarrow OA = SA \cdot \dfrac{\sqrt{3}}{2} = 6 \cdot \dfrac{\sqrt{3}}{2} = 3\sqrt{3} \Rightarrow$
   $\Rightarrow OA = 3\sqrt{3};$
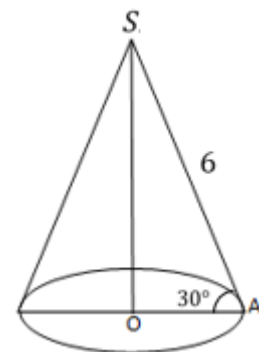
$$V = \frac{1}{3}\pi R^2 H = \frac{1}{3}\pi \cdot OA^2 \cdot SO = \frac{1}{3}\pi \cdot \left(3\sqrt{3}\right)^2 \cdot 3 = 27\pi \Rightarrow$$

$$\Rightarrow V = 27\pi. \qquad \text{Javobi: B.}$$

45. $\vec{b} =(3;-6;6)$ vektorga kollenar va $\vec{a} \cdot \vec{b}=27$ tenglikni qanoatlantiruvchi $\vec{a}$ vektorni toping.

A) $\vec{a}(1; -2; -2)$ \qquad B) $\vec{a}(1; 2; 3)$ \qquad C) $\vec{a}(\frac{1}{2}; -1; 1)$

D) $\vec{a}(1; -2; 2)$ \qquad E) $\vec{a}(2; -2; 1)$

Yechilishi: $\vec{b} = \{3; -6; 6\}; \quad \vec{a} = \{x; y; z\}; \qquad \vec{b} = \lambda\vec{a} \Rightarrow$

$$\Rightarrow \{3; -6; 6\} = \lambda \cdot \{x; y; z\} \Rightarrow \{3; -6; 6\} = \{\lambda x; \lambda y; \lambda z\} \Rightarrow$$

$$\Rightarrow \begin{cases} \lambda x = 3 \\ \lambda y = -6 \\ \lambda z = 6 \end{cases} \Rightarrow \begin{cases} x = \dfrac{3}{\lambda} \\ y = -\dfrac{6}{\lambda} \\ z = \dfrac{6}{\lambda} \end{cases} \Rightarrow \vec{a} = \left\{\dfrac{3}{\lambda}; -\dfrac{6}{\lambda}; \dfrac{6}{\lambda}\right\};$$

$$\vec{a} \cdot \vec{b} = 27 \Rightarrow \left\{\dfrac{3}{\lambda}; -\dfrac{6}{\lambda}; \dfrac{6}{\lambda}\right\} \cdot \{3; -6; 6\} = 27 \Rightarrow$$

$$\dfrac{9}{\lambda} + \dfrac{36}{\lambda} + \dfrac{36}{\lambda} = 27 \Rightarrow 9 + 36 + 36 = 27\lambda \Rightarrow$$

$$81 = 27\lambda \Rightarrow \lambda = \dfrac{81}{27} \Rightarrow \lambda = 3 \Rightarrow \vec{a} = \{1; -2; 2\}. \quad \text{Javobi: D.}$$

46. Radusi 13 ga teng bo'lgan shar tekislik bilan kesilgan. Agar shar markazidan kesimgacha masofa 10 ga teng bo'lsa, kesimning yuzini toping.

A) 69π \qquad B)100π \qquad C) 9π \qquad D)$3\sqrt{6}\pi$ \qquad E)3

Yechilishi: $OA = 13; OO_1 = 10;$

$O_1A^2 = 13^2 - 10^2 =$
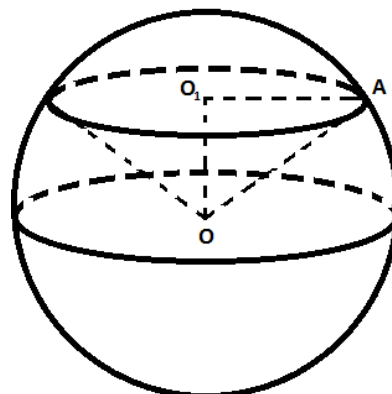
$= 169 - 100 = 69 \Rightarrow$

$\Rightarrow O_1A = \sqrt{69};$

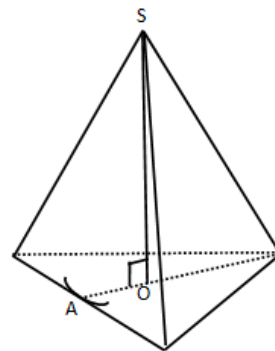$S_{kesim} = \pi R^2 = \pi \cdot O_1A^2 =$

$= \pi \cdot \sqrt{69}^2 = 69\pi.$

Javobi: A.

Pirnazar DAVRONOV

47. Uchburchakli piramidaning asosidagi barcha ikki yoqli burchaklari 30° ga teng. Agar piramidaning balandligi 6 ga teng bo'lsa ,uning asosiga ichki chizilgan doiraning radusini to ping.

A)2   B)6   C)3
D) $2\sqrt{3}$ E)$6\sqrt{3}$

Yechish: $SO = 6 \Rightarrow \frac{AO}{SO} = ctg30° \Rightarrow$

$\Rightarrow AO = SO \cdot ctg30° \Rightarrow AO = 6 \cdot \sqrt{3}$ Javobi: E.

48. Agar $tg(x + y) = 5$ va $tg\,x = 3$ bo'lsa, $tg\,y$ ni toping.

A) ½   B) 2   C)1/8   D) -4 /7   E) 8

Yechilishi: $tg(x + y) = 5; tgx = 3;\ tgy = ?$

$tg(x + y) = \frac{tgx+tgy}{1-tgx \cdot tgy} \Rightarrow \frac{3+tgy}{1-3 \cdot tgy} = 5 \Rightarrow$

$\Rightarrow 3 + tgy = 5 - 15tgy \Rightarrow$

$\Rightarrow 16tgy = 2 \Rightarrow tgy = \frac{2}{16} \Rightarrow tgy = \frac{1}{8}.$ Javobi: C.

49. $x = arccos0{,}9;\ y = arccos(-0{,}7)\ va\ z = arccos(-0{,}2)$ sonlarni o'sib borish tartibida yozing.

A) $y < z < x$ B) $x < y < z$ C) $y < x < z$
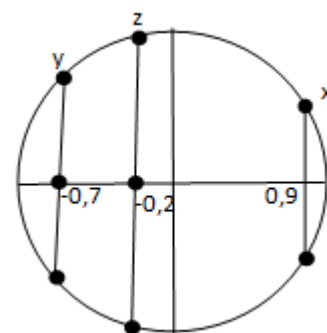D)$x < z < y$ E) $z < y < x$

Yechilishi: $x = arccos0{,}9 \Rightarrow cosx = 0{,}9;$
$y = arccos(-0{,}7) \Rightarrow cosy = -0{,}7;$
$z = arccos(-0{,}2) \Rightarrow cosz = -0{,}2;$
$x < z < y.$
Javobi: D.

50. $4(\cos 2x)^2$-1=cos 4x tenglamani yeching.

A) $\frac{\pi}{4} + \frac{n\pi}{2}$, n$\epsilon$Z   B) $\frac{\pi}{6} + \frac{n\pi}{2}$, n$\epsilon$Z   C) $\frac{\pi}{8} + \frac{n\pi}{2}$, n$\epsilon$Z
D) $\frac{\pi}{3} + \frac{n\pi}{2}$, n$\epsilon$Z   E) $\frac{n\pi}{2}$, nϵZ

Yechilishi: $4cos^2 2x - 1 = cos4x;$
$4cos^2 2x - 1 = cos(2x + 2x);$
$4cos^2 2x - sin^2 2x - cos^2 2x = cos^2 2x - sin^2 2x;$

$4cos^2 2x - 2cos^2 2x = 0;$

$2cos^2 2x = 0 \Rightarrow cos 2x = 0 \Rightarrow 2x = \frac{\pi}{2} + n\pi \Rightarrow$

$\Rightarrow x = \frac{\pi}{4} + \frac{n\pi}{2}, \quad n\epsilon Z.$ 　　　　　Javobi: A.

51. $\arcsin x < \arcsin(1 - x)$ tengsizlikni yeching.

A) $\left[0; \frac{1}{2}\right)$ 　B) $[-1; 1]$ 　C) $(-\infty; \frac{1}{2}]$ 　D) $[0; 2]$ 　E) $\emptyset$

Yechilishi: $arcsinx < \arcsin(1 - x)$

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

$\Rightarrow -2 \leq -x \leq 0 \Rightarrow 0 \leq x \leq 2 \Rightarrow 0 \leq x \leq 1;$

2) $sinarcsinx < sinarcsin(1 - x) \Rightarrow x < 1 - x \Rightarrow$

$2x < 1 \Rightarrow x < \frac{1}{2};$

1) va 　2) dan 　$0 \leq x < \frac{1}{2} \Rightarrow \left[0; \frac{1}{2}\right).$ 　　Javobi: A.

52. Agar $\sqrt{1 - cos^2 x} - \sqrt{1 + sin^2 x} = k$ bo'lsa,

$\sqrt{1 - cos^2 x} + \sqrt{1 + sin^2 x}$ ni toping.

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

Yechilishi: $\sqrt{1 - cos^2 x} - \sqrt{1 + sin^2 x} = k;$

$\frac{(\sqrt{1-cos^2 x}-\sqrt{1+sin^2 x})(\sqrt{1-cos^2 x}+\sqrt{1-sin^2 x})}{\sqrt{1-cos^2 x}-\sqrt{1+sin^2 x}} = k;$

$\frac{1-cos^2 x-1-sin^2 x}{\sqrt{1-cos^2 x}+\sqrt{1+sin^2 x}} = k \Rightarrow \frac{-(cos^2 x+sin^2 x)}{\sqrt{1-cos^2 x}+\sqrt{1+sin^2 x}} = k \Rightarrow$

$\Rightarrow k\left(\sqrt{1 - cos^2 x} + \sqrt{1 + sin^2 x}\right) = -1 \Rightarrow$

$\Rightarrow \sqrt{1 - cos^2 x} + \sqrt{1^2 + sin^2 x} = -\frac{1}{k}.$ 　　Javobi: E.

53. $\arcsin(2sinx) = \frac{\pi}{2}$ tenglamaning eng kichik musbat

ildizini toping.

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

Yechilishi: $\arcsin(2sinx) = \frac{\pi}{2} \Rightarrow$

$\Rightarrow sinarcsin(2sinx) = sin\frac{\pi}{2} \Rightarrow$

$\Rightarrow 2sinx = 1 \Rightarrow sinx = \frac{1}{2} \Rightarrow$

$\Rightarrow x = (-1)^k arcsin\frac{1}{2} + \pi k, \ k\epsilon Z;$

$x = (-1)^k \frac{\pi}{6} + \pi k, \ k\epsilon Z; \quad k = 0 \Rightarrow x = \frac{\pi}{6}.$ \qquad Javobi: D.

54. $\cos 45° \cos 15° + \sin 45° \sin 15°$ ni hisoblang.

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

Yechilishi: $\cos45°\cos15° + \sin45°\sin15° =$

$= \cos(45° - 15°) = \cos30° = \frac{\sqrt{3}}{2}.$ \qquad Javob: C.

55. $\cos 2x \leq -\frac{1}{2}$ tengsizlikning $[0; \pi]$ kesmadagi yechimini toping.

A) $\left[\frac{\pi}{3}; \frac{2\pi}{3}\right]$ \qquad B) $\left[0; \frac{2\pi}{3}\right]$ \qquad C) $\left[-\frac{2\pi}{3}; \frac{4\pi}{3}\right]$

D) $\left[\frac{4\pi}{3}; 2\pi\right]$ \qquad E) $\left[\frac{2\pi}{3}; \frac{4\pi}{3}\right]$

Yechilishi: $cos2x \leq -\frac{1}{2} \Rightarrow [0; 2\pi];$

$2\pi k + \frac{2\pi}{3} \leq 2x \leq \frac{4\pi}{3} + 2\pi k, k\epsilon Z;$

$\pi k + \frac{\pi}{3} \leq x \leq \frac{2\pi}{3} + \pi k, k\epsilon Z;$

$\frac{\pi}{3} \leq x \leq \frac{2\pi}{3}; \quad \left[\frac{\pi}{3}; \frac{2\pi}{3}\right].$ \quad Javobi: A.
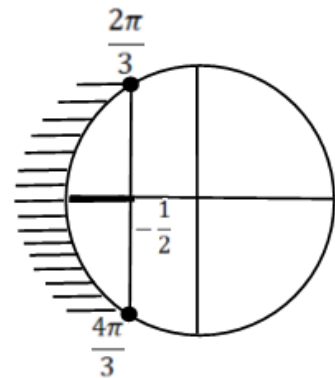
56. Agar $\begin{cases} sin^2x = \cos x \cos y \\ cos^2x = \sin x \sin y \end{cases}$ bo'lsa, $\cos(x - y)$ ni toping.

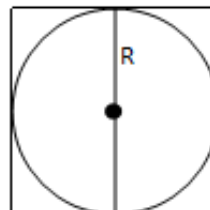A) $\frac{1}{2}$ \qquad B) 1 \qquad C) $\frac{\sqrt{3}}{2}$ \qquad D) $\frac{\sqrt{2}}{2}$ \qquad E) 0

Yechilishi: $+\begin{array}{c} sin^2x = \cos x \cos y \\ sin^2x = \cos x \cos y \end{array} \Rightarrow$

$\Rightarrow sin^2x + cos^2x = cosxcosy + sinxsiny \Rightarrow$

$\Rightarrow \cos(x - y) = 1.$ \qquad Javobi: B.

57. Teng tomonli silindrga radiusi 3 ga teng shar ichki chizilgan. Silindr va shar sirtlari orasida joylashgan jismning hajmini toping.

A) 27π B) 24π C) 18π
D) 12π E) 21

Yechilishi: $R = 3$; $H = 6$.

$V_{sil} = \pi R^2 H = \pi \cdot 3^2 \cdot 6 = 54\pi$;

$\Rightarrow V_{shar} = \frac{4}{3}\pi R^3 = \frac{4}{3}\pi \cdot 3^3 = 36\pi$;

$V = V_{sil} - V_{shar} = 54\pi - 36\pi = 18\pi$.   Javobi: C.

58. Qirrasi 12 ga teng kubga konus ichki chizilgan. Agar konusning asosi kubning pastki asosiga ichki chizilgan bo'lsa, uchi esa yuqoridagi asosining markazida yotsa, konusning hajmini toping.

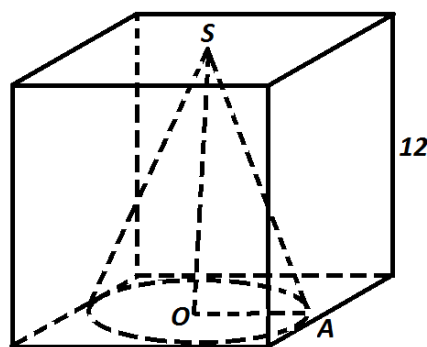A) 120π B) 132π C) 126π D) 156π E) 144π

Yechilishi: $SO = 12$; $OA = 6$;

$V = \frac{1}{3}\pi R^2 H = \frac{1}{3}\pi \cdot OA^2 \cdot SO =$

$= \frac{1}{3\pi} \cdot 6^2 \cdot 12 =$

$= 36 \cdot 4\pi = 144\pi$.

Javobi: E.

1998-YIL, 7-AXBOROTNOMA

1. $420 : (160 - 1000 : x) = 12$ dan x ni toping.

   A) 8   B) $\frac{1}{8}$ C) 35   D) 36   E) -8

   Yechilishi: $\frac{420}{160 - 1000 : x} = 12 \Rightarrow \frac{1}{160 - \frac{1000}{x}} \cdot 420 = 12 \Rightarrow$

   $\Rightarrow 35 = 160 - \frac{1000}{x};$

   $\Rightarrow \frac{1000}{x} = 125 \Rightarrow 125x = 1000 \Rightarrow x = 8.$

   Javobi: A.

2. $\frac{488 \cdot 475 - 462}{244 + 475 \cdot 243}$ ni hisoblang.

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

   Yechilishi: $\frac{488 \cdot 475 - 462}{244 + 475 \cdot 243} = \frac{2(244 \cdot 475 - 231)}{244 + 475 \cdot 243} =$

   $= \frac{2 \cdot [(243 + 1) \cdot 475 - 231]}{244 + 475 \cdot 243} = \frac{2 \cdot (243 \cdot 475 + 475 - 231)}{244 + 475 \cdot 243} =$

   $= \frac{2 \cdot (243 \cdot 475 + 244)}{244 + 475 \cdot 243} = 2.$ Javobi: D.

3. Qaysi tenglik qoldiqli bo'lishni ifodalaydi .

   1) 43=9·5 − 2; 2) 43=8·5 + 3;   3) 43=7·5 + 8;   4) 43= 21·2 +1;

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

   Yechilishi: Qoldiq musbat va bo'luvchidan kichik bo'lishi kerak.   Javobi: C.

4. x raqamining qanday eng kichik qiymatida ($147 + \overline{3x2}$) son 3 ga qoldiqsiz bo'linadi?

   A) 5   B) 0   C) 4   D) 7   E)1

   Yechilishi: $(147 + \overline{3x2}) = (147 + 3 \cdot 100 + 10x + 2) =$

   $= 449 + 10x \Rightarrow 4 + 4 + 9 = 17; x = 1.$ Javobi: E.

5. 243: (9 : 11) ni hisoblang.

   A) 27   B) $2\frac{5}{11}$ C) $\frac{11}{27}$ D) $198\frac{9}{11}$ E) 297

   Yechilishi: 243:(9:11)=243:9:11=27:11=$2\frac{5}{11}$.   Javobi: B.

6. Davri 0 yoki 9 dan farqli bo'lgan cheksiz davriy o'nlik kasrlarni ko'rsating.

   $m = \frac{1}{0,33}$, $n = 247{,}123123$, $p = 0{,}63(8)$,

   $q = \frac{172}{99}$, $l = \frac{17}{20}$;

A) n, p;   B) m, p, l;   C) m, n, p, q;   D) m, q;   E) hammasi

Yechilishi: m, n, p, q.   Javobi: C.

7. $m = 0{,}55(57)$; $n = 0{,}5(557)$; $l = 0{,}555(7)$ sonlarni kamayish tartibda yozing .

   A) $l > m > n$ B) $l > n > m$ C) $m > n > l$

   D) $n > l > m$ E) $n > m > l$

   Yechilishi: $\begin{cases} m = 0{,}55575757\ldots \\ n = 0{,}5557557\ldots \Rightarrow \ l > m > n. \\ \ l = 0{,}5557777\ldots \end{cases}$

8. $m = \sqrt[4]{256}$; $n = 3{,}141516\ldots$; $p = \sqrt{\sqrt{\sqrt{81}} + 13}$; $q = \frac{1}{\sqrt{2}}$;   sonlardan qaysilar irrotsional sonlar?

   A) p, q;   B) m, p;   C) m, n ;   D) n, q;   E) hammasi .

   Yechilishi: $\begin{cases} m = \sqrt[4]{256} = 2; \\ n = 3{,}141516\ldots; \\ p = \sqrt{\sqrt{\sqrt{81}} + 13} = 4; \\ q = \frac{1}{\sqrt{2}}. \end{cases}$ Davriy bo'lmagan

   cheksiz o'nli kasrlarga irratsional sonlar deyiladi.

   Javobi: D.

9. $\frac{2,21 \cdot 5,95 + 1,51}{6,42 \cdot 5,95 - 8,88}$ ni hisoblang .

A) 1   B) $\frac{1}{2}$ C) $1\frac{1}{2}$ D) $-\frac{62}{41}$ E) $\frac{62}{41}$

Yechilishi: $\frac{2,21\cdot5,95+1,51}{6,42\cdot5,95-8,88} = \frac{13,1495+1,51}{38,199-8,88} = \frac{14,6595}{29,319} = \frac{1}{2}$.

Javobi: B.

10. $\frac{(3,7^2-6,3^2)(13^2-12,6^2)}{(4,2^2-5,8^2)(2,3^2-0,3^2)}$ ni hisoblang.

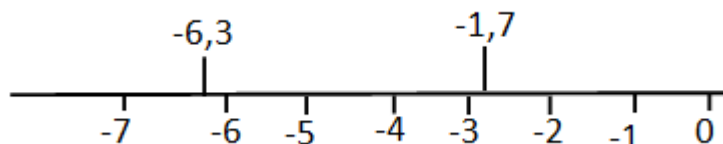A) 32   B) 0,32   C) 3,2   D) $\frac{1}{32}$ E) $\frac{5}{16}$

Yechilishi:
$\frac{(3,7^2-6,3^2)(13^2-12,6^2)}{(4,2^2-5,8^2)(2,3^2-0,3^2)} = \frac{(3,7-6,3)(3,7+6,3)(13-12,6)(13+12,6)}{(4,2-5,8)(4,2+5,8)(2,3-0,3)(2,3+0,3)} =$
$\frac{-2,6\cdot10\cdot0,4\cdot25,6}{-1,6\cdot10\cdot2\cdot2,6} = \frac{16}{5} = 3,2.$

Javobi: C.

11. Son o'qida -4 dan 2,3 birlik masofada joylashgan sonlarni aniqlang.

A) - 6,3   B) - 6,3 va 1,7   C) 6,3 va 1,7

D) - 6,3 va -1,7   E) -1,7

Yechilishi:

Javobi: D.

12. Piyoda kishi 1 km yo'lni $\frac{2}{9}$ soatda o'tadi. U $\frac{3}{4}$ km yo'lni qancha soatda o'tadi.

A) $\frac{1}{5}$ B) $\frac{1}{6}$ C) $\frac{8}{27}$ D) $\frac{1}{4}$ E) $\frac{27}{8}$

Yechilishi: $\frac{3}{4}\cdot\frac{2}{9} = \frac{1}{6}$.   Javobi: B.

13. $(\frac{1}{3} + x) : 7 = (\frac{3}{4} + x) : 9$ tenglamani yeching.

A) $1\frac{3}{8}$ B) $1\frac{1}{8}$ C) $1\frac{5}{8}$ D) $1\frac{7}{8}$ E) $1\frac{1}{4}$

Yechilishi: $(\frac{1}{3} + x): 7 = (\frac{3}{4} + x) : 9 \Rightarrow \frac{1+3x}{3}\cdot\frac{1}{7} = \frac{3+4x}{4}\cdot\frac{1}{9} \Rightarrow$

$\Rightarrow \frac{1+3x}{21} = \frac{3+4x}{36} \Rightarrow 36(3x+1) = 21(4x+3) \Rightarrow$

$\Rightarrow 36x + 12 = 28x + 21 \Rightarrow 8x = 9 \Rightarrow x = \frac{9}{8} = 1\frac{1}{8}.$

Javobi: B.

14. $(\sqrt{3 - \sqrt{5}} + \sqrt{3 + \sqrt{5}})^2 \cdot 0,5^{-2}$ ni hisoblang .

A) 38   B) 30   C) 40   D) 44   E) 50

Yechilishi: $\left(\sqrt{3 - \sqrt{5}} + \sqrt{3 + \sqrt{5}}\right)^2 \cdot 0,5^{-2} =$

$= (3 - \sqrt{5} + 2\sqrt{3 - \sqrt{5}} \cdot \sqrt{3 + \sqrt{5}} + 3 + \sqrt{5}) \cdot \frac{1}{0,5^2} =$

$= \left(6 + 2 \cdot \sqrt{(3 - \sqrt{5})(3 + \sqrt{5})}\right) \cdot \frac{1}{\left(\frac{1}{2}\right)^2} = (6 + 2\sqrt{9 - 5}) \cdot$

$\frac{1}{\frac{1}{4}} = = (6 + 2 \cdot 2) \cdot 4 = 40.$ Javobi: C.

15. $m = \frac{119}{120}$ va $n = \frac{240}{242}$ sonlar uchun quyidagi munosabatlardan qaysi biri to'g'ri ?

A) $n > m$ B) $n < m$ C) $n = m$

D) $n - 1 = m$ E) $n = \frac{2m+2}{242}$

Yechilishi: $\begin{cases} m = \frac{119}{120} = \frac{119 \cdot 120}{120 \cdot 120} = \frac{14280}{14400} \\ n = \frac{120}{121} = \frac{120 \cdot 119}{121 \cdot 119} = \frac{14280}{14399} \end{cases} \Rightarrow n > m.$

Javobi: A.

16. $c = \sqrt{13} - \sqrt{12}$ va $d = \sqrt{14} - \sqrt{13}$ sonlar uchun qaysi munosabat o'rinli?

A) $c > d$ B) $c < d$ C) $c = d$

D) $c = d - 1$ E) $c^2 + \sqrt{27} = d^2$

Yechilishi:

$\begin{cases} c = \frac{(\sqrt{13} - \sqrt{12})(\sqrt{13} + \sqrt{12})}{\sqrt{13} + \sqrt{12}} = \frac{13 - 2}{\sqrt{13} + \sqrt{12}} = \frac{11}{\sqrt{13} + \sqrt{12}} \\ d = \frac{(\sqrt{14} - \sqrt{13})(\sqrt{14} + \sqrt{13})}{(\sqrt{14} + \sqrt{13})} = \frac{14 - 13}{\sqrt{14} + \sqrt{13}} = \frac{1}{\sqrt{13} + \sqrt{14}} \end{cases} \Rightarrow c > d;$

133

Pirnazar DAVRONOV

Chunki, $\sqrt{13} + \sqrt{12} < \sqrt{13} + \sqrt{14}.$ Javobi: A.

17. O'zaro teskari sonlarni aniqlang.

1) $\dfrac{\sqrt{7}}{2}$ va $\dfrac{2\sqrt{7}}{7}$;   2) $\sqrt{6} - \sqrt{5}$ va $\sqrt{6} + \sqrt{5}$;

3) $\dfrac{2\sqrt{5}}{9}$ va $\dfrac{9\sqrt{5}}{10}$;   4) $\sqrt{3} - 1$ va $\sqrt{3} + 1.$

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

Yechilishi: 1) $\dfrac{\sqrt{7}}{2} \Rightarrow \dfrac{1}{\frac{\sqrt{7}}{2}} = \dfrac{2}{\sqrt{7}} = \dfrac{2\sqrt{7}}{\sqrt{7}\cdot\sqrt{7}} = \dfrac{2\sqrt{7}}{7}$;

2) $\sqrt{6} - \sqrt{5} \Rightarrow \dfrac{1}{\sqrt{6}-\sqrt{5}} = \dfrac{\sqrt{6}+\sqrt{5}}{(\sqrt{6}-\sqrt{5})(\sqrt{6}+\sqrt{5})} = \dfrac{\sqrt{6}+\sqrt{5}}{6-5} = \sqrt{6} + \sqrt{5}$;

3) $\dfrac{2\sqrt{5}}{9} \Rightarrow \dfrac{1}{\frac{2\sqrt{5}}{9}} = \dfrac{9}{2\sqrt{5}} = \dfrac{9\sqrt{5}}{2\sqrt{5}\cdot\sqrt{5}} = \dfrac{9\sqrt{5}}{10}$;

4) $\sqrt{3} - 1 \Rightarrow \dfrac{1}{\sqrt{3}-1} = \dfrac{\sqrt{3}+1}{(\sqrt{3}-1)(\sqrt{3}+1)} = \dfrac{\sqrt{3}+1}{3-1} = \dfrac{\sqrt{3}+1}{2}$;

1, 2 va 3.   Javobi: E.

18. $\sqrt{2\sqrt{2} - 1} \cdot \sqrt[4]{9 + 4\sqrt{2}}$ ni soddalashtiring.

A) 7   B) $\sqrt[4]{7}$ C) $2\sqrt{2} + 1$ D) $\sqrt{7}$ E) $\sqrt{8}$ -1

Yechish:

$$\sqrt{2\sqrt{2} - 1} \cdot \sqrt[4]{9 + 4\sqrt{2}} = \sqrt[4]{(2\sqrt{2} - 1)^2(9 + 4\sqrt{2})} ==$$

$$\sqrt[4]{(8 - 4\sqrt{2} + 1)(9 + 4\sqrt{2})} = \sqrt[4]{(9 - 4\sqrt{2})(9 + 4\sqrt{2})} =$$

$$\sqrt[4]{81 - 32} = \sqrt[4]{49} = \sqrt[4]{7^2} = \sqrt{7}.$$ Javobi: D.

19. b ning qanday qiymatida $\dfrac{7b^3}{b^3+1}$ kasrning qiymati $\dfrac{56}{9}$ ga teng bo'ladi?

A) -2   B) 2   C) 4   D) 10   E) $\dfrac{1}{2}$

Yechilishi: $\dfrac{7b^3}{b^3+1} = \dfrac{56}{9} \Rightarrow b = 2.$ Javobi: B.

20. Agar $a:b = -\sqrt{5}$ bo'lsa, $a^2 - 5b^2$ ni hisoblang.

A) 0   B) $\sqrt{5}$ C) 5   D) -5   E) -$\sqrt{5}$

Yechilishi: $\dfrac{a}{b} = -\sqrt{5} \Rightarrow a = -\sqrt{5}b;$

$\Rightarrow a^2 - 5b^2 = a^2 - \left(\sqrt{5}\right)^2 = (a - \sqrt{5}b)(a + \sqrt{5}b) = 0.$

Javobi: A.

21. $lg(x - 3) - lg(x + 9) = lg(x - 2)$ tenglamada x ning qabul qilishi mumkin bo'lgan qiymatlar to'plamini ko'rsating .

A) $(\ 2; 3)$ B) $(9;\ \infty)$ C) $(-\ 9\ ;\ \infty)$

 D) $(3\ ;\ \infty)$ E) $(-\ \infty\ ;\ 9)$

Yechilishi: $\begin{cases} x - 3 > 0 \\ x + 9 > 0 \\ x - 2 > 0 \end{cases} \Rightarrow \begin{cases} x > 3 \\ x > -9 \\ x > 2 \end{cases} \Rightarrow (3; \infty).$ Javobi: D.

22. $f(x) = lg\,(arcsinx)$ funksiyaning qiymatlari to'plamini toping.

A) $(-\ \infty\ ;\ 0)$ B) $(-\infty\ ;\ \infty)$ C) $(-\ \infty\ ;\ lg\dfrac{\pi}{2}]$

D) $[\ 0;\ lg\dfrac{\pi}{2}]$ E) $[\ lg\dfrac{\pi}{2}\ ;\ \infty)$

Yechilishi: 1) $arcSinx > 0$

2) $arcSinx$ ning asosiy qiymatlari;

$-\dfrac{\pi}{2}$ bilan $\dfrac{\pi}{2}$ oralig'ida bo'ladi. Bundan

$0 < arcSinx \le \dfrac{\pi}{2}$ kelib chiqadi. U holda, logarifmning asosi

$10 > 1$ va $(-\infty; lg\dfrac{\pi}{2}]$ bo'ladi.   Javobi: C.

23. Quyidagilardan qaysilari kamayuvchi funksiyalar?

1) $y = 0.37^x$ 2) $y = (\sqrt[3]{11})^x$

3) $y = 3 \cdot (\dfrac{1}{2})^x$ 4) $y = (\dfrac{3}{4})^x$ 5) $y = \dfrac{1}{2} \cdot 3^x$

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

Yechilishi: Asos nol bilan 1 orasida bo'lsa, funksiya kamayuvchi. Asos 1 dan katta bo'lsa, funksiya o'suvchi bo'ladi.

Javobi: E.

24. $\dfrac{5(3 \cdot 7^{15} - 19 \cdot 7^{14})}{7^{16} + 3 \cdot 7^{15}}$ ni hisoblang.

A)7   B)49   C)$\frac{1}{7}$ D)$\frac{1}{49}$ E)3

Yechilishi: $\frac{5 \cdot 7^{14}(3 \cdot 7 - 19)}{7^{15}(7+3)} = \frac{5(21-19)}{7 \cdot 10} = \frac{1}{7}$.   Javobi: C.

25. $\frac{2^{5n-3} \cdot 2^{3n+2}}{2^{4n-1}}$ ni soddalashtiring.

A)2^{3n} B)2^{4n+1} C)2^{4n+2} D)2^{5n} E)2^{4n}

Yechilishi: $\frac{2^{5n-3} \cdot 2^{3n+2}}{2^{4n-1}} = \frac{2^{5n-3+3n+2}}{2^{4n-1}} = 2^{8n-1-4n+1} = 2^{4n}$.

Javobi: E.

26. $-2a^2 - 2b^2$ ni $a+b$ va ab orqali ifodalang.

A)4ab-2(a+b)^2 B)2(a+b)^2 $- 4ab$ C) 4ab+2(a+b)^2

D) -4ab-2(a+b)^2 E) 2(a+b)^2 $- 2ab$

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

$a^2 + b^2 + 2ab = (a+b)^2 \Rightarrow a^2 + b^2 = (a+b)^2 - 2ab$;

$-2a^2 - 2b^2 = -2(a^2 + b^2) = -2[(a+b)^2 - 2ab] =$

$= 4ab - 2(a+b)^2$.   Javobi: A.

27. $\frac{x^4+1}{x^2+x\sqrt{2}+1}$ ni qisqartiring.

A)$x^2 + 1$ B)$x^2 - x\sqrt{2} - 1$ C) $x^2 - 2\sqrt{2x} + 1$

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

Yechilishi: $\frac{x^4+1}{x^2+x\sqrt{2}+1} = \frac{(x^2+x\sqrt{2}+1)(x^2-x\sqrt{2}+1)}{x^2+x\sqrt{2}+1} =$

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

Chunki, $(x^2 + x\sqrt{2} + 1)(x^2 - x\sqrt{2} + 1) =$

$= x^4 - x^3\sqrt{2} + x^2 + x^3\sqrt{2} - 2x^2 + x\sqrt{2} +$

$+x^2 - x\sqrt{2} + 1 = x^4 + 1$.   Javobi: E.

28. $\frac{4a^2-12ab+9b^2}{2a^2-ab-3b^2}$ ni soddalashtiring.

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

Yechilishi: $\frac{4a^2-12ab+9b^2}{2a^2-ab-3b^2} = \frac{(2a-3b)^2}{(2a-3b)(a+b)} = \frac{2a-3b}{a+b}$. Chunki,

$\frac{2a^2 - ab - 3b^2}{2a - 3b} = a + b \Rightarrow 2a^2 - ab - 3b^2 =$

$= (2a - 3b)(a + b).$ Javobi: C.

29. $\sqrt{13 + 30\sqrt{2 + \sqrt{9 + 4\sqrt{2}}}}$ ni soddalashtiring.

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

Yechilishi: Murakkab radikal formulasidan foydalanildi.

$$\sqrt{13 + 30\sqrt{2 + \sqrt{9 + 4\sqrt{2}}}} =$$

1) $\sqrt{9 + 4\sqrt{2}} = \sqrt{9 + \sqrt{32}} = \sqrt{\frac{9+\sqrt{81-32}}{2}} + \sqrt{\frac{9-\sqrt{81-32}}{2}} =$

$= \sqrt{8} + 1;$

2) $\sqrt{2 + \sqrt{9 + 4\sqrt{2}}} = \sqrt{2 + \sqrt{8} + 1} = \sqrt{3 + \sqrt{8}} =$

$= \sqrt{\frac{3+\sqrt{9-8}}{2}} + \sqrt{\frac{3-\sqrt{9-8}}{2}} = \sqrt{2} + 1;$

3) $\sqrt{13 + 30(\sqrt{2} + 1)} = \sqrt{13 + 30\sqrt{2} + 30} =$

$\sqrt{43 + \sqrt{1800}} =$

$= \sqrt{\frac{43+\sqrt{1849-1800}}{2}} + \sqrt{\frac{43-\sqrt{1849-1800}}{2}} = \sqrt{\frac{43+\sqrt{49}}{2}} + \sqrt{\frac{43-7}{2}} =$

$= \sqrt{\frac{43+7}{2}} + \sqrt{\frac{43-7}{2}} = 5 + 3\sqrt{2}.$ Javobi: D.

30. $10(ax - 1) = 2a - 5x - 9$ tenglama a ning qanday qiymatlarida yagona yechimga ega?

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

D) $(-\infty;-\frac{1}{2})$ E) $(-\frac{1}{2}; \infty)$

Yechilishi: $10(ax - 1) = 2a - 5x - 9;$

$10ax - 10 = 2a - 5x - 9;$

$10ax - 2a = 10 - 9 - 5x;$

$$2a(5x - 1) = 1 - 5x;$$

$$a = \frac{1-5x}{2(5x-1)} = -\frac{5x-1}{2(5x-1)} = -\frac{1}{2} \Rightarrow a = -\frac{1}{2} \text{ da yechim}$$

cheksiz ko'p bo'ladi. Demak, $\left(-\infty; -\frac{1}{2}\right) \cup \left(-\frac{1}{2}; \infty\right)$.

Javobi: A.

31. OY o'qqa nisbattan $y = -3x + 1$ to'g'ri chiziqqa simmetrik bo'lgan to'g'ri chiziqning tenglamasini ko'rsating.

A) $y = 3x - 1$ B) $y = 3x - 1$ C) $y = 3x + 1$

D) $y = -3x + 1$ E) y$= -\frac{1}{3}$x+1

Yechilishi: 1) $y = -3x + 1$

va OY o'qining kesisish nuqtasi topiladi.

$$\begin{cases} y = -3x + 1 \\ OY = x = 0 \end{cases} \Rightarrow \begin{cases} x = 0 \\ y = 1 \end{cases} \Rightarrow A(0; 1).$$

2) Izlanayotgan to'g'ri chiziq ham shu nuqtadan o'tadi.

3) $y = -3x + 1$ to'g'ri chiziqda

$B(-1; 4)$ nuqtani olamiz, $B(-1; 4)$

ga simmetrik nuqta $C(1; 4)$ bo'ladi.

4) $A(0; 1)$ va $C(1; 4)$ ikki nuqtadan

o'tuvchi, izlanayotgan to'g'ri chiziq

tenglamasi tuziladi: $\frac{x-0}{1-0} = \frac{y-0}{4-1} \Rightarrow y =$

$3x + 1.$ Javobi: C.
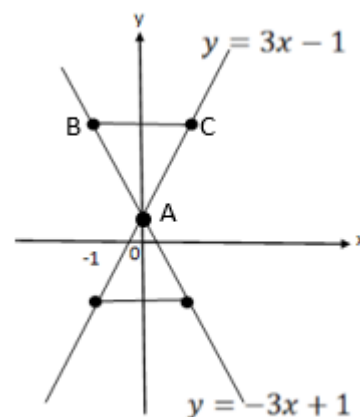
32. To'g'ri to'rtburchakning perimetri 32 ga, qo'shni tomonlarining ayirmasi 2 ga teng. Uning tomonlarini toping.

A) 8 va 6   B) 12 va 10   C) 10 va 8

D) 9 va 7   E) 11 va 9

Yechilishi:

$$\begin{cases} p = 2(x + y); \\ y - x = 2. \end{cases}$$

$$\begin{cases} 2(x + y) = 32 \\ y - x = 2 \end{cases} \Rightarrow$$

138
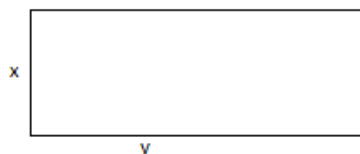
$$\begin{cases} x + y = 16 \\ y - x = 2 \end{cases} \Rightarrow \begin{cases} 2y = 18 \\ 2x = 14 \end{cases} \Rightarrow \begin{cases} y = 9; \\ x = 7. \end{cases}$$

Javobi: D.

33. $\begin{cases} \frac{x+y}{2} - \frac{2y}{3} = \frac{5}{2} \\ \frac{3x}{2} + 2y = 0 \end{cases}$ tenglamalar sistemasini yeching .

A) (-4; 3)   B) (4;3)   C) (3;-4)

D) (4; -3)   E) yechimga ega emas.

Yechilishi: $\begin{cases} 3x + 3y - 4y = 15 \\ 3x + 4y = 0 \end{cases} \Rightarrow \begin{cases} 3x - y = 15 \\ 3x + 4y = 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} y = 3x - 15 \\ 3x + 4(3x - 15) = 0 \end{cases} \Rightarrow \begin{cases} y = 3 \cdot 4 - 15 \\ x = 4 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} y = -3 \\ x = 4 \end{cases} \Rightarrow (4; -3).$ Javobi: D.

34. m ning qanday qiymatlarida $4x^2 - (\sqrt{3}m - 3)x - 9 = 0$ tenglamaning ildizlari qarama qarshi sonlar bo'ladi?

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

Yechilishi: $ax^2 + bx + c = 0, \ D \neq 0;$

1) $b < 0$ va $c < 0;$

2) $b > 0$ va $c < 0$ bo'lganda ildizlar qaram-qarshi sonlar

bo'ladi. $\begin{cases} -(\sqrt{3}m - 3) < 0 \\ c = -9 < 0 \end{cases} \Rightarrow \sqrt{3}m - 3 > 0 \Rightarrow \sqrt{3}m > 3 \Rightarrow$

$\Rightarrow m > \frac{3}{\sqrt{3}} = \frac{3\sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \sqrt{3};$ yoki,

$x_{1,2} = \frac{(\sqrt{3}m-3) \pm \sqrt{(\sqrt{3}m-3)^2 - 4 \cdot 4 \cdot (-9)}}{2 \cdot 4} =$

$= \frac{(\sqrt{3}m-3) \pm \sqrt{(\sqrt{3}m-3)^2 + 144}}{8} \Rightarrow x_1 = -x_2 \Rightarrow$

$\Rightarrow \frac{(\sqrt{3}m-3) \pm \sqrt{(\sqrt{3}m-3)^2 + 144}}{8} = -\frac{(\sqrt{3}m-3) + \sqrt{(\sqrt{3}m-3)^2 + 144}}{8} \Rightarrow$

Pirnazar DAVRONOV

$$\Rightarrow (\sqrt{3}m - 3) - \sqrt{(\sqrt{3}m - 3)^2 + 144} =$$

$$= -(\sqrt{3}m - 3) - \sqrt{(\sqrt{3}m - 3)^2 + 144} \Rightarrow$$

$$\Rightarrow \sqrt{3}m - 3 = -\sqrt{3}m + 3 \Rightarrow 2\sqrt{3}m = 6 \Rightarrow$$

$$\Rightarrow m = \frac{6}{2\sqrt{3}} = \frac{3\sqrt{3}}{\sqrt{3}\cdot\sqrt{3}} = \sqrt{3}. \qquad \text{Javobi: D.}$$

35. $x^2 + px + 6 = 0$ tenglama ildizlari ayirmasing kvadrati 40 ga teng bo'lsa ildizlari yig'indisi qancha bo'lishini toping.

A) $\sqrt{40}$ B) 8   C) -8   D) -8 va 8   E) 0

Yechilishi: $x^2 + px + 6 = 0 \Rightarrow x_1 + x_2 = ?$

$$\begin{cases} x_1 + x_2 = -p \\ (x_1 - x_2)^2 = 40 \\ x_1 \cdot x_2 = 6 \end{cases} \Rightarrow \begin{cases} x_1^2 + x_2^2 + 2x_1x_2 = 6 \\ x_1 + x_2 - 2x_1x_2 = 40 \\ x_1 \cdot x_2 = 6 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} 4x_1x_2 = p^2 - 40 \\ x_1 \cdot x_2 = 6 \end{cases} \Rightarrow 24 = p^2 - 40 \Rightarrow p = \pm 8.$$

Javobi: D.

36. $a > 2b > 0$ shartni qanoatlantiruvchi a va b sonlar uchun quyidagi munosabatlardan qaysi o'rinli ?

1) $a^3 > 7b^3$ 2) $\frac{a-b}{2} > \frac{b}{2}$

3) $\frac{6b-a}{a} < 2$ 4) $\frac{6b-3a}{a} > 0$

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

Yechilishi: $a > 2b > 0$;

1) $a > 2b \Rightarrow a^3 > 8b^3 \Rightarrow a^3 > 7b^3$;

2) $\frac{a-b}{2} > \frac{b}{2} \Rightarrow a - b > b \Rightarrow a > 2b$;

3) $\frac{6b-a}{a} < 2 \Rightarrow 6b - a < 2a \Rightarrow 3a > 6b \Rightarrow a > 2b$;

4) $\frac{6b-3a}{a} > 0 \Rightarrow \begin{cases} a > 0; \\ 6b - 3a > 0 \Rightarrow 3a < 6b \Rightarrow a < 2b. \end{cases}$

Javobi: E.

37. $\begin{cases} \frac{x-1}{4} \le \frac{x}{5} \\ \frac{x}{3} > \frac{x+4}{7} \end{cases}$ tengsizliklar sistemasi butun yechimlari

yig'indisini toping .

A) 12   B) 9   C) 7   D) 8   E) 1

Yechilishi: $\begin{cases} \frac{x-1}{4} \le \frac{x}{5} \\ \frac{x}{3} > \frac{x+4}{7} \end{cases} \Rightarrow \begin{cases} 5(x-1) \le 4x \\ 7x > 3(x+4) \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 5x - 5 \le 4x \\ 7x > 3x + 12 \end{cases} \Rightarrow \begin{cases} x \le 5 \\ x > 3 \end{cases} \Rightarrow$

$\Rightarrow 4 + 5 = 9 \Rightarrow 4 + 5 = 9.$
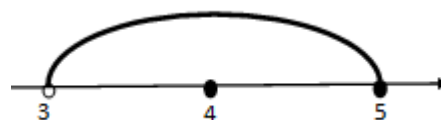
Javobi: B.

38. Quyidagi ketma-ketliklardan qaysilar geometrik progressiyani tashkil etadi?

1) $a_n = 2x^n$;   2) $c_n = ax^n + 1$;   3) $b_n = (\frac{3}{5})^n \cdot \sin 60°$

A) 1;3   B) 2;3   C) hech biri   D) 1;2;3   E) 1;2

Yechilishi: 1) $a_n = 2x^n \Rightarrow n = 1,2,3,4 \dots$

$a_1 = 2x, \; a_2 = 2x^2, \; a_3 = 2x^3, \dots$

$2x, 2x^2, 2x^3, \dots; \quad q = x;$

2) $c_n = ax^n + 1 \Rightarrow ax + 1, ax^2 + 1, ax^3 + 1, \dots;$

3) $b_n = (\frac{3}{5})^n \cdot \sin 60° = \frac{\sqrt{3}}{2}\left(\frac{3}{5}\right)^n \Rightarrow q = \frac{3}{5};$ Javobi: A.

39. $y = -\frac{1}{7}\sin(7x - 5)$ funksiyaning hosilasini toping .

A) $-\frac{1}{7}\cos(7x - 5)$ B) $-7\cos(7x - 5)$ C) $\cos(7x - 5)$

D) $-\cos(7x - 5)$ E) $-7\cos 7x$

Yechilishi: $y = -\frac{1}{7}\sin(7x - 5) \Rightarrow$

$\Rightarrow y' = -\frac{1}{7}\cos(7x - 5) \cdot (7x - 5)' = -\frac{1}{7}\cos(7x - 5) \cdot 7 =$

$= -\cos(7x - 5).$ Javobi: D.

40. $y = \log_5 2x$ funksiyaning hosilasini toping.

A) $\dfrac{1}{x\ln 2}$ B) $\dfrac{1}{x\ln 5}$ C) $\dfrac{2}{x\ln 5}$ D) $\dfrac{2}{x\ln 2}$ E) $\dfrac{1}{2x}$

Yechilishi: $y' = \dfrac{1}{2x\ln 5} \cdot (2x)' = \dfrac{1}{x\ln 5}.$ Javobi: B.

41. $\int_{-2}^{0}(|x|+1)dx$ ni hisoblang .

A) 3   B) 2   C) 4

D) -4   E)8

Yechilishi: Funksiyaning grafigi
absissa o'qidan yuqorida joylashsa,
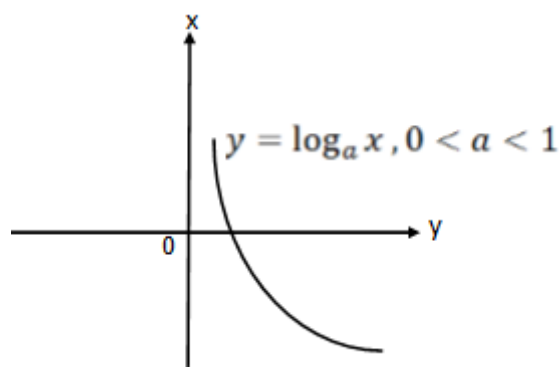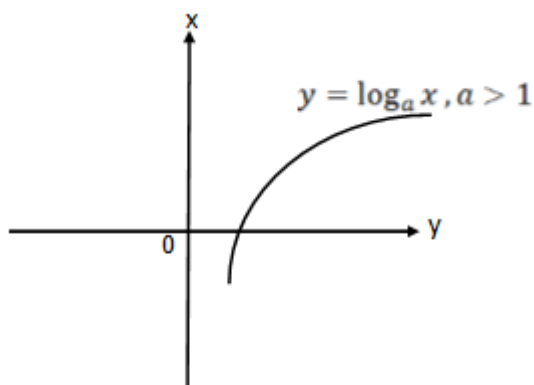modul belgisi shunday tashlab
yuboriladi:
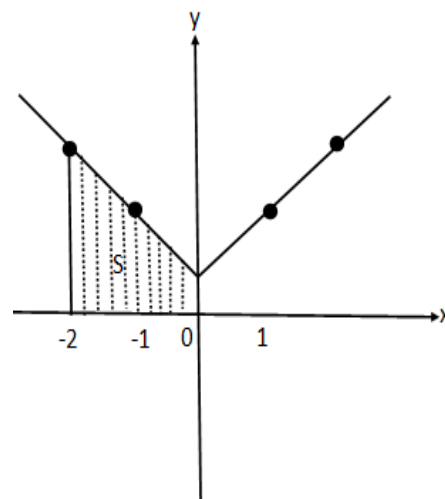
$S = \int_{-2}^{0}(x+1)dx) =$

$-\int_{0}^{2} x\,dx - \int_{0}^{2} dx = -\dfrac{x^2}{2}\Big|_0^2 - x\Big|_0^2 =$

$= -2 - 2 = -4.$ Javobi: C.

42. y$=-\log_5 x$ funksiyaning grafigi koordinatalar
tekisligining qaysi choraklarida yotadi.

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

Yechilishi: $x > 0$;

$y = \log_a x, a > 1$

$y = \log_a x, 0 < a < 1$

Masalan, $x = 5 \Rightarrow y = -1, IV - Chorak$;

$x = \dfrac{1}{5} = 5^{-1} \Rightarrow y = 1, I - chorak.$

Bu grafiklardan.   Javobi: D.

43. $27^x + 12^x - 2\cdot 8^x = 0$ tenglama ildizining uch baravarini
toping.

A) -6   B) 3   C) -3   D) 6   E) 0

Yechilishi: $\left(\frac{27}{8}\right)^x + \left(\frac{12}{8}\right)^x - 2 = 0 \Rightarrow \left(\frac{3}{2}\right)^{3x} + \left(\frac{3}{2}\right)^x - 2 =$

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

$2) = 0 \Rightarrow\Rightarrow \begin{cases} y - 1 = 0 \\ y^2 + y + 2 = 0 \end{cases} \Rightarrow \begin{cases} y = 1 \\ D < 0 \end{cases} \Rightarrow \left(\frac{3}{2}\right)^x = 1 \Rightarrow$

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

$\Rightarrow x = 0 \Rightarrow 3 \cdot 0 = 0.$ Javobi: E.

44. Radiusga teng bo'lgan vatarning uchlaridan aylanaga urinmalar o'tkazilgan.Shu urunmalar bilan vatar yotgan to'g'ri chiziq hosil qilgan burchaklarni toping.

A)$30°, 150°$ B) $60°, 120°$ C) $90°, 90°$

D) $40°, 140$ E) $50°, 130$

Yechilishi: Muntazam uchburchak va radiusning urinma to'g'ri chiziqqa perpendikulyarligi e'tiborga olinadi.
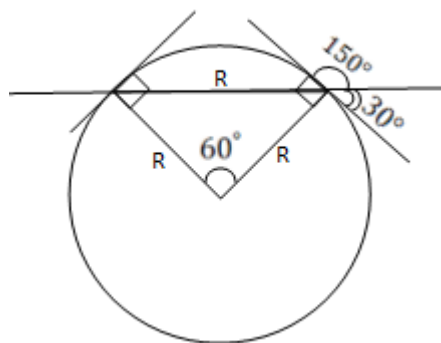
Javobi: A.

45. Uchburchakning tomonlari o'rtalarini tutashtirib , perimetri 65 ga teng bo'lgan uchburchak hosil qilindi. Berilgan uchburchak perimetrini toping.

A) 32,5   B) 260   C) 75   D) 195   E) 130

Yechilishi: $P = 30;$

$\begin{cases} AB = 2A_1B_1 \\ AC = 2B_1C_1 \\ BC = 2A_1C_1 \end{cases} \Rightarrow AB + AC + BC =$

$= 2(A_1B_1 + B_1C_1 + A_1C_1) \Rightarrow$

$P = 2 \cdot 65 = 130.$

Javobi: E.
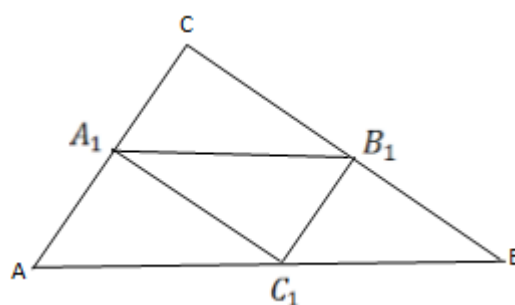
46. To'g'ri burchakli uchburchakning gipotenuzasi 13 ga , katetlaridan biri $\sqrt{52}$ ga teng. Gipotenuzaga tushirilgan balandlik uzunligini toping.
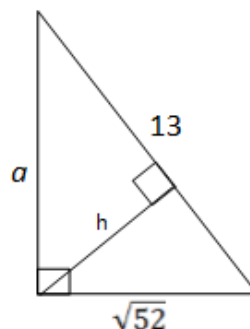
A) 5   B) 6   C) 7   D) 4   E) 9

Yechilishi: $a^2 = 13^2 - \left(\sqrt{52}\right)^2 = 117 \Rightarrow$

$\Rightarrow a = \sqrt{117};$

$h = \dfrac{ab}{c} = \dfrac{\sqrt{117} \cdot \sqrt{52}}{13} =$

$= \sqrt{\dfrac{117 \cdot 52}{169}} = \sqrt{36} = 6.$

Javobi: B.

47. ΔABC ning tomonlari $\Delta A_1 B_1 C_1$ ning mos tomonlaridan $2\sqrt{3}$ marta katta. ΔABC ning yuzi $\Delta A_1 B_1 C_1$ ning yuzidan nechi marta katta?

A) 12   B) 6   C) $2\sqrt{3}$

D) $4\sqrt{3}$ E) $6\sqrt{3}$

Yechilishi: $AB = 2\sqrt{3} \cdot A_1 B_1;$

$\dfrac{AB}{A_1 B_1} = k \Rightarrow \dfrac{2\sqrt{3} \cdot A_1 B_1}{A_1 B_1} = 2\sqrt{3} \Rightarrow$

$\dfrac{S}{S_1} = k^2 \Rightarrow \dfrac{S}{S_1} = (2\sqrt{3})^2 \Rightarrow$

$\dfrac{S}{S_1} = 4 \cdot 3 \Rightarrow S = 12 S_1.$
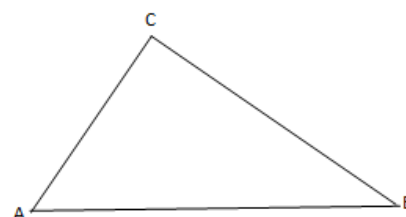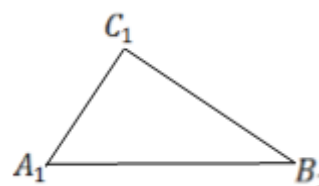
Javobi: A.

48. Muntazam oltiburchakka tashqi chizilgan aylananing uzunligi 4π ga teng. Shu ko'pburchakning yuzini toping.

A) 6   B) $\sqrt{3}$ C) $6\sqrt{3}$ D) $4\sqrt{3}$ E) 12

Yechilishi: $2\pi R = 4\pi \Rightarrow R = 2;$

$h^2 = R^2 - \left(\dfrac{R}{2}\right)^2 =$

$= 4 - 1 = 3 \Rightarrow h = \sqrt{3};$

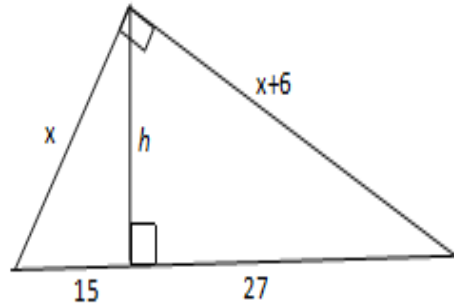$S_{OAB} = \dfrac{1}{2} \cdot AB \cdot h =$

$= \frac{1}{2} \cdot R \cdot h = \frac{1}{2} \cdot 2 \cdot \sqrt{3} = \sqrt{3};$

$S_{ko'pburchak} = 6 \cdot S_{AOB} = 6\sqrt{3}.$ Javobi: C.
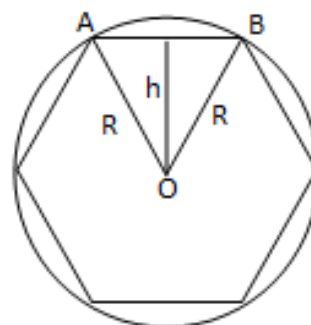
49. Berilgan nuqtadan tekislikka ikkita og'ma va perpendikulyar tushirildi. Og'malarning proyeksiyalari 27 va 15 ga teng hamda ulardan biri ikkinchisidan 6 ga uzun bo'lsa , perpendikulyarning uzunligini toping.

A) 30   B) 39   C) 45   D) 33   E) 36

Yechilishi: $\begin{cases} h^2 = x^2 - 225 \\ h^2 = (x+6)^2 - 27^2 \end{cases} \Rightarrow$

$\Rightarrow x^2 - 225 = x^2 + 12x + 36 - 729 \Rightarrow$

$\Rightarrow 12x = 468 \Rightarrow x = 39 \Rightarrow$

$\Rightarrow h^2 = 1521 - 225 = 1296 \Rightarrow$

$\Rightarrow h = 36.$ Javobi: E.

50. x ning qanday qiymatida $M(x; 0; 0)$ nuqta $M_1(1; 2; -3)$ va $M_1(-2; 1; 3)$ nuqtalardan baravar uzoqlashgan ?

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

Yechilishi: 1) $\overrightarrow{MM_1} = \{1 - x; 2; -3\};$

$|\overrightarrow{MM_1}| =$

$= \sqrt{(1-x)^2 + 4 + (-3)^2} =$
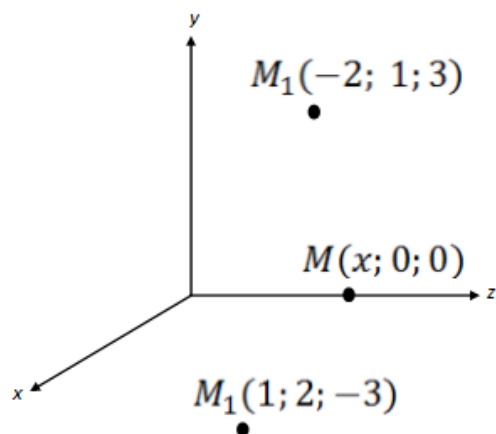
$= \sqrt{x^2 - 2x + 14};$

2) $|\overrightarrow{MM_2}| =$

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

$= \sqrt{x^2 + 4x + 14};$

1) va 2) dan $\Rightarrow \sqrt{x^2 - 2x + 14} =$

$= \sqrt{x^2 + 4x + 14} \Rightarrow x^2 - 2x + 14 = x^2 + 4x + 14 \Rightarrow x = 0.$

Javobi: A.

51. n ning qanday qiymatlarida $\vec{a} = \{n; -2; 1\}$ va $\vec{b} = \{n; 1; -n\}$ vektorlar perpendikulyar bo'ladi.

A) 0   B) -2   C) 2   D) -1   E) 2 va -1

Yechilishi: $\vec{a} = \{n; -2; 1\}; \vec{b} = \{n; 1; -n\};$

$\vec{a} \cdot \vec{b} = 0 \Rightarrow \{n; -2; 1\} \cdot \{n; 1; -n\} = 0 \Rightarrow$

$\Rightarrow n^2 + (-2) \cdot 1 + 1 \cdot (-n) = 0 \Rightarrow n^2 - n - 2 = 0 \Rightarrow$

$\Rightarrow n_{1,2} = \frac{1}{2} \pm \frac{3}{2} \Rightarrow \begin{cases} n_1 = -1; \\ n_2 = 2. \end{cases}$ Javobi: E.

52. Kubning dioganali $\sqrt{3}$ ga teng. Uning hajmini toping.

A) $9\sqrt{3}$ B) 9   C) $3\sqrt{3}$ D) 1   E) $6\sqrt{3}$

Yechilishi: $\begin{cases} BC = \sqrt{3} \\ AB = a\sqrt{2} \\ AC = a \end{cases} \Rightarrow$

$\Rightarrow BC^2 = AB^2 + AC^2 \Rightarrow$

$\Rightarrow (\sqrt{3})^2 = (a\sqrt{2})^2 + a^2 \Rightarrow$

$\Rightarrow a = \pm 1 \Rightarrow a = 1 \Rightarrow V = a^3 = 1.$

Javobi: D.
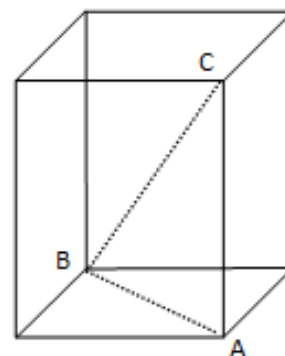
53. Har birining diametri 50 ga teng bo'lgan uchta quvur suv o'tkazish qobiliyati shu uchta quvurnikiga teng bo'lgan bitta quvur bilan almashtiriladi. Katta quvurning diametrini toping.

A) 85   B) 150   C) $50\sqrt{3}$ D) 75   E) 100

Yechilishi: $d = 50;$

Ko'ndalang kesim yuzi: $S = \pi R^2 = \pi \cdot 25^2 = 625\pi \Rightarrow$

$\Rightarrow 3S = 3 \cdot 625\pi; \ 3S = S_1;$

$S_1 = \pi R_1^2 \Rightarrow 3 \cdot 625\pi = \pi R_1^2 \Rightarrow$

$R_1^2 = 3 \cdot 625 \Rightarrow R_1 = 25\sqrt{3} \Rightarrow d_1 = 50\sqrt{3}.$ Javobi: C.

54. Radiuslari 2 , 3 va 4 ga teng bo'lgan metal sharlar eritilib , bitta shar qo'yiladi. Shu sharning hajmini toping.

A) 144π B) 396π C) 99π D) 116π E) 132π

Yechilishi: $R_1 = 2; R_2 = 3; R_3 = 4$

$$V_1 = \frac{4}{3}\pi \cdot 2^3 = \frac{32}{3}\pi; \qquad V_2 = \frac{4}{3}\pi \cdot 3^3 = 36\pi;$$

$$V_3 = \frac{4}{3} \cdot \pi \cdot 4^3 = \frac{256}{3}\pi;$$

$$V = V_1 + V_2 + V_3 = \frac{32}{3}\pi + 36\pi + \frac{256}{3}\pi = 132\pi.$$

Javobi: E.

Pirnazar DAVRONOV

1998-YIL, 8-AXBOROTNOMA

1. $1256:314 < 9x - 32 \le 2976:96$ tengsizlikni barcha natural yechimlarini toping.
   A) 4; 5; 6   B) 5; 6; 7   C) 6; 7; 8
   D) 7; 8   E) 4; 5; 6; 7
   Yechilishi: $1256:314 < 9x - 32 \le 2976:96 \Rightarrow$
   $\Rightarrow 4 < 9x - 32 \le 31 \Rightarrow 4 + 32 < 9x \le 31 + 32 \Rightarrow$
   $\Rightarrow 36 < 9x \le 63 \Rightarrow 4 < x \le 7.$
   Javobi: B.

2. $2\frac{5}{6}$ va $2\frac{1}{2}$ sonlar yig'indisining 25% ini toping.
   A) $1\frac{1}{3}$ B) $1\frac{1}{6}$ C) $1\frac{2}{3}$ D) $\frac{5}{6}$ E) $\frac{11}{12}$
   Yechilishi: $\left(2\frac{5}{6} + 2\frac{1}{2}\right) \cdot 0,25 = \left(2 + \frac{5}{6} + 2 + \frac{1}{2}\right) \cdot \frac{1}{4} =$
   $= \left(6/_4 + \frac{1/_5}{6} + \frac{3/_1}{2}\right) \cdot \frac{1}{4} = \frac{24+5+3}{6} \cdot \frac{1}{4} = \frac{32}{6 \cdot 4} = \frac{8}{6} = \frac{4}{3} = 1\frac{1}{3}.$
   Javobi: A.

3. $109 \cdot 9,17 - 5,37 \cdot 72 - 37 \cdot 9,17 + 1,2 \cdot 72$ ni hisoblang.
   A) 360   B) 350   C) 290   D) 380   E) 310
   Yechilishi: $109 \cdot 9,17 - 5,37 \cdot 72 - 37 \cdot 9,17 + 1,2 \cdot 72 =$
   $9,17(109 - 37) + 72(1,2 - 5,37) =$
   $= 9,17 \cdot 72 + 72 \cdot (-4,17) = 72(9,17 - 4,17) =$
   $72 \cdot 5 = 360.$ Javobi: A.

4. $5,6 - 7(0,8x + 1) = 14 - 5,32x$ tenglamani yeching.
   A) 5,5   B) 55   C) -55   D) -5,5   E) 50
   Yechilishi: $5,6 - 7(0,8x + 1) = 14 - 5,32x \Rightarrow$
   $\Rightarrow 5,6 - 7 \cdot 0,8x - 7 = 14 - 5,32x \Rightarrow 5,6x - 5,32x =$
   $= 5,6 - 7 - 14 \Rightarrow 0,28x = -15,4 \Rightarrow 28x = -1540 \Rightarrow$

$\Rightarrow x = -55.$ Javobi: C.

5. $\frac{3}{16} + \frac{1}{16} \cdot (0{,}312 : 0{,}3 - 3{,}15 \cdot 1{,}6)$ ni hisoblang.

A) $\frac{1}{4}$ B) $\frac{3}{16}$ C) $-\frac{1}{16}$ D) $-\frac{1}{8}$ E) $-\frac{5}{8}$

Yechilishi: $\frac{3}{16} + \frac{1}{16} \cdot (0{,}312 : 0{,}3 - 3{,}15 \cdot 1{,}6) =$

$= \frac{3}{16} + \frac{1}{16} \cdot \left(\frac{0{,}312}{0{,}3} - 3\frac{15}{100} \cdot 1\frac{6}{10}\right) = \frac{3}{16} + \frac{1}{16} \cdot \left(\frac{312}{300} - \frac{63}{20} \cdot \frac{8}{5}\right) =$

$= \frac{3}{16} + \frac{1}{16} \cdot \left(\frac{26}{25} - \frac{126}{25}\right) = \frac{3}{16} + \frac{1}{16} \cdot \frac{26-126}{25} = \frac{3}{16} + \frac{1}{16} \cdot \frac{-100}{25} =$

$= \frac{3}{16} - \frac{4}{16} = -\frac{1}{16}.$

Javobi: C.

6. $-4 < 2 - 4x < -2$ qo'sh tengsizlikni yeching.

A) $(-1{,}5;\ -1)$ B) $(1;\ 2)$ C) $(0;\ 1)$

D) $(1;\ 1{,}5)$ E) $(-1{,}5;\ 0)$

Yechilishi: $-4 < 2 - 4x < -2 \Rightarrow$

$\Rightarrow -4 - 2 < -4x < -2 - 2 \Rightarrow -6 < -4x < -4 \Rightarrow$

$\Rightarrow 6 > 4x > 4 \Rightarrow 1 < x < \frac{3}{2} \Rightarrow 1 < x < 1{,}5.$

Javobi: D.

7. $(\frac{5}{6} \cdot 5 - 5) : \frac{2}{3} - 0{,}5^2$ ni hisoblang.

A) 1   B) -1   C) 0,5   D) -1,75   E) -1,5

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

$= 5 \cdot \frac{5-6}{6} \cdot \frac{3}{2} - \frac{1}{4} = 5 \cdot \frac{-1}{2} \cdot \frac{1}{2} - \frac{1}{4} = -\frac{5}{4} - \frac{1}{4} = \frac{-5-1}{4} = \frac{-6}{4} =$

$= -\frac{3}{2} = -1{,}5.$

Javobi: E.

8. a ning qanday qiymatlarida $|a + 2| = -a - 2$ tenglik o'rinli bo'ladi?

A) $a = -2$ B) $a \epsilon \emptyset$ C) $a < -2$ D) $a \le -2$ E) $a = -3$

Yechilishi: $|a + 2| = -a - 2 \Rightarrow a + 2 < 0 = a < -2.$

149

Javobi: C.

9. $\dfrac{0,5^2-0,5}{0,4^2+2\cdot0,04+0,1^2}$ ning qiymatini hisoblang.

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

Yechilishi: $\dfrac{0,5^2-0,5}{0,4^2+2\cdot0,04+0,1^2}=\dfrac{0,5(0,5-1)}{(0,4+0,1)^2}=$

$=\dfrac{0,5\cdot(-0,5)}{0,25}=-\dfrac{0,25}{0,25}=-1.$

Javobi: B.

10. $a=3,(6);\ b=3,91-\dfrac{1}{4}$ va $c=4,68:1,3$ sonlarini o'sish tartibida joylashtiring.

A) $b<a<c$ B) $a<c<b$ C) $c<b<a$
D) $a<b<c$ E) $c<a<b$

Yechilishi: $\begin{cases} a=3,666\ldots \\ b=3,91-0,25=3,66 \Rightarrow c<b<a \\ c=\dfrac{4,68}{1,3}=\dfrac{468}{130}=3,6 \end{cases}$

Javobi: C.

11. $\dfrac{3n-1}{n+2}$ ifoda n ning nechta butun qiymatida natural son bo'ladi?

A) 1 B) 3 C) 4 D) 2 E) Hech bir qiymatida

Yechilishi: $\dfrac{3n-1}{n+2}=\dfrac{3n+6-7}{n+2}=\dfrac{3(n+2)-7}{n+2}=3-\dfrac{7}{n+2}=n+$

$2\leq7=n\leq5;$

Demak, $n=5,-3,-9.$

Javobi: B.

12. Bir son ikkinchisidan 15 ga kichik. Bu sonlarning o'rta arifmetigi 11,5 ga teng. Shu sonlardan kichigini toping.

A) 3 B) 3,5 C) 4 D) 7 E) 8

Yechilishi: $\begin{cases} x+15=y \\ \dfrac{x+y}{2}=11,5 \end{cases} \Rightarrow \begin{cases} y=x+15 \\ x+y=23 \end{cases} \Rightarrow$

$\Rightarrow x+x+15=23 \Rightarrow 2x=8 \Rightarrow x=4.$

Javobi: C.

13. $(0{,}98 - 0{,}312 : 0{,}3) \cdot 25 + \frac{1}{9}$ ni hisoblang.

   A) $15\frac{1}{9}$ B) $-14\frac{8}{9}$ C) $-10\frac{7}{18}$ D) $-1\frac{7}{18}$ E) $1\frac{11}{18}$

   Yechilishi: $(0{,}98 - 0{,}312 : 0{,}3) \cdot 25 + \frac{1}{9} =$

   $= \left(\frac{98}{100} - \frac{0{,}312}{0{,}3}\right) \cdot 25 + \frac{1}{9} = \frac{-18}{12} + \frac{1}{9} = -\frac{3}{2} + \frac{1}{9} = \frac{-27+2}{18} =$

   $= \frac{-25}{18} = -1\frac{7}{18}.$

   Javobi: D.

14. $a(b + c - bc) - b(c + a - ac) + c(b - a)$ ni soddalashtiring.

   A) $-2abc$ B) $2ac$ C) $-2bc$ D) $ab - ac$ E) 0

   Yechilishi: $a(b + c - bc) - b(c + a - ac) + c(b - a) =$

   $= ab + ac - abc - bc - ab + abc + bc - ac = 0.$

   Javobi: E.

15. $y = \sqrt{7 - |x - 2|} + \frac{1}{\sqrt{3 - 2x}}$ funksiyaning aniqlanish sohasini toping.

   A) $(-\infty; -1{,}5)$ B) $(-\infty; 1{,}5)$ C) $[-7; -1{,}5]$

   D) $[-5; 1{,}5)$ E) $(-5; 1{,}5)$

   Yechilishi: $y = \sqrt{7 - |x - 2|} + \frac{1}{\sqrt{3 - 2x}}$;

   1) $7 - |x - 2| \geq 0 \Rightarrow |x - 2| \leq 7 \Rightarrow -7 \leq x - 2 \leq 7 \Rightarrow$

   $\Rightarrow -7 + 2 \leq x \leq 7 + 2 \Rightarrow$
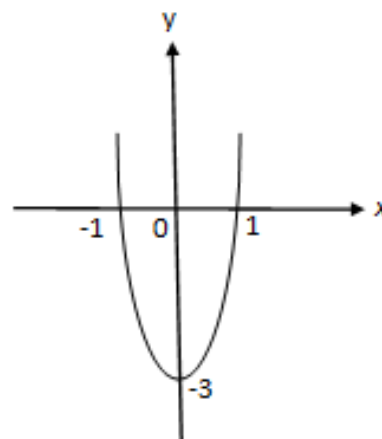
   $\Rightarrow -5 \leq x \leq 9$;

   2) $3 - 2x > 0 \Rightarrow 2x < 3 \Rightarrow$

   $\Rightarrow x < \frac{3}{2} \Rightarrow x < 1{,}5$;

   Demak, $[-5; 1{,}5)$.

   Javobi: D.

16. Rasmda qaysi funksiyaning grafigi tasvirlangan?

   A) $y = x^2 + 3x$ B) $y = 3(x^2 + 1)$

   C) $y = 3 - 3x^2$

D) $y = 3(x^2 - 1)$ E) $y = 2x^2 - 3$

Yechilishi: $A(-1; 0); \ B(1; 0), C(0; -3)$

$y = ax^2 + bx + c \Rightarrow$

$\begin{cases} 0 = a(-1)^2 + b(-1) + c \\ 0 = a \cdot 1^2 + b \cdot 1 + c \\ -3 = a \cdot 0^2 + b \cdot 0 + c \end{cases} \Rightarrow \begin{cases} a - b - 3 = 0 \\ a + b - 3 = 0 \\ c = -3 \end{cases} \Rightarrow$

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

$\qquad y = 3(x^2 - 1).$ Javobi: D.

17. Agar $f(x) = 2 - ax^2$ va $g(x) = 2b + x$ funksiyalarning qiymatlari $x = -1$ va $x = 0$ da teng bo'lsa, a va b ning qiymatini toping.

    A) $a = -1, b = 1$ B) $a = 1, b = 1$ C) $a = 1, b = -1$

    D) $a = 5, b = -1$ E) $a = 2, b = 2$

    Yechilishi: $f(x) = 2 - ax^2; \quad g(x) = 2b + x;$

    1) $x = 0 \Rightarrow \begin{cases} f(0) = 2 \\ g(0) = 2b \end{cases} \Rightarrow 2b = 2 \Rightarrow b = 1;$

    2) $x = -1 \Rightarrow \begin{cases} f(-1) = 2 - a \cdot (-1)^2 = 2 - a \\ g(-1) = 2b - 1 \end{cases} \Rightarrow$

    $\Rightarrow 2 - a = 2b - 1 \Rightarrow 2 - a = 2 \cdot 1 - 1 \Rightarrow 2 - a = 1 \Rightarrow$

    $\Rightarrow a = 2 - 1 \Rightarrow a = 1.$ Javobi: B.

18. $2n^2 - 3an - 10n + 15a$ ko'phadni ko'paytuvchilarga ajrating.

    A) $(5 - n)(3a - 2n)$ B) $(5 + n)(2n - 3a)$

    C) $(3a - n)(5 - 2n)$ D) $(2n + 3a)(n + 5)$

    E) $(2n - 5)(n + 3a)$

    Yechilishi: $2n^2 - 3an - 10n + 15a = 2n(n - 5) -$

    $-3a(n - 5) = (n - 5)(2n - 3a) = (5 - n)(3a - 2n)$

    Javobi: A.

19. a va b ning qanday qiymatida $\dfrac{2}{x^2 + x - 6} = \dfrac{a}{x - 2} + \dfrac{b}{x + 3}$ tenglik ayniyat bo'ladi?

A) $a = 1, b = 1$ B) $a = \frac{2}{5}, b = -\frac{2}{5}$ C) $a = 5, b = -5$

D) $a = -\frac{2}{5}, b = \frac{2}{5}$ E) $a = -\frac{1}{5}, b = \frac{3}{5}$

Yechilishi: $\frac{2}{x^2+x-6} = \frac{a}{x-2} + \frac{b}{x+3}$;

$\frac{a}{x-2} + \frac{b}{x+3} = \frac{ax+3a+bx-2b}{(x-2)(x+3)} \Rightarrow$

$\Rightarrow \begin{cases} ax + 3a + bx - 2b = 2 \\ x^2 + x - 6 = (x-2)(x+3) \end{cases} \Rightarrow$

$\Rightarrow ax + bx + 3a - 2b = 2 \Rightarrow$

$\Rightarrow (a + b)x + 3a - 2b = 2 \Rightarrow$

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

$\Rightarrow \begin{cases} a = -b \\ 3(-b) - 2b = 2 \end{cases} \Rightarrow \begin{cases} a = \frac{2}{5}; \\ b = -\frac{2}{5}. \end{cases}$

Javobi: B.

20. n ning qanday qiymatida $n^2(y - 1) = y - n$ tenglamaning ildizi yo'q?

A) $n = 0$ B) $n = 1$ C) $n = -1$

D) $n = 2$ E) $n = -1$ ва $n = 1$

Yechilishi: $n^2(y - 1) = y - n \Rightarrow n^2(y - 1) + n - y = 0 \Rightarrow \Rightarrow n^2y - n^2 - y + n = 0 \Rightarrow (n^2 - 1) \cdot y - n(n - 1) = 0 \Rightarrow \Rightarrow (n^2 - 1)y = n(n - 1) \Rightarrow$

$\Rightarrow y = \frac{n(n-1)}{n^2-1} = \frac{n(n-1)}{(n-1)(n+1)} = \frac{n}{n+1} \Rightarrow$

$\Rightarrow n = -1$.

Javobi: C.

21. $\frac{x}{1-x} - \frac{1-x^2}{1+x^2} \cdot \left(\frac{1}{(x-1)^2} - \frac{x}{1-x^2}\right)$ ni soddalashtiring.

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

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

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

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

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

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

$$= \frac{x-1}{-(x-1)} = -\frac{x-1}{x-1} = -1.$$

Javobi: B.

22. $\begin{cases} \frac{y+3}{2} \leq \frac{y-5}{3} \\ \frac{y+1}{4} > \frac{y-4}{5} \end{cases}$ tengsizliklar sistemasi nechta butun yechimga

ega?

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

Yechilishi: $\begin{cases} \frac{y+3}{2} \leq \frac{y-5}{3} \\ \frac{y+1}{4} > \frac{y-4}{5} \end{cases} \Rightarrow \begin{cases} 3y + 9 \leq 2y - 10 \\ 5y + 5 > 4y - 16 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} 3y - 2y \leq -10 - 9 \\ 5y - 4y > -16 - 5 \end{cases} \Rightarrow \begin{cases} y \leq -19; \\ y > -21; \end{cases}$$
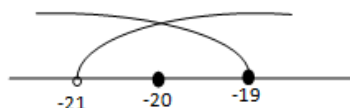
-20 va 19.   Javobi: D.

23. $\begin{cases} x + 2|y| = 3 \\ x - 3y = 5 \end{cases}$ bo'lsa, $x - y$ ning qiymatini toping.

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

Yechilishi: $\begin{cases} x + 2|y| = 3; \\ x - 3y = 5; \end{cases}$

1) $y \geq 0 \Rightarrow \begin{cases} x + 2y = 3 \\ x - 3y = 5 \end{cases} \Rightarrow \begin{cases} 3y + 5 + 2y = 3 \\ x = 3y + 5 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} 5y = 3 - 5 \\ x = 3y + 5 \end{cases} \Rightarrow \begin{cases} 5y = -2 \\ x = 3y + 5 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} y = -\frac{2}{5} \\ x = 3y + 5 \end{cases} \Rightarrow \begin{cases} y = -\frac{2}{5}; \\ x = 3 \cdot \left(-\frac{2}{5}\right) + 5 \end{cases} \Rightarrow \begin{cases} y = -\frac{2}{5} \\ x = \frac{19}{5} \end{cases} \text{chet ildiz;}$$

2) $y < 0 \Rightarrow \begin{cases} x - 2y = 3 \\ x - 3y = 5 \end{cases} \Rightarrow \begin{cases} 3y + 5 - 2y = 3 \\ x = 3y + 5 \end{cases} \Rightarrow$

$\begin{cases} y = -2 \\ x = -1 \end{cases} \Rightarrow$

$\Rightarrow x - y = -1 - (-2) = -1 + 2 = 1.$

Javobi: C.

24. Agar $B(-2; -7)$ nuqta $y = kx^2 + 8x + m$ parobolaning uchi bo'lsa, k va m ning qiymatini toping.

A) $k = 1, m = -9$ B) $k = 2, m = -1$

C) $k = -1, m = -16$ D) $k = -2, m = -4$

E) $k = 2, m = 1$

Yechilishi: $B(x_0; y_0) = B(-2; -7)$; $x_0 = -\frac{b}{2a} \Rightarrow$

$\Rightarrow -2 = -\frac{8}{2 \cdot k} \Rightarrow -2 = -\frac{4}{k} \Rightarrow 2k = 4 \Rightarrow k = 2;$

$y = kx^2 + 8x + m \Rightarrow -7 = 2 \cdot (-2)^2 + 8(-2) + m \Rightarrow$

$\Rightarrow m = 1.$ Javobi: E.

25. b ning qanday qiymatlarida $\begin{cases} x = 3 - |y| \\ 2x - |y| = b \end{cases}$ tenglamalar

sistemasi yagona yechimga ega ?

A) $b = 0$ B) $b > 0$ C) $b < 1$ D) $b = 6$ E) $b = 4$

Yechilishi: $\begin{cases} x = 3 - |y| \\ 2x - |y| = b \end{cases} \Rightarrow \begin{cases} |y| = 3 - x \\ |y| = 2x - b \end{cases} \Rightarrow$

1) $0 = 3 - x - (2x - b) \Rightarrow 3 - x - 2x + b = 0 \Rightarrow$

$\Rightarrow 3x = 3 + b \Rightarrow x = \frac{3+b}{3} \Rightarrow x = 1 + \frac{b}{3};$

2) $|y| = 3 - \left(1 + \frac{b}{3}\right) = 3 - 1 - \frac{b}{3} = 2 - \frac{b}{3} \Rightarrow$

$\Rightarrow |y| = 2 - \frac{b}{3} \Rightarrow |y| = \frac{6-b}{3} \Rightarrow b = 6$ da yagona yechimga

ega.   Javobi: D.

26. Geometrik progressiyaning birinchi hadi 486 ga, maxraji $\frac{1}{3}$ ga teng. Shu progressiyaning dastlabki to'rtta hadi yig'indisini toping.

A) 680   B) 840   C) 720   D) 760   E) 800

Yechilishi: $b = 486$; $q = \frac{1}{3}$; $S^4 = ?$

$$S_4 = \frac{b_1(q^4 - 1)}{q - 1} = \frac{486[(\frac{1}{3})^4 - 1]}{\frac{1}{3} - 1} = \frac{486(\frac{1}{81} - 1)}{\frac{1-3}{3}} = \frac{486 \cdot \frac{1-81}{81}}{\frac{-2}{3}} =$$

$$= \frac{486 \cdot \frac{-80}{81}}{\frac{-2}{3}} = \frac{-\frac{486 \cdot 80}{81}}{\frac{-2}{3}} = \frac{243 \cdot 80}{27} = 9 \cdot 80 = 720.$$

Javobi: C.

27. Arifmetik progressiyaning uchinchi hadi 8 ga, to'rtinchi hadi 5 ga va dastlabki bir nechta hadlari yig'indisi 28 ga teng. Yig'indida nechta had qatnashgan?

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

Yechilishi: $a_3 = 8$; $a_4 = 5$; $S_n = 28$;

$d = a_4 - a_3 = 5 - 8 = -3$;

$a_3 = a_1 + 2d \Rightarrow 8 = a_1 + 2 \cdot (-3) \Rightarrow a_1 = 14$;

$a_n = a_1 + d(n - 1) = 14 + (-3)(n - 1) =$

$= 14 - 3n + 3 = 17 - 3n$;

$$S_n = \frac{a_1 + a_n}{2} \cdot n \Rightarrow 28 = \frac{14 + 17 - 3n}{2} \cdot n \Rightarrow$$

$$\Rightarrow 56 = 31n - 3n^2 \Rightarrow 3n^2 - 31n + 56 = 0;$$

$$n_{1,2} = \frac{31 \pm \sqrt{31^2 - 4 \cdot 3 \cdot 56}}{2 \cdot 3} = \frac{31 \pm \sqrt{961 - 672}}{6} =$$

$$= \frac{31 \pm \sqrt{289}}{6} = \frac{31 \pm 17}{6} \Rightarrow n_1 = \frac{31 - 17}{6} = \frac{7}{3};$$

$n_2 = \frac{31+17}{6} = \frac{48}{6} = 8 \Rightarrow n = 8.$ Javobi: E.

28. Agar $f(x) = 3x - 2e^{-x}$ bo'lsa, $f'(\ln 2)$ ni hisoblang.

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

Yechilishi: $f'(x) = 3x - 2e^{-x}$; $f'(\ln 2) = ?$

$$f'(x) = 3 - 2(e^{-x})' = 3 - 2 \cdot \left(\frac{1}{e^x}\right)' =$$

$$= 3 - 2 \cdot \frac{1' \cdot e^x - 1 \cdot (e^x)'}{(e^x)^2} = 3 - 2 \cdot \frac{0 - e^x}{(e^x)^2} =$$

$$= 3 + 2 \cdot \frac{e^x}{(e^x)^2} = 3 + 2 \cdot \frac{1}{e^x} = 3 + \frac{2}{e^x} \Rightarrow f'(x) = 3 + \frac{2}{e^x};$$

$$f'(ln2) = 3 + \frac{2}{e^{ln2}} = 3 + \frac{2}{2} = 3 + 1 = 4. \quad \text{Javobi: D.}$$

29. $f(x) = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 6x$ funksiyaning maksimum
nuqtasidagi qiymatini hisoblang.

A) $13,5$ B) $11\frac{1}{3}$ C) $-7\frac{1}{3}$ D) $-3,5$ E) $-5\frac{1}{6}$

Yechilishi: $f'(x) = \frac{1}{3} \cdot x^3 + \frac{1}{2} \cdot x^2 - 6x;$

1) $D(f) = (-\infty; +\infty)$

2) $f'(x) = x^2 + x - 6 \Rightarrow f'(x) = 0 \Rightarrow x^2 + x - 6 = 0 \Rightarrow$

$$\Rightarrow x_{1,2} = -\frac{1}{2} \pm \sqrt{\frac{1}{2} + 6} = -\frac{1}{2} \pm \sqrt{\frac{1+24}{4}} = -\frac{1}{2} \pm \frac{5}{2} \Rightarrow$$

$$\Rightarrow \begin{cases} x_1 = -\frac{1}{2} - \frac{5}{2} = -\frac{6}{2} = -3 \\ x_2 = -\frac{1}{2} + \frac{5}{2} = \frac{-1+5}{2} = \frac{4}{2} = 2 \end{cases} \Rightarrow \begin{cases} x_1 = -3; \\ x_2 = 2; \end{cases}$$

3) $D(f) = (-\infty; +\infty) =$

$$= (-\infty; {}^{"+"}-3) \cup (-3; {}^{"-"}2) \cup (2^{"+"}; +\infty);$$

4) $x = -4 \Rightarrow f'(-4) = (-4)^2 - 4 - 6 = 16 - 10 = 6 > 0;$

$x = 0 \Rightarrow f'(0) = 0^2 + 0 - 6 = -6 < 0;$

$x = 3 \Rightarrow f'(3) = 3^2 + 3 - 6 = 9 - 3 = 6 > 0;$
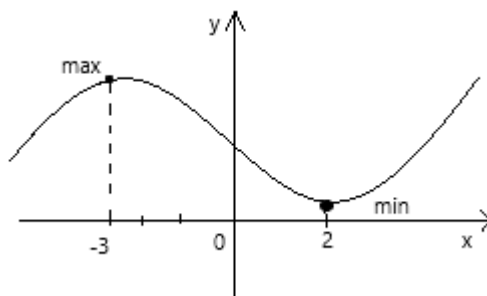
5) $x = -3 \Rightarrow f(-3) = \frac{1}{3} \cdot (-3)^3 + \frac{1}{2} \cdot (-3)^2 - 6 \cdot (-3) =$

$$= \frac{1}{3} \cdot (-27) + \frac{1}{2} \cdot 9 + 18 = \frac{-18+9+36}{2} = \frac{9+18}{2} = \frac{27}{2} = 13,5.$$

Javobi: A.

30. $y = 2 - sinx$ funksiyaning $\left[0; \frac{7\pi}{6}\right]$ oraliqdagi eng katta qiymatini toping.

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

Yechilishi: $y = 2 - \sin x$; $\left[0; \frac{7\pi}{6}\right] = [0; 210°]$;

$y' = -\cos x \Rightarrow \cos x = 0 \Rightarrow x = \frac{\pi}{2} + k\pi, k\epsilon\mathbb{Z}$;

$k = 0 \Rightarrow x = \frac{\pi}{2} \epsilon [0; 210°]$;

$x = 0; 90°; 210° \Rightarrow$

1) $y(0) = 2 - \sin 0° = 2 - 0 = 2$;
2) $y(90°) = 2 - sin90° = 2 - 1 = 1$;
3) $y(210°) = 2 - sin210° = 2 - \sin(180 + 30°) =$

$= 2 + sin30° = 2 + \frac{1}{2} = \frac{5}{2} = 2,5.$ Javobi: C.

31. $y = \frac{2}{e^x}$ funksiyaning boshlang'ich funksiyasini toping.

A) $\frac{2}{e^x} + C$ B) $2lnx + C$ C) $e^{-x} + C$

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

Yechilishi: $y = \frac{2}{e^x}$; $F(x) =?$

$F(x) = \int y dx = \int \frac{2}{e^x} dx = 2 \int \frac{dx}{e^x} = -\frac{2}{e^x} + c =$

$= -2e^{-x} + c.$ Javobi: E.

32. $\int_{-\pi/2}^{\pi} |cosx| dx$ ni hisoblang.

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

Yechilishi: $\int_{-\frac{\pi}{2}}^{\pi} |\cos x| dx =$

$= \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos x dx - \int_{\frac{\pi}{2}}^{\pi} cosx dx =$

$y = cosx$
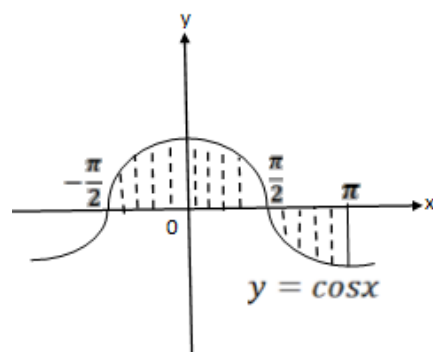
$$= \sin x \Big|_{-\frac{\pi}{2}}^{\frac{\pi}{2}} - \sin x \Big|_{\frac{\pi}{2}}^{\pi} =$$

$$= \sin\frac{\pi}{2} - \sin\left(-\frac{\pi}{2}\right) - [\sin\pi - \sin\frac{\pi}{2}] = 1 + 1 - (0 - 1) =$$

$$= 1 + 1 + 1 = 3. \qquad \text{Javobi: B.}$$

33. $\dfrac{2log_3^2 2 - log_3^2 18 - log_3 2 \cdot log_3 18}{2log_3 2 + log_3 18}$ ni soddalashtiring.

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

Yechilishi: $\dfrac{2log_3^2 2 - log_3^2 18 - log_3 2 \cdot log_3 18}{2log_3 2 + log_3 18}$;

1) $log_3^2 18 = [log_3^2 2 \cdot 9]^2 = [log_3 2 + log_3 9]^2 =$

$= [log_3 2 + 2]^2 = log_3^2 2 + 4log_3 2 + 4;$

2) $log_3 18 = log_3 2 + 2;$

3) $\dfrac{2log_3^2 2 - log_3^2 2 - 4log_3 2 - 4 - log_3 2 \cdot (log_3 2 + 2)}{2log_3 2 + log_3 2 + 2} =$

$= \dfrac{log_3^2 2 - 4log_3 2 - 4 - log_3^2 2 - 2log_3 2}{3log_3 2 + 2} = \dfrac{-6log_3 2 - 4}{3log_3 2 + 2} =$

$= \dfrac{-2(3log_3 2 + 2)}{3log_3 2 + 2} = -2. \qquad \text{Javobi: C.}$

34. $\left(\dfrac{1}{7}\right)^{-2x+3} + 49^{x-1} + 7^{2x-1} = 399$ tenglamani yeching.

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

Yechilishi: $\left(\dfrac{1}{7}\right)^{-2x+3} + 49^{x-1} + 7^{2x-1} = 399 \Rightarrow$

$\Rightarrow (7^{-1})^{-2x+3} + 7^{2(x-1)} + 7^{2x-1} = 399 \Rightarrow$

$\Rightarrow 7^{2x-3} + 7^{2x-2} + 7^{2x-1} = 399 \Rightarrow$

$\Rightarrow 7^{2x} \cdot 7^{-3} + 7^{2x} \cdot 7^{-2} + 7^{2x} \cdot 7^{-1} = 399 \Rightarrow$

$\Rightarrow 7^{2x} \cdot 7^{-1}(7^{-2} + 7^{-1} + 1) = 399 \Rightarrow$

$\Rightarrow 7^{2x} \cdot \dfrac{1}{7}\left(\dfrac{1}{49} + \dfrac{1}{7} + 1\right) = 399 \Rightarrow 7^{2x} \cdot \dfrac{1+7+49}{49} = 399 \cdot 7 \Rightarrow$

$\Rightarrow 7^{2x} \cdot 57 = 399 \cdot 7 \cdot 49 \Rightarrow 7^{2x} = 7^4 \Rightarrow 2x = 4 \Rightarrow x = 2.$

Javobi: D.

35. $\sqrt{3 - 2\sqrt{2}} \cdot \sqrt[4]{17 + 12\sqrt{2}}$ ni hisoblang.

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

 Yechilishi: $\sqrt{3 - 2\sqrt{2}} \cdot \sqrt[4]{17 + 12\sqrt{2}} =$

 $$= \sqrt[4]{(3 - 2\sqrt{2})^2} \cdot \sqrt[4]{17 + 12\sqrt{2}} =$$

 $$= \sqrt[4]{9 - 12\sqrt{2} + 8} \cdot \sqrt[4]{17 + 12\sqrt{2}} =$$

 $$= \sqrt[4]{17 - 12\sqrt{2}} \cdot \sqrt[4]{17 + 12\sqrt{2}} =$$

 $$= \sqrt[4]{(17 - 12\sqrt{2})(17 + 12\sqrt{2})} = \sqrt[4]{17^2 - 12^2 \cdot 2} =$$

 $$= \sqrt[4]{289 - 288} = \sqrt[4]{1} = 1. \qquad \text{Javobi: D.}$$

36. ABC uchburchakning AB tomoni 5 ga, BD balandligi 4 ga teng. Agar shu uchburchakka tashqi chizilgan aylananing radiusi 5 ga teng bo'lsa, BC tomonning uzunligini toping.

 A) 4,5   B) 8   C) 6   D) 10   E) 5,6

 Yechilishi: $R = 5$ $BC = ?$ $R = \dfrac{a \cdot b \cdot c}{4S}$;

 $$S = \frac{1}{2} \cdot (3 + x) \cdot 4 = 2(3 + x);$$

 $$AC = 3 + x;$$

 $$R = \frac{abc}{4S} \Rightarrow 5 = \frac{5 \cdot (3+x) \cdot a}{4 \cdot 2(3+x)} \Rightarrow$$

 $$5 = \frac{5a}{8} \Rightarrow 5a = 40 \Rightarrow a = 8. \qquad \text{Javobi: B.}$$
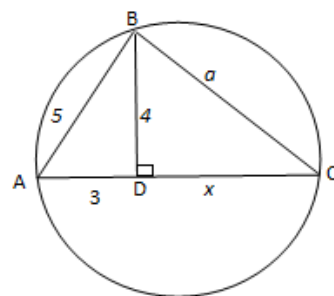
37. Teng yonli trapetsiyaning kichik asosi 3 ga, perimetri 42 ga teng. Uning diagonali o'tmas burchagini teng ikkiga bo'ladi. Trapetsiyaning o'rta chizig'ini toping.

 A) 8   B) 8,5   C) 12   D) 7,5   E) 10

 Yechilishi: $P = 42,$ $MN = ?$

 Uchburchakda teng burchaklar qarshisida, teng tamonlar yotadi.

 $$3l + 3 = 42 \Rightarrow 3l = 39 \Rightarrow l = 13;$$

 $$MN = \frac{l+3}{2} = \frac{13+3}{2} = \frac{16}{2} = 8;$$
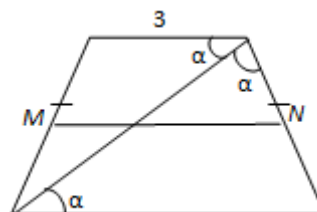
$MN = 8.$ Javobi: A.

38. To'g'ri burchakli uchburchakning katetlari 9 va 12 ga teng. Kichik katetning gipotenuzadagi proeksiyasini toping.

A) 6   B) $5\frac{2}{3}$ C) 5,4   D) 4,8   E) $6\frac{1}{3}$

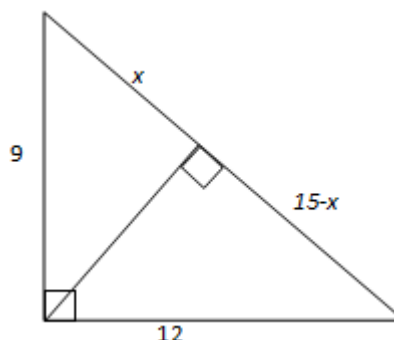Yechilishi: $c^2 = 12^2 + 9^2 = 144 + 81 = 225 \Rightarrow c = 15;$

$h = \frac{ab}{c} = \frac{9 \cdot 12}{15} = \frac{3 \cdot 12}{5} = \frac{36}{5};$

$x^2 = 9^2 - (\frac{36}{5})^2 = 81 - \frac{36^2}{25} =$

$= \frac{81 \cdot 25 - 36^2}{25} = \frac{2025 - 1296}{25} = \frac{729}{25} \Rightarrow$

$\Rightarrow x = \frac{27}{5} = 5,4.$

Javobi: C.

39. Ikki parallel to'g'ri chiziqni uchinchi to'g'ri chiziq kesib o'tganda hosil bo'lgan ichki bir tomonli burchaklardan biri ikkinchisidan 17 marta kichik. Shu burchaklardan kichigini toping.

A) 20°   B) 24°   C) 15°

D) 10°   E) 18°

Yechilishi: $17x + x = 180°$

$18x = 180 \Rightarrow x = 10°.$

Javobi: D.
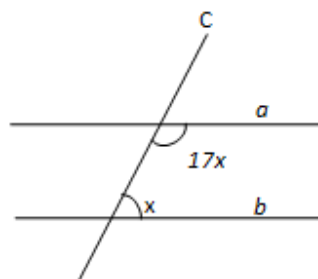
40. Teng yonli uchburchakning asosi18 ga, yuzi 108 ga teng. Shu uchburchakning yon tomonini toping.

A) 15   B) 16   C) 12,5   D) 21   E) 25

Yechilishi: $AB = 18;$ $S = 108;$

$S = \frac{1}{2} \cdot a \cdot h \Rightarrow 108 = \frac{1}{2} \cdot 18 \cdot h \Rightarrow h = \frac{108}{9} = 12;$

$AC^2 = AD^2 + CD^2 =$

$= 9^2 + 12^2 = 81 + 144 =$

$= 225 \Rightarrow AC = 15.$

Javobi: A.

161
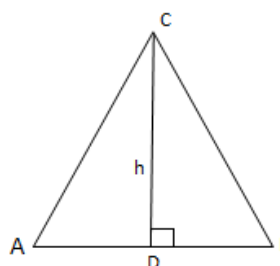
Pirnazar DAVRONOV

41. Uzunligi m ga teng bo'lgan vatar $90°$ li yoyga tiraladi. Hosil bo'lgan segmentning yuzini hisoblang.

A) $\dfrac{\pi m^2}{8}$ B) $\dfrac{m^2}{8}(\pi - 2)$ C) $\dfrac{m^2(\pi-\sqrt{3})}{4}$

D) $\dfrac{\pi m^2}{4}$ E) $\dfrac{m^2}{4}(\pi - \sqrt{2})$

Yechilishi: $AB = m;$ $\widetilde{AB} = 90°$

$S_{sektor} = \dfrac{\pi R^2}{360°}\cdot n° = \dfrac{\pi R^2}{360°}\cdot 90° = \dfrac{\pi R^2}{4°};$

$S_{segment} = S_{sektor} - S_{\Delta OAB};$

$m^2 = 2R^2 \Rightarrow R^2 = \dfrac{m^2}{2};$

$S_{\Delta AOB} = \dfrac{1}{2}R^2 = \dfrac{1}{2}\cdot\dfrac{m^2}{2} = \dfrac{m^2}{4};$

$S_{segment} = \dfrac{\pi}{4}\cdot\dfrac{m^2}{2} - \dfrac{m^2}{4} = \dfrac{\pi m^2}{8} - \dfrac{m^2}{4} =$

$= \dfrac{\pi m^2 - 2m^2}{8} = \dfrac{m^2}{8}(\pi - 2).$ Javobi: B.
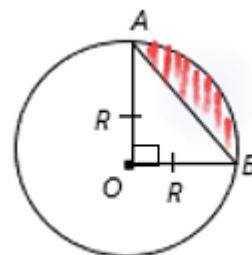
42. Uchburchakning tomonlari 11 va 23 ga, uchinchi tomoniga tushirilgan medianasi 10 га тенг. Uchburchakning uchunchi tomonini toping.
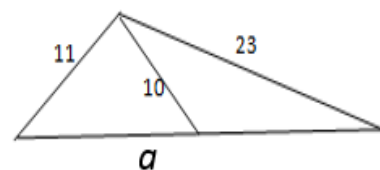
A) 30 B) 15 C) 25 D) 28 E) 26

Yechilishi: $m_a = \dfrac{1}{2}\sqrt{2b^2 + 2c^2 - a^2} \Rightarrow$

$\Rightarrow 10 = \dfrac{1}{2}\sqrt{2\cdot 11^2 + 2\cdot 23^2 - a^2} \Rightarrow$

$\Rightarrow 20 = \sqrt{2\cdot 121 + 2\cdot 529 - a^2} \Rightarrow$
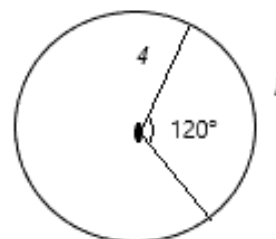
$242 + 1058 - a^2 = 400 \Rightarrow$

$\Rightarrow a^2 = 1300 - 400 \Rightarrow a^2 = 900 \Rightarrow a = 30.$ Javobi: A.

43. Aylananing uzunligi radiusi 4 ga, markaziy burchagi $120°$ ga teng yoy uzunligiga teng. Aylananing radiusini toping.

A) $\dfrac{2\sqrt{2}}{3}$ B) $\dfrac{2\sqrt{2}}{\sqrt{3}}$ C) $2\dfrac{2}{3}$

D) $1\dfrac{1}{3}$ E) 2

Yechilishi: $l_1 = 2\pi r \Rightarrow l = 2\pi r;$

$$l = \frac{\pi R}{180°} \alpha° = \frac{\pi R}{180°} \cdot 120° =$$

$$= \frac{2\pi R}{3} = \frac{2\pi \cdot 4}{3} = \frac{8\pi}{3};$$

$$\frac{8\pi}{3} = 2\pi r \Rightarrow$$

$$\Rightarrow r = \frac{8\pi}{3} : 2\pi = \frac{8\pi}{3} \cdot \frac{1}{2\pi} = \frac{4}{3} = 1\frac{1}{3}. \qquad \text{Javobi: D.}$$

44. To'g'ri to'rtburchakning peremetri 60 ga teng, bir tomoni boshqa tomonidan 6 ga ko'p. To'g'ri to'rtburchakning yuzini toping.

    A) 196   B) 216   C) 108   D) 144   E) 180

    Yechilishi: $P = 2(a + b) \Rightarrow 60 = 2(x + x + 6) \Rightarrow$

    $$\Rightarrow 2x + 6 = 30 \Rightarrow$$

    $$\Rightarrow 2x = 24 \Rightarrow$$

    $$\Rightarrow x = 12; \qquad x + 6 = 18;$$

    $$S = x(x + 6) = 12 \cdot 18 = 216.$$

    Javobi: B.

45. Teng yonli to'g'ri burchakli uchburchakka romb shunday ichki chizilganki, ularning bir burchagi umumiy rombning qolgan uchlari uchburchakning tomonlarida yotadi. Agar uchburchakning kateti. $\frac{2+\sqrt{2}}{5}$ ga teng bo'lsa, rombning tomonini toping.

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

    Yechilishi: $AB = \frac{2+\sqrt{2}}{5}; \quad x = ?$
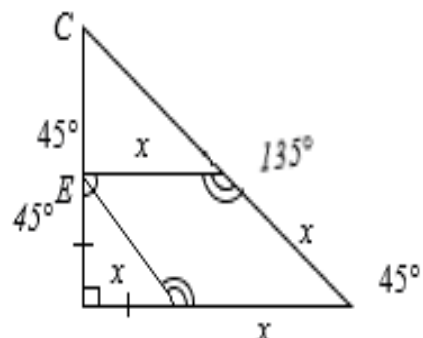
    $$AD = AE \Rightarrow x^2 = 2AD^2 \Rightarrow x = AD\sqrt{2};$$

    $$AD = AB - x =$$

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

    $$\Rightarrow x = \frac{2\sqrt{2}+2}{5} - \sqrt{2}x \Rightarrow$$

    $$\Rightarrow x + \sqrt{2}x = \frac{2(\sqrt{2}+1)}{5} \Rightarrow$$

$\Rightarrow (\sqrt{2}+1) \cdot x = \frac{2}{5}(\sqrt{2}+1) \Rightarrow x = \frac{2}{5} = 0{,}4.$

Javobi: C.

46. Agar $\vec{m}$ va $\vec{n}$ vektorlar $30°$ li burchak tashkil etsa va $\vec{m} \bullet \vec{n} = \sqrt{3}$ bo;lsa, ularga qurilgan parallelogramning yuzini hisoblang.
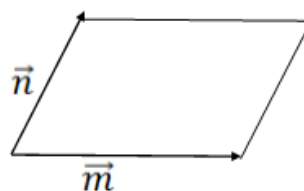
   A) 2   B) $\frac{\sqrt{3}}{2}$ C) 1   C) $2\sqrt{3}$ E) 1,5

   Yechilishi: $(\overrightarrow{m},^\wedge \vec{n}) = 30°;\quad \overrightarrow{m}, \vec{n} = \sqrt{3};\quad S =?$

   1) $\overrightarrow{m}, \vec{n} = |\vec{m}| \cdot |\vec{n}| \cos 30° \Rightarrow$

   $\Rightarrow \sqrt{3} = |\vec{m}| \cdot |\vec{n}| \cdot \frac{\sqrt{3}}{2} \Rightarrow$

   $\Rightarrow |\vec{m}| \cdot |\vec{n}| = 2;$

   2) $S_\square = |\vec{m}| \cdot |\vec{n}| \cdot \sin\alpha = 2 \cdot \sin 30° = 2 \cdot \frac{1}{2} = \frac{2}{2} = 1.$

   Javobi: C.

47. Agar $\vec{a} = -\overrightarrow{2i} + \vec{j}$ va $\vec{b} = \overrightarrow{2i}$ bo'lsa,$\vec{c} = -3\vec{a} + 2\vec{b}$ vektorning koordinatalarini toping.

   A) (10; -3)   B) (-6; 4)   C) (-2; 3)
   D) (4; -4)   E) (-10; 3)

   Yechilishi: $\begin{cases} \vec{a} = -\overrightarrow{2i} + \vec{j} \\ \vec{b} = \overrightarrow{2i} \end{cases} \Rightarrow \begin{cases} \vec{a} = \{-2; 1\}; \\ \vec{b} = \{2; 0\}; \end{cases}$

   $\vec{c} = -3\vec{a} + 2\vec{b} = -3\{-2; 1\} + 2 \cdot \{2; 0\} =$
   $= \{-2 \cdot (-3); 1 \cdot (-3)\} + \{2 \cdot 2; 0 \cdot 2\} =$
   $= \{6; -3\} + \{4; 0\} = \{6 + 4; -3 + 0\} = \{10; -3\}.$
   Javobi: A.

48. Har bir tashqi burchagi $24°$ dan bo'lgan muntazam ko'pburchakning nechta tomoni bor?

   A) 24   B) 18   C) 15   D) 12   E) 10
   Yechilishi: $24n = 360° \Rightarrow n = 15.$ Javobi: C.

49. y ning qanday qiymatlarida $\vec{b} = 12\vec{i} - y\vec{j} + 15\vec{k}$ vektorning uzunligi 25 ga teng?

   A) 14   B) 16   C) 14 ва -14   D) 2   E) 16 ва -16

Yechilishi: $\vec{b} = 12\vec{\imath} - y\vec{\jmath} + 15\vec{k} = \{12; -y; 15\} \Rightarrow$

$\Rightarrow |\vec{b}| = \sqrt{12^2 + (-y)^2 + 15^2} \Rightarrow |\vec{b}| = 25 \Rightarrow$

$\Rightarrow \sqrt{144 + y^2 + 225} = 25 \Rightarrow y^2 + 369 = 625 \Rightarrow$

$\Rightarrow y^2 = 625 - 369 \Rightarrow y^2 = 256 \Rightarrow \sqrt{y^2} = \sqrt{256} \Rightarrow$

$\Rightarrow |y| = 16 \Rightarrow y = \pm 16.$ Javobi: E.

50. Tekislikdan b masofada joylashgan nuqtadan tekislikka ikkita og'ma tushirilgan. Bu og'malar tekislik bilan 30 va $45°$ li, o'zaro to'g'ri burchak tashkil qiladi. Og'malarning oxirlari orasidagi masofani toping.

A) $\frac{2b\sqrt{2}}{3}$ B) $2b\sqrt{3}$ C) $\frac{b\sqrt{11}}{2}$ D) $b\sqrt{5}$ E) $b\sqrt{6}$

Yechilishi: 1) $\frac{b}{x} = sin45° \Rightarrow$

$\Rightarrow b = x\sin 45° = x \cdot \frac{\sqrt{2}}{2} \Rightarrow$

$\Rightarrow 2b = x\sqrt{2} \Rightarrow x = \frac{2b}{\sqrt{2}};$

2) $\frac{b}{y} = \sin 30° \Rightarrow$

$\Rightarrow y = \frac{b}{\sin 30°} = \frac{b}{\frac{1}{2}} = 2b = y = 2b;$

3) $c^2 = x^2 + y^2 = (\frac{2b}{\sqrt{2}})^2 + (2b)^2 = \frac{4b^2}{2} + 4b^2 =$

$= 2b^2 + 4b^2 = 6b^2 \Rightarrow c^2 = 6b^2 \Rightarrow c = b\sqrt{6}.$

Javobi: E.
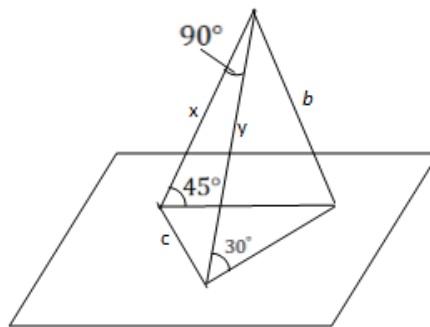
51. Uchburchakli to'g'ri prizma asosining tomonlari 36; 29; va 25 ga, to'la sirti esa 1620 ga teng. Prizmaning balandligini toping.
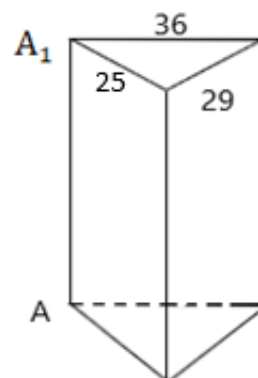
A) 20   B) 12,6   C) 10
D) 18   E) 15

Yechilishi: $S_T = 1620$ $H = ?$
$S_T = S_{Yon} + 2S_{asos};$
$S_{Yon} = P_{asos} \cdot AA_1;$ $H = AA_1;$

Geron formulasidan foydalaniladi.

1)$S_{asos} = \sqrt{45(45-25)(45-29)(45-36)} =$
$= \sqrt{45 \cdot 20 \cdot 16 \cdot 9} = \sqrt{900 \cdot 16 \cdot 9} = 30 \cdot 4 \cdot 3 = 360;$

2) $S_{yon} = P_{asos} \cdot AA_1 = (25 + 29 + 36) \cdot AA_1 = 90 \cdot AA_1;$

3) $1620 = 90 \cdot AA_1 + 2 \cdot 360 \Rightarrow 1620 - 720 = 90 \cdot$
$AA_1 \Rightarrow \Rightarrow AA_1 = \frac{900}{90} = 10 \Rightarrow AA_1 = 10.$ Javobi: C.

52. Silindr yon sirtining yoyilmasi a ga teng bo'lgan kvadratdan iborat. Silindrning hajmini toping.

A) $\frac{a^3}{2\pi}$ B) $\frac{2\pi a^3}{3}$ C) $4\pi a^3$ D) πa^3 E) $\frac{a^3}{4\pi}$

Yechilishi: $2\pi R = a \Rightarrow R = \frac{a}{2\pi}; \quad H = a;$

$V = \pi R^2 H = \pi \cdot (\frac{a}{2\pi})^2 \cdot a =$

$= \frac{\pi \cdot a^2}{4\pi^2} \cdot a = \frac{a^3}{4\pi} \Rightarrow V = \frac{a^3}{4\pi}.$ Javobi: E.
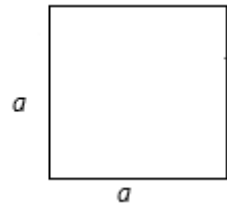
53. Konusning o'q kesimi muntazam uchburchakdan, silindrniki esa kvadratdan iborat. Agar ularning hajmlari teng bo'lsa, to'la sirtlarining nisbati nimaga teng?

A) $\sqrt{2} : \sqrt{3}$ B) $\sqrt[3]{3} : \sqrt[3]{2}$ C) $3:2$

D) $1 : \sqrt[3]{3}$ E) $\sqrt[3]{9} : 2$

Yechilishi: $V_k = V_s; \quad \frac{S_{t.k}}{S_{t.s}} = ?$

$S_{t.k} = \pi R l + \pi R^2 = \pi R \cdot 2R + \pi R^2 = 3\pi R^2$
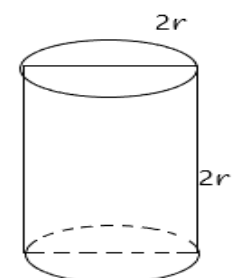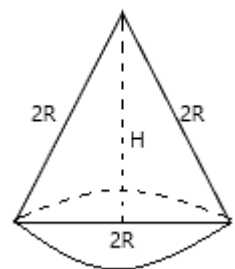$S_{t.s} = 2\pi r H + 2\pi r^2 = 2\pi r \cdot 2r + 2\pi r^2 =$
$4\pi r^2 + 2\pi r^2 = 6\pi r^2;$

$V_k = \frac{1}{3}\pi R^2 H; \qquad V_s = \pi r^2 \cdot h;$

$H^2 = (2R)^2 - R^2 = 4R^2 - R^2 = 3R^2 \Rightarrow$
$\Rightarrow H = R\sqrt{3};$

$\begin{cases} V_k = \frac{1}{3}\pi R^2 \cdot R\sqrt{3} = \frac{\sqrt{3}}{3}\pi R^3 \\ V_s = \pi r^2 \cdot 2r = 2\pi r^3 \end{cases} \Rightarrow$

$$\Rightarrow \frac{\sqrt{3}}{3}\pi R^3 = 2\pi r^3 \Rightarrow \sqrt{3}R^3 = 6r^3 \Rightarrow$$

$$\Rightarrow \frac{R^3}{r^3} = \frac{6}{\sqrt{3}} \Rightarrow \frac{R^3}{r^3} = \sqrt{\frac{36}{3}} = \sqrt{12} = 12^{\frac{1}{2}} \Rightarrow$$

$$\Rightarrow \frac{R}{r} = \sqrt[3]{12^{\frac{1}{2}}} = 12^{\frac{1}{2}:3} = 12^{\frac{1}{6}} \Rightarrow \frac{R}{r} = 12^{\frac{1}{6}}; \quad \frac{S_{t.k}}{S_{t.s}} = \frac{3\pi R^2}{6\pi r^2} =$$

$$= \frac{1}{2} \cdot \left(\frac{R}{r}\right)^2 = \frac{1}{2} \cdot (12^{\frac{1}{6}})^2 = \frac{1}{2} \cdot 12^{\frac{1}{3}} = \frac{\sqrt[3]{12}}{2} = \sqrt[3]{\frac{12}{8}} = \sqrt[3]{\frac{3}{2}} =$$

$$\frac{\sqrt[3]{3}}{\sqrt[3]{2}} \Rightarrow\Rightarrow S_{t.k}:S_{t.s} = \sqrt[3]{3}:\sqrt[3]{2}. \qquad \text{Javobi: B.}$$

54. Agar $ctga = \frac{1}{8}$ bo'lsa, $\frac{sin2\alpha+2sin^2a}{sin2a+2cos^2a}$ ni hisoblang.

A) $\frac{1}{8}$ B) 8   C) $\frac{1}{4}$ D) 4   E) 2

Yechilishi: $ctg\alpha = \frac{1}{8};$ $\frac{\sin 2\alpha + 2sin^2\alpha}{\sin 2\alpha + 2cos^2\alpha} =$

$$\frac{2\sin\alpha\cos\alpha + 2sin^2\alpha}{2\sin\alpha\cos\alpha + 2cos^2\alpha} =$$

$$= \frac{2\sin\alpha(\cos\alpha + \sin\alpha)}{2\cos\alpha(\sin\alpha + \cos\alpha)} = tg\alpha = \frac{1}{ctg\alpha} = \frac{1}{\frac{1}{8}} = 8.$$

Javobi: B.

55. $\frac{1+cos^2a+cos^4a}{3cos^2a+sin^4a}$ ni soddalashtiring.

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

Yechilishi: $\frac{1+cos^2\alpha+cos^4\alpha}{3cos^2\alpha+sin^4\alpha} = \frac{1+cos^2\alpha+cos^4\alpha}{3cos^2\alpha+(sin^2\alpha)^2} =$

$$= \frac{1+cos^2\alpha+cos^4\alpha}{3cos^2\alpha+(1-cos^2\alpha)^2} =$$

$$= \frac{1+cos^2\alpha+cos^4\alpha}{3cos^2\alpha+1-2cos^2\alpha+cos^4\alpha} = \frac{1+cos^2\alpha+cos^4\alpha}{1+cos^2\alpha+cos^4\alpha} = 1.$$

Javobi: E.

56. $\frac{sin2x}{1+ctgx}$=0 tenglamani yeching.

A) $\frac{\pi}{2} + \pi k, k \in Z$ B) $\pi k, k \in Z$ C) $\frac{\pi k}{2}, k \in Z$

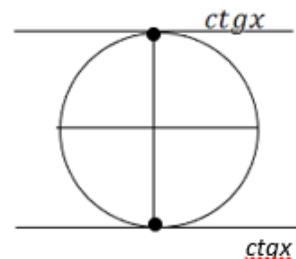D) $\frac{\pi}{4} + \pi k, k \in Z$ E) $\pi + 2\pi k, k \in Z$

Pirnazar DAVRONOV

Yechilishi: $\frac{sin2x}{1+ctgx} = 0 \Rightarrow \begin{cases} sin2x = 0 \\ 1 + ctgx \neq 0 \\ sinx \neq 0 \end{cases} \Rightarrow$

$\Rightarrow 2sinxcosx = 0 \Rightarrow cosx = 0 \Rightarrow$

$\Rightarrow x = \frac{\pi}{2} + \pi n, n\epsilon \mathbb{Z}.$

Javobi: A.

57. $sin^4 \frac{23\pi}{12} - cos^4 \frac{13\pi}{12}$ ni hisoblang.

A) $\frac{\sqrt{3}}{2}$ B) ½   C) $-\frac{\sqrt{3}}{2}$ D) $-\frac{\sqrt{2}}{2}$ E) $-\frac{1}{2}$

Yechilishi: $sin^4 \frac{23\pi}{12} - cos^4 \frac{13\pi}{12} =$

$= [sin^2 \frac{23\pi}{12}]^2 - [cos^2 \frac{13\pi}{12}]^2 =$

$= \left(sin^2 \frac{23\pi}{12} - cos^2 \frac{13\pi}{12}\right) \cdot \left(sin^2 \frac{23\pi}{12} + cos^2 \frac{13\pi}{12}\right) =$

$= -\left(cos^2 \frac{13\pi}{12} - sin^2 \frac{23\pi}{12}\right) \cdot (cos^2 \frac{13\pi}{12} + sin^2 \frac{23\pi}{12} =$

$= -[cos^2 \frac{13\pi}{12} - (\sin(3\pi - \frac{13\pi}{12}))^2] \cdot [cos^2 \frac{13\pi}{12} +$

$+ (\sin(3\pi - \frac{13\pi}{12}))^2] = -[cos^2 \frac{13\pi}{12} - sin^2 \frac{13\pi}{12}] \cdot$

$\cdot \left[cos^2 \frac{13\pi}{12} + sin^2 \frac{13\pi}{12}\right] = -\cos 2 \cdot \frac{13\pi}{12} =$

$= -\cos \frac{13\pi}{6} = -\cos 390° = -\cos(2\pi + 30) =$

$= -cos30° = -\frac{\sqrt{3}}{2}.$

Javobi: C.

58. $\frac{1-sin\alpha-cos2\alpha+sin3\alpha}{sin2\alpha+2cos\alpha cos2\alpha}$ ni soddalashtiring.

A) $2ctg\alpha$ B) $tg\alpha$ C) $2sin\alpha$ D) $ctg\alpha$ E) $-ctg\alpha$

Yechilishi:

$\frac{1-\sin\alpha-\cos2\alpha+\sin3\alpha}{\sin2\alpha+2\cos\alpha\cdot\cos2\alpha} =$

$\frac{sin^2\alpha+cos^2\alpha-cos^2\alpha+sin^2\alpha+\sin3\alpha-\sin\alpha}{2\sin\alpha\cos\alpha+2\cos\alpha\cdot\cos2\alpha} =$

$= \frac{2sin^2\alpha+2\sin\frac{3\alpha+\alpha}{2}}{2\cos\alpha(\sin\alpha+\cos2\alpha)} = \frac{2sin^2\alpha+2\sin\alpha\cos2\alpha}{2\cos\alpha(\sin\alpha+\cos2\alpha)} =$

168

$$= \frac{2\sin\alpha(\sin\alpha + \cos 2\alpha)}{2\cos\alpha(\sin\alpha + \cos 2\alpha)} = \frac{\sin\alpha}{\cos\alpha} = tg\alpha.$$

Javobi: B.

59. $cosxcos2x = cos3x$ tenglama $[0; 2\pi]$ oraliqda nechta ildizga ega?

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

Yechilishi: $\cos x \cos 2x = \cos 3x; [0; 2\pi]$;

$\cos x \cos 2x = \cos(2x + x) \Rightarrow \cos x \cos 2x = \cos 2x \cos x - $

$-\sin 2x \sin x \Rightarrow -\sin 2x \sin x = 0 \Rightarrow \begin{cases} \sin x = 0 \\ \sin 2x = 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = \pi n, \\ x = \frac{\pi n}{2}, \end{cases} n\epsilon Z;$

$n = 0 \Rightarrow x = 0;$ $n = 1 \Rightarrow \begin{cases} x = \pi; \\ x = \frac{\pi}{2}; \end{cases}$

$n = 2 \Rightarrow \begin{cases} x = 2\pi; \\ x = \pi; \end{cases}$ $n = 3 \Rightarrow \begin{cases} x = 3\pi; \\ x = \frac{3\pi}{2}; \end{cases}$

$n = 4 \Rightarrow \begin{cases} x = 4\pi; \\ x = 2\pi; \end{cases}$ $x = 0; \frac{\pi}{2}; \pi; \frac{3\pi}{2}; 2\pi.$

Javobi: A.

60. $1 - 2sin4x < cos^2 4x$ tengsizlikni yeching.

A) $(\pi k; \frac{\pi}{2} + \pi k), k \in Z$ B) $\left(-\frac{\pi}{2} + 2\pi k; \frac{\pi}{2} + 2\pi k\right), k \in Z$

C) $\left(\frac{\pi k}{2}; \frac{\pi}{4} + \frac{\pi k}{2}\right), k \in Z$ D) $\left(-\frac{\pi}{4} + 2\pi k; \frac{\pi}{4} + 2\pi k\right), k \in Z$

E) $(\frac{\pi}{8} + 2\pi k; \frac{5\pi}{8} + 2\pi k), k \in Z$

Yechilishi: $1 - 2sin4x < cos^2 4x \Rightarrow$

$\Rightarrow 1 - 2sin4x < 1 - sin^2 4x \Rightarrow sin^2 4x - 2sin4x < 0 \Rightarrow$

$\Rightarrow sin4x(sin4x - 2) < 0 \Rightarrow$

$\Rightarrow \begin{cases} sin4x > 0 \\ sin4x - 2 < 0 \end{cases} \Rightarrow \begin{cases} sin4x > 0 \\ sin4x < 2 \end{cases} \Rightarrow sin4x > 0 \Rightarrow$

$\Rightarrow 0 < 4x < \pi \Rightarrow 2\pi k < 4x < \pi + 2\pi k \Rightarrow$

$\Rightarrow \frac{\pi k}{2} < x < \frac{\pi}{4} + \frac{k\pi}{2}, k\epsilon Z.$ Javobi: C.

61. Agar $b = sin(40° + a)$ va $0° < a < 45°$ bo'lsa,
$cos(70° + a)$ ni b orqali ifodalang.

A) $-\frac{1}{2}(\sqrt{3(1 - b^2)} + b)$

B) $\frac{1}{2}\left(b - \sqrt{3(1 - b^2)}\right)$

C) $\frac{1}{2}\sqrt{3(1 - b^2)} - b$

D) $\frac{1}{2}(\sqrt{3(1 - b^2)} + b)$

E) $\frac{1}{2}\sqrt{3(1 - b^2)}$

Yechilishi: $b = \sin(40° + \alpha)$; $0° < \alpha < 45°$

$\cos(70° + \alpha) = \cos°(30° + 40° + \alpha) =$

$= \cos[30° + (40° + \alpha)] =$

$= \cos 30° \cos(40° + \alpha) - \sin 30° \cdot \sin(40° + \alpha)] =$

$= \frac{\sqrt{3}}{2} \cdot \cos(40° + \alpha) - \frac{1}{2} \cdot b = \frac{\sqrt{3}}{2}\sqrt{1 - b^2} - \frac{1}{2} \cdot b =$

$= \frac{1}{2}\left[\sqrt{3(1 - b^2)} - b\right]$; Chunki,

$cos^2\alpha = 1 - sin^2\alpha$; $\cos \alpha = \sqrt{1 - sin^2\alpha}$.

Javobi: C.

62. Agar $tg\alpha + ctg\alpha = p$ bo'lsa, $tg^3\alpha + ctg^3\alpha$ ni p orqali ifodalang.

A) $-p^3 - 3p$

B) $p^3 - 3p$

C) $p^3 + 3p$

D) $3p - p^3$

E) $3p^3 - p$

Yechilishi: $tg\alpha + ctg\alpha = p$; $tg^3\alpha + ctg^3\alpha$

1) $(tg\alpha + ctg\alpha)^2 = p^2 \Rightarrow$

$\Rightarrow tg^2\alpha + ctg^2\alpha + 2tg\alpha ctg\alpha = p^2 \Rightarrow$

$\Rightarrow tg^2\alpha + ctg^2\alpha + 2 \cdot 1 = p^2 \Rightarrow tg^2\alpha + ctg^2\alpha = p^2 - 2$;

2) $tg^3\alpha + ctg^3\alpha = (tg\alpha + ctg\alpha)(tg^2\alpha - tg\alpha \cdot ctg\alpha +$

$+ctg^2\alpha) = p(p^2 - 2 - 1) = p(p^2 - 3) = p^3 - 3p$.

 Javobi: B.

63. $m = cos75°, n = sin50°, p = sin45°$ va
$q = cos85°$ sonlarni o'sish tartibida yozing.

A) $q < m < p < n$

B) $m < n < p < q$

C) $q < n < p < m$

C) $p < m < q < n$

E) $q < m < n < p$

Yechilishi: $\begin{cases} m = cos75° \\ n = sin50° \\ p = sin45° \\ q = cos85° \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} m = \cos(90° - 15°) = sin15° \\ n = sin50° \\ p = sin45° \\ q = \cos(90° - 5°) = sin5° \end{cases} \Rightarrow q < m < p < n.$

Burchak ortgan sar sinusning qiymati ortib borishi e'tiborga olinadi.   Javobi: A.

1998-YIL, 9-AXBOROTNOMA

1. $\dfrac{\frac{15}{19}(3\frac{4}{5} \cdot 5\frac{1}{3} + 4\frac{2}{3} \cdot 3,8)}{0,005}$ ni hisoblang.

   A) 2010   B) 1800   C) 2120   D) 2000   E) 2200

   Yechilishi: $\dfrac{\frac{5}{19}(3\frac{4}{5} \cdot 5\frac{1}{3} + 4\frac{2}{3} \cdot 3,8)}{0,005} = \dfrac{\frac{5}{19}(\frac{19}{5} \cdot \frac{16}{3} + \frac{14}{3} \cdot 3\frac{8}{10})}{\frac{5}{1000}} =$

   $\dfrac{\frac{5}{19} \cdot \frac{19}{5} \cdot \frac{16}{3} + \frac{5}{19} \cdot \frac{14}{3} \cdot \frac{19}{5}}{\frac{5}{1000}} = \dfrac{\frac{16}{3} + \frac{14}{3}}{\frac{5}{1000}} = \dfrac{10}{\frac{5}{1000}} = \dfrac{10000}{5} = 2000.$

   Javobi: D.

2. 15 va 25 sonlai eng kichik umumiy karralisining natural bo'luvchilari nechta?

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

   Yechilishi: $K(15; 25) = ?$

   $\begin{cases} 15 = 3 \cdot 5 \\ 25 = 5 \cdot 5 \end{cases} \Rightarrow \begin{array}{l} K(15; 25) = 3 \cdot 5^2 = 75; \\ (1+1)(2+1) = 2 \cdot 3 = 6. \end{array}$

   $\begin{array}{l|l} 15 & 3 \\ 5 & 5 \\ 1 & \end{array} \qquad \begin{array}{l|l} 25 & 5 \\ 5 & 5 \\ 1 & \end{array}$

   Javobi: C.

3. Sinfdagi 35 ta o'quvchidan 28 tasi suzish seksiyasiga, 14 tasi valeybol seksiyasiga qatnashadi. Agar har bir o'quvchi, hech bo'lmaganda, bitta seksiyaga qatnashsa, ikkala seksiyaga qatnashadigan o'quvchilar necha foizni tashkil etadi.

   A) 20   B) 18   C) 25   D) 15   E) 20

   Yechilishi: $28 + 14 - 35 = 7.$

   $\begin{array}{l} 35 - 100\% \\ \ \ 7 - x\% \end{array} \Rightarrow 35x = 700 \Rightarrow x = 20\%.$

   Javobi: A.

4. Quyidagi sonlardan qaysi biri 12 ga qoldiqsiz bo'linmaydi?

   A) 9216   B) 13626   C) 12024   D) 18312   E) 52308

   Yechilishi: 3 va 4 ga bo'linmaydigan son 13626.

   Javobi: B.

5. Agar kamayuvchini 24 ta va ayriluvchini 36 ta kamaytirilsa, ayirma qanday o'zgaradi?
   A) 56 ta kamayadi   B) 24 ta ortadi   C) 12 ta ortadi
   D) 12 ta kamayadi   E) 56 ta ortadi
   Yechilishi: $(x - 24) - (y - 36) \Rightarrow x - y - 24 + 36 \Rightarrow$
   $\Rightarrow x - y + 12.$ Javobi: C.

6. Ikki pristan orasidagi masofa 63 km. Bir vaqtning o'zida oqim bo'ylab birinchi pristandan sol, ikkinchisidan motorli qayiq jo'natildi va motorli nqayiq solni 3 soatda quvib yetdi. Agar daryo oqimining tezligi 3km/soat bo'lsa, qayiqning turg'un suvdagi tezligi qanchaga teng bo'ladi?
   A) 21   B) 20   C) 22   D) 19   E) 18
   Yechilishi: $v_0 = 3 \frac{km}{soat}$; $v_q + v_0 = v_q + 3$;
   $t = 3$; $v_s = v_0$; $x -$ solning 3 soatda bosib o'tgan yo'li;
   $S = 63 + x$ butun yo'l; $63 + x = (v_q + 3) \cdot 3$;
   $x = v_s \cdot t = v_0 \cdot t = 3 \cdot 3 = 9 \Rightarrow x = 9$;
   $63 + 9 = (v_q + 3) \cdot 3 \Rightarrow v_q + 3 = 72 : 3 \Rightarrow$
   $\Rightarrow v_q = 24 - 3 \Rightarrow v_q = 21.$
   Javobi: A.

7. $\frac{a^2 + ab + b^2}{a^3 - b^3} - \frac{a^2 - ab + b^2}{a^3 + b^3}$ ni soddalashtiring.
   A) $\frac{2b}{b^2 - a^2}$ B) $\frac{2a}{a^2 - b^2}$ C) $\frac{2b}{a^2 - b^2}$ D) $\frac{2a}{b^2 - a^2}$ E) $\frac{b}{a^2 - b^2}$
   Yechilishi: $\frac{a^2 + ab + b^2}{(a-b)(a^2 + ab + b^2)} - \frac{a^2 - ab + b^2}{(a+b)(a^2 - ab + b^2)} = \frac{1}{a-b} - \frac{1}{a+b} =$
   $= \frac{a + b - (a - b)}{(a - b)(a + b)} = \frac{a + b - a + b}{a^2 - b^2} = \frac{2b}{a^2 - b^2}.$
   Javobi: C.

8. t ning qanday qiymatida $-t^2 + 14t - 31$ uchhad eng katta qiymatga erishadi?
   A) 6   B) 5   C) 8   D) 7   E) 9
   Yechilishi: $f(t) = -t^2 + 14t - 31 \Rightarrow f'(t) = -2t + 14 \Rightarrow$
   $\Rightarrow f'(t) = 0 \Rightarrow -2t + 14 = 0 \Rightarrow 2t = 14 \Rightarrow t = 7$;

$D(f) = (-\infty; +\infty) = (-\infty; 7) \cup (7; +\infty);$

1) $x = 0 \Rightarrow f(0) = 14 > 0;$

2) $x = 8 \Rightarrow f(8) = -2 < 0;$

Funksiya hosilasi $x = 7$ kretik nuqtadan o'tishda ishorasini "+" dan "−" ga o'zgartiradi. Demak, $x = 7$ maksimum nuqta.

$f(7) = -7^2 + 14 \cdot 7 - 31 =$

$= -49 - 31 + 98 = 98 - 80 = 18.$

Javobi: D.

9. Agar $ax^2 + kx + kx^2 - ax = x^2 - 17x$ ayniyat bo'lsa, k ning qiymati qanchaga teng bo'ladi?

A) -6   B) -8   C) -7   D) -9   E) 8

Yechilishi: $ax^2 + kx + kx^2 - ax = x^2 - 17x \Rightarrow$

$(a + k)x^2 + (k - a)x = x^2 - 17x \Rightarrow$

$\Rightarrow \begin{cases} a + k = 1 \\ k - a = -17 \end{cases} \Rightarrow 2k = -16 \Rightarrow k = -8.$ Javobi: B.

10. $x^2 + px + q = 0$ tenglamaning har bir ildizi 4taga orttirib, ildizlari hosil bo'lgan sonlarga teng bo'lgan kvadrat tenglama tuzildi. Agar uning ozod hadi $q + 64$ ga teng bo'lsa, p nechaga teng bo'ladi?

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

Yechilishi: $x^2 + px + q = 0;$

$\begin{cases} x_1 + x_2 = -p \\ x_1 \cdot x_2 = q \end{cases} \Rightarrow \begin{cases} (x_1 + 4) + (x_2 + 4) = -p + a \\ (x_1 + 4) \cdot (x_2 + 4) = q + 64 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x_1 + x_2 + 8 = -p + a \\ x_1 x_2 + 4x_2 + 4x_1 + 16 = q + 64 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x_1 + x_2 + 8 = -p + a \\ x_1 x_2 + 4(x_1 + x_2) + 16 = q + 64 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} -p + 8 = -p + a \Rightarrow a = 8 \\ q + 4(-p) + 16 = q + 64 \end{cases} \Rightarrow$

$\Rightarrow -4p = 64 - 16 \Rightarrow -4p = 48 \Rightarrow p = -12.$

Javobi: E.

11. $y = (x + 3)(x - 1)$ parobolaning grafigi OX o'qini A va B nuqtalarda, OY o'qini C nuqtada kesib o'tadi. ΔABC ning yuzini toping.

    A) 8   B) 12   C) 10   D) 6   E) 9

    Yechilishi: $y = (x + 3)(x - 1)$;

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

    $\Rightarrow \begin{cases} x + 3 = 0 \\ x - 1 = 0 \end{cases} \Rightarrow \begin{cases} x_1 = -3 \\ x_2 = 1 \end{cases} \Rightarrow \begin{cases} A(-3; 0) \\ B(1; 0) \end{cases} \Rightarrow$
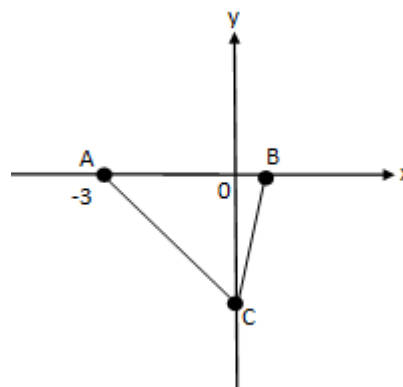
    $\Rightarrow AB = \sqrt{[1 - (-3)]^2} = 4$;

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

    $\Rightarrow y = (0 + 3)(0 - 1) =$

    $= 3 \cdot (-1) = -3 \Rightarrow$

    $C(x; y) = C(0; -3)$;

    3) $S_A = \frac{1}{2} AB \cdot OC = \frac{1}{2} \cdot 4 \cdot 3 = 6$.

    Javobi: D.

12. Agar arifmetik progressiyada $S_n - S_{n-1} = 52$ va $S_{n+1} - S_n = 64$ bo'lsa, uning hadlari ayirmasi qanchaga teng bo'ladi?

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

    Yechilishi: $\begin{array}{l} S_n - S_{n-1} = 52 \Rightarrow a_n = 52 \\ S_{n+1} - S_n \Rightarrow a_{n+1} = 64 \end{array} \Rightarrow$

    $\Rightarrow d = a_{n+1} - a_n = 12 \Rightarrow d = 12$.   Javobi: C.

13. Agar geometrik progressiyada $S_k - S_{k-1} = 64$ va $S_{k+1} - S_k = 128$ bo'lsa, uning maxraji qanchaga teng bo'ladi?

    A) 2   B) 2,2   C) 1,8   D) 2,4   E) 1,6

    Yechilishi: $\begin{array}{l} S_k - S_{k-1} = 64 \Rightarrow b_k = 64; \\ S_{k+1} - S_k \Rightarrow b_{k+1} = 128; \end{array}$
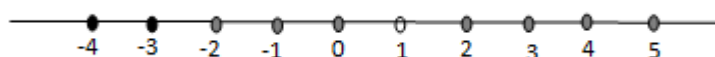
    $q = \frac{b_{k+1}}{b_k} = 2$.   Javobi: A.

14. $\begin{cases} \dfrac{(x+4)(x-5)}{(x-1)^2} \leq 0 \\ x \geq -6 \end{cases}$ Tengsizliklar sistemasining butun

yechimlari yig'indisini toping.

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

Yechilishi: $\begin{cases} (x-1)^2 > 0; \quad x \neq 1; \\ (x+4)(x-5) \leq 0 \Rightarrow \begin{cases} x = -4 \\ x = 5 \end{cases}; \\ x \geq -6; \end{cases}$

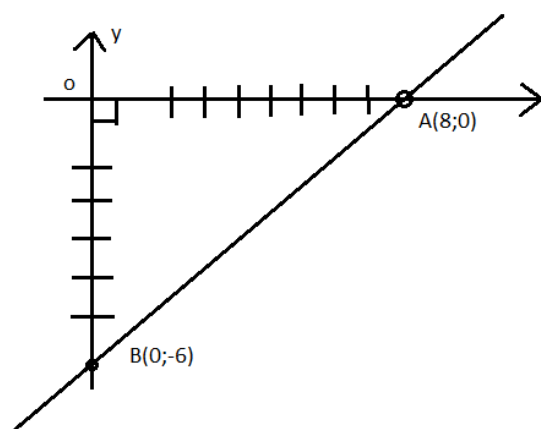$\Rightarrow [-4; 1) \cup (1; 5];$

$-4 - 3 - 2 - 1 + 0 + 2 + 3 + 4 + 5 = 4.$ Javobi: B.

15. Koordinata o'qlari $\dfrac{x}{8} - \dfrac{y}{6} = 1$ to'g'ri chiziqdan qanday
uzunlikdagi kesma ajratadi?

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

Yechilishi: $\dfrac{x}{8} - \dfrac{y}{6} = 1;$

$AB^2 = OA^2 + OB^2 = 8^2 + 6^2 = 100 \Rightarrow AB = 10.$

Javobi: E.

16. Agar $p^2 + pq = 96$ va $q^2 + pq = 48$ b'olsa, $p + q$ ning
qiymati qanchaga teng bo'ladi?

A) 12   B) 14   C) $\pm 12\sqrt{2}$ D) ± 12 E) $\pm 14\sqrt{2}$

Yechilishi: $p^2 + pq = 96;\ \ q^2 + pq = 48;\ \ p + q = ?$
$(p + q)^2 = p^2 + 2pq + q^2 \Rightarrow$
$\Rightarrow p^2 + 2pq + q^2 = 144 \Rightarrow (p + q)^2 = 12^2 \Rightarrow$
$\Rightarrow |p + q| = 12 \Rightarrow p + q = \pm 12.$ Javobi: D.

17. Agar $y^2 > x > 0$ bo'lsa, $|x - y^2| + |x + 9| - 25 = 0$
    tenglik y ning qanday qiymatlarida o'rinli bo'ladi?
    A) 4   B) ± 3 C) ± 4 D) 3   E) ± 2
    Yechilishi: $Y^2 > x > 0;\ \ |x - y^2| + |x + 9| - 25 = 0;$
    $y = ?$
    $-(x - y^2) + (x + 9) - 25 = 0 \Rightarrow$
    $-x + y^2 + x + 9 - 25 = 0 \Rightarrow y^2 = 16 \Rightarrow y = \pm 4.$
    Javobi: C.

18. Agar $n = 81$ bo'lsa, $\sqrt[3]{n\sqrt{n}}$ ning qiymati qanchaga teng
    bo'ladi?
    A) 3   B) 6   C) 9   D) 4   E) 5
    Yechilishi: $n = 81$ $\sqrt[3]{n\sqrt{n}} = ?$
    $\sqrt[3]{81\sqrt{81}} = \sqrt[3]{9^2 \cdot 9} = \sqrt[3]{9^3} = 9.$
    Javobi: C.

19. $\sqrt{x^4 + 5x^2} = -3x$ tenglamaning ildizlari yig'indisini
    toping.
    A) 0   B) -2   C) -4   D) 2   E) 4
    Yechilishi: $\sqrt{x^4 + 5x^2} = -3x \Rightarrow x^4 + 5x^2 = 9x^2 \Rightarrow$
    $\Rightarrow x^4 - 4x^2 = 0 \Rightarrow x^2(x^2 - 4) = 0 \Rightarrow$
    $\Rightarrow \begin{cases} x^2 = 0 \\ x^2 - 4 = 0 \end{cases} \Rightarrow \begin{cases} x_{1,2} = 0 \\ x_{3,4} = \pm 2 \end{cases} \Rightarrow x = +2\, chet\ ildiz \Rightarrow$
    $\Rightarrow x_1 + x_2 + x_3 + x_4 = 0 + 0 - 2 = -2.$ Javobi: B.

20. $\arccos\left(-\frac{1}{2}\right) - \arcsin\left(-\frac{\sqrt{2}}{2}\right)$ ni hisoblang.
    A) $\frac{11}{12}\pi$ B) $\frac{7}{4}\pi$ C) $\frac{\pi}{12}$ D) $\frac{5}{6}\pi$ E) $\frac{9}{7}\pi$

Pirnazar DAVRONOV

Yechilishi: $arccos\left(-\frac{1}{2}\right)$ ko'rinishdagi misollarni „Kosinus necha gradusda $-\frac{1}{2}$ ga teng", degan savolni qo'yib yechish qulay. $arccos\left(-\frac{1}{2}\right) - arcsin\left(-\frac{\sqrt{2}}{2}\right) = \frac{2\pi}{3} - \left(-\frac{\pi}{4}\right) = \frac{11\pi}{12}$.
Javobi: A.

21. Quyidagi ayirlamalardan qaysi birining qaymati manfiy?
A) $sin140° - sin150°$ B) $cos10° - cos50°$
C) $tg87° - tg85°$ D) $ctg45° - ctg40°$
E) $cos75° - sin10°$
Yechilishi: Birlik doiraning birinchi choragida, burchak kattaligi ortgan sari, $ctgx$ funksiyaning qiymati kamayib boradi: $ctg40° > ctg45°$. Javobi: D.

22. Quyida keltirilgan ifodalardan qaysi birining qiymati 1 ga teng emas? 1) $2cos^2a - cos2a$; 2) $2sin^2a + cos2a$;
3) $tg(90° + a)tga$; 4) $(\frac{1}{cos^2a} - 1)(\frac{1}{sin^2a} - 1)$
(3 ва 4 ifodalardan a ning qabul qilishi mumkin bo'lgan qiymatlariga qaraladi)
A) 1   B) 2   C) 3   D) 4   E) бундай сон йўк
Yechilishi: 1) $2cos^2a - cos2a = 2cos^2a - cos^2a + sin^2a == cos^2a + sin^2a = 1$;
2) $2sin^2a + cos2a = 2sin^2a + cos^2a - sin^2a = 1$;
3) $tg(90° + a)tga = -ctga \cdot tga = -1$;
4) $\left(\frac{1}{cos^2a} - 1\right) \cdot \left(\frac{1}{sin^2a} - 1\right) =$
$= (1 + tg^2a - 1)(1 + ctg^2a - 1) = (tgactga)^2 = 1$.
Javobi: C.

23. $arccos\left(-\frac{\sqrt{2}}{2}\right) - arcsin(-\frac{\sqrt{3}}{2})$ ni hisoblang.
A) $\frac{7\pi}{12}$ B) $\frac{\pi}{12}$ C) $\frac{13}{12}\pi$ D) $\frac{5\pi}{12}$ E) $-\frac{5\pi}{12}$
Yechilishi: $arccos\left(-\frac{\sqrt{2}}{2}\right) - arcsin\left(-\frac{\sqrt{3}}{2}\right) =$

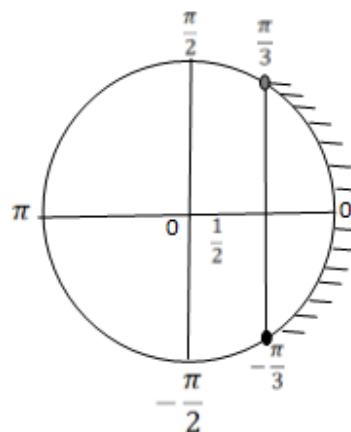$$= \frac{3\pi}{4} - \left(-\frac{\pi}{3}\right) = \frac{13\pi}{12}.$$

Javobi: C.

24. x ning $(-\pi; \pi)$ oraliqqa tegishli qanday qiymatlarida $|cosx + 2{,}5| \geq 3$ tengsizlik o'rinli bo'ladi?

A) $[-\frac{\pi}{3}; \frac{\pi}{3}]$ B) $(-\frac{\pi}{6}; \frac{\pi}{6})$

C) $(-\frac{\pi}{3}; \frac{\pi}{3})$ D) $[-\frac{\pi}{6}; \frac{\pi}{6}]$

E) $[-\frac{\pi}{4}; \frac{\pi}{4}]$

Yechilishi: $(-\pi; \pi)$; $|cosx + 2{,}5| \geq 3$;

$cosx \geq \frac{1}{2} \Rightarrow \left[-\frac{\pi}{3}; \frac{\pi}{3}\right].$

Javobi: A.

25. $sin(60° + x) - sin(60° - x) = k$ tenglama k nıng qanday qiymatlarida yechimga ega?

A) $k \in (-1; 1)$ B) $k \in [-1; 1]$ C) $k \leq 1$

D) $k \leq -1$ E) $k > 1$

Yechilishi: $sin(60° + x) - sin(60° - x) = k \Rightarrow$

$\Rightarrow 2cos\frac{60°+x+60°-x}{2} sin\frac{60°+x-60°+x}{2} = k \Rightarrow$

$\Rightarrow 2cos60° \cdot sinx = k \Rightarrow 2 \cdot \frac{1}{2} \cdot sinx = k \Rightarrow$

$\Rightarrow sinx = k \Rightarrow k \in [-1; 1].$ Javobi: B.

26. $\frac{1}{cos^2x} = 2tg^2x$ tenglamani yeching.

A) $\pm\frac{\pi}{4} + 2\pi k, k \in Z$ B) $\pm\frac{\pi}{4} + \pi k, k \in Z$

C) $\pm\frac{\pi}{3} + \pi k, k \in Z$ D) $\pm\frac{\pi}{3} + 2\pi k, k \in Z$

E) $\pm\frac{\pi}{6} + \pi k, k \in Z$

Yechilishi: $\frac{1}{cos^2x} = 2tg^2x \Rightarrow x \neq \frac{\pi}{2} + k\pi$;

$1 + tg^2x = 2tg^2x \Rightarrow tg^2x = 1 \Rightarrow tgx = \pm 1 \Rightarrow$

$\Rightarrow x = \pm\frac{\pi}{4} + k\pi, \; k \in \mathbb{Z}.$

Javobi: B.

27. $\dfrac{a^{\frac{2}{3}} \cdot b^{\frac{2}{3}} \left[(ab)^{-\frac{1}{6}} \right]^{4}}{(ab)^{-\frac{8}{3}}}$ ni soddalashtiring.

A) $(ab)^{\frac{4}{3}}$ B) $-(ab)^{\frac{4}{3}}$ C) $(ab)^{3}$ D) $(ab)^{\frac{5}{3}}$ E) $(ab)^{\frac{8}{3}}$

Yechilishi: $\dfrac{a^{\frac{2}{3}} \cdot b^{\frac{2}{3}} \left[(ab)^{-\frac{1}{6}} \right]^{4}}{(ab)^{-\frac{8}{3}}} = \dfrac{(ab)^{\frac{2}{3}} \cdot (ab)^{-\frac{4}{6}}}{(ab)^{-\frac{8}{3}}} = \dfrac{(ab)^{\frac{2}{3}} \cdot (ab)^{-\frac{2}{3}}}{(ab)^{-\frac{8}{3}}} =$

$= (ab)^{\frac{2}{3} + \left(-\frac{2}{3} \right) - \left(-\frac{8}{3} \right)} = (ab)^{\frac{2}{3} - \frac{2}{3} + \frac{8}{3}} = (ab)^{\frac{8}{3}}.$

Javobi: E.

28. $a = 0{,}2^{-0,7} \cdot 0{,}3^{-0,6};\ \ b = 0{,}8^{-1,3} \cdot 3^{0,4};$
$c = 2^{0,7} \cdot 0{,}2^{-0,1}$ va $d = 1{,}2^{0,4} \cdot 1{,}1^{1,5}$ sonlardan qaysi biri 1 dan kichik?

A) a B) b C) c D) d E) bunday son yo'q

Yechilishi: Har qanday ko'rsatkichli ildiz ostidagi birdan katta sondan birdan katta son chiqadi:

$a = 0{,}2^{-0,7} \cdot 0{,}3^{-0,6};\ \ \ b = 0{,}8^{-1,3} \cdot 3^{0,4};$

$c = 2^{0,7} \cdot 0{,}2^{-0,1};\ \ \ d = 1{,}2^{0,4} \cdot 1{,}1^{1,5};$

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

$= \sqrt[10]{5^{7}} \cdot \sqrt[5]{\left(\dfrac{10}{3} \right)^{3}} > 1;$

$b = \left(\dfrac{8}{10} \right)^{-\frac{1}{3}} \cdot 3^{\frac{4}{10}} = \left(\dfrac{5}{4} \right)^{\frac{1}{3}} \cdot 3^{\frac{2}{5}} = \sqrt[3]{\dfrac{5}{4}} \cdot \sqrt[5]{3^{2}} > 1;$

$c = 2^{\frac{7}{10}} \cdot \left(\dfrac{2}{10} \right)^{-\frac{1}{10}} = 2^{\frac{7}{10}} \cdot 5^{\frac{1}{10}} = \sqrt[10]{2^{7}} \cdot \sqrt[10]{5} > 1;$

$d = \left(1\dfrac{2}{10} \right)^{\frac{4}{10}} \cdot \left(1\dfrac{1}{10} \right)^{\frac{3}{2}} = \left(\dfrac{6}{5} \right)^{\frac{2}{5}} \cdot \left(\dfrac{11}{10} \right)^{\frac{3}{2}} = \sqrt[5]{\left(\dfrac{6}{5} \right)^{2}} \cdot \sqrt[2]{\left(\dfrac{11}{10} \right)^{3}} > 1.$

Javobi: E.

29. $b^{-5} > b^{-4}$ va $(4b)^{5} > (4b)^{7}$ tengsizliklar bir vaqtda o'rinli bo'ladigan b ning barcha qiymatlari to'plamini toping..

A) $(0;1)$ B) $[\frac{1}{4}; 1]$ C) $(\frac{1}{4}; 1)$ D) $(0;1]$ E) $[0;1)$

Yechilishi: $b^{-5} > b^{-4}$ va $(4b)^5 < (4b)^7$;

1) $-5\log_b b > -4\log_b b$; $b > 0, b \neq 1$;

$-5 < -4 \Rightarrow 0 < b < 1$;

2) $5\log_b 4b > 7\log_b 4b \Rightarrow$

$\Rightarrow 5(\log_b 4 + \log_b b) > 7(\log_b 4 + \log_b b) \Rightarrow$

$\Rightarrow 5\log_b 4 + 5 > 7\log_b 4 + 7 \Rightarrow 2\log_b 4 < -2 \Rightarrow$

$\Rightarrow \log_b 4 < -1 \Rightarrow \begin{cases} 4 > 1 \\ 0 < b < 1 \end{cases} \Rightarrow b > \frac{1}{4}.$

1) va 2) dan $\frac{1}{4} < b < 1.$ Javobi: C.

30. $0,6^{x^2} \cdot 0,2^{x^2} > (0,12^x)^4$ tengsizlikning eng kachik butun yechimi 10 dan qancha kam?

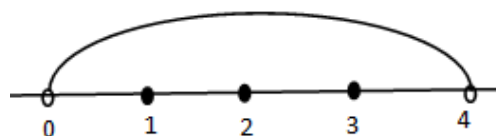   A) 10 ta   B) 8 ta   C) 7та   D) 9 ta   E) 6ta

   Yechilishi: $0,6^{x^2} \cdot 0,2^{x^2} > (0,12^x)^4 \Rightarrow$

   $\Rightarrow (0,6 \cdot 0,2)^{x^2} > 0,12^{4x} \Rightarrow 0,12^{x^2} > 0,12^{4x} \Rightarrow$

   $\Rightarrow 0 < 0,12 < 1 \Rightarrow$

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

   $\Rightarrow x(x-4) < 0 \Rightarrow \begin{cases} x = 0 \\ x = 4 \end{cases} \Rightarrow$

   $x = 1, 2, 3 \Rightarrow x = 1 \Rightarrow 10 - 1 = 9.$ Javobi: D.

31. 18 va $2^{x-4} + 2^{x+1} = 132$ tenglamaning ildizi orasidagi ayirmani toping.

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

   Yechilishi: $2^{x-4} + 2^{x+1} = 132 \Rightarrow 2^x \cdot 2^{-4} + 2^x \cdot 2 = 132 \Rightarrow$

   $\Rightarrow 2^x \left(\frac{1}{2^4} + 2\right) = 132 \Rightarrow 2^x \cdot \frac{1+32}{16} = 132 \Rightarrow$

   $\Rightarrow 33 \cdot 2^x = 16 \cdot 132 \Rightarrow 2^x = 64 \Rightarrow 2^x = 2^6 \Rightarrow x = 6 \Rightarrow$

   $\Rightarrow 18 - 6 = 12.$ Javobi: E.

32. $p = \log_{1,2} \frac{3}{8}$; $q = \log_{0,8} \frac{2}{5}$; $r = \log_{1,4} 0,3$ va $l = \log_{0,4} \frac{3}{4}$ sonlardan qaysilari musbat?

A) faqat p B) p va q C) q va l D) p va l E) faqat l

Yechilishi: $\begin{cases} 0 < a < 1 \\ 0 < x < 1 \end{cases} \Rightarrow \log_a x > 0$ xossaga asosan q, l.

Javobi: C.

33. $\dfrac{log_2 729}{log_2 9}$ ni hisoblang.

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

Yechilishi: $\dfrac{log_2 729}{log_2 9} = \dfrac{\log_2 9^3}{\log_2 9} = 3.$ Javobi: B.

34. $\lg(x^2 + 2x - 3) = \lg(x - 3)$ Tenglamani yeching.
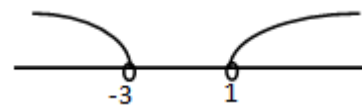
A) 0   B) -1   C) 0; -1   D) $\emptyset$ E) 1
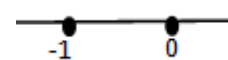
Yechilishi: $\lg(x^2 + 2x - 3) = \lg(x - 3) \Rightarrow$

$$\Rightarrow \begin{cases} x^2 + 2x - 3 > 0 \\ x - 3 > 0 \\ x^2 + 2x - 3 = x - 3 \end{cases} \Rightarrow \begin{cases} (x-1)(x+3) > 0 \\ x > 3 \\ x(x+1) = 0 \end{cases}$$

1) $x_{1,2} = -1 \pm \sqrt{1+3} = -1 \pm 2 \Rightarrow$
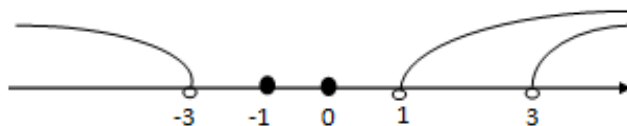$\begin{cases} x_1 = -3; \\ x_2 = 1. \end{cases}$

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

1 va 2 dan

Javobi: D.

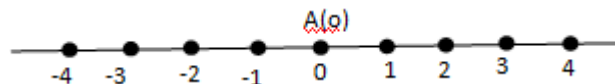35. $log_{0,3}(2x^2 + 4) \geq log_{0,3}(x^2 + 20)$ tengsizlik yechimi bo'lgan kesma o'rtasining koordinatasini toping.

A) -2   B) -1   C) 2   D) 1   E) 0

Yechilishi: $log_{0,3}(2x^2 + 4) \geq log_{0,3}(x^2 + 20) \Rightarrow$

$\Rightarrow 2x^2 + 4 \leq x^2 + 20 \Rightarrow x^2 \leq 16 \Rightarrow \sqrt{x^2} \leq \sqrt{16} \Rightarrow$

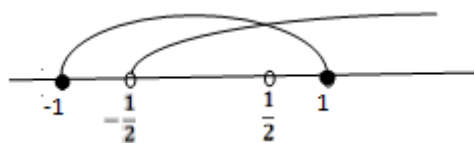$\Rightarrow |x| \leq 4 \Rightarrow -4 \leq x \leq 4.$

Javobi: E.

36. $y = \dfrac{arccos x}{\ln(x + \frac{1}{2})}$ funksiyaning aniqlanish sohasini toping.

A) $[-1; 1)$ B) $[-1; 1]$ C) $(-\frac{1}{2}; 1]$

D) $(-\frac{1}{2}; \frac{1}{2}) \cup (\frac{1}{2}; 1]$ E) $(0; 1]$

Yechilishi: $y = \frac{arccosx}{\ln(x+\frac{1}{2})} \Rightarrow \begin{cases} o \le arccosx \le \pi \\ x + \frac{1}{2} > 0 \\ x + \frac{1}{2} \ne 1 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} -1 \le x \le 1 \\ x > -\frac{1}{2} \\ x \ne \frac{1}{2} \end{cases} \Rightarrow$

$\Rightarrow x \in \left(-\frac{1}{2}; \frac{1}{2}\right) \cup \left(\frac{1}{2}; 1\right].$ Javobi: D.

37. Quyidagi funksiyalardan qaysi biri toq?

A) $f(x) = x^4 cos\frac{x}{2}$ B) $f(x) = |xctgx|$

C) $f(x) = sin2xtg\frac{x}{3}$ D) $f(x) = |x|ctgx$

E) $f(x) = e^{x^2}$

Yechilishi: $x = -x \Rightarrow f(-x) = |-x| \cdot ctg(-x) =$
$= -(-x) \cdot (-ctgx) = -x \cdot ctgx.$
Javobi: D.

38. $f(x) = x^3 + 2x - 5$ funksiyaning $[-1; 1]$ kesmadagi eng katta va eng kichik qiymatlari orasidagi ayirmani toping.

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

Yechilishi: $f(x) = x^3 + 2x - 5;$ $[-1; 1];$

1) $D(f) = (-\infty; +\infty);$

2) $f'(x) = 3x^2 + 2;$

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

4) $x = -1 \Rightarrow f(-1) = (-1)^3 + 2(-1) - 5 =$
$= -1 - 2 - 5 = -8;$
$x = 1 \Rightarrow f(1) = 1^3 + 2 \cdot 1 - 5 = 3 - 5 = -2;$

5) $-2 - (-8) = -2 + 8 = 6.$ Javobi: B.

39. $f(x) = \frac{\sqrt{3}}{3}x^3 - 1$ funksiyaning grafigiga $x_0 = 1$ nuqtada o'tkazilgan urinmaning OX o'qi bilan tashkil qilgan burchagini toping.

    A) $60°$ B) $30°$ C) $45°$ D) $120°$ E) $150°$

    Yechilishi: $f(x) = \frac{\sqrt{3}}{3}x^3 - 1;$ $x_0 = 1$ $\alpha = ?$
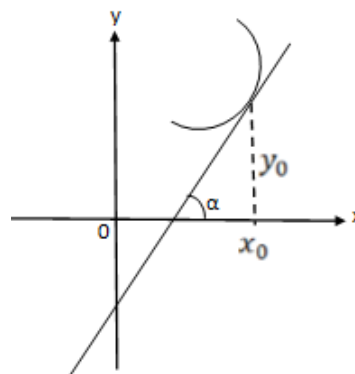
    $k = tg\alpha = f'(x_0);$

    $f'(x) = \frac{\sqrt{3}}{3} \cdot 3x^2 = \sqrt{3}x^2 \Rightarrow$

    $\Rightarrow f(x_0) = \sqrt{3} \cdot x_0^2 \Rightarrow$

    $\Rightarrow f'(1) = \sqrt{3} \cdot 1^2 = \sqrt{3};$

    $tg\alpha = \sqrt{3} \Rightarrow \alpha = 60°.$

    Javobi: A.

40. Moddiy nnuqta $S(t) = e^t + cost + 5t$ qonuniyat bo'yicha harakatlanayapti. Shu nuqtaning $t = 0$ dagi tezligini toping.

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

    Yechilishi: $S(t) = e^t + cost + 5t \Rightarrow S'(t) = v \Rightarrow$

    $\Rightarrow v = e^t - sint + 5;$

    $t = 0 \Rightarrow v = e^0 - sin0 + 5 = 1 + 5 = 6 \Rightarrow v = 6.$

    Javobi: E.

41. $F(x) = 2cos2x + sinx + c$ funksiya quyidagi funksiyalardan qaysi birining boshlang'ich funksiyasi bo'ladi?

    A) $f(x) = -4sin2x - cosx$ B) $f(x) = 4sinx + cosx$
    C) $f(x) = -2sin2x + cosx$ D) $f(x) = -4sin2x + cosx$
    E) $f(x) = -2sinx - cosx$

    Yechilishi: $F(x) = 2cos2x + sinx + c;$

    $[F(x)]' = f(x) \Rightarrow f(x) = (2cos2x + sinx + c)' =$

    $= 2 \cdot (-sin2x) \cdot (2x)' + cosx = cosx - 4sin2x.$

    Javobi: D.

42. $\int_{\pi/12}^{\pi/4} \frac{dx}{sin^2x}$ ni hisoblang.

A) $\frac{\sqrt{3}}{3}$ 　　 B) $-\frac{\sqrt{3}}{2}$ 　　 C) $\frac{\sqrt{3}}{2}$ 　　 D) $-\frac{\sqrt{3}}{3}$ 　　 E) $\frac{\sqrt{2}}{2}$
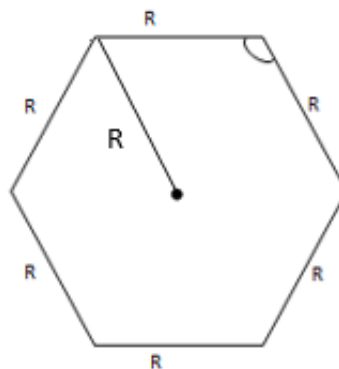
Yechilishi: $\int_{\frac{\pi}{12}}^{\frac{\pi}{4}} \frac{dx}{sin^2 2x} = -\frac{1}{2}ctg2x|_{\frac{\pi}{12}}^{\frac{\pi}{4}} =$

$= -\frac{1}{2}\left[ctg2\cdot\frac{\pi}{4} - ctg2\cdot\frac{\pi}{12}\right] = -\frac{1}{2}\left[ctg\frac{\pi}{2} - ctg\frac{\pi}{6}\right] =$

$= -\frac{1}{2}(0 - \sqrt{3}) = \frac{\sqrt{3}}{2}.$ 　　　　　　 Javobi: C.

43. Radiusi R ga teng bo'lgan aylanadagi nuqtadan uzunliklari R ga teng bo'lgan ikkita vatar o'tkazildi. Vatarlar orasidagi burchakni toping.

A) $40°$ 　　 B) $110°$ 　　 C) $135°$
D) $120°$ 　　 E) $150°$
Yechilishi: $180(n-2)$;
Muntazam oltiburchak.
$n = 6 \Rightarrow 180(6-2) = 720$;
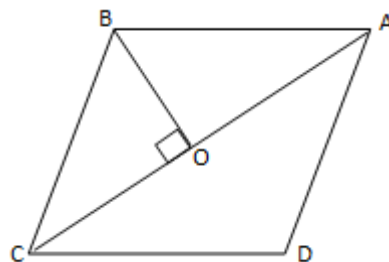$\frac{720}{6} = 120°.$ 　　 Javobi: D.

44. $ABCD$ paralellogrammda $OB \perp AC, AO = 8, OC = 6$ va $BO = 4.$ Paralellogrammning yuzini toping.

A) 50 　　 B) 28 　　 C) 56
D) 52 　 E) 32
Yechilishi: $S_{\Delta ABC} = \frac{1}{2}AC \cdot BO = 28$;
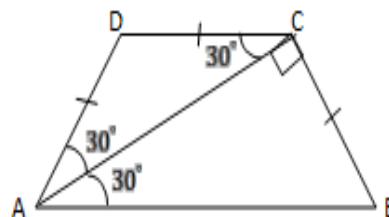$S_{paralellogramm} = 2S_{\Delta ABC} = 56.$
Javobi: C.

45. Radiusi 6 ga teng bo'lgan aylanaga teng yonli trapetsiya ichki chizilgan. Uning dioganali katta asosi bilan $30°$ li burchak tashkil qiladi hamda yon tomoniga perpendikulyar. Trapetsiyaning perimetrini toping.

A) 26 　　 B) 34 　　 C) 29
D) 32 　　 E) 30
Yechilishi: To'g'ri burchakli ΔACB ni
e'tiborga olinsa, unga jumladan teng

185

yonli trapetsiyaga tashqi chizilgan aylana markazi, AB asos o'rtasida yotadi. $AB = 2R \Rightarrow AB = 12;$ $\frac{CB}{AB} = sin30° \Rightarrow$
$CB = \frac{1}{2} \cdot 12 \Rightarrow CB = 6;$ U holda, $3 \cdot BC + AB = p \Rightarrow$
$\Rightarrow p = 3 \cdot 6 + 12 = 30 \Rightarrow p = 30.$ Javobi: E.

46. To'g'ri to'rtburchakning katta tomoni 12 ga, diogonallarining kesishgan nuqtasidan katta tomonigacha bo'lgan masofa 3 ga teng. To'g'ri to'rtburchakning yuzini toping.

    A) 96   B) 54   C) 48

    D) 72   E) 64

    Yechilishi: $S = 12 \cdot 6 = 72.$
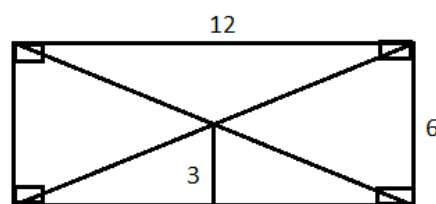
    Javobi: D.

47. Muntazam uchburchakka ichki chizilgan aylananing uzunligi 24π ga teng. Shu uchburchakka tashqi chizilgan aylananing uzunligini toping.

    A) 48π B) 32π C) 36π D) 52π E) 64π

    Yechilishi: $l = 2\pi r \Rightarrow 2\pi r = 24\pi \Rightarrow r = 12;$
    $R = \frac{2}{3}AB;$ $r = \frac{1}{3}AB \Rightarrow AB = 3r;$
    $R = 2r \Rightarrow R = 24;$
    $l = 2\pi R = 2\pi \cdot 24 \Rightarrow l = 48\pi.$
          Javobi: A.

48. Balandligi 28 ga teng bo'lgan rombga ichki chizilgan doiraning yuzini toping.

    A) 198π B) 190π C) 192π

    D) 200π E) 196π

    Yechilishi: $CB = 28;$
     r radius ABC uchburchakning o'rta chizig'i bo'lganligi uchun $r = \frac{h}{2} = 14.$
          $S = \pi r^2 = 196\pi.$ Javobi: E.
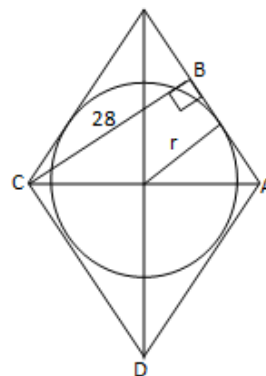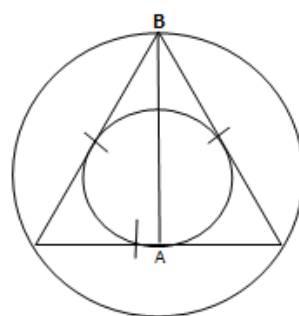
49. Trapetsiyaning asoslari 3 va 6 ga, yuzi 30 ga teng. Uning yon tomonlari E nuqtada kesishguncha davom ettiriladi. BEC uchburchakning yuzini toping.
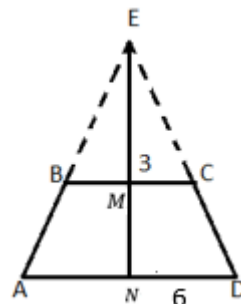
   A) 12   B) 10   C) 8   D) 15   E) 14

   Yechilishi: $S_\Delta = 30;$ $S_{\Delta BEC} = ?$

   $S = \frac{a+b}{2}h \Rightarrow 30 = \frac{6+3}{2} \cdot h \Rightarrow h = \frac{60}{9};$

   $\Delta ADE \backsim \Delta BCE \Rightarrow k = \frac{AD}{BC} = \frac{6}{3} = 2;$

   $k^2 = \frac{S_{\Delta ADE}}{S_{\Delta BCE}} = \frac{30 + S_{\Delta BCE}}{S_{\Delta BCE}} \Rightarrow 30 + S_{\Delta BCE} =$

   $= 4 . S_{\Delta BCE} \Rightarrow S_{\Delta BCE} == 10.$ Javobi: B.

50. Uchburchakning b va c ga teng tomonlari orasidagi burchagi $30°$ga teng. Uchburchakning uchinchi tomoni $c^2 = b^2 + 12b + 144$ shartni qanoatlantirsa, c ning qiymatini toping.

   A) $12\sqrt{2}$ B) $16\sqrt{3}$ C) $16\sqrt{2}$ D) $12\sqrt{3}$ E) $15\sqrt{3}$

   Yechilishi: $\begin{cases} c^2 = b^2 + 12b + 144 \\ c^2 = 12^2 + b^2 - 2 \cdot 12 \cdot b \cdot cos\alpha \end{cases} \Rightarrow$

   $\Rightarrow 144 + b^2 - 24b cos\alpha =$

   $= b^2 + 12b + 144 \Rightarrow$

   $\Rightarrow -24b cos\alpha = 12b \Rightarrow$

   $cos\alpha = -\frac{1}{2} \Rightarrow \alpha = 120° \Rightarrow$

   $\Rightarrow \beta = 30° \Rightarrow b = 12;$

   $c^2 = 12^2 + 12 \cdot 12 + 144 = 3 \cdot 144 \Rightarrow c = 12\sqrt{3}$

   Javobi: D.
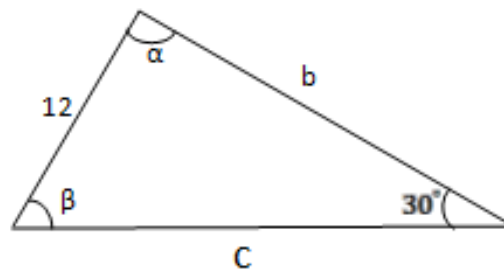
51. Quyidagi nuqtalardan qaysi biri XZ tekislikda yotadi?

   A) $(-4; 3; 0)$ B) $(0; -7; 0)$ C) $(2; 0; -8)$

   D) $(2; -4; 6)$ E) $(0; -4; 5)$

   Yechilishi: $(XOZ) \Rightarrow y = 0 \Rightarrow (2; 0; -8).$ Javobi: C.

52. Agar $\vec{p} = \{2,5; -1\}$ va $\vec{q} = \{-2; -2\}$ bo'lsa, $\vec{m} = 4\vec{p} + 2\vec{q}$ vektorning uzunligini toping.

   A) 12   B) 8   C) 14   D) 6   E) 10

Yechilishi: $\vec{p} = \{2,5; -1\};\ \ \vec{q} = \{-2; -2\};$

$\vec{m} = 4\vec{p} + 2\vec{q} = 4 \cdot \{2,5; -1\} + 2 \cdot \{-2; -2\} =$

$= \{4 \cdot 2,5;\ \ 4 \cdot (-1)\} + \{2 \cdot (-2); 2 \cdot (-2)\} =$

$= \{10; -4\} + \{-4; -4\} = \{10 + (-4);\ -4 + (-4)\} =$

$= \{10 - 4; -4 - 4\} = \{6; -8\};$

$\vec{m} = \{6; -8\} \Rightarrow |\vec{m}| = \sqrt{6^2 + (-8)^2} = \sqrt{100} = 10.$

Javobi: E.

53. Bir uchi (8;2) nuqtada, o'rtasi (4;-12) nuqtada bo'lgan kesmaning ikkinchi uchi koordinatalarini toping.

A) $(1; -13)$ B) $(0; -24)$ C) $(0; -26)$

D) $(0; 26)$ E) $(0; 13)$

Yechilishi:

$$\begin{cases} 4 = \dfrac{8+x}{2} \\ -12 = \dfrac{2+y}{2} \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} 8 = 8 + x \\ -24 = 2 + y \end{cases} \Rightarrow \begin{cases} x = 0 \\ y = -26 \end{cases} \Rightarrow (0; -26).$$
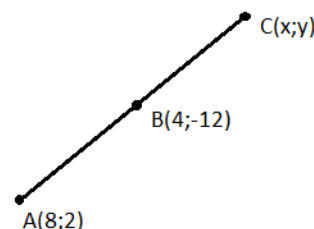
Javobi: C.

54. Uchburchakli muntazam prizmaga tashqi chizilgan silindr yon sirti yuzining unga ichki chizilgan silindr yon sirti yuziga nisbatini toping.

A) 3   B) 2   C) 1,5

D) 2,5   E) 1,2

Yechilishi: $S_{yon} = 2\pi R \cdot H;$

$R = \dfrac{2}{3} AB;\ \ r = \dfrac{1}{3} \cdot AB;$

$S_{yon\ tashqi\ silindr} = 2\pi r \cdot H =$

$= 2\pi \cdot \dfrac{2}{3} \cdot AB \cdot AC = \dfrac{4\pi \cdot AB \cdot AC}{3};$

$S_{yon\ ichki\ silindr} = 2\pi r H = 2\pi \cdot \dfrac{1}{3} \cdot AB \cdot AC = \dfrac{2\pi \cdot AB \cdot AC}{3};$

$\dfrac{S_{yon\ tashqi\ silindr}}{S_{yon\ ichki\ silindr}} = \dfrac{4\pi \cdot AB \cdot AC}{3} \cdot \dfrac{3}{2\pi \cdot AB \cdot AC} = 2.$ Javobi: B.
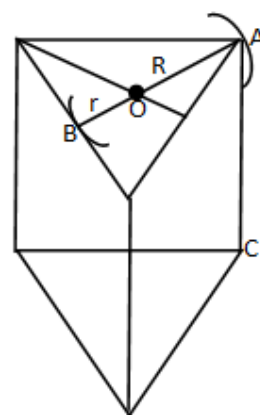
55. Konusning yon sirti 60π ga, to'la sirti 96π ga teng. Konusning yasovchisini toping.

A) 12   B) 9   C) 8

D) 10   E) 11

Yechilishi: $S_{yon} = \pi R l$; $S_t = S_{yon} + S_{asos}$;

$S_{yon} = 60\pi$; $S_t = 96\pi$;

$S_{asos} = 96\pi - 60\pi = 36\pi \Rightarrow$

$\Rightarrow \pi R^2 = 36\pi \Rightarrow R = 6$;

$S_{yon} = \pi R l \Rightarrow 60\pi = \pi \cdot 6 \cdot l \Rightarrow l = 10$.

Javobi: D.
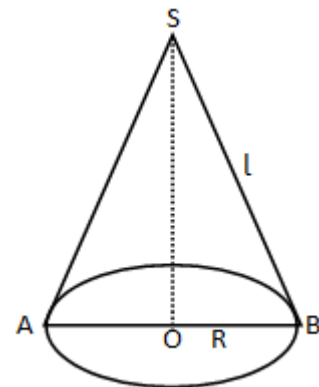
56. Sirtining yuzi 16π ga teng bo'lgan sharning hajmini toping.

A) $8\frac{2}{3}\pi$ B) $12\frac{1}{3}\pi$ C) $10\frac{2}{3}\pi$

D) $9\frac{2}{3}\pi$ E) 14π

Yechilishi: $S_{sirt} = 4\pi R^2 \Rightarrow 4\pi R^2 = 16\pi \Rightarrow$

$\Rightarrow R^2 = 4 \Rightarrow R = 2$;

$V = \frac{4}{3}\pi R^3 = \frac{4}{3}\pi \cdot 2^3 = \frac{32}{3}\pi = 10\frac{2}{3}\pi$.

Javobi: C.
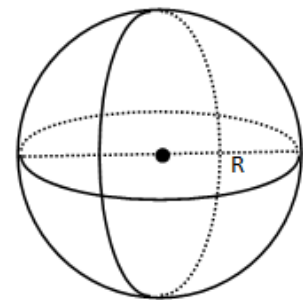
57. Ko'paytmaning har bir hadi 2 ga ko'paytirildi, natijada ko'paytma 1024 marta ortdi. Ko'paytmada nechta had qatnashgan?

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

Yechilishi: $a_1 \cdot a_2 \cdot \ldots \cdot a_n \Rightarrow$

$\Rightarrow 2^n \cdot a_1 \cdot a_2 \cdot \ldots \cdot a_n = 1024 \cdot a_1 \cdot a_2 \cdot \ldots \cdot a_n \Rightarrow$

$\Rightarrow 2^n = 1024 \Rightarrow 2^n = 2^{10}$

Bundan, n = 10. Javobi: C.

```
1024 | 2
 512 | 2
 256 | 2
 128 | 2
  64 | 2
  32 | 2
  16 | 2
   8 | 2
   4 | 2
   2 | 2
```

1998-YIL, 10-AXBOROTNOMA

1. 21 va 35 sonlarning eng kichik umumiy karralisi bilan eng katta umumiy bo'luvchisining yig'indisini toping.
   A) 108   B) 110   C) 112   D) 109   E) 114
   Yechilishi: $K(21; 35) = 3 \cdot 5 \cdot 7 = 105;$
   $$D(21; 35) = 7;$$
   $K + D = 105 + 7 = 112.$ Javobi: C.

   $$\begin{array}{c|c} 21 & 3 \\ 7 & 7 \\ 1 & \end{array} \qquad \begin{array}{c|c} 35 & 5 \\ 7 & 7 \\ 1 & \end{array}$$

2. Quyidagi sonlardan qaysi biri 36 ga qoldiqsiz bo'linmaydi?
   A) 2016   B) 3924   C) 1782   D) 8244   E) 2484
   Yechilishi: 4 va 9 ga bo'linmaydigan son 36 ga ham qoldiqsiz bo'linmaydi. Demak, 1728.   Javobi: C.

3. $\dfrac{n^2 - 12}{n}$ ifoda natural son bo'ladigan n ning barcha natural qiymatlari yig'inisini toping.
   A) 22   B) 7   C) 11   D) 20   E) 18
   Yechilishi: $\dfrac{n^2 - 12}{n} = n - \dfrac{12}{n} \Rightarrow n > \dfrac{12}{n}; \quad n = 4; 6; 12 \Rightarrow 22.$
   Javobi: A.

4. $2{,}014 : 0{,}19 - 2{,}5 \cdot 0{,}3$ ni hisoblang.
   A) 20,85   B) 1,85   C) 8,85   D) 7,85   E) 9,85
   Yechilishi: $2{,}014 : 0{,}19 - 2{,}5 \cdot 0{,}3 = \dfrac{2{,}014}{0{,}19} - 0{,}75 =$
   $= \dfrac{2014}{190} - \dfrac{75}{100} = \dfrac{2014}{190} - \dfrac{3}{4} = 10{,}6 - 0{,}75 = 9{,}85.$
   Javobi: E.

5. 21 kg shakar va 129 kg boshqa mahsulotlardan muzqaymoq tayyorlandi. Shakar muzqaymoqning necha foizini tashkil qiladi?
   A) 13   B) 15   C) 16   D)14   E) 12
   Yechilishi: $\begin{array}{rcl} 150 & - - - & 100\% \\ 21 & - - - & x\% \end{array} \Rightarrow 150x = 21 \cdot 100 \Rightarrow$

$$\Rightarrow x = \frac{21 \cdot 10}{15} = 14.$$ 　　　　　Javobi: D.

6. Sayyoh muayyan masofaning 70% ini poezdda, 29,8% ini porohodda bosib o'tgandan keyin , yo'l oxirigacha yana 200 m qoldi. Sayyoh poezdda necha km yo'l bosgan?

   A) 80 　　　　B) 70 　　　　C) 85 　　　　D) 75 　　　　E) 90

   Yechilishi: $0,7x + 0,298x + \frac{1}{5} = x \Rightarrow 0,998x + 0,2 = x \Rightarrow$

   $\Rightarrow x - 0,998x = 0,2 \Rightarrow 0,002x = 0,2 \Rightarrow 2x = 200 \Rightarrow$

   $\Rightarrow x = 100 \Rightarrow 70\% \Rightarrow 100 \cdot 0,7 = 70 km.$

   Javobi: B.

7. $a = \frac{49}{150}; b = \frac{102}{300}$ va $c = \frac{22}{75}$ sonlarini o'sish tartibida joylashtiring.

   A) $a < c < b$ 　　　　B) $b < c < a$ 　　　　C) $c < a < b$

   D) $b < c < a$ 　　　　E) $a < b < c$

   Yechilishi: $= \frac{49}{150} = \frac{49 \cdot 2}{150 \cdot 2} = \frac{98}{300}; \quad b = \frac{102}{300};$

   $c = \frac{22}{75} = \frac{22 \cdot 4}{75 \cdot 4} = \frac{88}{300} \Rightarrow \quad c < a < b.$ 　　　　Javobi: C.

8. $\frac{(20-48)(-5-20)}{-5}$ kasrning qiymati 40 dan qancha kam?

   A) 160 　　　　B) 140 　　　　C) 180 　　　　D) 200 　　　　E) 120

   Yechilishi: $\frac{(20-48)(-5-20)}{-5} = \frac{(-28) \cdot (-25)}{-5} = -28 \cdot 5 =$

   $-140 \Rightarrow \Rightarrow 40 - (-140) = 180.$ 　　　　Javobi: C.

9. $\left(4\frac{5}{8} \cdot 4\frac{1}{5} \cdot \frac{8}{37} - 3\frac{3}{5}\right)^{-1}$ ni hisoblang.

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

   Yechilishi: $\left(4\frac{5}{8} \cdot 4\frac{1}{5} \cdot \frac{8}{37} - 3\frac{3}{5}\right)^{-1} = \left(\frac{37}{8} \cdot \frac{21}{5} \cdot \frac{8}{37} - \frac{18}{5}\right)^{-1} =$

   $= \left(\frac{21}{5} - \frac{18}{5}\right)^{-1} = \left(\frac{3}{5}\right)^{-1} = \frac{5}{3} = 1\frac{2}{3}.$ 　　　　Javobi: D.

10. Daryodagi ikki pristan orasidagi masofa $240\ km$. Bulardan bir vaqtda ikki paroxod bir-biriga qarab yo'lga tushdi. Paroxodlarning tezligi $20\ km/soat$ ga teng. Agar daryo

191

oqimining tezligi $3\ km/soat$ bo'lsa, porohodlar necha soatdan keyin uchrashishadi.
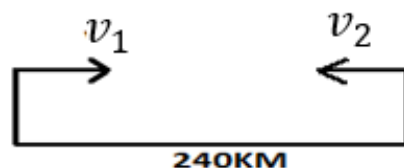
A) 5,5   B) 6   C) 5
D) 6,5   E) 4

Yechilishi: $v_1 = v_2 = 20;\ \ v_0 = 3;$
$v_1 = v + v_0 = 20 + 3 = 23;$
$v_2 = v - v_0 = 20 - 3 = 17;\ \ S_1 = 23 \cdot t;$
$S_2 = 17 \cdot t \Rightarrow S = S_1 + S_2 \Rightarrow 240 = 23t + 17t \Rightarrow$
$\Rightarrow 240 = 40t \Rightarrow t = \dfrac{240}{40} = 6 \Rightarrow t = 6.$ Javobi: B.

11.   Bir kombayn daladagi hosilni 15 soatda, boshqasi esa shu hosilni 10 soatda yig'ib olishi mumkin. Ikkala kambayn birgalikda hosilni qancha soatda yig'ib olishi mumkin?

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

Yechilishi: $(\dfrac{1}{15} + \dfrac{1}{10})x = 1 \Rightarrow \dfrac{2+3}{30}x = 1 \Rightarrow$
$\Rightarrow 5x = 30 \Rightarrow x = 6.$ Javobi: E.

12. $\dfrac{x^3 + y^3}{x^2 - xy + y^2} - \dfrac{x^2 - y^2}{x+y}$ ni soddalashtiring.

A) $2x$ B) $2y$ C) $-2y$ D) $-2x$ E) $2x - 2y$

Yechilishi: $\dfrac{x^3 + y^3}{x^2 - xy + y^2} - \dfrac{x^2 - y^2}{x+y} =$
$= \dfrac{(x+y)(x^2 - xy + y^2)}{x^2 - xy + y^2} - \dfrac{(x-y)(x+y)}{x+y} =$
$= x + y - (x - y) = x + y - x + y = 2y.$
Javobi: B.

13. $2x^2 - 5x + 2 = 0$ tenglamaning ildizlari yig'indisi va ko'paytmasining yig'indisini toping.

A) 2,5   B) 7   C) 2,8   D) 3,5   E) 3,2

Yechilishi: $2x^2 - 5x + 2 = 0 \Rightarrow x_{1,2} = \dfrac{5 \pm \sqrt{25 - 4 \cdot 2 \cdot 2}}{2 \cdot 2} = \dfrac{5 \pm 3}{4} \Rightarrow$

$\Rightarrow \begin{cases} x_1 = \dfrac{1}{2} \\ x_2 = 2 \end{cases} \Rightarrow \begin{cases} x_1 + x_2 = \dfrac{1}{2} + 2 = \dfrac{1+4}{2} = \dfrac{5}{2} \\ x_1 \cdot x_2 = \dfrac{1}{2} \cdot 2 = 1 \end{cases} \Rightarrow$

$$\Rightarrow (x_1 + x_2) + x_1 \cdot x_2 = \frac{5}{2} + 1 = \frac{5+2}{2} = 3{,}5.$$

Javobi: D.

14. t ning qanday qiymatlarida $y = tx^2 - 4x + t$ funksiyaning grafigi Ox o'qining yuqori qismida joylashadi.

A) $t\epsilon[0; 2)$ B) $t\epsilon(0; 2)$ C) $t \in (-2; 2)$

D) $t \in [-2; 2)$ E) $t \in (2; \infty)$

Yechilishi: $y = tx^2 - 4x + t \Rightarrow \begin{cases} t > 0 \\ D < 0 \end{cases} \Rightarrow$

$$\Rightarrow D = b^2 - 4ac = 4^2 - 4 \cdot t \cdot t = 16 - 4t^2 < 0 \Rightarrow$$

$$\Rightarrow 4t^2 > 16 \Rightarrow t^2 > 4 \Rightarrow |t| > 2 \Rightarrow \begin{cases} t > 2 \\ t < -2 \end{cases} \Rightarrow t\epsilon(2; +\infty).$$

Javobi: E.

15. Agar $a < b$ va $ab \neq 0$ bo'lsa, quyidagi tengsizlikdan qaysi biri doim o'rinli?

A) $\frac{1}{a} > \frac{1}{b}$ B) $a^2 > b^2$ C) $-a > -b$

D) $2a < 3a + b$ E) $2a > a + b$

Yechilishi: $a < b; ab \neq 0$. Suratlari teng, maxraji kichik kasr, katta bo'ladi.   Javobi: A.

16. $f(x) = \frac{\sqrt{8+x}}{x+2}$ funksiyaning aniqlanish sohasini toping.

A) $(-\infty; 8)$ B) $(-\infty; 8]$ C) $(-\infty; -2) \cup (-2; 8)$

D) $(-\infty; -2) \cup (-2; 8]$ E) $(-8; -2) \cup (-2; \infty)$

Yechilishi: $f(x) = \frac{\sqrt{8+x}}{x+2} \Rightarrow \begin{cases} 8 + x \geq 0 \\ x + 2 \neq 0 \end{cases} \Rightarrow \begin{cases} x \geq -8 \\ x \neq -2 \end{cases} \Rightarrow$

$$\Rightarrow [-8; -2) \cup (-2; +\infty).$$

Javobi: E.

17. $\begin{cases} x^4 - 1 = 0 \\ xy^2 = -4 \end{cases}$ tenglamalar sistemasini yeching.

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

D) $(-1; 2)$ va $(-1; -2)$ E) $(-1; -2)$
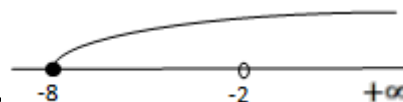
Yechilishi: $\begin{cases} x^4 - 1 = 0 \\ xy^2 = -4 \end{cases} \Rightarrow \begin{cases} x^4 = 1 \\ y^2 = -\frac{4}{x} \end{cases} \Rightarrow \begin{cases} x_{1,2} = \pm 1 \\ y^2 = -\frac{4}{x} \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x_1 = -1 \\ x_2 = 1 \\ y^2 = -\frac{4}{x} \end{cases} \Rightarrow \begin{bmatrix} \begin{cases} x_1 = -1 \\ y_1{}^2 = -\frac{4}{-1} \end{cases} \\ \begin{cases} x^2 = 1 \\ y_2{}^2 = -\frac{4}{1} \end{cases} \end{bmatrix} \Rightarrow \begin{bmatrix} \begin{cases} x_1 = -1 \\ y_1{}^2 = 4 \end{cases} \\ \begin{cases} x^2 = 1 \\ y_2{}^2 \neq -4 \end{cases} \end{bmatrix} \Rightarrow \begin{cases} x_1 = -1 \\ y_{1,2} = \pm 2 \end{cases} \Rightarrow$

$\Rightarrow \begin{bmatrix} \begin{cases} x_1 = -1 \\ y_1 = -2 \end{cases} \\ \begin{cases} x_1 = -1 \\ y_2 = 2 \end{cases} \end{bmatrix} \Rightarrow \begin{cases} (x_1; y_1) = (-1; -2); \\ (x_1; y_2) = (-1; 2). \end{cases}$ Javobi: D.

18. Arifmetik progressiyada $a_2 + a_{19} = 40$. Shu progressiyanbing dastlabki 20 ta hadining yig'indisini toping.

A) 300   B) 360   C) 400   D) 420   E) 380

Yechilishi: $a_2 + a_{19} = 40 \Rightarrow a_1 + a_{20} = 40;$

$S_{20} = \frac{a_1 + a_{20}}{2} \cdot 20 = \frac{40}{2} \cdot 20 = 400.$ Javobi: C.

19. Geometrik progressiyaning dastlabki uchta hadi yig'indisi -26 ga, dastlabki to'rttasiniki esa -80 ga teng. Agar shu progressiyaning birinchi hadi -2 ga teng bo'lsa, uning maxraji qanchaga teng bo'ladi?

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

Yechilishi: $S_3 = -26;\ S_4 = -80,\ a_1 = -2;$

$a_4 = S_4 - S_3 = -80 - (-26) = -54;$

$a_4 = a_1 \cdot q^{4-1} \Rightarrow -54 = -2 \cdot q^3 \Rightarrow a^3 = 27 \Rightarrow$

$\Rightarrow q^3 = 3^3 \Rightarrow q = 3.$ Javobi: A.

20. $ABCD$ to'g'ri to'rtburchakning A burchgi bissektrissasi BC tomoni uzunliklari $BM = 16\ sm$ va $MC = 14\ sm$ bo'lgan ikki qismga ajratadi. To'g'ri to'rtburchakning yuzini toping.
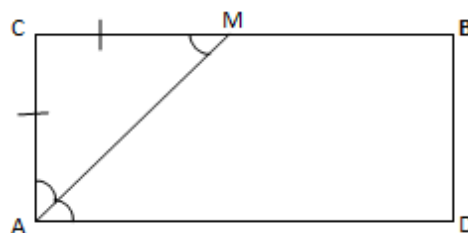
A) 500 sm²   B) 420 sm²   C) 480 sm²

D) 510 sm²   E) 460 sm²

Yechilishi: $BM = 16$; $MC = 14$;

$BC = 30$; $AC = CM$; $S = AC \cdot BC =$

$= 14 \cdot 30 = 420$.

Javobi: B.

21. Qavariq to'rtburchakning uchta burchagi yig'indisi 240° ga teng.To'rtinchi burchagiga qo'shni bo'lgan burchakni toping.

A) 30°   B) 45°   C) 90°

D) 120°   E) 60°

Yechilishi: $\alpha + \beta + \gamma = 240° \Rightarrow$

$\Rightarrow \sigma = 120°$;

$\angle m = 180 - 120 = 60°$.

Javobi: E.
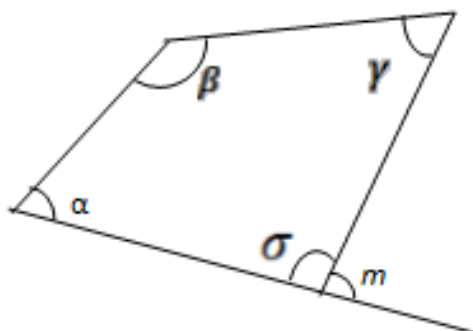
22. ΔABC ning AB va BC tomonlari orasidagi burchagi 30° ga teng. Agar AB va BC tomonlar orasidagi burchak 120° ga orttirilsa, ΔABC ning yuzi qanday o'zgaradi?

A) 4 marta kamayadi   B) 4 marta kamayadi

C) o'zgarmaydi   D) $\sqrt{3}$ marta ortadi

E) $\sqrt{3}$ marta kamayadi

Yechilishi: $S_1 = \frac{1}{2} AB \cdot BC \cdot \sin 30° = \frac{1}{4} \cdot AB \cdot BC$;

$S_2 = \frac{1}{2} AB \cdot BC \cdot \sin 150° =$

$= \frac{1}{2} \cdot AB \cdot BC \cdot \cos 60° =$

$= \frac{1}{4} AB \cdot BC \Rightarrow S_1 = S_2$.

Javobi: C.

23. Rombning tomoni 6 ga, o'tkir burchagi 30° ga teng. Uning diagonallari ko'paytmasini toping.

A) 27   B) 18   C) 42

D) 36   E) 28

195

Yechilishi: $d_1 \cdot d_2 =$?

Kosinuslar teoremasidan foydalanamiz.

1) $d_1{}^2 = 6^2 + 6^2 - 2 \cdot 6 \cdot 6 \cdot cos30° =$

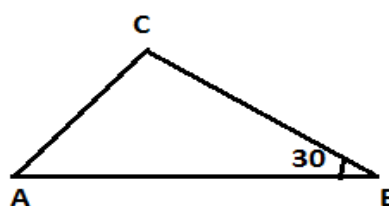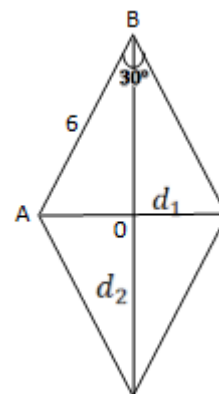$= 72 - 72 \cdot \frac{\sqrt{3}}{2} = 36\left(2 - \sqrt{3}\right) \Rightarrow$

$\Rightarrow d_1 = 6\sqrt{2 - \sqrt{3}}; \ d_2{}^2 = 72 - 72 \cdot cos150° =$

$= 72\left(1 + \frac{\sqrt{3}}{2}\right) = 36\left(2 + \sqrt{3}\right) \Rightarrow d_2 = 6\sqrt{2 + \sqrt{3}};$

3) $d_1 \cdot d_2 = 6\sqrt{2 - \sqrt{3}} \cdot 6 \cdot \sqrt{2 + \sqrt{3}} =$

$= 36 \cdot \sqrt{2^2 - \left(\sqrt{3}\right)^2} = 36\sqrt{4 - 3} = 36 \Rightarrow d_1 \cdot d_2 = 36.$

Javobi: D.

24. Muntazam uchburchakning medianasi 24 ga teng. Unga ichki chizilgan doiraning yuzini toping.

A) 60π B) 64π C) 68π

D) 56π E) 72π

Yechilishi: $AB = 24;$

$r = \frac{1}{3}AB = \frac{1}{3} \cdot 24 = 8;$

$S = \pi r^2 = 64\pi.$

Javobi: B.
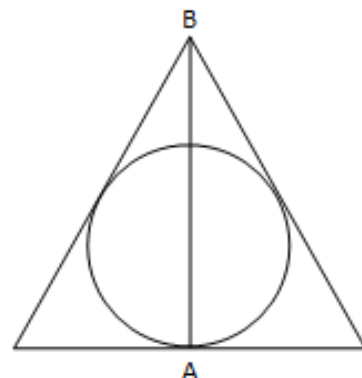
25. ΔABC ning AB tomoni $MN||AC$ to'g'ri chiziq, yordamida $BM = 2$ va $AM = 4$ bo'lgan kesmalarga ajratildi. Agar ΔMBN ning yuzi 16 ga teng bo'lsa, ΔABC ning yuzi qanchaga teng bo'ladi?

A) 48   B) 96   C) 80   D) 144   E) 128

Yechilishi: $AC//MN; \ BM = 2; \ AM = 4;$

$S_{\Delta MBN} = 16; \ S_{\Delta ABC} =$?

$\Delta MBN \backsim \Delta ABC;$.

$\frac{MB}{AB} = k \Rightarrow \frac{2}{6} = k \Rightarrow k = \frac{1}{3};$

$\frac{S_{\Delta MBN}}{S_{\Delta ABC}} = k^2 \Rightarrow \frac{16}{S_{\Delta ABC}} = \left(\frac{1}{3}\right)^2 \Rightarrow \frac{16}{S_{ABC}} = \frac{1}{9} \Rightarrow$

196
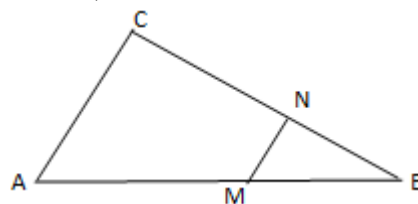
$\Rightarrow S_{\Delta ABC} = 16 \cdot 9 \Rightarrow S_{\Delta ABC} = 144.$ Javobi: D.

26. Doiraga tashqi chizilgan teng yonli trapetsiyaning perimetri 44 ga teng. Agar doiraning radiusi 5 ga teng bo'lsa, trapetsiyaning yuzi qanchaga teng bo'ladi?

A) 200   B) 120   C) 220   D) 100   E) 110

Yechilishi: $r = 5, h = 2r = 10, \ p = 44. \quad S = ?$

$$\begin{cases} 2c = a + b \\ 2c + a + b = 44 \end{cases} \Rightarrow \begin{cases} 4c = 44 \\ a + b = 22 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} c = 11; \\ a + b = 22. \end{cases}$$

$S = \frac{a+b}{2} \cdot h = \frac{22}{2} \cdot 10 = 110.$
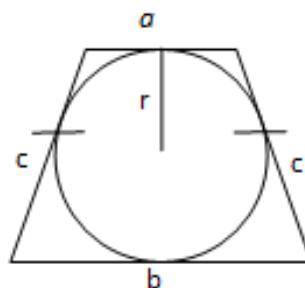
Javobi: E.

27. Uchburchakning a, b va c tomonlari orasida $a^2 = b^2 + c^2 + bc$ munosabat o'rinli. Uzunligi a ga teng bo'lgan tomon qarshisidagi burchakni toping.

A) 60°   B) 120°   C) 30°   D) 150°   E) 45°

Yechilishi: $\begin{cases} - & a^2 = b^2 + c^2 + bc \\ & a^2 = b^2 + c^2 - 2bc \ \cos\alpha \end{cases} \Rightarrow$

$\Rightarrow bc + 2bc \cdot cos\alpha = 0 \Rightarrow$

$\Rightarrow 2bc \cos\alpha = -bc \Rightarrow \cos\alpha = -\frac{1}{2};$

$\alpha = \pm\left(\pi - arccos\frac{1}{2}\right) = \pm\left(\pi - \frac{\pi}{3}\right) =$

$= \pm\frac{2\pi}{3} = \pm 120° \Rightarrow$

$\Rightarrow \alpha = 120°.$ Javobi: B.
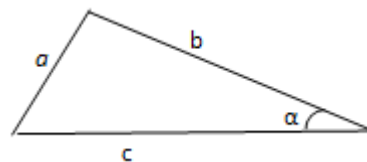
28. To'g'ri burchakli uchburchakning burchaklaridan biri 60° ga, gipotenuzasiga tushirilgan medianasi 15 ga teng. Kichik katetning uzunligini toping.

A) 7,5   B) 10,5   C) 15   D) 12   E) 20

Yechilishi: $m_c = 15 \Rightarrow m_c = \frac{c}{2} \Rightarrow$

$\Rightarrow c = 30 \Rightarrow \frac{a}{c} = \sin 30° \Rightarrow$
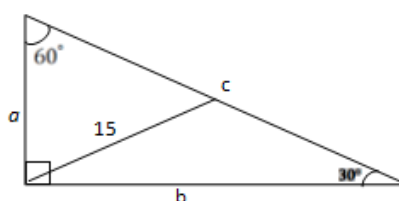
$\Rightarrow a = c \cdot \sin 30° \Rightarrow a = 30 \cdot \frac{1}{2} \Rightarrow a = 15.$ Javobi: C.

29. $A(9; 7);\ B(6; -1)$ va $C(4; 9)$ nuqtalar ΔABCning uchlari. BC tomonga tushirilgan medianasining uzunligini toping.

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

Yechilishi: $A(9; 7);\ B(6; -1);\ C(4; 9);\ D(x; y).$

$$\begin{cases} x = \frac{x_1 + x_2}{2} = \frac{6+4}{2} = 5 \\ y = \frac{x_1 + x_2}{2} = \frac{-1+9}{2} = 4 \end{cases} \Rightarrow D(5; 4);$$
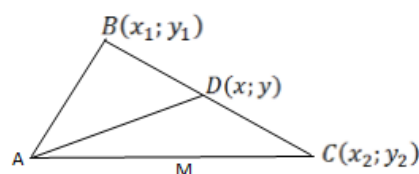
$\overrightarrow{AD} = \{5 - 9; 4 - 7\} = \{-4; -3\};$

$|\overrightarrow{AD}| = \sqrt{(-4)^2 + (-3)^2} = \sqrt{16 + 9} = \sqrt{25} = 5.$

Javobi: D.

30. Agar $\vec{a} = \{4; -10\}$ ва $\vec{b} = \{-2; x\}$ vektorlar o'zaro perpindikulyar bo'lsa, x ning qiymati qanchaga teng bo'ladi?

A) 0,8   B) 0,6   C) -0,8   D) -0,6   E) 5

Yechilishi: $\vec{a} \perp \vec{b} \Rightarrow \vec{a} \cdot \vec{b} = 0 \Rightarrow \{4; -10\} \cdot \{-2; x\} = 0 \Rightarrow$

$\Rightarrow 4 \cdot (-2) + (-10) \cdot x = 0 \Rightarrow -8 - 10x = 0 \Rightarrow$

$\Rightarrow 10x = -8 \Rightarrow x = -\frac{8}{10} = -\frac{4}{5} = -0,8 \Rightarrow x = -0,8.$

Javobi: C.

31. $f(x) = \frac{\sin 2x}{\cos x}$ funksiyaning qiymatlar sohasini toping.

A) (-1;1)   B) (-1;1]   C) [-2;0) ∪ (0;2]

D) [-2;2]   E) (-2;2)

Yechilishi: $f(x) = \frac{\sin 2x}{\cos x} \Rightarrow$ 1) $\cos x \neq 0 \Rightarrow x \neq \frac{\pi}{2} + k\pi;$

2) $f(x) = \frac{\sin 2x}{\cos x} = \frac{2\sin x \cos x}{\cos x} = 2\sin x;$

1) e'tiborga olinsa, 2) dan

$x \in \left[0; \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}; \frac{3\pi}{2}\right) \cup \left(\frac{3\pi}{2}; 2\pi\right] \Rightarrow$

$E(f) = (-2; 2).$ Javobi: E.

32. $tg 15° - ctg 15°$ ni hisoblang.

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

Yechilishi: $tg15° - ctg15° = |tg\alpha - ctg\alpha = -2tg\alpha| =$
$$= -2ctg30° = -2\sqrt{3}. \quad \text{Javobi: B.}$$

33. Agar $\alpha = 46°$ va $\beta = 16°$ bo'lsa,
    $\sin(\alpha + \beta) - 2\sin\beta cos\alpha$?   21,5 dan qancha kam bo'ladi?
    A) 22   B) 20   C) 20,5   D) 19,5   E) 21
    Yechilishi: $\alpha = 46°$; $\beta = 16°$;
    1) $Sin(\alpha + \beta) - 2sin\beta cos\alpha = sin\alpha cos\beta + cos\alpha sin\beta - 2sin\beta cos\alpha = sin\alpha cos\beta - cos\alpha sin\beta = \sin(\alpha - \beta) =$
    $\sin(46° - 16°) = \dfrac{1}{2}$; $21,5 - \dfrac{1}{2} = 21.$
    Javobi: E

34. $2\sin^2 x + \cos^2 x$ ning eng katta qiymatini toping?
    A) 1,5   B) 2,5   C) 2   D) 1,8   E) 2,4
    Yechilishi: $2sin^2 x + cos^2 x = sin^2 x + sin^2 x + cos^2 x =$
    $= sin^2 x + 1 \Rightarrow 0 \le sinx^2 \le 1.$ Javobi: C.

35. $\dfrac{\sin 4a - \sin 6a}{\cos 5a}$ ni soddalashtiring.
    A) $\sin 2a$ B) $2\sin a$ C) $-2\cos a$
    D) $-2\sin a$ E) $2\cos a$
    Yechilishi:

$$\frac{sin4a - sin6a}{cos5a} = \frac{2cos\frac{4a+6a}{2}sin\frac{4a-6a}{2}}{cos5a} = \frac{2cos5a \cdot sin(-a)}{cos5a} = -2\sin a.$$

Javobi: D

36. $tg\dfrac{\pi}{6} \cdot \sin\dfrac{\pi}{3} \cdot ctg\dfrac{5\pi}{4}$ ni hisoblang.

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

Yechilishi: $tg\dfrac{\pi}{6} \cdot sin\dfrac{\pi}{3} \cdot ctg\dfrac{5\pi}{4} = \dfrac{1}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{2} \cdot ctg225 =$

$= \dfrac{1}{2}ctg(180 + 45°) = \dfrac{1}{2} \cdot ctg45° = \dfrac{1}{2} = 0,5.$

Javobi: B.

37. Agar $a = 15°$ bo'lsa, $(1 + \cos 2\alpha)tg\alpha$ ning qiymatini $\frac{1}{8}$ bilan solishtiring.

A) $y\frac{1}{8}$ dan kichik   B) $y\frac{1}{8}$ ga teng   C) $y\frac{1}{8}$ dan 2 marta kata

D) $y\frac{1}{8}$ dan 4 marta katta   E) $y\frac{1}{8}$ dan $\frac{1}{4}$ ga katta

Yechilishi: $\alpha = 15°$; $(1 + \cos2\alpha)tg\alpha =$

$= (1 + \cos30°) \cdot tg15° = \left(1 + \frac{\sqrt{3}}{2}\right) \cdot \frac{\sin30°}{1+\cos30°} =$

$= \frac{2+\sqrt{3}}{2} \cdot \frac{\frac{1}{2}}{1+\frac{\sqrt{3}}{2}} = \frac{2+\sqrt{3}}{2} \cdot \frac{1}{2} \cdot \frac{2}{2+\sqrt{3}} = \frac{1}{2}.$ Javobi: D.

38. Natural a sonni natural b songa bo'lganda, bo'linma c ga qoldiq d ga teng bo'ldi. Agar bo'linuvchi va bo'luvchi 2 marta orttirilsa, d qanday o'zgaradi?

A) O'zgarmaydi   B) 2 marta kamayadi   C) 1 taga ortadi
D) 2 marta ko'payadi   E) 1 taga kamayadi

Yechilishi: $a = b \cdot c + d \Rightarrow 2a = 2b \cdot c + 2d$; 2 marta ko'payadi.   Javobi: D.

39. Ikki natural sonning yig'indisi 462 ga teng. Ulardan birining oxirgi raqami 0 bilan tugaydi. Agar bu nol o'chirilsa, ikkinchi son hosil bo'ladi. Berilgan sonlardan kichigini toping.

A) 46   B) 44   C) 42   D) 38   E) 34

Yechilishi: $\overline{xyo} + \overline{xy} = \overline{xy} \cdot 10 + xy = 11xy$;

$11\overline{xy} = 462 \Rightarrow \overline{xy} = 42.$ Javobi: C.

40. $\begin{cases} 2x - 3 < 17 \\ 4x + 6 > 8 \end{cases}$ sistemaning eng katta butun va eng kichik butun yechimlari yig'indisini toping.

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

$\begin{cases} 2x - 3 < 17 \\ 4x + 6 > 8 \end{cases} \Rightarrow \begin{cases} 2x < 20 \\ 4x > 2 \end{cases} \Rightarrow \begin{cases} x < 10 \\ x > \frac{1}{2} \end{cases} \Rightarrow \frac{1}{2} < x < 10 \Rightarrow$

$\Rightarrow 1 + 9 = 10.$ Javobi: E.

41. $\sqrt{19 - 8\sqrt{3}} + \sqrt{3}$ ni hisoblang.

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

Yechilishi: $\sqrt{19 - 8\sqrt{3}} + \sqrt{3} = \sqrt{19 - \sqrt{64 \cdot 3}} + \sqrt{3} =$

$= \sqrt{19 - \sqrt{192}} + \sqrt{3} = \sqrt{\frac{19 + \sqrt{361 - 192}}{2}} - \sqrt{\frac{19 - \sqrt{361 - 192}}{2}} +$

$\sqrt{3} == \sqrt{\frac{19 + 13}{2}} - \sqrt{\frac{19 - 13}{2}} + \sqrt{3} = 4 - \sqrt{3} + \sqrt{3} = 4.$

Javobi: B.

42. n ning qanday qiymatida $2y = 8 + n - (3n + 4)x$ va $3y = 5 - 2n - (4n - 3)x$ tenglamalar bilan berilgan to'g'ri chiziqlarning kesishish nuqtasi OY o'qida yotadi?

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

Yechilishi: $\begin{cases} 2y = 8 + n - (3n + 4)x \\ 3y = 5 - 2n - (4n - 3)x \end{cases} \Rightarrow A(0; y) \Rightarrow$

$\Rightarrow \begin{cases} 2y = 8 + n - (3n + 4) \cdot 0 \\ 3y = 5 - 2n - (yn - 3) \cdot 0 \end{cases} \Rightarrow \begin{cases} 2y = 8 + n \\ 3y = 5 - 2n \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 6y = 24 + 3n \\ 6y = 10 - 4n \end{cases} \Rightarrow 0 = 14 + 7n \Rightarrow n = -2.$

Javobi: E.

43. $2x^2 + x - a = 0$ tenglamaning ildizlaridan biri 2 ga teng. Uning ikkinchi ildizini toping.

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

Yechilishi: $2x^2 + x - a = 0; \quad x_1 = 2, \quad x_2 = ?$

$2x^2 + x - a = 0 \Rightarrow x^2 + \frac{1}{2}x - \frac{1}{2}a = 0 \Rightarrow$

$\Rightarrow \begin{cases} x_1 + x_2 = -\frac{1}{2} \\ x_1 \cdot x_2 = -\frac{1}{2}a \end{cases} \Rightarrow x_2 = -\frac{1}{2} - x_1 = -\frac{1}{2} - 2 = -2,5.$

Javobi: B.

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

$(a > b)$

A) $2b^{1\backslash 2}$ B) $2a^{1\backslash 2}$ C) $-2b^{1\backslash 2}$

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

Yechilishi: $\sqrt{a - 2a^{\frac{1}{2}}b^{\frac{1}{2}} + b} - \dfrac{a-b}{a^{\frac{1}{2}}-b^{\frac{1}{2}}} =$

$$= \sqrt{(\sqrt{a})^2 - 2\sqrt{a}\cdot\sqrt{b} + (\sqrt{b})^2} - \frac{(\sqrt{a})^2 - (\sqrt{b})^2}{\sqrt{a}-\sqrt{b}} =$$

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

$$= \sqrt{a} - \sqrt{b} - \sqrt{a} - \sqrt{6} == -2\sqrt{b} = -2b^{1\backslash 2}. \quad \text{Javobi: C.}$$

45. Quyidagi mulohazalardan qaysi biri to'g'ri?

A) $6x^4 + 3x^3 + 8 = 0$ tenglamaning ildizi $x = 3$ bo'lishi mumkin.

B) $3x^6 + 4x = -9$ tenglama musbat ildizga ega.

C) $12x^3 + 7x = 2$ tenglama manfiy ildizga ega.

D) $x^2 - 2x - 8 = 0$ tenglamaning ildizlari qarama- qarshi ishorali.

E) $p \ne 0$ da $x^2 - px + p^2 = 0$ tenmglama musbat ildizga ega.

Yechilishi: $x^2 - 2x - 8 = 0 \Rightarrow x_{1,2} = 1 \pm \sqrt{1 + 8} = 1 \pm 3 \Rightarrow$

$$\Rightarrow \begin{cases} x_1 = -2; \\ x_2 = 4. \end{cases} \quad \text{Javobi: D.}$$

46. AB va CD vatarlarning kesishish nuqtasi O nuqta AB vatarni $AO = 4$ va $OB = 12$ ga, CD vatarni esa uzunliklarining nisbati $1:3$ bo'lgan kesmalarga ajratadi. CD vatarning uzunligini toping.

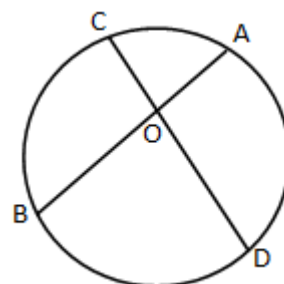A) 12   B) 15   C) 18   D) 27   E) 16

Yechilishi: $AO = 4; OB = 12; CO:OB = 1:3;$

$AO \cdot OB = CO \cdot OD;$

$\dfrac{CO}{OD} = \dfrac{1}{3} \Rightarrow CO = \dfrac{1}{3} \cdot OD;$

$4 \cdot 12 = \dfrac{1}{3}OD \cdot OD \Rightarrow OD = 12;$

$CO = 4; \quad CD = CO + OD = 16.$

Javobi: E.

47. P nuqta radiusi 6 см bo'lgan aylananing markazidan 12 см uzoqlikda joylashgan. P nuqtadan aylana va urinmaning markazidan o'tadigan kesuvchi o'tkzilgan. Urinma va kesuvchi orasidagi burchakni toping.

A) 75°   B) 65°   C) 60°

D) 30°   E) 45°

Yechilishi: $R = 6; P = ?$ $OP = 12;$

$\frac{OB}{OP} = \sin p \Rightarrow Sin\, p = \frac{6}{12} \Rightarrow$

$\Rightarrow Sin\, p = \frac{1}{2} \Rightarrow P = 30°.$
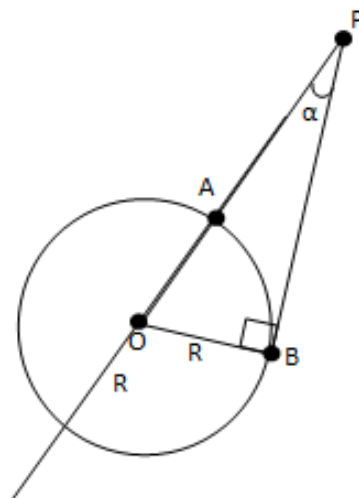
Javobi: D.

48. ΔABC da $BAC = 45°, ACB = 30°$ va $BC = 14\sqrt{2}$ ga teng. AB tomonning uzunligini toping.

A) 12   B) 15   C) 14   D) $12\sqrt{2}$ E) $12\sqrt{3}$

Yechilishi: $\angle BAC = 45°; \angle ACB = 30°;\ BC = 14\sqrt{2}$

1) $\frac{h}{BC} = sin30° \Rightarrow h = 7\sqrt{2};$

2) $\frac{h}{AB} = Sin45° \Rightarrow AB = h : Sin45° =$

$= 7\sqrt{2} : \frac{\sqrt{2}}{2} = 7\sqrt{2} \cdot \frac{2}{\sqrt{2}} = 14.$

Javobi: C.
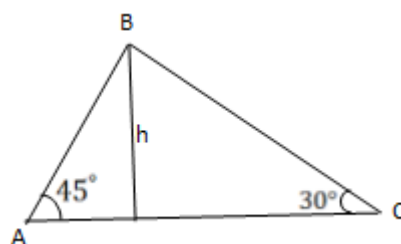
49. Berilgan beshta sonning har biri 3 ga ko'paytirilib, so'ngra hosil bo'lgan sonlarning har biriga 2 qo'shildi. Hosil bo'lgan sonlar yig'indisi 70 ga teng bo'lsa, berilgan sonlar yig'indisi nechaga teng bo'lgan?

A) 20   B) 22   C) 15   D) 25   E) 24

Yechilishi: $(3a + 2) + (3b + 2) + (3c + 2) +$

$+(3m + 2) + +(3n + 2) = 70 \Rightarrow 3(a + b + c + m + n) =$

$= 70 - 10 \Rightarrow a + b + c + m + n = 20.$ Javobi: A.

50. 6 ni berilgan songa ko'paytirilganda, hosil bo'lgan son …44 ko'rinishda bo'lsa, berilgan son quyidagilardan qaysi biri ko'rinishida bo'lishi mumkin?

    A) …24   B) …19   C) …79   D) …14   E) …34

    Yechilishi: … $24 \cdot 6 = \cdots 44$.   Javobi: A.

51. Berilgan $P = 10189144$, $Q = 396715256$ va $R = 78901644$ sonlardan qaysilari 8 ga bo'linadi?

    A) Hech qaysisi   B) P va Q   C) P ва R   D) P   E) R

    Yechilishi: Oxirgi 3 raqamli nol yoki 8 ga bo'linadigan sonlar 8 ga qoldiqsiz bo'linadi.   Javobi: B.

52. 0,0025·0,026 ko'paytma quyidagilardan qaysi biriga teng?

    A) $6{,}5 \cdot 10^{-5}$ B) $650 \cdot 10^{-7}$ C) $65 \cdot 10^{-8}$

    D) $0{,}65 \cdot 10^{-4}$ E) $0{,}0065 \cdot 10^{-3}$

    Yechilishi: $0{,}0025 \cdot 0{,}026 = 25 \cdot 10^{-4} \cdot 26 \cdot 10^{-3} =$
    $= 650 \cdot 10^{-7}$.   Javobi: B.

53. $a = \frac{5}{11}$, $b = \frac{6}{13}$ va $c = \frac{7}{15}$ sonlarni o'sish tartibida joylashtiring.

    A) $a < b < c$ B) $b < a < c$ C) $b < c < a$

    D) $c < b < a$ E) $c < a < b$

    Yechilishi: 1) $a = \frac{5 \cdot 6}{11 \cdot 6} = \frac{30}{66}$; $b = \frac{6 \cdot 5}{13 \cdot 5} = \frac{30}{65} \Rightarrow a < b$;

    2) $b = \frac{6 \cdot 7}{13 \cdot 7} = \frac{42}{91}$; $c = \frac{7 \cdot 6}{15 \cdot 6} = \frac{42}{90} \Rightarrow b < c$;

    3) $a < b < c$.   Javobi: A.

54. Ishchining maoshi dastlab 25% ga , so'ngra yana 25% ga oshirilgan bo'lsa, uning maoshi necha protsentga oshgan?

    A) 50   B) 55   C) 55,25   D) 56   E) 56,25

    Yechilishi: 1) dastlabki maosh x so'm;

    2) $\frac{100+25}{100} \cdot x = 1{,}25x$;   3) $\frac{100+25}{100} \cdot 1{,}25x = 1{,}5625x$;

    Javobi: E.

55. $5\frac{7}{12}$ son $11\frac{1}{6}$ ga ko'paygan bo'lsa, u necha marta ko'paygan?

A) 3   B) 2   C) 2,5   D) 3,5   E) 1,75

Yechilishi: $5\frac{7}{12} = \frac{67}{12}$; $11\frac{1}{6} = \frac{67}{6}$; $\frac{67}{12} + \frac{67}{6} = \frac{201}{12} = \frac{67}{12} \cdot 3$.

Javobi: B.

56. $2\frac{2}{3} : 1\frac{1}{7} \cdot 3\frac{3}{7} \cdot (-\frac{1}{4})$ ni hisoblang.

A) 4   B) 3   C) -2   D) $\frac{2}{7}$ E) $\frac{7}{4}$

Yechilishi: $2\frac{2}{3} : 1\frac{1}{7} \cdot 3\frac{3}{7} \cdot \left(-\frac{1}{4}\right) = -\frac{8}{3} \cdot \frac{7}{8} \cdot \frac{24}{7} \cdot \frac{1}{4} = -2.$

Javobi: C.

57. $45815 \cdot 45818 - 45814 - 45816$ ni hisoblang.

A) 137446   B) 137447   C) 241584

D) 241586   E) 241585

Yechilishi: $45815 \cdot 45818 - 45814 \cdot 45816 =$
$= (45814 + 1) \cdot (45816 + 2) - 45814 \cdot 45816 =$
$= 45814 \cdot 45816 + 45816 + 2 \cdot 45814 + 2 -$
$-45814 \cdot 45816 = 45814 + 2 + 2 \cdot 45814 + 2 =$
$= 3 \cdot 45814 + 4 = 137446.$ Javobi: A.

58. $x^3 + 2nx^2 + mx + 5$ ko'phad $x^2 - x - 2$ ga qoldiqsiz bo'linadi. n ni toping.

A) $\frac{21}{12}$ B) $-\frac{21}{12}$ C) $\frac{12}{21}$ D) $-\frac{12}{21}$ E) -2

Yechilishi: $x^2 - x - 2 = 0 \Rightarrow x_{1,2} = \frac{1}{2} \pm \sqrt{\frac{1}{4} + 2} = \frac{1}{2} \pm \frac{3}{2} \Rightarrow$

$\begin{cases} x_1 = -1 \\ x_2 = 2 \end{cases} \Rightarrow \begin{cases} (-1)^3 + 2n(-1)^2 + m \cdot (-1) + 5 = 0 \\ 2^3 + 2n \cdot 2^2 + m \cdot 2 + 5 = 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} -1 + 2n - m + 5 = 0 \\ 8 + 8n + 2m + 5 = 0 \end{cases} \Rightarrow \begin{cases} 2n - m + 4 = 0 \\ 8n + 2m + 13 = 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} + \quad 4n - 2m + 8 = 0 \\ \quad 8n + 2m + 13 = 0 \end{cases} \Rightarrow 12n + 21 = 0 \Rightarrow 12n = -21 \Rightarrow$

$\Rightarrow n = -\frac{21}{12}.$ Javobi: B.

59. $A(1; 1), B(0; 3)$ va $C(2; 3)$ nuqtalardan o'tuvchi parabola qaysi funksiyaning grafigi hisoblanadi?

A) $y = 2x^2 + 2x - 3$ B) $y = 2x^2 - 2x - 3$
C) $y = 2x^2 - 4x + 3$ D) $y = 2x^2 - 3x + 2$
E) $y = 2x^2 + 3x - 2$

Yechilishi: $A(1; 1), B(0; 3), C(2; 3)$ nuqtalarning koordinatalari javobdagi funksiyalarga qo'yib tekshiriladi.

$C) \ y = 2x^2 - 4x + 3;$

1) $1 = 2 \cdot 1^2 - 4 \cdot 1 + 3 \Rightarrow 1 = 2 - 4 + 3 \Rightarrow 1 = 1;$
2) $3 = 2 \cdot 0^2 - 4 \cdot 0 + 3 \Rightarrow 3 = 3;$
3) $3 = 2 \cdot 2^2 - 4 \cdot 2 + 3 \Rightarrow 3 = 8 - 8 + 3 \Rightarrow 3 = 3.$

Javobi: C.

60. $\dfrac{(x^2+x+1)(x^2+2x-3)}{x^2+3x+2} \leq 0$ tengsizlikning butun yechimlari nechta?

A) 5   B) 4   C) 3   D) cheksiz ko'p   E) 2

Yechilishi: $\dfrac{(x^2+x+1)(x^2+2x-3)}{x^2+3x+2} \leq 0;$

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

$\Rightarrow \begin{cases} x_1 = -3 \\ x_2 = 1 \end{cases} \Rightarrow x^2 + 2x - 3 = (x-1)(x+3);$

2) $x^2 + 3x + 2 = 0 \Rightarrow x_{1,2} = -\dfrac{3}{2} \pm \sqrt{\dfrac{9}{4} - 2} = -\dfrac{3}{2} \pm \dfrac{1}{2} \Rightarrow$

$\Rightarrow \begin{cases} x_1 = -2 \\ x_2 = -1 \end{cases} \Rightarrow x^2 + 3x + 2 = (x+1)(x+2);$

3) $x^2 + x + 1 > 0;$

1), 2) va 3) dan $\dfrac{x^2+2x-3}{x^2+3x+2} \leq 0 \Rightarrow$ 1) $\begin{cases} x^2 + 2x - 3 \geq 0 \\ x^2 + 3x + 2 < 0 \end{cases} \Rightarrow$

$\Rightarrow$
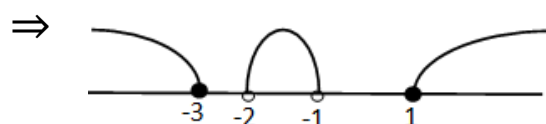
2) $\begin{cases} x^2 + 2x - 3 \leq 0 \\ x^2 + 3x + 2 > 0 \end{cases} \Rightarrow$

$x = -3; 0; 1.$ Javobi: C.

206

61. $kx^2 + 2x + k + 2 > 0$ tengsizlik yechimga ega bo'lmaydigan k ning butun qiymatlari orasidan eng kattasini toping.

A) -1   B) -2   C) eng kattasi yo'q   D) -4   E) -3
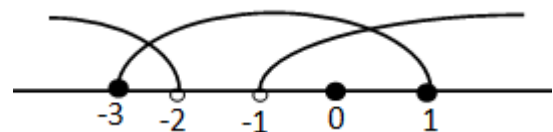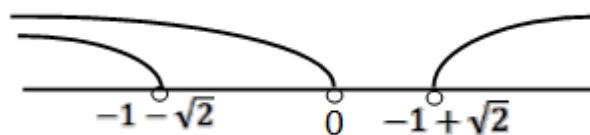
Yechilishi: $kx^2 + 2x + k + 2 > 0 \Rightarrow$

$$\Rightarrow \begin{cases} k < 0 \\ D = 2^2 - 4 \cdot k \cdot (k+2) < 0 \end{cases} \Rightarrow 4 - 4k^2 - 8k < 0 \Rightarrow$$

$$\Rightarrow k^2 + 2k - 1 < 0;$$

$$k_{1,2} = -1 \pm \sqrt{1+1} = -1 \pm \sqrt{2} \Rightarrow \begin{cases} k_1 = -1 - \sqrt{2} \\ k_2 = -1 + \sqrt{2} \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} k_1 = -1 - 1{,}41 = -2{,}41 \\ k_2 = -1 + 1{,}41 = 0{,}41 \end{cases} \Rightarrow$$

$$\begin{cases} k < 0 \\ k_1 = -2{,}41 \\ k_2 = 0{,}41 \end{cases} \Rightarrow$$

$$\Rightarrow \left(-\infty; -1 - \sqrt{2}\right) <=> (-\infty; -2{,}41) \Rightarrow$$

$$\Rightarrow \qquad \Rightarrow k = -3.$$
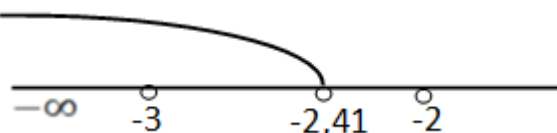
Javobi: E.

62. k ning $(k^2 - 3k + 1)x = k - x - 4 \: va \: (k+1)x + 1 = k + x$ tenglamalardan hech bo'lmaganda birining cheksiz ko'p yechimga ega bo'ladigan nechta qiymati mavjud ?

A) bunday qiymat yo'q   B) 1   C) 2

D) 3   E) cheksiz ko'p

Yechilishi: $(k^2 - 3k + 1)x = k - x - 4;$

$(k+1)x + 1 = k + x;$

Ayniyat bo'lsa yechim cheksiz ko'p bo'ladi:

1) $(k^2 - 3k + 1)x = -x + k - 4 \Rightarrow$

$$\begin{cases} k^2 - 3k + 1 = -1 \\ k - 4 = 0 \end{cases} \Rightarrow \Rightarrow \begin{cases} k^2 - 3k + 2 = 0 \\ k = 4 \end{cases} \Rightarrow \begin{cases} k_1 = 1 \\ k_2 = 2 \\ k_3 = 4 \end{cases} \Rightarrow$$

$a)$ $k_1 = 1 \Rightarrow (1^2 - 3 \cdot 1 + 1)x = -x + 1 - 4 \Rightarrow$

$\Rightarrow -x \neq -x - 3;$

b) $k_2 = 2 \Rightarrow (2^2 - 3 * 2 + 1)x = -x + 2 - 4 \Rightarrow$

$\Rightarrow -x \neq -x - 2;$

c) $k_3 = 4 \Rightarrow (4^2 - 3 * 4 + 1)x = -x + 4 - 4 \Rightarrow 5x \neq -x;$

2) $(k + 1)x + 1 = k + x \Rightarrow \begin{cases} k + 1 = 1 \\ k = 1 \end{cases} \Rightarrow \begin{cases} k = 0; \\ k = 1. \end{cases}$

a) $k = 0 \Rightarrow (0 + 1)x + 1 = 0 + x \Rightarrow x + 1 \neq x;$

b) $k = 1 \Rightarrow (1 + 1)x + 1 = 1 + x \Rightarrow 2x + 1 \neq 1 + x.$

Javobi: A.

63. $\begin{cases} -x - 5 < -2x - 2 \\ -2x + 2 > 3 - 3x \end{cases}$ tengsizliklarning butun yechimlari yig'indisini toping.

A) 0   B) 1   C) 2

D) 3   E) 4
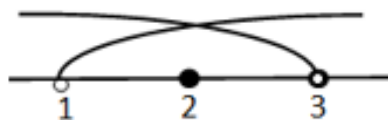
Yechilishi: $\begin{cases} -x - 5 < -2x - 2 \\ -2x + 2 > 3 - 3x \end{cases} \Rightarrow \begin{cases} -x + 2x < -2 + 5 \\ -2x + 3x > 3 - 2 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x < 3; \\ x > 1. \end{cases}$ Javobi: C.

64. $\begin{cases} 3x + 4y = 11 \\ 5x - 2y = 1 \end{cases}$ $y =?$

A) 0   B) 1   C) 2   D) -2   E) -1

Yechilishi: $\begin{cases} 3x + 4y = 11 \\ 5x - 2y = 1 \end{cases} \Rightarrow -\dfrac{\begin{smallmatrix}15x+20y=55\\15x-6y=3\end{smallmatrix}}{20y+6y=55-3} \Rightarrow 26y =$

$52 \Rightarrow\Rightarrow y = \dfrac{52}{26} \Rightarrow y = 2.$ Javobi: C.

65. $\begin{cases} x^2 + y^2 = 10 \\ xy = 3 \end{cases}$ $(x + y)^2 =?$

A) 13   B) 7   C) 16   D) 19   E) 22

Yechililishi: $\begin{cases} x^2 + y^2 = 10 \\ xy = 3 \end{cases} \Rightarrow \begin{cases} x^2 + y^2 = 10 \\ + \dfrac{2xy=6}{x^2+2xy+y^2=16} \end{cases} \Rightarrow$

$\Rightarrow (x + y)^2 = 16.$ Javobi: C.

66. $|x - 1| \leq |x + 3|$ tengsizlikning butun yechimlari nechta?
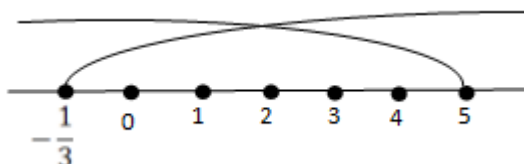
A) 6   B) 5   C) cheksiz ko'p   D) 0   E) 8

Yechilishi: $2|x - 1| \leq |x + 3|$;

$\begin{array}{l} x-1\geq0\Rightarrow2(x-1)\leq|x+3| \\ x-1<0\Rightarrow-2(x-1)\leq|x+3| \end{array} \Rightarrow \begin{cases} 2x - 2 \leq |x + 3| \\ -2x + 2 \leq |x + 3| \end{cases} \Rightarrow x + 3 \geq$

$0 \Rightarrow\Rightarrow \begin{cases} 2x - 2 \leq x + 3 \\ -2x + 2 \leq x + 3 \end{cases} \Rightarrow \begin{cases} x \leq 5; \\ x \geq -\dfrac{1}{3}. \end{cases}$

$x + 3 < 0$ da yechim yo'q.

Javobi: A.

67. Ikkinchi hadi 5 ga, sakkizinchi hadi 15 ga teng bo'lgan arifmetik progressiyaning besinchi hadini toping.

A) 7,5   B) 12,5   C) 10   D) 8,5   E) 9

Yechilishi: $a_2 = 5$; $a_8 = 15$; $a_5 =?$

$a_n = a_4 + d(n - 1) \Rightarrow$

$\begin{cases} a_2 = a_4 + d \\ a_8 = a_4 + 7d \Rightarrow \\ a_5 = a_4 + 4d \end{cases}$

$\begin{cases} 5 = a_4 + d \\ 15 = a_4 + 7d \end{cases} \Rightarrow\Rightarrow \begin{cases} a_4 = 5 - d \\ 15 = 5 - d + 7d \end{cases} \Rightarrow \begin{cases} a_4 = 5 - d \\ 6d = 10 \end{cases} \Rightarrow$

$\begin{cases} a_4 = 5 - d \\ d = \dfrac{10}{6} \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} a_4 = 5 - \dfrac{5}{3} \\ d = \dfrac{5}{3} \end{cases} \Rightarrow \begin{cases} a_4 = \dfrac{10}{3} \\ d = \dfrac{5}{3} \end{cases} \Rightarrow a_5 = \dfrac{10}{3} + 4 \cdot \dfrac{5}{3} = \dfrac{30}{3} = 10.$

Javobi: C.

68. Geometrik progressiyaning maxraji 3 ga, dastlabki to'rtta hadining yig'indisi 80 ga teng. Birinchi hadining qiymatini toping.

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

Yechilishi: $q = 3$, $S_4 = 80$; $b_1 =?$

$$b_n = b_1 q^{n-1}; \quad S_n = \frac{b_1(q^n - 1)}{q-1} \Rightarrow 80 = \frac{b_1(3^4 - 1)}{3-1} \Rightarrow$$

$$\Rightarrow 80 = \frac{b_1 \cdot 80}{2} \Rightarrow 80 = 40 \cdot b_1 \Rightarrow b_1 = 2.$$

Javobi: B.

69. $f(x) = \frac{\sqrt{x}+1}{\sqrt{x}}.$ $\qquad f'(1) = ?$

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

   Yechilishi: $f(x) = \frac{\sqrt{x}+1}{\sqrt{x}}; \quad f'(1) = ?$

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

   $$= -\frac{1}{2\sqrt{x}} \cdot \frac{1}{x} = -\frac{1}{2x\sqrt{x}}; \qquad f'(1) = -\frac{1}{2}.$$

   Javobi: C.

70. $f(x) = \frac{1}{3}x^3 + \frac{3}{2}x^2 - 4x$

   $$\begin{cases} \frac{f'(x) \cdot (x-1)}{x^2 - x - 6} \le 0 \\ x \ge -4 \end{cases}$$ tengsizliklar sistemasining butun

   yechimlari nechta?

   A) 3   B) 4   C) 5   D) 6   E) cheksiz ko'p

   Yechilishi: 1) $f(x) = \frac{1}{3}x^3 + \frac{3}{2}x^2 - 4x \Rightarrow$

   $$\Rightarrow f'(x) = x^2 + 3x - 4 \Rightarrow x_{1,2} = -\frac{3}{2} \pm \sqrt{\frac{9}{4} + 4} = -\frac{3}{2} \pm$$

   $$\frac{5}{2} \Rightarrow \Rightarrow \begin{cases} x_1 = -4 \\ x_2 = 1 \end{cases} \Rightarrow f'(x) = (x-1)(x+4);$$

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

   $$\Rightarrow \begin{cases} x_1 = -2 \\ x_2 = 3 \end{cases} \Rightarrow x^2 - x - 6 = (x+2)(x-3);$$

   3) $\begin{cases} \frac{f'(x) \cdot (x-1)}{x^2 - x - 6} \le 0 \\ x \ge -4 \end{cases} \Rightarrow \begin{cases} \frac{(x-1)(x+4)(x-1)}{(x+2)(x-3)} \le 0 \\ x \ge -4 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} \frac{(x-1)^2(x+4)}{(x+2)(x-3)} \leq 0 \\ x \geq -4 \end{cases} \Rightarrow \begin{cases} \frac{x+4}{(x+2)(x-3)} \leq 0 \\ x \geq -4 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x + 4 \geq 0 \\ (x+2)(x-3) < 0 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x \geq -4 \\ (x+2)(x-3) < 0 \end{cases} \Rightarrow$$

$$\Rightarrow x = -4; -1; 0; 1; 2. \qquad\qquad \text{Javobi: C.}$$

71. k ning qanday qiymatlarida $\begin{cases} (k^2 + k + 1)x + 3y - 6 = 0 \\ x + y + k = 0 \end{cases}$

sistema birorta ham yechimga ega bo'lmaydi?

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

Yechilishi: $\begin{cases} (k^2 + k + 1)x + 3y - 6 = 0 \\ x + y + k = 0 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} (k^2 + x + 1)x + 3(-x - k) - 6 = 0 \\ y = -x - k \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} (k^2 + k + 1)x - 3x - 3k - 6 = 0 \\ y = -x - k \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} (k^2 + k + 1)x - 3x = 3k + 6 \\ y = -x - k \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} (k^2 + k + 1 - 3)x = 3k + 6 \\ y = -x - k \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x = \frac{3k+6}{k^2+k-2} \\ y = -\frac{3k+6}{k^2+k-2} - k \end{cases} \Rightarrow k^2 + k - 2 = 0 \Rightarrow$$

$$\Rightarrow k_{1,2} = -\frac{1}{2} \pm \sqrt{\frac{1}{4} + 2} = -\frac{1}{2} \pm \frac{3}{2} \Rightarrow \begin{cases} k_1 = -2; \\ k_2 = 1. \end{cases}$$

Javobi: C.

72. $y = 2x^3 + 3x^2 - 12x$ funksiyaning [0;2] kesmadagi eng kichik qiymatini toping.

A) 0   B) -2   C) -5   D) -7   E) -8

Yechilishi: $y = 2x^3 + 3x^2 - 12x;$ $[0; 2];$

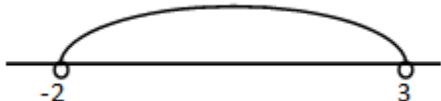$$y' = 6x^2 + 6x - 12 \Rightarrow y' = 0 \Rightarrow 6x^2 + 6x - 12 = 0 \Rightarrow$$

$$\Rightarrow x^2 + x - 2 = 0 \Rightarrow x_{1,2} = -\frac{1}{2} \pm \sqrt{\frac{1}{4} + 2} = -\frac{1}{2} \pm \frac{3}{2} \Rightarrow$$

$$\Rightarrow \begin{cases} x_1 = -2 \\ x_2 = 1 \end{cases} \Rightarrow$$ Funksiyaning hosilasi $x = 1$ kritik nuqtadan

o'tishda ishorasini "$-$„ dan "$+$„ ga almashtiradi: $1 \in [0; 2]$;

$$x = \frac{1}{2} \Rightarrow y'\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2 + \frac{1}{2} - 2 = \frac{1}{4} + \frac{1}{2} - 2 =$$
$$= \frac{1+2-8}{4} = -\frac{5}{4} < 0;$$

$$x = \frac{3}{2} \Rightarrow y'\left(\frac{3}{2}\right) = \left(\frac{3}{2}\right)^2 + \frac{3}{2} - 2 = \frac{9}{4} + \frac{3}{2} - 2 = \frac{9+6-8}{4} = \frac{7}{4} > 0,$$

Demak, $x = 1$ min nuqta ;

$$y_{\min}(1) = 2 \cdot 1^3 + 3 \cdot 1^2 - 12 \cdot 1 = 2 + 3 - 12 = -7.$$

Javobi: D.

73. $y = 2x^3 + 3x^2 - 6x$ funksiyaning grafigiga o'tkazilgan urinma x ning qanday qiymatlarida $y = 6x + 1$ to'g'ri chiziqqa parallel bo'ladi?

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

Yechilishi: 1) $y = 2x^3 + 3x^2 - 6x;\quad x = x_0 =?$

$$y' = 6x^2 + 6x - 6 = 6(x^2 + x - 1) \Rightarrow k = y'(x_0) \Rightarrow$$
$$\Rightarrow k = y'(x_0) = 6(x_0^2 + x_0 - 1);\quad k_1 = k_2 \Rightarrow u_1 \mathbin{//} u_2;$$
2) $y = 6x + 1 \Rightarrow k = 6 \Rightarrow 6 = 6(x_0^2 + x_0 - 1) \Rightarrow$
$$\Rightarrow x_0^2 + x_0 - 1 = 1 \Rightarrow x_0^2 + x_0 - 2 = 0 \Rightarrow$$

$$\Rightarrow x_{0_{1,2}} = -\frac{1}{2} \pm \sqrt{\frac{1}{4} + 2} = -\frac{1}{2} \pm \frac{3}{2}; \begin{cases} x_0 = -2 \\ x_0 = 1 \end{cases} \Rightarrow$$

$$\Rightarrow x = -2 \text{ va } 1.\qquad \text{Javobi: C.}$$

74. $\dfrac{1}{\sin^2(3x+1)}$ ning boshlang'ich funksiyasini toping.

A) $-\frac{1}{3} ctg(3x + 1) + C$ \qquad\qquad B) $\frac{1}{3} ctg(3x + 1) + C$

C) $\frac{1}{3} tg(3x + 1) + C$ \qquad\qquad D)$-\frac{1}{3} tg(3x + 1) + C$

E)$-3 ctg(3x + 1) + C$

Yechilishi: $f(x) = \dfrac{1}{sin^2(3x+1)}$; $F(x) =?$

$F(x) = \int f(x)dx = \int \dfrac{1}{sin^2(3x+1)} dx = -\dfrac{1}{3}ctg(3x + 1) + c.$

Javobi: A.

75. $y = 0, x = 1$ va $x = 3$ to'g'ri chiziqlar hamda A(2;1), B(1;3) va C(3;3) nuqtalardan o'tuvchi parabola bilan chegaralangan sohaning yuzini toping.

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

Yechilishi; $y = 0,\ x = 1,\ x = 3$;

$A(2;1),\ \ B(1;3),\ \ \ C(3;3)$;

$y = ax^2 + bx + c$

1) $A(2;1) \Rightarrow 1 = a \cdot 2^2 + b \cdot 2 + c \Rightarrow 1 = 4a + 2b + c$;

2) $B(1;3) \Rightarrow 3 = a \cdot 1^2 + b \cdot 1 + c \Rightarrow 3 = a + b + c$;

3) $C(3;3) \Rightarrow 3 = a \cdot 3^2 + b \cdot 3 + c \Rightarrow 3 = 9a + 3b + c$;

$$\begin{cases} c = 1 - 4a - 2b \\ 3 = a + b + 1 - 4a - 2b \\ 3 = 9a + 3b + 1 - 4a - 2b \end{cases} \Rightarrow \begin{cases} C = 1 - 4a - 2b \\ 3 = 1 - 3a - b \\ 3 = 5a + b + 1 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} c = 1 - 4a - 2b \\ b = -3a - 2 \\ 5a = 2 - b \end{cases} \Rightarrow \begin{cases} c = 1 - 4a - 2b \\ b = -3 \cdot \dfrac{2-b}{5} - 2 \\ a = \dfrac{2-b}{5} \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} c = 1 - 4a - 2b \\ b = \dfrac{-6+3b-10}{5} = \dfrac{36-16}{5} \\ a = \dfrac{2-b}{5} \end{cases} \Rightarrow \begin{cases} c = 1 - 4a - 2b \\ 5b = 36 - 16 \\ a = \dfrac{2-b}{5} \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} c = 1 - 4 \cdot 2 - 2 \cdot (-8) \\ b = -8 \\ a = 2 \end{cases} \Rightarrow \begin{cases} c = 1 - 8 + 16 \\ b = -8 \\ a = 2 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} c = 9 \\ b = -8 \\ a = 2 \end{cases} \Rightarrow y = 2x^2 - 8x + 9;$$

Pirnazar DAVRONOV

x	-1	0	1	2
y	19	9	3	1
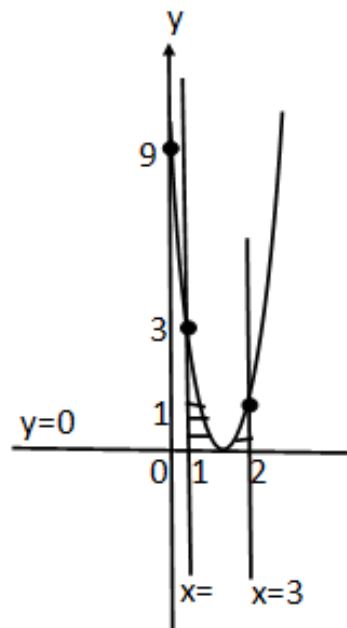
$$S = \int_a^b f(x)dx =$$
$$= \int_1^3 (2x^2 - 8x + 9)dx =$$
$$= \int_1^3 2x^2 dx - \int_1^3 8x dx + \int_1^3 9 dx =$$
$$2 \cdot \frac{x^3}{3}\Big|_1^3 - 8 \cdot \frac{x^2}{2}\Big|_1^3 + 9x\Big|_1^3 =$$
$$= \frac{2}{3}x^3\Big|_1^3 - 4x^2\Big|_1^3 + 9x\Big|_1^3 =$$
$$= \frac{2}{3}[3^3 - 1^3] - 4[3^2 - 1^2] + 9(3-1) = \frac{2}{3} \cdot 2 = 1\frac{1}{3}.$$

Javobi: B.

76. $v(t) = (t^2 - t + 1)$ m/s tezlik bilan to'g'ri chiziq bo'ylab harakatlanayotgan moddiy nuqta dastlabki 6 sek vaqt oralig'ida qancha m masofa bosib o'tadi?

A) 54   B) 64   C) 56   D) 62   E) 60

Yechilishi: $v(t) = (t^2 - t + 1) \Rightarrow S = \int_a^b v(t)dt =$
$$= \int_0^6 (t^2 - t + 1)dt = \int_0^6 t^2 dt - \int_0^6 t dt + \int_0^6 dt =$$
$$= \left[\frac{1}{3}t^3 - \frac{1}{2}t^2 + t\right]\Big|_0^6 \Rightarrow S(t) = \left[\frac{1}{3}t^3 - \frac{1}{2}t^2 + t\right]\Big|_0^6 \Rightarrow$$
$$S(6) = \frac{1}{3} \cdot 6^3 - \frac{1}{2} \cdot 6^2 + 6 = 72 - 18 + 6 = 60.$$
Javobi: E

77. $a = \log_6 108$ bo'lsa, $\log_2 3$ ni a orqali ifodalang.

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

Yechilishi: $a = \log_6 108$; $\log_2 3$;
$$a = \frac{\log_2 108}{\log_2 6} = \frac{\log_2 3 \cdot 36}{\log_2 6} = \frac{\log_2 3 + \log_2 6^2}{\log_2 (2 \cdot 3)} = \frac{\log_2 3 + 2\log_2 6}{\log_2 2 + \log_2 3} =$$
$$= \frac{\log_2 3 + 2(\log_2 2 + \log_2 3)}{1 + \log_2 3} = \frac{\log_2 3 + 2 + 2\log_2 3}{1 + \log_2 3} = \frac{2 + 3\log_2 3}{1 + \log_2 3} \Rightarrow$$

$$\Rightarrow a = \frac{2+3log_2 3}{1+log_2 3} \Rightarrow a + a\, log_2 3 = 2 + 3\, log_2 3 \Rightarrow$$

$$\Rightarrow a \cdot log_2 3 - 3 log_2 3 = 2 - a \Rightarrow (a-3)log_2 3 = 2 -$$

$$a \Rightarrow\Rightarrow log_2 3 = \frac{2-a}{a-3} = \frac{a-2}{3-a}. \qquad \text{Javobi: D.}$$

78. $|x^2 - 2x - 1|^{x-7} = |x^2 - 2x - 1|$ tenglamaning nechta ildizi bor?

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

Yechilishi: $|x^2 - 2x - 1|^{x-7} = |x^2 - 2x - 1|$;

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

$$\Rightarrow \begin{cases} x_1 \neq 1 - \sqrt{2}; \\ x_2 \neq 1 + \sqrt{2}. \end{cases}$$

2) $x - 7 = 1 \Rightarrow x_1 = 8$;

3) $\dfrac{|x^2 - 2x - 1|^{x-7}}{|x^2 - 2x - 1|} = 1 \Rightarrow |x^2 - 2x - 1|^{x-7-1} = 1 \Rightarrow$

$$\Rightarrow |x^2 - 2x - 1|^{x-8} = 1 \Rightarrow |x^2 - 2x - 1| = 1 \Rightarrow$$

$a)$ $x^2 - 2x - 2 = 0 \Rightarrow x_2 = 1 - \sqrt{3};\ \ x_3 = 1 + \sqrt{3}$;

$b)$ $-x^2 + 2x + 1 = 1 \Rightarrow x^2 - 2x = 0 \Rightarrow$

$$\Rightarrow x(x-2) = 0 \Rightarrow \begin{cases} x_4 = 0; \\ x_5 = 2. \end{cases}$$

$$\begin{cases} x_1 = 8 \\ x_2 = 1 - \sqrt{3} \\ x_3 = 1 + \sqrt{3} \qquad \Rightarrow 5 \text{ ta.} \qquad \text{Javobi: E.} \\ x_4 = 0 \\ x_5 = 2 \end{cases}$$

79. $\log_2(4-x) - \log_2 7 < 0$ tengsizlikni qanoatlantiradigan butun sonlar nechta?

A) 6   B) 5   C) 8

D) 7   E) 4
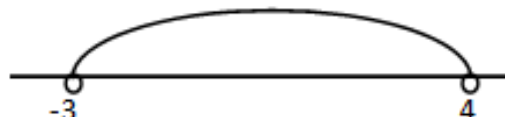
Yechilishi: $\log_2(4-x) - \log_2 7 < 0$;

$$\begin{cases} \log_2(4-x) < \log_2 7 \\ 4 - x > 0 \end{cases} \Rightarrow \begin{cases} 4 - x < 7 \\ x < 4 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} x > -3 \\ x < 4 \end{cases} \Rightarrow \qquad \text{Javobi: A.}$$

80. $log_2{}^2x - 4log_2x + 3 = 0$ tenglamaning ildizlari yig'indisini toping.

A) 8   B) 10   C) 12   D) 6   E) 14

Yechilishi: $log_2{}^2x - 4log_2x + 3 = 0 \Rightarrow \begin{cases} x > 0; \\ log_2 = y. \end{cases}$

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

$\Rightarrow \begin{cases} y_1 = 1 \\ y_2 = 3 \end{cases} \Rightarrow \begin{cases} log_2x_1 = y_1 \\ log_2x_2 = y_2 \end{cases} \Rightarrow \begin{cases} log_2x_1 = 1 \\ log_2x_2 = 3 \end{cases} \Rightarrow \begin{cases} x_1 = 2; \\ x_2 = 8. \end{cases}$

$\Rightarrow x_1 + x_2 = 2 + 8 = 10.$ Javobi: B.

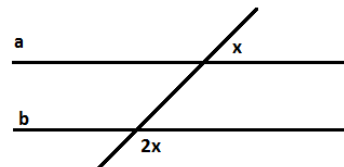81.   a||b.   x=?

A) 50°   B) 60°   C) 45°   D) 55°   E) 65°

Yeshilishi: $a||b; x =?$

$x + 2x = 180° \Rightarrow x = 60°;$

  Javobi: B.

82. $CD -$ bissektrisa, $AC = 5; \quad CB = 7;$

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

Yechilishi: $AC = 5; \quad CB = 7; \quad AD = 3; \quad BD =?$

Bissektrisaning xossasidan:

$\dfrac{a}{a_1} = \dfrac{b}{b_1} \Rightarrow \dfrac{5}{3} = \dfrac{7}{b_1} \Rightarrow 5b_1 = 21 \Rightarrow$

$\Rightarrow b_1 = \dfrac{21}{5} = 4\dfrac{1}{5} = 4,2.$

     Javobi: C.
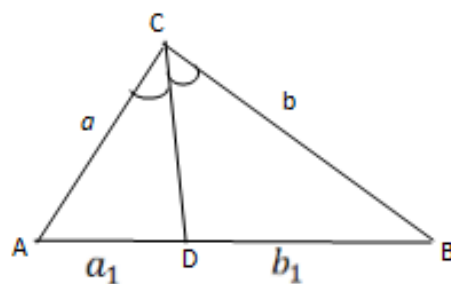
83. $CD = 3; \quad DB = 12. \quad AD =?$

A) 5,5   B) $5\dfrac{5}{6}$ C) $5\dfrac{1}{6}$ D) 6   E) $6\dfrac{1}{6}$

Yechilishi: $CD = 3; \quad DB = 12; \quad AD =?$

$AD^2 = CD \cdot DB = 36 \Rightarrow AD = 6.$

     Javobi: D.
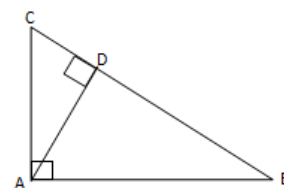
84. $AE = 4, EB = 10, CE = 2. DE =?$

A) 15   B) 16   C) 18   D) 20   E) 22

Yechilishi: $AE = 4; \quad EB = 10; \quad CE = 2; \quad DE =?$

$AE \cdot EB = CE \cdot DE \Rightarrow$

$\Rightarrow 4 \cdot 10 = 2 \cdot DE \Rightarrow DE = 20.$

Javobi: D.

85. ABC uchburchakda $\angle A = 30°$, $AB = \sqrt{3}$, $AC = 6$. A uchidan tushirilgan balandlikning uzunligini toping.

A) $\frac{\sqrt{7}}{7}$ B) $\frac{2}{7}\sqrt{7}$ C) $\frac{3}{7}\sqrt{7}$ D) $\frac{4}{7}\sqrt{7}$ E) $\frac{5}{7}\sqrt{7}$
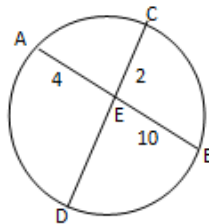
Yechilishi: 1) $BC^2 = 6^2 + \left(\sqrt{3}\right)^2 - 2 \cdot 6 \cdot \sqrt{3} \cdot cos30° = 21$;

$BC = \sqrt{21}$;

2) ΔADB dan $AD^2 = AB^2 - DB^2 =$

$= \left(\sqrt{3}\right)^2 - BD^2 = 3 - BD^2$;

3) ΔADC dan $AD^2 = AC^2 - CD^2 =$

$= 36 - (CB + BD)^2 = 36 - \left(\sqrt{21} + BD\right)^2$;

4) $3 - BD^2 = 36 - 21 - 2\sqrt{21} \cdot BD - BD^2 \Rightarrow$

$\Rightarrow 2\sqrt{21} \cdot BD = 12 \Rightarrow BD = \frac{6}{\sqrt{21}}$;

5) $AD^2 = 3 - \frac{36}{21} = \frac{63-36}{21} = \frac{27}{21} = \frac{9}{7} \Rightarrow AD = \frac{3}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$.

Javobi: C.
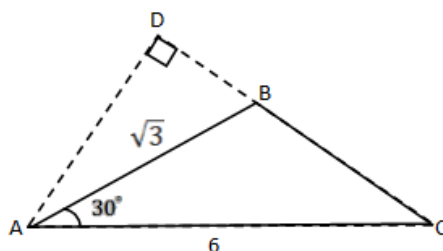
86. Teng yonli uchburchakning uchidagi burchagi 2α. Unga ichki chizilgan aylananing radiusi r ga teng. Uchburchakning yon tomonini toping.

A) $\frac{1+cos\alpha}{cos\alpha} \cdot r$ B) $\frac{1+cos\alpha}{sin\alpha} \cdot r$ C) $\frac{1+sin\alpha}{sin\alpha} \cdot r$

D) $\frac{1+sin\alpha}{cos\alpha} \cdot r$ E) $\frac{1+sin\alpha}{sin\alpha \cdot cos\alpha} \cdot r$

Yechilishi: $l = ?$ 1) $r = \frac{2s}{a+b+c} = \frac{2s}{a+2l}$;

2) $S_\Delta = \frac{1}{2} \cdot l^2 \cdot sin2\alpha$;

3) $\frac{a}{2} : l = sin\alpha \Rightarrow a = 2l \cdot sin\alpha$;

4) $r = \frac{2 \cdot \frac{1}{2} \cdot l^2 sin2\alpha}{2l \cdot sin\alpha + 2l} = \frac{l^2 \cdot 2sin\alpha cos\alpha}{2l(sin\alpha + 1)} = \frac{sin\alpha cos\alpha}{sin\alpha + 1} \cdot l \Rightarrow$
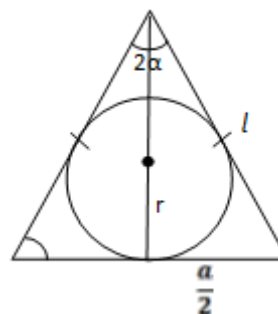
Pirnazar DAVRONOV

$$\Rightarrow l = r : \frac{sin\alpha cos\alpha}{1+sin\alpha} \Rightarrow l = \frac{1+sin\alpha}{sin\alpha \cdot cos\alpha} \cdot r.$$ Javobi: E.

87. Aylanaga tashqi chizilgan teng yonli trapetsiyaning asoslari 54 va 24 sm. Aylananing radiusi necha sm?

A) 15   B) 16   C) 17   D) 18   E) 19

Yechilishi: $2l = 24 + 54 \Rightarrow 2l = 78 \Rightarrow$
$\Rightarrow l = 39;$
$h^2 = 39^2 - 15^2 = 1521 - 225 = 1296;$
$h = 36 \Rightarrow r = \frac{h}{2} = 18.$
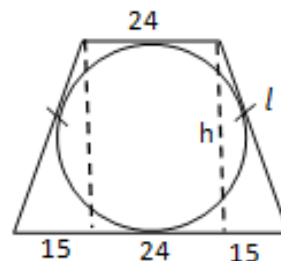
Javobi: D.

88. $y = x$ ga nisbatann $y = 2x + 1$ ga simmetrik bo'lgan to'g'ri chiziq tenglamasini toping.

A) $y = 2x - 1$ B) $y = \frac{x}{2} - 1$ C) $y = \frac{x}{2} + 1$

D) $y = \frac{x-1}{2}$ E) $y = \frac{x+1}{2}$

Yechilishi: $y = x$ ga nisbatan $y = 2x + 1$ ga simmetrik funksiya, unga teskari funksiyadan iborat bo'ladi.
$2x = y - 1 \Rightarrow$
$\Rightarrow x = \frac{y-1}{2} \Rightarrow$
$\Rightarrow y = \frac{x-1}{2}.$

Javobi: D.
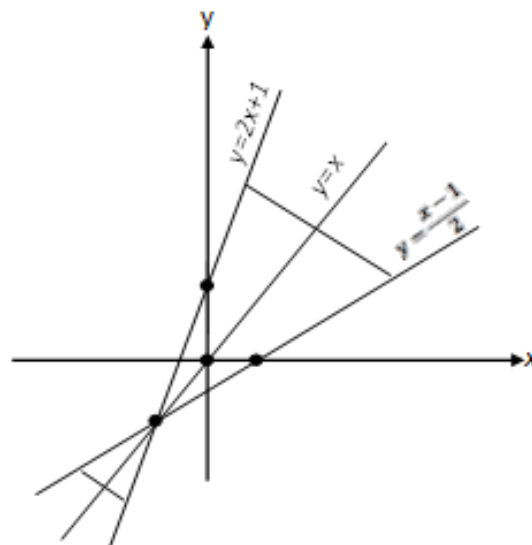
89. To'g'ri burchakli uchburchakning katetlaridan biri 4 sm, uning gipotenuzadagi proyeksiyasi esa $\frac{4}{3}$ sm. Uchburchakka tashqi chizilgan aylananing radiusi necha sm?

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

Yechilishi: $R = ?$ $h^2 = 16 - \left(\frac{4}{3}\right)^2 = 16 - \frac{16}{9} = \frac{9 \cdot 16 - 16}{9} =$

$$= \frac{8 \cdot 16}{9} \Rightarrow h = \sqrt{\frac{8 \cdot 16}{9}} = \frac{8\sqrt{2}}{9} \Rightarrow h = \frac{8}{3}\sqrt{2};$$

$$h^2 = \frac{4}{3} \cdot x \Rightarrow \frac{8 \cdot 16}{9} = \frac{4}{3}x \Rightarrow$$

$$\Rightarrow 3 \cdot 8 \cdot 16 = 4 \cdot 9 \cdot x \Rightarrow$$

$$\Rightarrow 3x = 32 \Rightarrow x = \frac{32}{3};$$

$$y^2 = \left(x + \frac{4}{3}\right)^2 - 4^2 = \left(\frac{32}{3} + \frac{4}{3}\right)^2 - 4^2 = 144 - 16 =$$

$$128 \Rightarrow\Rightarrow y^2 = 64 \cdot 2 \Rightarrow y = 8\sqrt{2};$$

$$S_\Delta = \frac{1}{2} \cdot 4 \cdot 8\sqrt{2} = 16\sqrt{2}; \quad x + \frac{4}{3} = \frac{32}{3} + \frac{4}{3} = 12;$$

$$R = \frac{a \cdot b \cdot c}{4S} = \frac{12 \cdot 8\sqrt{2} \cdot 4}{4 \cdot 16 \cdot \sqrt{2}} = \frac{12}{2} = 6. \qquad \text{Javobi: C.}$$
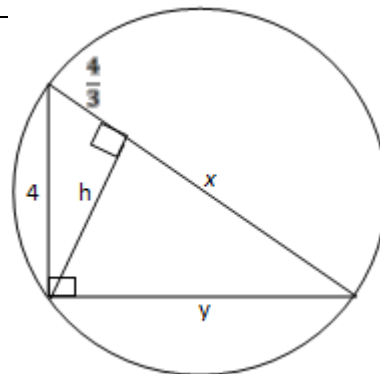
90. Uchlari $A(0;0)$, $B(3;4)$ va $C(8;6)$ nuqtalarda bo'lgan uchburchakning A burchagini toping.

A) $arccos 0,96$ B) $arccos 0,92$ C) $\frac{\pi}{24}$

D) $arccos 0,9$ E) $arccos 0,98$

Yechilishi: $A(0;0);$ $B(3;4);$ $C(8;6);$ $\angle A =?$

$\overrightarrow{AB} = \{3;4\};$ $\overrightarrow{AC} = \{8;6\};$

$|\overrightarrow{AB}| = \sqrt{3^2 + 4^2} = 5;$

$|\overrightarrow{AB}| = \sqrt{8^2 + 6^2} = 10;$

$\overrightarrow{AB} \cdot \overrightarrow{AC} = \{3;4\} \cdot \{8;6\} =$

$= 3 \cdot 8 + 4 \cdot 6 = 24 + 24 = 48;$

$cos\angle A = \frac{\overrightarrow{AB} \cdot \overrightarrow{AC}}{|\overrightarrow{AB}| \cdot |\overrightarrow{AC}|} = \frac{48}{5 \cdot 10} = \frac{24}{25} = 0,96;$

$\angle A = arccos 0,96.$ Javobi: A.
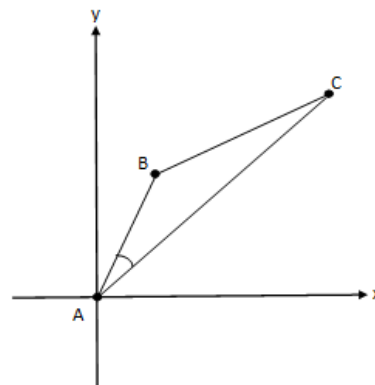
91. k ning qanday qiymatlarida $kx + 3y + 1 = 0$ va $2x +$
$+ (k + 1)y + 2 = 0$ to'g'ri chiziqlar parallel bo'ladi?

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

Yechilishi: $kx + 3y + 1 = 0$ va $2x + (k + 1)y + 2 = 0;$

$\frac{k}{2} = \frac{3}{k+1} \Rightarrow k^2 + k = 6 \Rightarrow k^2 + k - 6 = 0 \Rightarrow$

Pirnazar DAVRONOV

$$\Rightarrow k_{1,2} = -\frac{1}{2} \pm \sqrt{\frac{1}{4} + 6} = -\frac{1}{2} \pm \frac{5}{2} \Rightarrow \begin{cases} k_1 = -3; \\ k_2 = 2. \end{cases}$$

Javobi: E.

92. Muntazam oltiburchakka tashqi chizilgan aylananing radiusi 12ga teng.Uning kichik diagonalini toping.

A) $12\sqrt{2}$ B) $12\sqrt{3}$ C) $6\sqrt{5}$

D) $8\sqrt{5}$ E) $9\sqrt{5}$

Yechilishi: $AB =?$ $R = a = 12;$

$\frac{BD}{BC} = \cos 30° \Rightarrow BD = 12 \cdot \frac{\sqrt{3}}{2} = 6\sqrt{3};$

$AB = 2BD \Rightarrow AB = 12\sqrt{3};$

Javobi: B.
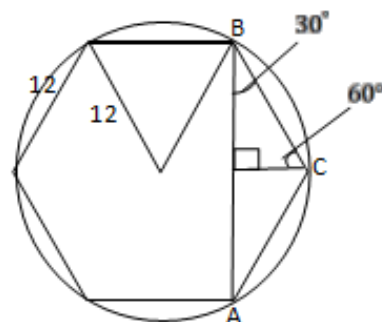
93. Aylananing radiusi 6 ga teng. Aylanaga ichki chizilgan muntazam uchburchakning yuzini toping.

A) 27   B) $27\sqrt{2}$ C) $27\sqrt{3}$

D) $18\sqrt{5}$ E) $18\sqrt{3}$

Yechilishi: $OB = R \Rightarrow R = 6 \Rightarrow AB = $

$\frac{AB}{AD} = tg60° \Rightarrow AD = \frac{AB}{tg60°} = \frac{9}{\sqrt{3}} \Rightarrow$

$\Rightarrow DE = 2AD \Rightarrow DE = 6\sqrt{3};$

$S_\Delta = \frac{1}{2} \cdot DE \cdot AB = \frac{1}{2} \cdot 6\sqrt{3} \cdot 9 = 27\sqrt{3}.$

Javobi: C.
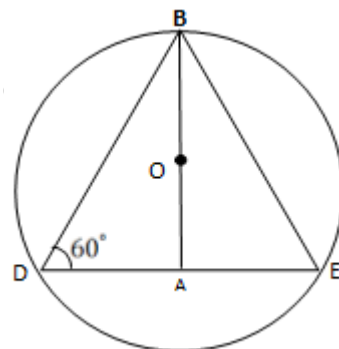
94. Asoslari 6 va 14 ga teng bo'lgan teng yonli trapetsiyaning diagonallari o'zaro perpendikulyar. Trapetsiyaning yon tomonini toping.

A) $\sqrt{29}$ B) $\sqrt{58}$ C) $2\sqrt{29}$

D) $4\sqrt{5}$ E) $7\sqrt{3}$

Yechilishi: $l =?$ Kvadrat Diagonalidan foydalaniladi:

$d = a\sqrt{2}.$
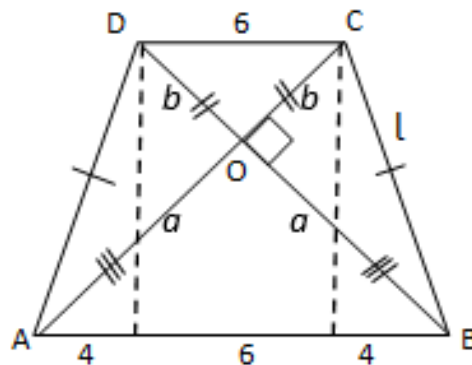
$$\begin{cases} 6 = b\sqrt{2} \Rightarrow b = 3\sqrt{2} \\ 14 = a\sqrt{2} \Rightarrow a = 7\sqrt{2} \end{cases} \Rightarrow$$

$$\Rightarrow l^2 = a^2 + b^2 = 49 \cdot 2 + 9 \cdot 2 = 116 \Rightarrow l = 2\sqrt{29}.$$

Javobi: C.

95. Nuqtadan tekislikka uzunliklari 10 va 15 sm bo'lgan og'malar tushirilgan. Birinchi og'maning tekislikdagi proeksiyasi 7 sm bo'lsa, ikkinchi og'manining proyeksiyasi qancha sm bo'ladi?

A) $\sqrt{170}$ B) $\sqrt{171}$ C) $\sqrt{172}$
D) $\sqrt{173}$ E) $\sqrt{174}$

Yechilishi: $h^2 = 10^2 - 7^2 = 51;$
$x^2 = 15^2 - h^2 = 225 - 51 = 174 \Rightarrow$
$\Rightarrow x = \sqrt{174}.$ Javobi: E.
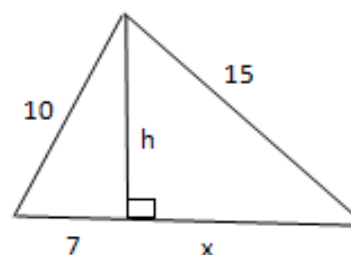
96. Uchlari $A(1; -2; 4)$ va $B(3; -4; 2)$ nuqtalarda bo'lgan kesma o'rtasining koordinatalarini toping.

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

Yechilishi: $A(1; -2; 4);$ $B(3; -4; 2);$

$$\begin{cases} x = \frac{x_1 + x_2}{2} = \frac{1+3}{2} = 2 \\ y = \frac{y_1 + y_2}{2} = \frac{-2-4}{2} = -3 \Rightarrow \\ z = \frac{z_1 + z_2}{2} = \frac{4+2}{2} = 3 \end{cases}$$

$$\Rightarrow C(x; y; z) = C(2; -3; 3).$$ Javobi: C.
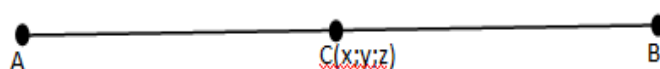
97. To'rtburchakli muntazam prizmaning balandligi 4 ga, diagonali $\sqrt{34}$ ga teng. Prizmaning yon sirtini toping.

A) 34   B) 38   C) 42
D) 46   E) 48

Yechilishi: $AA_1, = 4; DB_1 = \sqrt{34}.$
$S_{yon} =?$
$S_{yon} = P_{asos} \cdot H;$
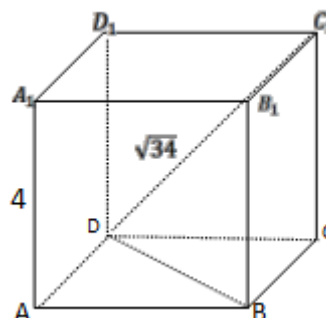
$$BD^2 = DB_1{}^2 - BB_1{}^2 = 34 - 16 = 18 \Rightarrow$$
$$\Rightarrow BD = \sqrt{18} \Rightarrow BD = a\sqrt{2} \Rightarrow$$
$$a\sqrt{2} = \sqrt{18} \Rightarrow a = \frac{\sqrt{18}}{\sqrt{2}} = 3 \Rightarrow$$
$$a = 3 \Rightarrow p = 12;$$
$$S_{yon} = 12 \cdot 4 = 48. \qquad \text{Javobi: E.}$$

98. Konusning yasovchisi asos tekisligi bilan 45°li burchak tashkil etadi. Asosining markazidan yasovchigacha bo'lgan masofa $3\sqrt{2}$ga teng.Konusning balandligini toping.

   A) 5   B) 4   C) 7

   D) 6,5   E) 6

   Yechilishi: $AO = 3\sqrt{2}.$

   $$\frac{AO}{OS} = sin45° \Rightarrow \frac{3\sqrt{2}}{OS} = \frac{\sqrt{2}}{2} \Rightarrow$$
   $$\Rightarrow \sqrt{2} \cdot SO = 6\sqrt{2} \Rightarrow SO = 6.$$

   Javobi: E.
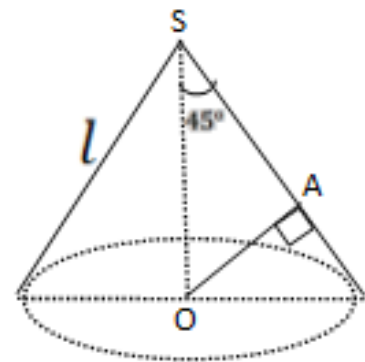
99. Sharning radiusi $\frac{8}{\sqrt{\pi}}$ ga teng. Radiusning oxiridan y bilan $60°$ li burchak tashkil etadigan kesuvchi o'tkazilgan. Kesimning yuzini toping.

   A) 8   B) 12   C) 16

   D) 14   E) 10

   Yechilishi: $R = \frac{8}{\sqrt{\pi}};$ $\angle OAB = 60°;$

   $$\frac{r}{R} = cos60° \Rightarrow r = Rcos60° \Rightarrow$$
   $$\Rightarrow r = \frac{8}{\sqrt{\pi}} \cdot \frac{1}{2} = \frac{4}{\sqrt{\pi}};$$
   $$S_{kesim} = \pi r^2 = \pi \cdot \left(\frac{4}{\sqrt{\pi}}\right)^2 = 16.$$

   Javobi: C.
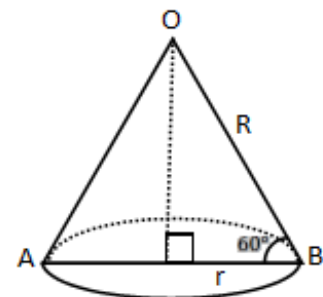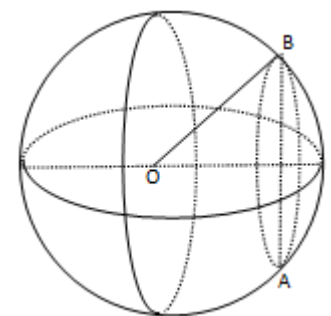
100. $sin105° + sin75° = ?$

   A) $\frac{\sqrt{2+\sqrt{3}}}{2}$ B) $\frac{\sqrt{2-\sqrt{3}}}{2}$ C) $\sqrt{\sqrt{3} - \sqrt{2}}$

D) $\sqrt{2 + \sqrt{3}}$ E) $\dfrac{\sqrt{2+\sqrt{3}}}{2}$

Yechilishi: $sin(90° + 15°) + sin(90° - 15°) =$

$= cos15° + cos15° = 2cos15° = 2 \cdot \sqrt{\dfrac{1+cos30°}{2}} =$

$= 2\sqrt{\dfrac{1+\frac{\sqrt{3}}{2}}{2}} = 2 \cdot \sqrt{\dfrac{\frac{2+\sqrt{3}}{2}}{2}} = 2\sqrt{\dfrac{2+\sqrt{3}}{4}} = 2 \cdot \dfrac{1}{2}\sqrt{2 + \sqrt{3}} =$

$= \sqrt{2 + \sqrt{3}}.$ Javobi: D.

101. $tg\alpha = \dfrac{1}{2}.$ $tg2\alpha =$?

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

    Yechilishi: $tg\alpha = \dfrac{1}{2}$; $tg2\alpha =$?

$tg2\alpha = \dfrac{2tg\alpha}{1-tg^2\alpha} = \dfrac{2 \cdot \frac{1}{2}}{1-(\frac{1}{2})^2} = \dfrac{1}{1-\frac{1}{4}} = \dfrac{1}{\frac{3}{4}} = \dfrac{4}{3}.$ Javobi: B.

102. $y = \sin(3x + 1)$ funksiyaning davrini toping.

    A) $\dfrac{2\pi}{3}$ B) π C) $\dfrac{\pi}{3}$ D) 2π E) to'g'ri javob yo'q

    Yechilishi: $y = \sin(3x + 1) \Rightarrow \dfrac{T}{|K|} = \dfrac{2\pi}{3}.$ Javobi: A.

103. Rasmda quyidagi funksiyalardan qaysi birining grafigi keltirilgan?

    A) $\sin(x - \frac{\pi}{4})$ B) $-\sin(x - \frac{\pi}{4})$ C) $\sin(2\left(x - \frac{\pi}{4}\right))$

    D) to'g'ri javob yo'q

    E) $-\sin(2\left(x - \frac{\pi}{4}\right))$

    Yechilishi

$A\left(-\dfrac{\pi}{4};0\right)$ $B(0; 1)$ $C\left(\dfrac{\pi}{4};0\right);$

$D\left(\dfrac{3\pi}{4};0\right);$ $E\left(\dfrac{\pi}{2};-1\right);$

$y = -\sin[2\left(x - \dfrac{\pi}{4}\right)];$
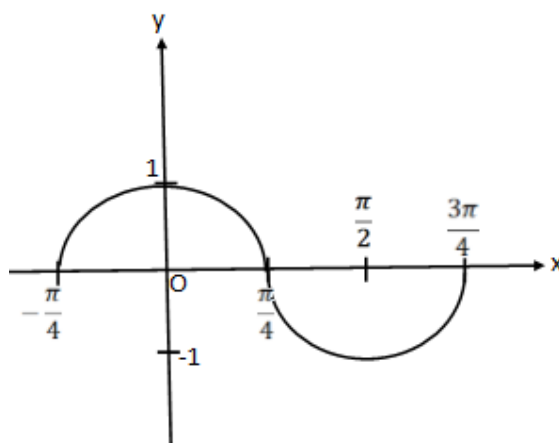
1) $A\left(-\frac{\pi}{4};0\right) \Rightarrow 0 = -\sin\left[2\left(-\frac{\pi}{4}-\frac{\pi}{4}\right)\right] = -\sin\left[2\cdot\left(-\frac{\pi}{2}\right)\right] =$

$= -\sin(-\pi) = \sin\pi = 0.$

Javobi: E.

104. $arctg\left(tg\left(-\frac{3\pi}{5}\right)\right) + arcctg\left(ctg\left(-\frac{3\pi}{5}\right)\right) =?$

A) $-\frac{6}{5}\pi$ B) $-\frac{7}{10}\pi$ C) $\frac{4}{5}$ D) $-\frac{4}{5}\pi$ E) $\frac{\pi}{5}$

Yechilishi: $arctg\left(tg\left(-\frac{3\pi}{5}\right)\right) + arcctg\left(ctg\left(-\frac{3\pi}{5}\right)\right);$

$\begin{cases} -\frac{\pi}{2} < arctg\alpha < \frac{\pi}{2}; \\ 0 < arcctg\alpha < \pi. \end{cases}$

1) $-\frac{3\pi}{5} \notin \left(-\frac{\pi}{2};\frac{\pi}{2}\right); \ tg\left(-\frac{3\pi}{5}\right) = tg\left(\pi - \frac{3\pi}{5}\right) \Rightarrow$

$\Rightarrow tg\left(-\frac{3\pi}{5}\right) = tg\left(\frac{2\pi}{5}\right) \Rightarrow \frac{2\pi}{5} \in \left(-\frac{\pi}{2};\frac{\pi}{2}\right);$

$arctg\left(tg\left(-\frac{3\pi}{5}\right)\right) = arctg\left(tg\left(\frac{2\pi}{5}\right)\right) = \frac{2\pi}{5};$

2) $-\frac{3\pi}{5} \notin (0;\pi);$

$ctg\left(-\frac{3\pi}{5}\right) = ctg\left(\pi - \frac{3\pi}{5}\right) = ctg\frac{2\pi}{5} \Rightarrow \frac{2\pi}{5} \in (0;\pi);$

$arcctg\left(ctg\left(-\frac{3\pi}{5}\right)\right) = arcctg\left(ctg\left(\frac{2\pi}{5}\right)\right) = \frac{2\pi}{5};$

1) va 2) dan $\frac{2\pi}{5} + \frac{2\pi}{5} = \frac{4\pi}{5}.$ Javobi: C.

105. $\frac{1+cosx}{sinx} = cos\frac{x}{2}$ tenglamaning $[0;2\pi]$ kesmada nechta ildizi bor?

A) $\emptyset$ B) 1   C) 2   D) 3   E) 4

Yechilishi: $\frac{1+cosx}{sinx} = cos\frac{x}{2};$ $[0;2\pi];$

$sinx \neq 0 \Rightarrow x \neq \pi n, \ n\epsilon z;$ $1 + cosx = sinxcos\frac{x}{2} \Rightarrow$

$$\Rightarrow \begin{cases} \sin^2\frac{x}{2} + \cos^2\frac{x}{2} = 1 \\ \cos x = \cos^2\frac{x}{2} - \sin^2\frac{x}{2} \\ \sin x = 2\sin\frac{x}{2}\cdot\cos\frac{x}{2} \end{cases} \Rightarrow$$

$$\Rightarrow \sin^2\frac{x}{2} + \cos^2\frac{x}{2} + \cos^2\frac{x}{2} - \sin^2\frac{x}{2} = 2\sin\frac{x}{2}\cos\frac{x}{2}\cdot$$

$$\cos\frac{x}{2} \Rightarrow\Rightarrow 2\cos^2\frac{x}{2} = 2\sin\frac{x}{2}\cos^2\frac{x}{2} \Rightarrow \sin\frac{x}{2}\cos^2\frac{x}{2} = \cos^2\frac{x}{2} \Rightarrow$$

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

$$\Rightarrow \begin{cases} \cos^2\frac{x}{2} = 0 \\ \sin\frac{x}{2} = 1 \end{cases} \Rightarrow \begin{cases} \cos\frac{x}{2} = 0 \\ \sin\frac{x}{2} = 1 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} \frac{x}{2} = \frac{\pi}{2} + n\pi, & n\epsilon z \\ \frac{x}{2} = \frac{\pi}{2} + 2\pi n, & n\epsilon z \end{cases} \Rightarrow \begin{cases} x = \pi + 2\pi n, & n\epsilon z; \\ x = \pi + 4\pi n, & n\epsilon z; \\ x \neq \pi n, & n\epsilon z. \end{cases}$$

$$n = 0 \Rightarrow \begin{cases} x = \pi; \\ x = \pi; \\ x \neq 0. \end{cases} \qquad n = 1 \Rightarrow \begin{cases} x = 3\pi \\ x = 5\pi \\ x \neq \pi \end{cases} \Rightarrow \emptyset.$$

Javobi: A.

1998-YIL, 11-AXBOROTNOMA

1. $(-\frac{2}{3})^2 \cdot (-0,75)^3 \cdot (1,5)^4 \cdot (-\frac{4}{3})^3$ ni hisoblang.

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

   Yechilishi: $(-\frac{2}{3})^2 \cdot (-0,75)^3 \cdot (1,5)^4 \cdot (-\frac{4}{3})^3 =$

   $= \frac{4}{9} \cdot (\frac{75}{100})^3 \cdot (\frac{3}{2})^4 \cdot \frac{64}{27} = \frac{4}{9} \cdot \frac{27}{64} \cdot \frac{81}{16} \cdot \frac{64}{27} = \frac{9}{4} = 2,25.$

   Javobi: D.

2. 270 va 300 sonlarning eng kichik umumiy karrasining 4 va 6 sonlarning eng kichik umumiy karrasiga nisbatini toping.

   A) 25   B) 45   C) 225   D) 95   E) 125

   Yechilishi:

270	2
135	3
45	3
15	3
5	5
1	

300	2
150	2
75	3
25	5
5	5
1	

4	2
2	2
1	

6	2
3	3
1	

   $K(270; 300) = 2^2 \cdot 3^3 \cdot 5^2 ;$ $K(4; 6) = 2^2 \cdot 3;$

   $\frac{K(270;300)}{K(4;6)} = \frac{2^2 \cdot 3^3 \cdot 5^2}{2^2 \cdot 3} = 3^2 \cdot 5^2 = 225.$ Javobi: C.

3. $\frac{0,8(3) - 0,4(6)}{0,(3)}$ ni hisoblang.

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

   Yechilishi: $\frac{\frac{83-8}{90} - \frac{46-4}{90}}{\frac{3}{9}} = \frac{\frac{75}{90} - \frac{42}{90}}{\frac{3}{9}} = \frac{33}{90} \cdot \frac{9}{3} = \frac{11}{10} = 1,1.$

   Javobi: A.

4. Jamg'arma banki xar yili omonatchi hisobiga ilk bor joylashtirilgan pulining 25,5% ini o'tkazib turadi. Omonatchi 400 so'm qo'yilgan bo'lsa, 5 yildan so'ng uning hisobida necha so'm bo'ladi?

   A) 880   B) 980   C) 910   D) 1020   E) 960

Yechilishi: 1) $\frac{25,5}{100} \cdot 400 = 102$;

2) $102 \cdot 5 = 510$; $400 + 510 = 910$.

Javobi: C.

5. $\sqrt[3]{80 + 48\sqrt{3}}$ ni soddalashtiring.

A) $4\sqrt{3}+1$ B) $2\sqrt{3}+2$ C) $4\sqrt{2}+2$

D) $3\sqrt{2} + 2$ E) $2\sqrt{3}+1$

Yechilishi: $\sqrt[3]{80 + 48\sqrt{3}} = a + b\sqrt{3} \Rightarrow$

$\Rightarrow 80 + 48\sqrt{3} = \left(a + b\sqrt{3}\right)^3 \Rightarrow$

$\Rightarrow 80 + 48\sqrt{3} = a^2 + 3a^2 b\sqrt{3} + 9a \cdot b^2 + 3b^3\sqrt{3} \Rightarrow$

$\Rightarrow \begin{cases} a^3 + 9ab^2 = 80 \\ 3\sqrt{3}a^2 b + 3\sqrt{3}b^3 = 48\sqrt{3} \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} a^3 + 9ab^2 = 80 \\ a^2 b + b^3 = 16 \end{cases} \Rightarrow \begin{cases} a = 2 \\ b = 2 \end{cases} \Rightarrow \sqrt[3]{80 + 48\sqrt{3}} =$

$= 2 + 2\sqrt{3}$. Javobi: B.

6. To'rtta banderolni jo'natish haqi uchun jami 120 so'mlik to'rtta har xil pochta markasi kerak bo'ladi. Agar markalarning baholari arifmetik progressiyani tashkil etib, eng qimmat marka eng arzonidan 3 marta qimmat tursa, eng qimmatining bahosi necha so'm bo'ladi?

A) 50 B) 45 C) 62 D) 54 E) 48

Yechilishi: $a_1 + a_2 + a_3 + a_4 = 120$; $S_4 = 120$

$S_4 = \frac{a_1 + 3a_1}{2} \cdot 4 \Rightarrow 120 = \frac{4a_1}{2} \cdot 4 \Rightarrow$

$\Rightarrow 8a_1 = 120 \Rightarrow a_1 = 15 \Rightarrow a_4 = 3a_1 \Rightarrow a_4 = 45$.

Javobi: B.

7. $(2k + 1)^2 - (2k - 1)^2$ ifoda, k∈N da qaysi raqamlarga qoldiqsiz bo'linadi?

A) 2; 4; 8; B) 2 C) 4 D) 8 E) 4;8;

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

$= [(2k + 1) - (2k - 1)] \cdot [(2k + 1) + (2k - 1)] =$

$= (2k + 1 - 2k + 1)(2k + 1 + 2k - 1) = 2 \cdot 4k = 8k$.

Javobi: A.

8. $12^2 - (x + 7)^2 - (5 - x) \cdot (19 + x)$ ni soddalashtiring.

A) 0   B) 50   C) 140   D) 90   E) 85

Yechilishi: $12^2 - (x + 7)^2 - (5 - x) \cdot (19 + x) =$

$= 144 - (x^2 + 14x + 49) - (95 + 5x - 19x - x^2) =$

$= 144 - x^2 - 14x - 49 - 95 - 5x + 19x + x^2 = 0.$

Javobi: A.

9. $\dfrac{x^6 - x^4}{x^3 + x^2}$ ni qisqartiring.

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

D) $x^3 + x^2$ E) $x^3 + 1$

Yechilishi: $\dfrac{x^6 - x^4}{x^3 + x^2} = \dfrac{(x^3)^2 - (x^2)^2}{x^3 + x^2} = \dfrac{(x^3 + x^2)(x^3 - x^2)}{x^3 + x^2} =$

$= x^3 - x^2.$ Javobi: C.

10. $y^4 - 2y^2 - 8 = 0$ tenlamaning haqiqiy ildizlari ko'paytmasini aniqlang.

A) 4   B) -16   C) 16   D) -4   E) 64

Yechilishi: $y^4 - 2y^2 - 8 = 0; ;$ $y^2 = x;$

$x^2 - 2x - 8 = 0 \Rightarrow x_{1,2} = 1 \pm \sqrt{1 + 8} = 1 \pm 3 \Rightarrow$

$\Rightarrow \begin{cases} x_1 = -2; \\ x_2 = 4. \end{cases} \begin{cases} y^2 \neq -2 \\ y^2 = 4 \end{cases} \Rightarrow y_{1,2} = \pm 2 \Rightarrow$

$\Rightarrow y_1 \cdot y_2 = 2 \cdot (-2) = -4.$ Javobi: D.

11. Quyida keltirilgan funksiyalardan qaysi biri juft?

$y_1 = \dfrac{x}{x^2 - 4};$ $y_2 = \sqrt[3]{x^2};$ $y_3 = arccos(x^2 - 1)$

$y_4 = log_2 log_3 x;$ $y_4 = (0,5)^x + (\sqrt{2})^{2x}$

A) $y_2; y_3$ 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: $y_1 = \dfrac{x}{x^2 - 4} \Rightarrow y_1(-x) = \dfrac{-x}{(-x)^2 - 4} = -\dfrac{x}{x^2 - 4};$

$y_2 = \sqrt[3]{x^2} \Rightarrow y_2(-x) = \sqrt[3]{(-x)^2} = \sqrt[3]{x^2}; y_2(x) = y_2(-x);$

$y_3 = arccos(x^2 - 1) = y_3(-x) = arccos[(-x)^2 - 1] =$

$= arccos(x^2 - 1) \Rightarrow y_3(x) = y_3(-x);$

$y_4 = log_2 log_3 x; \ x > 0.$

$y_5 = (0,5)^x + (\sqrt{2})^{2x} \Rightarrow$

$\Rightarrow y_5(-x) = \dfrac{1}{(0,5)^x} + \dfrac{1}{(\sqrt{2})^{+2x}} = 2^x + \dfrac{1}{2^x}; \ y_5(-x) = y_5(x).$

Javobi: D.

12. $y = |x - 2| + 1$ va $y = 5$ funksiyalar grafiklari kesishgan nuqtalari abssisalari kvadratlarining yig'indisini toping.

A) 52   B) 32   C) 40   D) 36   E) 48

Yechilishi: $y = |x - 2| + 1; y = 5 \Rightarrow 5 = |x - 2| + 1 \Rightarrow$

$\Rightarrow |x - 2| = 4 \Rightarrow \begin{cases} x - 2 \geq 0 \\ x - 2 < 0 \end{cases} \Rightarrow \begin{cases} x - 2 = 4 \\ -x + 2 = 4 \end{cases} \Rightarrow \begin{cases} x = 6; \\ x = -2. \end{cases}$

Javobi: C.

13. $y = -3x^2 + 8x - 8$ funksiyaning grafigi qaysi choraklarda joylashgan?

A) II, III, IV;   B) Barcha choraklar   C) III,IV;

D) I, II, III;   E) I, III, IV;

Yechilishi: $y = -3x^2 + 8x - 8;$

$D = b^2 - 4ac = 8^2 - 4 \cdot (-8) \cdot (-3) =$

$= 64 - 96 = -32 < 0;$

$x = -\dfrac{b}{2a} = -\dfrac{8}{2 \cdot (-3)} = \dfrac{4}{3} = 1\dfrac{1}{3};$

$y = -\dfrac{b^2 - 4ac}{4a} = \dfrac{8^2 - 4 \cdot (-8) \cdot (-3)}{4 \cdot (-3)} =$

$= -\dfrac{8}{3} = -2\dfrac{2}{3}.$ Javobi: C.
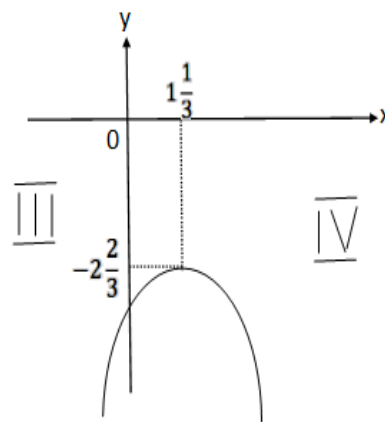
14. $y_1 = -\dfrac{41}{5}x$ funksiyaning grafigi $y_1 = kx + \dfrac{41}{5}$ funksiyaning grafigiga k ning qaysi qiymatida parallel bo'ladi?

A) $\left(\dfrac{5}{41}\right)^{-1}$ B) $\dfrac{5}{41}$ C) $-\left(\dfrac{5}{41}\right)^{-1}$ D) $-\dfrac{5}{41}$ E) $\emptyset$

Yechilishi: $y_1 = -\dfrac{41}{5}x \ ; \ y_1 = kx + \dfrac{41}{5}$

$k_1 = k_2 \Rightarrow k = -\dfrac{41}{5}.$ Javobi: C.

Pirnazar DAVRONOV

15. $y = x^2 - \frac{1}{2}$ $\left(x \geq -\frac{1}{2}\right)$ funksiyaga teskari bo'lgan funksiyani toping.

   A) $\sqrt{2x+1} \cdot 2^{-1}$ B) $\sqrt{2x+1} \cdot 4^{-1}$ C) $\sqrt{2x+1} \cdot 2^{-1} - \frac{1}{2}$

   D) $\sqrt{2x+1} \cdot 4^{-1} - \frac{1}{2}$ E) $\sqrt{2x+1} \times 2^{-1} + \frac{1}{2}$

   Yechilishi: $y = 2x^2 - \frac{1}{2}$ $\left(x \geq -\frac{1}{2}\right)$;

   $2x^2 = y + \frac{1}{2} \Rightarrow x^2 = \frac{1}{2}y + \frac{1}{4} = \frac{1}{4}(2y+1)$;

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

   $\Rightarrow y = 2^{-1}\sqrt{2x+1}.$ Javobi: A.

16. $b \cdot \sqrt{ab}\sqrt[3]{ab} \cdot (a\sqrt[3]{a^2b^2 \cdot \sqrt{ab}})^{-1}$ ni soddalashtiring.

   A) $b \cdot a^{-2}$ B) $b^{-2} \cdot a$ C) $b^{-1} \cdot a$ D) $b \cdot a^{-1}$ E) $b \cdot a$

   Yechilishi: $b \cdot \sqrt{ab}\sqrt[3]{ab} \cdot \left(a\sqrt[3]{a^2b^2 \cdot \sqrt{ab}}\right)^{-1} = $

   $= b(a \cdot b)^{\frac{1}{2}} \cdot (a \cdot b)^{\frac{1}{3}} \cdot \dfrac{1}{a\sqrt[3]{a^2 \cdot b^2 \cdot (a \cdot b)^{\frac{1}{2}}}} = $

   $= b \cdot a^{\frac{1}{2}} \cdot b^{\frac{1}{2}} \cdot a^{\frac{1}{3}} \cdot b^{\frac{1}{3}} \dfrac{1}{a \cdot [a^2 \cdot b^2 \cdot a^{\frac{1}{2}}b^{\frac{1}{2}}]^{\frac{1}{3}}} = $

   $= b \cdot a^{\frac{1}{2}+\frac{1}{3}} \cdot b^{\frac{1}{2}+\frac{1}{3}} \cdot \dfrac{1}{a \cdot [a^{2+\frac{1}{2}} \cdot b^{2+\frac{1}{2}}]^{\frac{1}{3}}} = a^{\frac{5}{6}} \cdot b^{\frac{11}{6}} \cdot \dfrac{1}{a \cdot a^{\frac{5}{2} \cdot \frac{1}{3}} \cdot b^{\frac{5}{2} \cdot \frac{1}{3}}} = $

   $= a^{\frac{5}{6}} \cdot b^{\frac{11}{6}} \cdot \dfrac{1}{a \cdot a^{\frac{5}{6}} \cdot b^{\frac{5}{6}}} = \dfrac{b^{\frac{11}{6}}}{a \cdot b^{\frac{5}{6}}} = \dfrac{1}{a} \cdot b^{\frac{11}{6}} : b^{\frac{5}{6}} = a^{-1} \cdot b^{\frac{11}{6}-\frac{5}{6}} = $

   $= a^{-1} \cdot b^{\frac{6}{6}} = a^{-1} \cdot b.$ Javobi: D.

17. $tg\,22{,}5° + tg^{-1}\,22{,}5°$ ni hisoblang.

   A) $\sqrt{2}$ B) $(\sqrt{2})^{-1}$ C) $4\sqrt{2}$ D) $4^{-1} \cdot 2$ E) $2\sqrt{2}$

   Yechishlishi: $tg\,22{,}5° + tg^{-1}\,22{,}5° = tg\,22{,}5° + \dfrac{1}{tg\,22{,}5°} = $

   $= tg\,22{,}5° + ctg\,22{,}5° = \left|tg\,\alpha + ctg\,\alpha = \dfrac{2}{sin\,2\alpha}\right| = $

$$= \frac{2}{sin45°} = \frac{2}{\frac{\sqrt{2}}{2}} = \frac{4}{\sqrt{2}} = 2\sqrt{2}. \qquad \text{Javobi: E.}$$

18. $\frac{x^2+1}{x} + \frac{x}{x^2+1} = -2{,}5$ tenglamaning yechimlari quyidagi
oraliqlarning qaysi birida joylashgan?

 A) $(-\infty; -1$ B) $[-1; 8]$ C) $[2; 8)$ D)$[3; 8)$ E)$[4; 8]$

Yechilishi: $\frac{x^2+1}{x} + \frac{x}{x^2+1} = -2{,}5;$ $\frac{x^2+1}{x} = t$

$t + \frac{1}{t} = -2{,}5;$ $t^2 + 2{,}5t + 1 = 0 \Rightarrow t_{1,2} = -\frac{5}{4} \pm \sqrt{\frac{25}{16} - 1} =$

$= -\frac{5}{4} \pm \frac{3}{4} \Rightarrow \begin{cases} t_1 = -2; \\ t_2 = -\frac{1}{2}. \end{cases}$

1) $\frac{x^2+1}{x} = -2 \Rightarrow x^2 + 2x + 1 = 0 \Rightarrow x = -1.$ Javobi: B.

19. $\vec{m} = (2; 3; x)\ va\ \vec{n} = (-1; 4; 2)$ vektorlar perpendikular
bo'lsa x ning qiymati qanchaga teng bo'ladi.

 A) $\sqrt{5}$ B) 5   C) 0   C) $5\sqrt{5}$ D) -4   E) -5

Yechilishi: $\vec{m} = (2; 3; x)$ va $\vec{n} = (-1; 4; 2)$ $\vec{m} \cdot \vec{n} = 0;$
$\{2; 3; x;\} \cdot \{-1; 4; 2;\} = 0;$
$2 \cdot (-1) + 3 \cdot 4 + 2 \cdot x = 0;$ $2x = 2 - 12 ;$ $x = -5.$
Javobi: E.

20. $\cos\alpha = \frac{7}{18},\ 0 < \alpha < \frac{\pi}{2}$ bo'lsa, $6\cos\frac{\alpha}{2}$ qanchaga teng
bo'ladi?

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

Yechilishi: $\cos\alpha = \frac{7}{18},$ $0 < \alpha < \frac{\pi}{2}$ $6\cos\frac{\alpha}{2} =?$

$\cos\frac{\alpha}{2} = \sqrt{\frac{1+\cos\alpha}{2}} = \sqrt{\frac{1+\frac{7}{18}}{2}} = \sqrt{\frac{25}{36}} = \frac{5}{6};\ 6\cos\frac{\alpha}{2} = 6 \cdot \frac{5}{6} = 5.$

Javobi: B.

21. Xaritada 2 ta shahar orasidagi masofa 4,5 sm ga teng.
Xaritadagi mashtab 1:2000000 bo'lsa shaharlar orasidagi
xaqiqiy masofa necha km bo'ladi?

 A) 0,9   B) 9   C) 90   D) 900   E) 9000

Yechilishi:

$$\frac{1}{2000000} = \frac{2000000}{100000} = 20km \Rightarrow 20 \cdot 4,5 = 90 \ km$$

Javobi: C.

22. $|x| \cdot \left(x - \frac{1}{2}\right) < 0$ tenglikni yeching.

A) $(-\infty; \frac{1}{2})$ B) $(0; \frac{1}{2})$ C) $(-\infty; \ 0)$

D) $(-\infty; \frac{1}{2}) \cup (\frac{1}{2}; \ \infty)$ E) $(-\infty: 0) \cup (0; \frac{1}{2})$

Yechilishi: $|x| \cdot \left(x - \frac{1}{2}\right) < 0 \Rightarrow \begin{cases} x \neq 0; \\ x \neq \frac{1}{2}; \end{cases}$

1) $\begin{cases} x > 0 \\ x - \frac{1}{2} < 0 \end{cases} \Rightarrow \begin{cases} x > 0; \\ x < \frac{1}{2}; \end{cases} \ 0 < x < \frac{1}{2};$

2) $\begin{cases} x < 0 \\ x - \frac{1}{2} > 0 \end{cases} \begin{cases} x < 0 \\ x > \frac{1}{2} \end{cases}$ 1) va 2) dan $(-\infty; 0) \cup \left(0; \frac{1}{2}\right)$.

Javobi: E.

23. a ning qanday qiymatlarida $x^2 + 2(1 - a)x + a + 5 = 0$ tenglamaning yechimlari o'zaro teng bo'ladi?

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

Yechilishi: $x^2 + 2(1 - a)x + a + 5 = 0$;

$D = b^2 - 4ac = [2(1 - a)]^2 - 4 \cdot 1 \cdot (a + 5) =$

$= (2 - 2a)^2 - 4a - 20 = 4 - 8a + 4a^2 - 4a - 20 =$

$= 4a^2 - 12a - 16 = 0; \ a^2 - 3a - 4 = 0;$

$a_{1,2} = \frac{3}{2} \pm \sqrt{\frac{9}{4} + 4} = \frac{3}{2} \pm \frac{5}{2} \Rightarrow \begin{cases} a_1 = -1; \\ a_2 = 4. \end{cases}$ Javobi: E.

24. $|\log_2 x| = -x + 4$ tenglamaning yechimi nechta?

A) 1   B) $\emptyset$ C) Cheksiz ko'p   D) 2   E) 3

Yechilishi: $|\log_2 x| = -x + 4; \ x > 0;$

Tenglama quyidagi ikki funksiya ko'rinishida yozib olinadi va grafiklari chiziladi: $y = |\log_2 x|;$

x	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{4}$	1	2	4
y	3	1	2	0	1	2

$y = -x + 4;$

x	-1	0
y	5	4

Yechim 2 ta.
Javobi: D.

$y = |\log_2 x|$
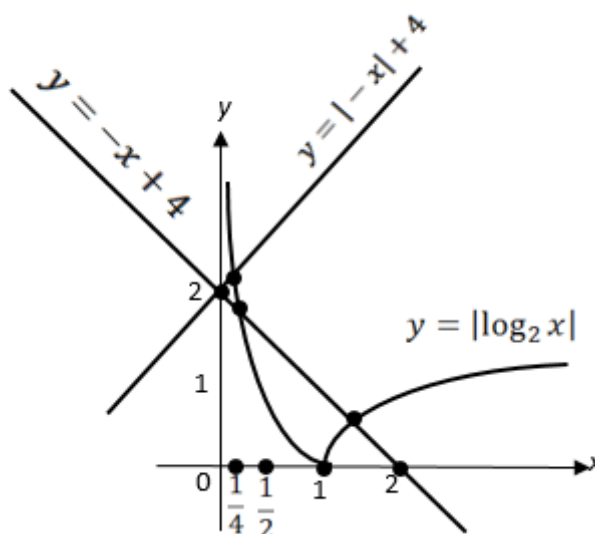
25. $\begin{cases} 0{,}4(2x - 3) > x - 2 \\ 3x - 7 \geq x - 6 \end{cases}$ tengsizliklar sistemasining butun
yechimlari yig'indisini aniqlang.

A) 10   B) 5   C) 6
D) 8   E) 7
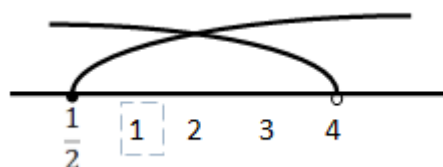
Yechilishi: $\begin{cases} 0{,}4(2x - 3) > x - 2 \\ 3x - 7 \geq x - 6 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 0{,}8x - 1{,}2 > x - 2 \\ 3x - x \geq 7 - 6 \end{cases} \Rightarrow \begin{cases} x - 0{,}8x < 2 - 1{,}2 \\ 2x \geq 1 \end{cases}$

$\Rightarrow \begin{cases} 0{,}2x < 0{,}8 \\ x \geq \dfrac{1}{2} \end{cases} \Rightarrow \begin{cases} x < 4; \\ x \geq \dfrac{1}{2}. \end{cases}$

$1 + 2 + 3 = 6.$ Javobi: C.

26. Arifmetik progressaning uchinchi va beshinchi hadi mos
ravishda ,11 va 19 ga teng bo'lsa uning dastlabki 10 ta
hadlarning yigindisini toping?

A) 210   B) 190   C) 230   D) 220   E) 240

Yechilishi: $a_3 = 11;$ $a_5 = 19;$ $S_{10} =?$

$\begin{cases} a_3 = a_1 + 2d \\ a_5 = a_1 + 4d \end{cases} \Rightarrow \begin{cases} 19 = a_1 + 4d \\ -\ 11 = a_1 + 2d \end{cases} \Rightarrow 8 = 2d \Rightarrow d = 4;$

$11 = a_1 + 2 \cdot 4 \Rightarrow a_1 = 3 \Rightarrow$

$\Rightarrow a_{10} = 3 + 9 \cdot 4 = 39;$

$$S_{10} = \frac{a_1 + a_{10}}{2} \cdot 10 = \frac{39+3}{2} \cdot 10 = 210. \quad \text{Javobi: A.}$$

27. Agar 6 hadli geometrik progressiyaning dastlabki 3ta hadining yig'indisi 112 ga va oxiridagi 3ta hadining yig'indisi 14 ga teng bo'lsa, birinchi hadi nechiga teng?

    A) 72   B) 64   C) 56   D) 63   E) 81

    Yechilishi:

$$\begin{cases} b_1 + b_2 + b_3 = 112 \\ b_4 + b_5 + b_6 = 14 \end{cases} \Rightarrow \begin{cases} b_1 + b_1 q + b_2 q^2 = 112 \\ b_1 q^3 + b_1 q^4 + b_1 q^5 = 14 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} b_1(1 + q + q^2) = 112 \\ b_1 q^3 = (1 + q + q^2) = 14 \end{cases} \Rightarrow \begin{cases} 1 + q + q^2 = \frac{112}{b_1} \\ 1 + q + q^2 = \frac{14}{b_1 q} \end{cases} \Rightarrow$$

$$\Rightarrow \frac{112}{b_1} = \frac{14}{b_1 q^3} \Rightarrow 112 b_1 q^3 = 14 b_1 \Rightarrow q^3 = \frac{14}{112} = \frac{1}{8} \Rightarrow$$

$$\Rightarrow q = \frac{1}{2}; \quad b_1 = \frac{112}{1 + q + q^2} = \frac{112}{1 + \frac{1}{2} + \frac{1}{4}} = \frac{112}{\frac{4+2+1}{4}} = \frac{112 \cdot 4}{7} =$$

$$= 16 \cdot 4 = 64 \Rightarrow b_1 = 64. \quad \text{Javobi: B.}$$

28. Radiusi 8 da teng aylananing $\frac{\pi}{8}$ radianga teng bo'lgan yoyining uzunligini toping.

    A) $\frac{\pi}{64}$ B) π C) $\frac{\pi}{32}$ D) 2π E) $\frac{\pi}{12}$

    Yechilishi: $l = \frac{\pi R n}{180} = \frac{\pi \cdot 8 \cdot \frac{\pi}{8}}{180} = \frac{\pi^2}{180} = \pi.$

    Javobi: B.
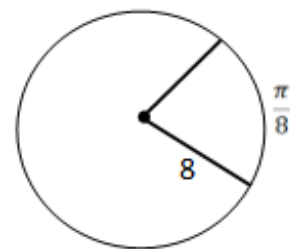
29. Agar A(1; 0), B(1; 3) va C(4; 3) bo'lsa, ABC uchburchakning turi qanday bo'ladi?

    A) Teng yonli   B) To'g'ri burchakli

    C) Teng yonli to'g'ri burchakli   D) Teng tomonli

    E) Turli tomonli

    Yechilishi: A(1; 0), B(1; 3), C(4; 3) ;

    Javobi: C.

30. $arctg|x| = -\frac{\pi}{6}$ tenglamaning yechimi nechta?

A) 1   B) $\emptyset$ C) 2   D) Cheksiz ko'p   E) 3

Yechilishi: $arctg|x| = -\frac{\pi}{6}$;

$tgarctg|x| = tg(-\frac{\pi}{6}) \Rightarrow |x| = -tg\frac{\pi}{6} \Rightarrow |x| = -\frac{\sqrt{3}}{3}.$

Bu tenglik o'rinli emas.   Javobi: B.

31. Yuzasi $6,25\pi$ bo'lgan doira aylanasining uzunligini aniqlang.

A) 5π B) $2,25\pi$ C) $2,5\pi$ D) $5,25\pi$ E) $5,5\pi$

Yechilishi: $\pi R^2 = 6,25\pi \Rightarrow R^2 = 6,25 \Rightarrow$

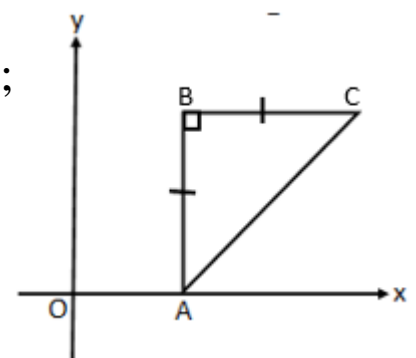$\Rightarrow R = 2,5 \Rightarrow l = 2\pi R = 2\pi \cdot 2,5 = 5\pi \Rightarrow l = 5\pi.$

Javobi: A.

32. $y = (\sqrt{3x})^{-1} + \sqrt{3x}$, $y'(\frac{1}{3}) = ?$

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

Yechilishi: $y = (\sqrt{3x})^{-1} + \sqrt{3x}$, $y'\left(\frac{1}{3}\right) = ?$

$y = (\sqrt{3} \cdot \sqrt{x})^{-1} + \sqrt{3} \cdot \sqrt{x} = \frac{1}{\sqrt{3}x^{\frac{1}{2}}} + \sqrt{3} \cdot \sqrt{x} =$

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

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

$\Rightarrow y' = -\frac{1}{2\sqrt{3}\sqrt{x^3}} + \frac{\sqrt{3}}{2\sqrt{x}} \Rightarrow y'\left(\frac{1}{3}\right) = -\frac{1}{2\sqrt{3}\sqrt{(\frac{1}{3})^3}} + \frac{\sqrt{3}}{2\sqrt{\frac{1}{3}}} =$

$= \frac{1}{2}\left[-\frac{1}{\sqrt{3 \cdot \frac{1}{27}}} + \sqrt{\frac{3}{\frac{1}{3}}}\right] = \frac{1}{2}\left[-\frac{1}{\frac{1}{3}} + 3\right] = \frac{1}{2}[-3 + 3] = 0.$

Javobi: A.

33. $y = 0,25x^4 - \frac{x^3}{3} - x^2$ funksiyaning $[-2,5; \infty)$ oraliqdagi eng kichik qiymatini toping.

A) $-\frac{3}{8}$ B) $\frac{3}{8}$ C) $\frac{8}{3}$ D) $-\frac{8}{3}$ E) $aniqlab\ bo'lmaydi$

Pirnazar DAVRONOV

Yechilishi: $y = 0{,}25x^4 - \dfrac{x^3}{3} - x^2$ $\qquad$ [-2,5; ∞)

1) $y' = \dfrac{1}{4} \cdot 4x^3 - \dfrac{1}{3} \cdot 3x^2 - 2x = x^3 - x^2 - 2x \Rightarrow$

$\Rightarrow y' = x^3 - x^2 - 2x;$

2) $y' = 0 \Rightarrow x(x^2 - x - 2) = 0 \Rightarrow \begin{cases} x = 0 \\ x^2 - x - 2 = 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x_1 = 0; \\ x_2 = -1; \\ x_3 = 2; \end{cases}$

3) $y(-\dfrac{5}{2}) = \dfrac{1}{4} \cdot (-\dfrac{5}{2})^4 - \dfrac{1}{3} \cdot (-\dfrac{5}{2})^3 - (-\dfrac{5}{2})^2 =$

$= (-\dfrac{5}{2})^2[\dfrac{1}{4} \cdot (-\dfrac{5}{2})^2 - \dfrac{1}{3} \cdot (-\dfrac{5}{2}) - 1 = \dfrac{25}{4}(\dfrac{1}{4} \cdot \dfrac{25}{4} + \dfrac{25}{8} - 1) =$

$= \dfrac{25}{4} \cdot \dfrac{75+40-48}{48} = \dfrac{25}{4} \cdot \dfrac{63}{48} = \dfrac{1575}{192} = 8{,}2;$

$x_1 = 0 ;\quad y(0) = 0$

$x_2 = -1;\quad y(-1) = \dfrac{1}{4} + \dfrac{1}{3} - 1 = \dfrac{3+4-12}{12} = -\dfrac{5}{12};$

$x_3 = 2;\quad y(2) = \dfrac{1}{4} \cdot 16 - \dfrac{1}{3} \cdot 8 - 4 = 4 - \dfrac{8}{3} - 4 = -\dfrac{8}{3};$

Javobi: D.

34. Qaysi nuqtada $y = \sqrt[3]{x}$ funksiya grafigi absissa o'qiga 30° li burchak ostida joylashgan?

A) $(\dfrac{1}{\sqrt{3}}; \dfrac{1}{\sqrt[4]{3}})$ $\qquad$ B) $(\dfrac{1}{\sqrt[4]{27}}; \dfrac{1}{3})$ $\qquad$ C) $(\dfrac{1}{\sqrt{3}}; \dfrac{1}{\sqrt[4]{3}})$

D) $(\dfrac{1}{\sqrt{3}}); (\dfrac{1}{\sqrt[4]{27}})$ $\qquad$ E) $(\dfrac{1}{\sqrt[4]{27}}; \dfrac{1}{\sqrt[4]{3}})$

Yechilishi. $y = \sqrt[3]{x} = x^{\frac{1}{3}} \Rightarrow$

$\Rightarrow y' = \dfrac{1}{3}x^{\frac{1}{3}-1} = \dfrac{1}{3}x^{-\frac{2}{3}} = \dfrac{1}{3x^{\frac{2}{3}}} = \dfrac{1}{3\sqrt[3]{x^2}};\quad tg\alpha = y'(x_0) \Rightarrow$

$\Rightarrow tg\,30° = \dfrac{1}{3\sqrt[3]{x_0^2}} = \dfrac{\sqrt{3}}{3} = \dfrac{1}{3\sqrt[3]{x_0^2}} = \sqrt{3} = \dfrac{1}{3\sqrt[3]{x_0^2}} = \sqrt{3} \Rightarrow$

$\Rightarrow \sqrt[3]{x_0^2} = 1 \quad \sqrt[3]{x_0^2} = \dfrac{1}{\sqrt{3}} = x_0^2 = \dfrac{1}{\sqrt{3^3}} \Rightarrow$

$\Rightarrow x_0 = \sqrt{\dfrac{1}{\sqrt{27}}} = \dfrac{1}{\sqrt{\sqrt{27}}} = \dfrac{1}{\sqrt[4]{27}} \Rightarrow x_0 = \dfrac{1}{\sqrt[4]{27}};$

$$y_0 = \sqrt[3]{\frac{1}{\sqrt[4]{27}}} = \frac{1}{\sqrt[3]{\sqrt[4]{27}}} = \frac{1}{\sqrt[12]{27}} = \frac{1}{\sqrt[12]{3^3}} = \frac{1}{\sqrt[4]{3}} \Rightarrow y_0 = \frac{1}{\sqrt[4]{3}};$$

Demak, $(x_0; y_0) = (\frac{1}{\sqrt[4]{27}}; \frac{1}{\sqrt[4]{3}})$. 　　　Javobi: E.

35. Qaysi m va n larda $\vec{a} = \{-2; m; -2\}$ va $\vec{b} = \{-1; 3; n; \}$ vektorlar kollinear bo'ladi?

A) 3; -1 　　　B) 3; 1 　　　C) 6; -1 　　　D) 6; 1 　　　E) 3; 6

Yechilishi: $\vec{a} = \{-2; m; -2\}$; 　$\vec{b} = \{-1; 3; n; \}$;

$\vec{a} = \lambda\vec{b} \Rightarrow \{-2; m; -2\} = \lambda\{-1; 3; n; \} \Rightarrow$

$\Rightarrow \{-2; m; -2\} = \{-1\lambda; 3\lambda; n\lambda\} \Rightarrow$

$$\Rightarrow \begin{cases} -2 = -\lambda \\ m = 3\lambda \\ -2 = n\lambda \end{cases} \Rightarrow \begin{cases} \lambda = 2; \\ m = 6; \\ n = -1. \end{cases}$$ 　　　Javobi: C.

36. Agar teng yonli to'g'ri burchakli uchburchakning yuzasi 18 ga teng bo'lsa, gepotenuzaning uzunligi qanchaga teng bo'ladi?

A) 6 　　　B) $2\sqrt{6}$ 　　　C) 2 　　　D) $6\sqrt{2}$ 　　　E) $6\sqrt{6}$

Yechilishi: $S_\Delta = 18 \Rightarrow 18 = \frac{1}{2}a^2 \Rightarrow$

$\Rightarrow a = 6 \Rightarrow c = 6\sqrt{2}.$

Javobi: D.
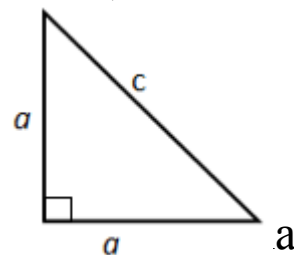
37. $y = x^2 - 2x + 1$ dagi qanday nuqtada o'tk... $y = -4(x + 1)$ to'g'ri chiqqa parallel bo'ladi?

A) $(-1; \frac{1}{4})$ 　B) $(-1; 4)$ 　C) $(1; \frac{1}{4})$ 　D) $(1; 4)$ 　E) $(0; 4)$

Yechilishi: 1) $y = x^2 - 2x + 1 \Rightarrow y' = 2x - 2 \Rightarrow$

$\Rightarrow k_1 = y'(x_o) \Rightarrow k_1 = 2x_0 - 2;$

2) $y = -4(x + 1) \Rightarrow y = -4x - 4 \Rightarrow k_2 = -4;$

3) $k_1 = k_2 \Rightarrow 2x_0 - 2 = -4 \Rightarrow x_0 = -1;$

4) $x_0 = -1 \Rightarrow y_0(-1) = (-1)^2 - 2(-1) + 1 \Rightarrow y_0 = 4;$

$A(x_0; y_0) = A(-1; 4).$ 　　　Javobi: B.

38. Trapetsiyaning yuzasi 30 ga , balandligi 6 ga teng bo'lsa, uning o'rta chizig'i qanchaga teng bo'ladi?

Pirnazar DAVRONOV

A) 2,5   B) 5   C) 7,5   D) 4,5   E) 6

Yechilishi: $S = \frac{a+b}{2} \cdot h \Rightarrow$

$\Rightarrow S = MN \cdot h \Rightarrow MN = \frac{S}{h} \Rightarrow$

$\Rightarrow MN = \frac{30}{6} = 5.$ Javobi: B.

39. $\log_x 6 > \log_x 12$ tengsizlikni yeching.

A) $(0; \frac{1}{2})$ B) $(\frac{1}{2}; 1)$ C) $(0; 1)$

D) $(0; 2)$ E) $(1; 2)$

Yechilishi: $\log_x 6 > \log_x 12 \Rightarrow 0 < x < 1.$ Javobi: C.

40. Sharni bo'yash uchun 50 massa birligiga bo'yoq ishlatiladi. Agar sharning diametri 2 marta oshirilsa, uni bo'yash uchun qancha bo'yoq kerak bo'ladi?

A) 100   B) 125   C) 150   D) 200   E) 250

Yechilishi: 1)$S'_m = 4\pi R^2 = 4\pi(\frac{d}{2})^2 = \pi d^2$;

2) $S''_m = \pi(2d)^2 = \pi \cdot 4 \cdot d^2 = 4\pi d^2$;

3) $\frac{S''}{S'} = \frac{4\pi d^2}{\pi d^2} = 50 \cdot 4 = 200.$ Javobi: D.

41. $\int_0^{ln3} \left(e^{2t} - e^{-\frac{t}{2}}\right) dt$ ni hisoblang.

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

Yechilishi: $\int_0^{ln3} \left(e^{2t} - e^{-\frac{t}{2}}\right) dt = \int_0^{ln3} e^{2t} dt -$

$\int_0^{ln3} e^{-\frac{t}{2}} dt =$

$= \frac{1}{2}e^{2t}\Big|_0^{ln3} - (-2)e^{-\frac{t}{2}}\Big|_0^{ln3} = \frac{1}{2}e^{2t}\Big|_0^{ln3} + 2e^{-\frac{t}{2}}\Big|_0^{ln3} =$

$= \frac{1}{2}[e^{2 \cdot ln3} - e^{2 \cdot 0}] + 2 \cdot \left[e^{-\frac{1}{2} \cdot ln3} - e^{-\frac{1}{2} \cdot 0}\right] =$

$= \frac{1}{2}[e^{ln3^2} - e^0] + 2 \cdot \left[e^{ln3^{-\frac{1}{2}}} - e^0\right] =$

$= \frac{1}{2}[9 - 1] + 2\left[3^{-\frac{1}{2}} - 1\right] = 4 + 2(\frac{1}{\sqrt{3}} - 1) = 4 + \frac{2}{\sqrt{3}} - 2 =$

238

$$= 2 + \frac{2}{\sqrt{3}}.$$
Javobi: A.

42. $tg\left(\frac{1}{2}arcsin\frac{5}{13}\right)$ ni hisoblang.

A) $\frac{1}{25}$ B) $\frac{1}{15}$ C) $\frac{1}{10}$ D) $\frac{1}{5}$ E) 5

Yechilishi: $tg\frac{\alpha}{2} = \frac{1-cos\alpha}{sin\alpha}$;

$$tg\left(\frac{1}{2}arcsin\frac{5}{13}\right) = \frac{1-cosarcSin\frac{5}{13}}{SinarcSin\frac{5}{13}} = \frac{1-\sqrt{1-\frac{25}{169}}}{\frac{5}{13}} = \frac{1-\frac{12}{13}}{\frac{5}{13}} =$$

$$= \frac{1}{13}\cdot\frac{13}{5} = \frac{1}{5}.$$ Javobi: D.

43. Silindrning o'q kesimi tomonlari $\frac{2}{\sqrt[3]{\pi}}$ ga teng bo'lgan kvadrat bo'lsa , uning hajmi qanchaga teng bo'ladi?

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

Yechilishi: $V = S_{asos}\cdot H$; $H = \frac{2}{\sqrt[3]{\pi}}$;

$$2 = R = \frac{2}{\sqrt[3]{\pi}};\quad R = \frac{1}{\sqrt[3]{\pi}};$$

$$S_{asos} = \pi\cdot R^2 = \frac{\pi}{\sqrt[3]{\pi^2}} = \sqrt[3]{\frac{\pi^3}{\pi^2}} = \sqrt[3]{\pi};$$

$$V = \sqrt[3]{\pi}\cdot\frac{2}{\sqrt[3]{\pi}} = 2.$$ Javobi: B.
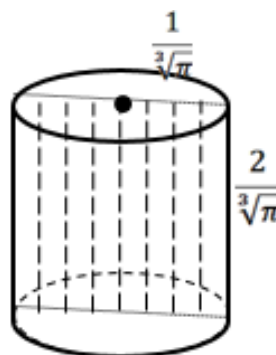
44. Agar $\log_7 2 = a$, $\log_2 10 = b$ bo'lsa, $\log_4 39{,}2$ ni a va b orqali ifodalang.

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

D) $\frac{1}{a} - \frac{2}{3} + \frac{b}{2}$ E) $\frac{1}{a} - \frac{2}{3} + \frac{b}{3}$

Yechilishi: $\log_7 2 = a$, $\log_2 10 = b$ $\log_4 39{,}2$

1) $a = \frac{lg2}{lg7}$; $b = \frac{lg10}{lg2} = \frac{1}{lg2} \Rightarrow lg2 = \frac{1}{b}$;

2) $a = \frac{\frac{1}{b}}{lg7} \Rightarrow lg7 = \frac{1}{ab}$;

3) $\log_4 39{,}2 = \frac{lg39{,}2}{lg4} = \frac{lg\frac{392}{10}}{lg2^2} = \frac{lg392-lg10}{2lg2} = \frac{lg2^3\cdot7^2-1}{2lg2} =$

$$= \frac{lg\, 2^3 + lg\, 7^2 - 1}{2 lg\, 2} = \frac{3 lg\, 2 - 2 lg\, 7 - 1}{2 lg\, 2} = \frac{3 \cdot \frac{1}{b} + 2 \cdot \frac{1}{ab} - 1}{2 \cdot \frac{1}{b}} = \frac{\frac{3}{b} + \frac{2}{ab} - 1}{\frac{2}{b}} =$$

$$= \left(\frac{3}{b} + \frac{2}{a \cdot b} - 1 \right) \cdot \frac{b}{2} = \frac{3}{2} + \frac{1}{a} - \frac{b}{2} = \frac{1}{a} + \frac{3}{2} - \frac{b}{2}. \qquad \text{Javobi: B.}$$

45. $\log_x 2 \log_{2x} 2 = \log_{4x} 2$ tenglamaning yechimlari ko'paytmasini aniqlang.

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

Yechilishi: $\log_x 2 \log_{2x} 2 = \log_{4x} 2 \Rightarrow$

$$\Rightarrow \frac{1}{\log_2 x} \cdot \frac{1}{\log_2 2x} = \frac{1}{\log_2 4x} \Rightarrow log_2 x \cdot log_2 2x = log_2 4x \Rightarrow$$

$$\Rightarrow \log_2 4 + \log_2 x = \log_2 x \, (\log_2 2 + \log_2 x) \Rightarrow$$

$$\Rightarrow \log_2 2^2 + \log_2 x = \log_2 x \, (1 + \log_2 x) \Rightarrow$$

$$\Rightarrow 2 + \log_2 x = \log_2 x + log_2^2 x \Rightarrow log_2^2 x = 2 \Rightarrow$$

$$\Rightarrow |\log_2 x| = \sqrt{2} \Rightarrow \log_2 x = \pm\sqrt{2} \Rightarrow$$

$$\Rightarrow \begin{cases} \log_2 x_1 = -\sqrt{2} \\ \log_2 x_2 = \sqrt{2} \end{cases} \Rightarrow \begin{cases} x_1 = 2^{-\sqrt{2}} \\ x_2 = 2^{\sqrt{2}} \end{cases} \Rightarrow$$

$$\Rightarrow x_1 \cdot x_2 = 2^{-\sqrt{2}} \cdot 2^{\sqrt{2}} = 2^{-\sqrt{2}+\sqrt{2}} = 2^0 = 1 \Rightarrow x_1 \cdot x_2 = 1.$$

Javobi: A.

46. $\log_{2\sqrt{2}} 128$ ni hisoblang;

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

Yechilishi: $\log_{2\sqrt{2}} 128 = \log_{\sqrt{8}} 2^7 = \log_{2^{\frac{3}{2}}} 2^7 = \frac{\log_2 2^7}{\log_2 2^{\frac{3}{2}}} =$

$$= \frac{7}{\frac{3}{2}} = \frac{14}{3} = 4\frac{2}{3}. \qquad \text{Javobi: A.}$$

47. Muntazam to'rt burchakli pramidaning balanligi 24ga, asosining tomoni 14 ga teng, Uning apofemasini toping;

A) 18 $\qquad$ B) 27 $\qquad$ C) 25

D) 32 $\qquad$ E) 28

Yechilishi: $H = 24; \quad a = 14 \quad h = ?$

$h^2 = 24^2 + 7^2 = 576 + 49 = 625 \Rightarrow$

$\Rightarrow h = 25.$

Javobi: C.
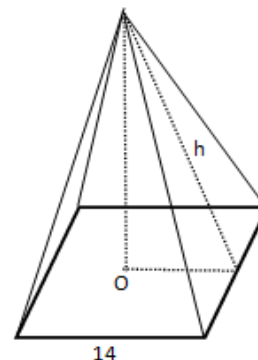
48. $y = -2x,\ y = 0,\ x = 4$ chiziqlar bilan chegaralangan yuzani toping.

   A) 8   B) 12   C) 16   D) 20   E) 24

Yechilish: $y = -2x;\ y = 0;$
$x = 4;\ S =?$

1) $\begin{cases} y = -2x \\ x = 4 \end{cases} \Rightarrow \begin{cases} y = -8; \\ x = 4. \end{cases}$

2) $S = \dfrac{1}{2}OB \cdot AB = \dfrac{1}{2} \cdot 4 \cdot 8 = 16.$

Shuningdek ΔOAB absissa o'qidan
Pastda joylashganligi uchun

$S = -\int_a^b f(x)dx$ dan foydalaniladi.

U holda $S = -\int_0^4 (-2x)dx = 2 \cdot \dfrac{x^2}{2}\Big|_0^4 = 16$ Javobi: C.

49. $x^{\log_2 x + 4} < 32$ tengsizlikni yeching.

  A) $(2^{-1};\ 2)$ B) $(2^{-2};\ 2)$ C) $(2^{-3};\ 2)$
  D) $(2^{-4};\ 2)$ E) $(2^{-5};\ 2)$
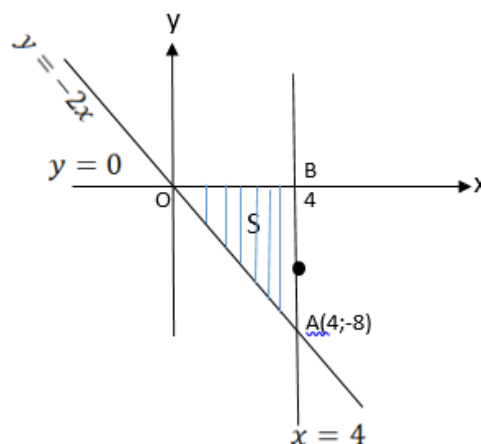
Yechilishi: $x^{\log_2 x + 4} < 32 \Rightarrow x^{\log_2 x} \cdot x^4 < 32 \Rightarrow$

$\Rightarrow \log_2 x \log_2 x + \log_2 x^4 < \log_2 2^5 \Rightarrow$

$\Rightarrow \log_2^2 x + 4\log_2 x < 5 \Rightarrow \log_2^2 x + 4\log_2 x - 5 < 0 \Rightarrow$

$\Rightarrow \log_2 x = y \Rightarrow y^2 + 4y - 5 < 0 \Rightarrow y^2 + 4y - 5 = 0 \Rightarrow$

$\Rightarrow y_{1,2} = -2 \pm \sqrt{4 + 5} = -2 \pm 3 \Rightarrow$

$\Rightarrow \begin{cases} y_1 = -5 \\ y_2 = 1 \end{cases} \Rightarrow \begin{cases} \log_2 x_1 = -5 \\ \log_2 x_2 = 1 \end{cases}$

$\Rightarrow \begin{cases} x_1 = 2^{-5} \\ x_2 = 2^1 \end{cases} \Rightarrow (x_1;\ x_2) \Rightarrow$

$\Rightarrow (2^{-5}; 2).$ Javobi: E.

50. Konusning o'q kesimi – tomoni $\dfrac{6}{\sqrt{\pi}}$ ga teng bo'lgan muntazam uchburchak bo'lsa, uning yon sirti yuzasi qanchaga teng bo'ladi?
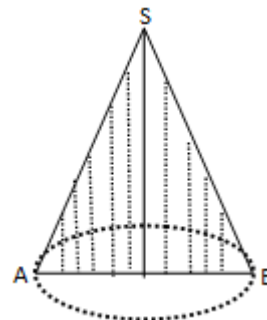
  A) 9   B) 18   C) 24   D) 28   E) 32

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

$AB = AS = BS = \dfrac{6}{\sqrt{\pi}}$;

$R = \dfrac{3}{\sqrt{\pi}}$;

$S = \pi \cdot \dfrac{3}{\sqrt{\pi}} \cdot \dfrac{6}{\sqrt{\pi}} = 18.$ Javobi: B.

51. Qandaydir sonni 289 ga bo'linganda, qoldiq 287 ga teng bo'lsa, shu soni 17 ga bo'lgandagi qoldiqni toping?

A) 15   B) 2   C) 5   D) 16   E) 0

Yechish: $x = 17^2 \cdot a + 287$; $17^2 \cdot a$ soni 17 ga qoldiqsiz bo'linadi. Demak, $287 = 17 \cdot 16 + 15 \Rightarrow$ qoldiq 15.

Javobi: A.

52. Agar $xy = 4$; $yz = 7$ va $xz = 28$ ($y > 0$) bo'lsa, xyz ni toping.

A) -28   B) 28   C) 27   D) 56   E) -56

Yechilishi: $xy = 4$; $yz = 7$ va $xz = 28$ ($y > 0$); $xyz = ?$

$(xyz)^2 = x^2 \cdot y^2 \cdot z^2 = x \cdot y \cdot y \cdot z \cdot x \cdot z =$

$= 4 \cdot 7 \cdot 28 = 28^2 \Rightarrow x \cdot y \cdot z = 28.$ Javobi: B.

53. Qisqarmaydigan oddiy kasrning maxraj suratidan 6 birlikka katta. Agar kasrning surat va maxrajiga 5 ni qo'shsak , xosil bo'lgan kasirning qiymati $\dfrac{1}{2}$ ga teng bo'ladi. Berilgan kasrning suratini toping?

A) 5   B) 7   C) 6   D) 12   E) 1

Yechilishi: $\dfrac{x}{x+6} \Rightarrow \dfrac{x+5}{x+11} = \dfrac{1}{2} \Rightarrow 2x + 10 = x + 11 \Rightarrow x = 1.$

Javobi: E.

54. $\dfrac{0,202 - 0,004}{\frac{8}{9} \cdot 18 \cdot 0,125}$ ni hisoblang.

A) 0,099   B) 0,99   C) 0,0099   D) 1   E) 1,98

Yechilishi: $\dfrac{0,202-0,004}{\frac{8}{9}\cdot 18\cdot 0,125}=\dfrac{0,198}{8\cdot 0,25}=\dfrac{0,198}{2}=0,099.$

Javobi: A.

55. Agar $a>0,\ b>0$ va $c<0$ bo'lsa, $\sqrt[3]{a^3b^3c^3}$
quyidagilarning qaysi biriga teng bo'ladi?

  A) $a|bc|$ B) $-abc$ C) $ab|c|$ D) $|abc|$

  E) abc

Yechilishi: $a>0;$ $b>0;$ $c<0;$ $\sqrt[3]{a^3b^3c^3}=?$
$\sqrt[3]{a^3b^3c^3}=\sqrt[3]{a^3}\sqrt[3]{b^3}\sqrt[3]{c^3}=-abc.$ Javobi: B.

56. Uchta sonning o'rta geometrigi 6 ga teng bo'lib, ulardan
ikkitasi 8 va 9 bo'lsa, uchunchi son necha bo'ladi?

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

Yechilishi: O'rta geometrik qiymat$=\sqrt[n]{a_1\cdot a_2\cdot ...\cdot a_n};$
$6=\sqrt[3]{8\cdot 9\cdot x}\Rightarrow 6^3=8\cdot 9\cdot x\Rightarrow x=\dfrac{36\cdot 6}{8\cdot 9}=3.$ Javobi: A.

57. 9^{10} ni 7 ga bo'lgandagi qoldiqni toping.

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

Yechilishi: $9^{10}=(7+2)^{10}=7\cdot l+2^{10};$
$2^{10}=2\cdot 2^9=2\cdot(2^3)^3=2\cdot(7+1)^3=2\cdot 7m+2\cdot 1^3=$
$=2\cdot 7m+2.$ Javobi: C.

58. $\left(1997\frac{3}{5}-1996\frac{1}{6}\right)\cdot 1\frac{1}{29}$ ni hisoblang.

  A) $\dfrac{13}{29}$ B) $2\dfrac{1}{29}$ C) $1\dfrac{13}{29}$ D) $3\dfrac{1}{29}$ E) $1\dfrac{14}{29}$

Yechilishi: $\left(1997\frac{3}{5}-1996\frac{1}{6}\right)\cdot 1\frac{1}{29}=$
$=\left(1997+\frac{3}{5}-1996-\frac{1}{6}\right)\cdot\frac{30}{29}=\left(1+\frac{3}{5}-\frac{1}{6}\right)\cdot\frac{30}{29}=$
$=\frac{30+18-5}{30}\cdot\frac{30}{29}=1\frac{14}{29}.$ Javobi: E.

59. $\dfrac{\sqrt[3]{-24}+\sqrt[3]{81}+\sqrt[3]{192}}{\sqrt[3]{-375}}$ ni hisoblang;

  A) -1   B) 1   C) $-\dfrac{83}{125}$ D) $\dfrac{83}{125}$ E) 0,99

Yechilishi: $\dfrac{\sqrt[3]{-24}+\sqrt[3]{81}+\sqrt[3]{192}}{\sqrt[3]{-375}}=\dfrac{\sqrt[3]{-2^3\cdot 3}+\sqrt[3]{3^3\cdot 3}+\sqrt[3]{4^3\cdot 3}}{\sqrt[3]{-5^3\cdot 3}}=$

$=\dfrac{-2\sqrt[3]{3}+3\sqrt[3]{3}+4\sqrt[3]{3}}{-5\sqrt[3]{3}}=\dfrac{\sqrt[3]{3}(-2+3+4)}{-5\sqrt[3]{3}}=\dfrac{5}{-5}=-1.$ Javobi: A.

60. Agar $x^2+y^2=281\ va\ x-y=11$ bo'lsa, xy qanchaga teng bo'ladi?

A) 80   B) 160   C) -80   D) 40   E) -160

Yechilishi: $\begin{cases}x^2+y^2=281\\ x-y=11\end{cases}\Rightarrow\begin{cases}x^2+y^2=281\\ x^2+y^2-2xy=121\end{cases}\Rightarrow$

$\Rightarrow 281-2xy=121\Rightarrow 2xy=281-121\Rightarrow$

$\Rightarrow xy=\dfrac{160}{2}\Rightarrow xy=80.$ Javobi: A.

61. Agar x va y sonlari $x^2+y^2+(y-1)^2=2xy$ tenglikni qanoatlantirsa $x+y$ qanchaga teng bo'ladi?

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

Yechilishi: $x^2+y^2+(y-1)^2=2xy\Rightarrow$

$\Rightarrow x^2-2xy+y^2+(y-1)^2=0\Rightarrow$

$\Rightarrow (x-y)^2+(y-1)^2=0\Rightarrow\begin{cases}(x-y)^2=0\\ (y-1)^2=0\end{cases}\Rightarrow$

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

Javobi: D.

62. $\dfrac{x^{\sqrt[4]{\pi}}-y^{\sqrt[4]{\pi}}}{x^{2\sqrt[4]{\pi}}-y^{2\sqrt[4]{\pi}}}$ ni qisqartiring.

A) $\dfrac{1}{x^{\sqrt[4]{\pi}}+y^{\sqrt[4]{\pi}}}$ B) $x^{\sqrt{\pi}}+y^{\sqrt{\pi}}$ C) $x^{\sqrt{\pi}}-y^{\sqrt{\pi}}$

D) $\dfrac{1}{x^{\sqrt[4]{\pi}}-y^{\sqrt[4]{\pi}}}$ E) $x^{\frac{\pi}{2}}+y^{\frac{\pi}{2}}$

Yechilishi: $\dfrac{x^{\sqrt[4]{\pi}}-y^{\sqrt[4]{\pi}}}{x^{2\sqrt[4]{\pi}}-y^{2\sqrt[4]{\pi}}}=\dfrac{1}{x^{\sqrt[4]{\pi}}+y^{\sqrt[4]{\pi}}}.$ Javobi: A.

63. Quyidagi berilganlardan toq funksiyani toping?

A) $y=|x|-1$ B) $y=x(|x|+1)$ C) $y=-cosx$

D) $y = \begin{cases} -x, x \geq 0, \\ x, x < 0 \end{cases}$ E) $y = -x^2$

Yechilishi: $y(-x) = -x(|x| + 1) \Rightarrow y = x(|x| + 1)$.

Javobi: B.

64. Agar $|a| \leq 1$, $|b| \leq 1$ bo'lsa, $arccosa - 4arcsinb$ ifodaning eng katta qiymati qanchaga teng bo'ladi?

A) 2π B) 1   C) 3π D) 5π E) 4π

Yechilishi: $\begin{cases} |a| \leq 1, \\ |b| \leq 1 \end{cases} \Rightarrow$

$\begin{cases} -1 \leq a \leq 1; \\ -1 \leq b \leq 1; \end{cases}$ $\begin{cases} -\frac{\pi}{2} \leq arcsinb \leq \frac{\pi}{2} \\ 0 \leq arccosa \leq \pi \end{cases}$

$arccosa - 4arcsinb = \pi - 4\left(-\frac{\pi}{2}\right) = \pi + 2\pi = 3\pi$.

Javobi: C.

65. Agar $(x - 2)f(x - 2) + f(2x) + f(x + 2) = x + 6$ bo'lsa, $f(4)$ qanchaga teng bo'ladi?

A) 13   B) 2   C) 3   D) 4   E) 41

Yechilishi: $(x - 2)f(x - 2) + f(2x) + f(x + 2) = x + 6$; $x = 2 \Rightarrow 0 \cdot f(0) + f(4) + f(4) = 8 \Rightarrow$

$\Rightarrow 2f(4) = 8 \Rightarrow f(4) = 4$.   Javobi: D.

66. $y = \sqrt{9 - x^2}$ funksiya qiymatlar sohasini aniqlang?

A) $(-\infty; \infty)$ B) [-3; 3]   C) $[0; \infty)$

D) [0; 3]   E) [0; 9]

Yechilishi:

$y = \sqrt{9 - x^2} \Rightarrow \begin{cases} y \geq 0 \\ 9 - x^2 = 0 \end{cases} \Rightarrow \begin{cases} y \geq 0 \\ x^2 \leq 9 \end{cases} \Rightarrow \begin{cases} y \geq 0 \\ |x| = 3 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} y \geq 0 \\ -3 \leq x \leq 3 \end{cases} \Rightarrow \begin{cases} y \geq 0 \\ x = 0 \end{cases} \Rightarrow \begin{cases} y \geq 0 \\ y = 3 \end{cases} \Rightarrow 0 \leq y \leq 3 \Rightarrow$

[0; 3].

Javobi: D.

67. $y = \frac{3}{4-x}$ funksiyaning o'sish oraliqlarini toping.

A) $(-\infty;\ 4)\cup(4;\ \infty)$ B) R C) $(-\infty;\ \frac{3}{4})\cup(\frac{3}{4};\ \infty)$

D) R^+ E) $[4;\ \infty)$

Yechilishi:

$$y = \frac{3}{4-x} \Rightarrow y' = \frac{3'(4-x)-3(4-x)'}{(4-x)^2} = \frac{-3(0-1)}{(4-x)^2} = \frac{3}{(4-x)^2} \Rightarrow$$

$$y' > 0 \Rightarrow \frac{3}{(4-x)^2} > 0 \Rightarrow 4 - x \neq 0 \Rightarrow$$

$$\Rightarrow x \neq 4 \Rightarrow (-\infty;\ 4)\cup(4;\ \infty). \qquad \text{Javobi: A.}$$

68. Agar $(x^3 - x + 1)^3 + x$ ifoda standart shakldagi ko'phad ko'rinishda yozilsa, x ning toq darajalari oldidagi koeffisiyentlarning yig'indisi nechchiga teng bo'ladi?

A) 1   B) 7   C) 4   D) 5   E) 3

Yechilishi: $(x^3 - x + 1)^3 + x = [x^3 - (x - 1)]^3 + x =$

$$= x^9 - 3x^6(x - 1) + 3x^3(x - 1)^2 - (x - 1)^3 + x =$$

$$= x^9 - 3x^7 + 3x^6 + 3x^3(x^2 - 2x + 1) -$$

$$-(x^3 - 3x^2 + 3x - 1) + x =$$

$$= x^9 - 3x^7 + 3x^6 + 3x^5 - 6x^4 + 3x^3 - x^3 +$$

$$+3x^2 - 3x + 1 + x =$$

$$= x^9 - 3x^7 + 3x^6 + 3x^5 - 6x^4 + 2x^3 + 3x^2 - 2x + 1 =$$

$$= 1 - 3 + 3 + 2 - 2 = 1. \qquad \text{Javobi: A.}$$

69. $4^x - 5 \cdot 2^x + 3 = 0$ tenglama ildizlarning yig'indisini toping?

A) 5   B) $\log_2 3$ C) 3   D) $\log_2 5$ E) 8

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

$$\Rightarrow (2^x)^2 - 5 \cdot 2^x + 3 = 0 \Rightarrow 2^x = y \Rightarrow$$

$$\Rightarrow y^2 - 5y + 3 = 0 \Rightarrow$$

$$\Rightarrow y_{1,2} = \frac{5}{2} \pm \sqrt{\frac{25}{4} - 3} = \frac{5}{2} \pm \sqrt{\frac{13}{4}} = \frac{5 \pm \sqrt{13}}{2} \Rightarrow$$

$$\Rightarrow \begin{cases} y_1 = \frac{5 - \sqrt{13}}{2}; \\ y_2 = \frac{5 + \sqrt{13}}{2}; \end{cases}$$

1) $2^{x_1} = \frac{5-\sqrt{13}}{2} \Rightarrow x_1 = \log_2 2 = \log_2 \frac{5-\sqrt{13}}{2} \Rightarrow$

$\Rightarrow x_1 = \log_2 \frac{5-\sqrt{13}}{2};$

2) $2^{x_2} = \frac{5+\sqrt{13}}{2} \Rightarrow x_2 = \log_2 2 = \log_2 \frac{5+\sqrt{13}}{2};$

3) $x_1 + x_2 = \log_2 \frac{5-\sqrt{13}}{2} + \log_2 \frac{5+\sqrt{13}}{2} =$

$\log_2 \frac{5-\sqrt{13}}{2} \cdot \frac{5+\sqrt{13}}{2} == \log_2 \frac{25-13}{4} = \log_2 3.$

Javobi: B.

70. $b^{-1}x^2 = 2x - b$ tenglik x ning qanday qiymatlarda to'g'ri bo'ladi?

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

Yechilishi: $b^{-1}x^2 = 2x - b \Rightarrow \frac{1}{b}x^2 - 2x + b = 0 \Rightarrow$

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

$\Rightarrow x_1 = x_2 = b.$ Javobi: A.

71. $\frac{1-\frac{1}{x-1}}{1+\frac{1}{x-1}} = 0$ tenglamani yeching.

A) -2 B) 0 C) -1 D) 1 E) 2

Yechilishi: $\frac{1-\frac{1}{x-1}}{1+\frac{1}{x-1}} = 0;$

1) $x - 1 \neq 0 \Rightarrow x \neq 1;$

2) $1 - \frac{1}{x-1} = 0 \Rightarrow \frac{x-1-1}{x-1} = 0 \Rightarrow x = 2.$

Javobi: E.

72. $(\sin 40°)^{x^2-4x+4} \geq 1$ tengsizlikni yeching.

A) {2} B) [2; ∞) C) (-∞; 2] D) (-∞; ∞) E) ∅

Yechilishi: $(\sin 40°)^{x^2-4x+4} \geq 1 \Rightarrow (\sin 40°)^{(x-2)^2} \geq 1 \Rightarrow$

$\Rightarrow \begin{cases} 0 < \sin 40° < 1 \\ (x-2)^2 \geq 0 \end{cases} \Rightarrow x = 2.$ Javobi: A.

73. Agar $5x^2 - 3x - 1 = 0$ tenglamaning ildizlari $tg\alpha$ va $tg\beta$ bo'lsa, $tg(\alpha + \beta)$ qanchaga teng bo'ladi?

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

   Yechilishi: $5x^2 - 3x - 1 = 0 \Rightarrow x_{1,2} = \frac{3 \pm \sqrt{9 + 4 \cdot 5 \cdot 1}}{2 \cdot 5} = \frac{3 \pm \sqrt{29}}{10} \Rightarrow$

   $$\Rightarrow \begin{cases} tg\alpha = \frac{3 - \sqrt{29}}{10} \\ tg\beta = \frac{3 + \sqrt{29}}{10} \end{cases} \Rightarrow \begin{cases} \alpha = arctg \frac{3 - \sqrt{29}}{10}; \\ \beta = arctg \frac{3 + \sqrt{29}}{10}. \end{cases}$$

   $$tg(\alpha + \beta) = \frac{tg\alpha + tg\beta}{1 - tg\alpha + tg\beta} = \frac{\frac{3 - \sqrt{29}}{10} + \frac{3 + \sqrt{29}}{10}}{1 - \frac{3 - \sqrt{29}}{10} \cdot \frac{3 + \sqrt{29}}{10}} = \frac{\frac{6}{10}}{1 - \frac{9 - 29}{100}} =$$

   $$= \frac{3}{5} : \frac{100 + 20}{100} = \frac{3}{5} : \frac{6}{5} = \frac{3}{5} \cdot \frac{5}{6} = \frac{1}{2}. \qquad \text{Javobi: D.}$$

74. $arccosx > arccosx^2$ tengsizlikni yeching.

   A) $(0; 1)$ B) $[-1; 0)$ C) $[-1; 1]$
   D) $(-\infty; 0) \cup (1; \infty)$ E) $(1; \infty)$

   Yechilishi: $arccosx > arccosx^2$;

   $$arccos\alpha > arccos\beta \Rightarrow \begin{cases} \alpha < \beta; \\ \alpha \le -1; \\ \beta \le 1. \end{cases} \text{ Bundan}$$

   $$\begin{cases} -1 \le x \le 1 \\ 0 \le x^2 \le 1 \\ x^2 > x \Rightarrow x^2 - x > 0 \Rightarrow x(x - 1) > 0 \Rightarrow \begin{cases} x_1 = 0; \\ x_2 = 1. \end{cases} \end{cases}$$

   Kvadrat tengsizlikning yechimlari to'plamidan:
   $[-1; 0) \cup (1; \infty) \Rightarrow [-1; 0).$ Javobi: B.

75. (a_n) arifmetik progressiyaga $a_1 = 3$, $a_{60} = 57$ progressiyaning dastlabki 60 ta hadi yig'indisi qanchaga teng bo'ladi?

   A) 1500   B) $\frac{3423}{2}$ C) 1600   D) 1800   E) 6000

   Yechilishi: $a_1 = 3$; $a_{60} = 57$; $S_{60} = ?$
   $S_{60} = \frac{57 + 3}{2} \cdot 60 = 60 \cdot 30 = 1800.$ Javobi: D.

76. Qaysi nuqtada $y = 1 + e^{x-1}$ funksiyaning grafigiga o'tkazilgan urinma OX o'qi bilan $45°$ li burchak hosil qiladi?

A) $x = 1$ B) $x = 0$ C) $x = -1$

D) $x = 2$ E) $x = -2$

Yechilishi: $y = 1 + e^{x-1} \Rightarrow y' = e^{x-1} \Rightarrow y'(x_0) =$
$= e^{x_0-1} \Rightarrow \quad \Rightarrow k = e^{x_0-1} \Rightarrow tg\alpha = e^{x_0-1} \Rightarrow tg\,45° =$
$= e^{x_0} \cdot e^{-1} \Rightarrow$
$\Rightarrow 1 = e^{x_0} \cdot e^{-1} \Rightarrow e^{x_0} = e \Rightarrow x_0 = 1.$

Javobi: A.

77. Agar $f(x)$ funksiyaning grafigiga $x_0 = 2$ nuqtada o'tkazilgan urinmaning tenglamasi $2x - 3y = 6$ bo'lsa, $f'(2)$ qanchaga teng bo'ladi.

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

Yechilishi: $y - y_0 = f'(x_0)(x - x_0) \Rightarrow 2x - 3y = 6$;
$x_0 = 2; \quad f'(2) = ? \quad 3y = 2x - 6 \Rightarrow y = \dfrac{2}{3}x - 2 \Rightarrow$
$\Rightarrow k = \dfrac{2}{3} \Rightarrow f'(2) = \dfrac{2}{3}.$ Javobi: A.

78. $y = \sqrt{x} + \sqrt[3]{x}$ ning boshlag'ich funksiyasini toping.

A) $\dfrac{2}{3}\sqrt{x^3} + \dfrac{3}{4}\sqrt[3]{x^4} + C$ B) $\dfrac{3}{2}\sqrt{x^3} + \dfrac{3}{4}\sqrt[3]{x^4} + C$

C) $\dfrac{2}{3}\sqrt{x^3} + \dfrac{3}{4}\sqrt[3]{x} + C$ D) $\dfrac{2}{3}\sqrt{x^3} + \dfrac{3}{4}\sqrt{x^4} + C$

E) $\dfrac{1}{3}\sqrt{x^3} + \dfrac{1}{4}\sqrt[3]{x^4} + C$

Yechilishi: $y = \sqrt{x} + \sqrt[3]{x};$ $F(x) = ?$

$F(x) = \int (x^{\frac{1}{2}} + x^{\frac{1}{3}})dx = \dfrac{x^{\frac{1}{2}+1}}{\frac{1}{2}+1} + \dfrac{x^{\frac{1}{3}+1}}{\frac{1}{3}+1} + c = \dfrac{x^{\frac{3}{2}}}{\frac{3}{2}} + \dfrac{x^{\frac{4}{3}}}{\frac{4}{3}} + c =$

$= \dfrac{2}{3}\sqrt{x^3} + \dfrac{3}{4}\sqrt[3]{x^4} + c.$ Javobi: A.

79. m ning qaysi qiymatda $y = 1$ to'g'ri chiziq , $y = x^2 - 2x + m$ parabolaga urinadi?

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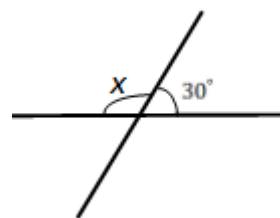
Pirnazar DAVRONOV

Yechilishi: $\begin{cases} y = 1 \\ y = x^2 - 2x + m \end{cases} \Rightarrow 1 = x^2 - 2x + m \Rightarrow$

$\Rightarrow x^2 - 2x + m - 1 = 0 \Rightarrow D = b^2 - 4ac =$

$= (-2)^2 - 4 \cdot 1(m - 1) = 4 - 4m + 4 = 8 - 4m \Rightarrow$

$\Rightarrow D = 0 \Rightarrow 8 - 4m = 0 \Rightarrow m = 2.$ Javobi: D.

80. Ikki to'g'ri chiziqning kesishishidan hosil bo'lgan burchaklarning biri 30° ga teng. Qolgan burchaklarni toping.

A) 150°; 150°; 30°;   B) 110°; 110°; 110°;
C) 60°; 60°; 30°;   D) 120°; 120°; 90°;
E) 130°; 130°; 70°;

Yechilishi: $x + 30° = 180° \Rightarrow$
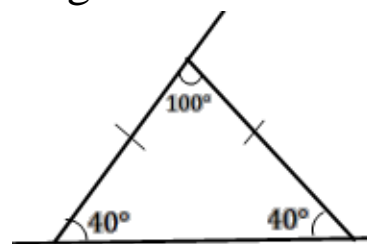$\Rightarrow x = 150°.$ Demak, 150°; 150°; 30°;
Javobi: A.

81. Teng yonli uchburchakning asosdagi burchagi 40° ga teng. Bu uchburchakning yon tomonlari orasidagi burchakka qo'shni bo'lgan tashqi burchaklarning qiymatni toping?

A) 90°   B) 100°   C) 140°   D) 50°   E) 80°

Yechilishi: Uchburchakning tashqi burchagi o'ziga qo'shni bo'lmagan burchaklar yig'indisiga teng

$x + 40° + 40° = 180° \Rightarrow x = 100°;$
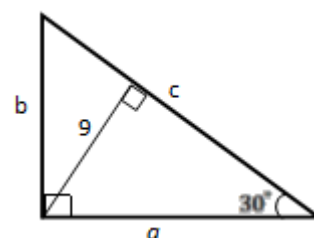$\gamma = 180° - 100° = 80°.$
Javobi: E.

82. To'g'ri burchak uchburchakning o'tkir burchagi 60° ga, gepotenuzasi tushirilgan balandligi 9 ga teng. Gepotenuzasini toping.

A) $12\sqrt{3}$ B) $12\sqrt{2}$ C) 12   D) $9\sqrt{3}$ E) $6\sqrt{3}$

Yechilishi: $b = \frac{c}{2}; a = c \cdot cos30° =$

$= c \cdot \frac{\sqrt{3}}{2};$

250

$$a = \frac{\sqrt{3}}{2}c \Rightarrow H = \frac{ab}{c} \Rightarrow 9 = \frac{\frac{\sqrt{3}c}{2} \cdot \frac{c}{2}}{c} \Rightarrow$$

$$\Rightarrow 9c = \frac{\sqrt{3}}{4}c^2 \Rightarrow \sqrt{3}c = 36 \Rightarrow$$

$$\Rightarrow c = \frac{36}{\sqrt{3}} = \frac{36 \cdot \sqrt{3}}{3} = 12\sqrt{3} \Rightarrow c = 12\sqrt{3}. \quad \text{Javobi: A.}$$

83. Teng yonli trapetsiyaning asoslari 12 va 6 ga teng. Uning diagonallari o'zaro perpendikulyar bo'lsa, trapetsiyaning yuzi qanchaga teng bo'ladi?

A) 80　　　B) 64　　　C) 72　　　D) 81　　　E) 100
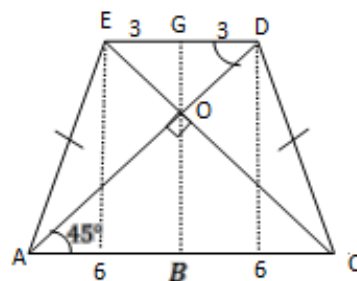
Yechilishi: $S =?$　$\frac{OB}{AB} = tg45° \Rightarrow$

$$\Rightarrow OB = 6 \cdot tg45° \Rightarrow$$
$$\Rightarrow OB = 6; \quad \frac{OG}{GD} = tg45° \Rightarrow$$
$$\Rightarrow OG = GD \cdot tg45° \Rightarrow OG = 3 \Rightarrow$$
$$\Rightarrow BG = OB + OG = 6 + 3 = 9;$$
$$S = \frac{a+b}{2} \cdot h = \frac{12+6}{2} \cdot 9 = 81. \quad \text{Javobi: D.}$$

84. PA urinma 4 ga, PB kesma 2 ga teng. Aylananing radiusini toping?

A) 3　　　B) 5　　　C) $3\sqrt{3}$

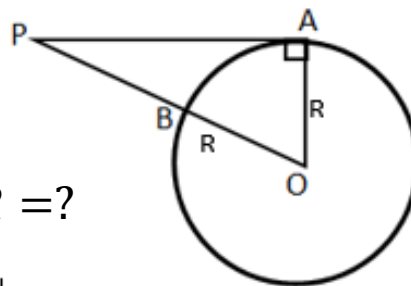D) $4\sqrt{2}$　　　E) $2\sqrt{3}$

Yechilishi: $PA = 4$　$PB = 2$　$R =?$

$$(R + 2)^2 = 4^2 + R^2 \Rightarrow$$
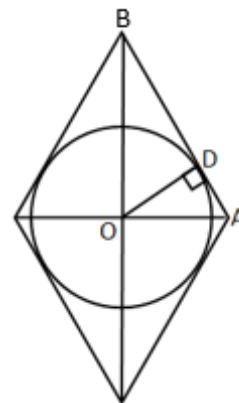$$\Rightarrow R^2 + 4R + 4 = 16 + R^2 \Rightarrow R = 3.$$

Javobi: A.

85. Rombning tomoni unga ichki chizilgan aylananing urinish nuqtasida 2 va 18 ga teng kesmalarga bo'linadi. Ichki chizilgan aylananing radiusini toping.

A) 9　　　B) 10　　　C) 4

D) 6　　　E) 3

Yechilishi: $AD = 2; BD = 18;$

$OD = r; \ r = ?$

$OD^2 = BD \cdot AD \Rightarrow r^2 = 18 \cdot 2 = 36 \Rightarrow r = 6.$

Javobi: D.

86. $\vec{a}$ va $\vec{b}$ birlik vektorlar orasidagi burchak $30°$.

$|\vec{a} + \vec{b}|$ ni toping.

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

Yechilishi: $|\vec{a}| = |\vec{b}| = 1; \ (\vec{a}{}^{\wedge}\vec{b}) = 30°; \quad |\vec{a} + \vec{b}| = ?$

$|\vec{a} + \vec{b}|^2 = \vec{a}^2 + 2\vec{a} \cdot \vec{b} + \vec{b}^2 = |\vec{a}|^2 + |\vec{b}|^2 = 2\vec{a} \cdot \vec{b} =$

$= 1 + 1 + 2 \cdot |\vec{a}| \cdot |\vec{b}| \cdot \cos 30° = 2 + 2 \cdot 1 \cdot 1 \cdot \dfrac{\sqrt{3}}{2} =$

$= 2 + \sqrt{3} \Rightarrow |\vec{a} + \vec{b}| = \sqrt{2 + \sqrt{3}}.$ Javobi: A.

87. $y = -x - 1; \ y = x - 1$ to'g'ri chiziqlar va OX o'qi bilan chegaralangan uchburchakning yuzini toping.

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

Yechilishi: Uchta to'g'ri chiziqning

Kesishish nuqtalarini topish uchun

tenglamalarini sistema qilib

yechiladi: $\begin{cases} y = -x - 1; \\ y = x - 1; \\ \quad y = 0. \end{cases}$

$S = \dfrac{1}{2}ah = \dfrac{1}{2} \cdot 2 \cdot 1 = 1$

Javobi: B.
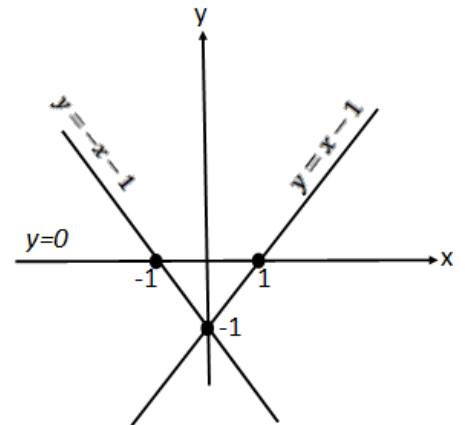
88. Radiusi R ga teng aylanaga tashqi chizilgan muntazam olti burchakning tomonini toping;

A) $\dfrac{\sqrt{3}}{2}R$ B) $\sqrt{3}R$ C) $\dfrac{4}{3}R$ D) $\dfrac{3}{4}R$ E) $\dfrac{2}{\sqrt{3}}R$

Yechilishi: $180°(n-2) \Rightarrow 180° \cdot 4 = 720° \Rightarrow$

$\Rightarrow 720° : 6 = 120°;$

$R : \dfrac{a}{2} = tg 60° \Rightarrow \dfrac{2R}{a} = \sqrt{3} \Rightarrow$

$\Rightarrow a = \dfrac{2}{\sqrt{3}} \cdot R.$ Javobi: E.

89. Muntazam sakkiz burchakning nechta dioganali bor?

A) 8   B) 10   C) 24   D) 16   E) 20

Yechilishi: $\frac{n(n-3)}{2} = \frac{8 \cdot 5}{2} = 20;$ 20 ta.   Javobi: E.

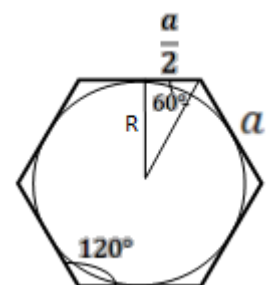90. Konusning yasovchisi 12 ga teng va u asos tekisligi bilan $60°$ li burchak hosil qiladi. Konus asosining radiusini toping?

A) 12   B) 6   C) 3

D) 2   E) 4

Yechilishi: $\frac{R}{12} = cos60° \Rightarrow$

$\Rightarrow R = 12 \cdot \frac{1}{2} \Rightarrow R = 6.$

Javobi: B.
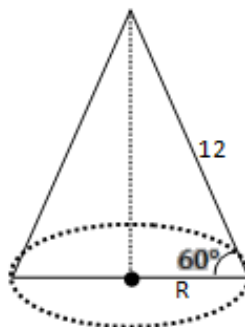
91. Uchburchakli piramida asosining tomonlari 6, 8 va 10 ga teng. Piramidaning yon qirrasi asos tekisligi bilan bir xil burchak hosil qiladi. Agar piramidaning balandligi 4 ga teng bo'lsa , yon qirrasi qanchaga teng bo'ladi?

A) $\sqrt{41}$ B) 3   C) 4   D) 5   E) 7

Yechilishi: $AC = 6; \; AB = 8; \; BC = 10;$

$SO = 4; \quad SB = ?$

$S_\Delta = \frac{1}{2} \cdot 6 \cdot 8 = 24;$

$R = \frac{abc}{4S} = \frac{6 \cdot 8 \cdot 10}{4 \cdot 24} = 5;$

$l^2 = h^2 + R^2 = 4^2 + 5^2 =$

$= 16 + 25 = 41 \Rightarrow l = \sqrt{41}.$

Javobi: A.
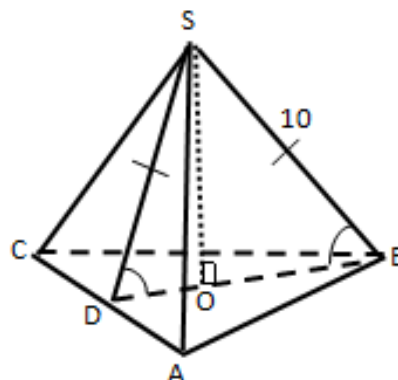
92. Kesik konus asoslarning radiuslari 1 va 5 ga teng . Agar balandligi 3 ga teng bo'lsa, uning yasovchisi qanchaga teng bo'ladi?

A) 6   B) 3   C) 4

D) 5   E) 12

Yechilishi: $l^2 = 3^2 + 4^2 = 9 + 16 = 25 \Rightarrow$

$\Rightarrow l = 5.$

Javobi: D.

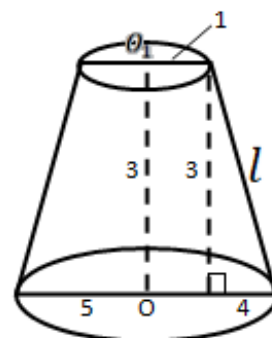93. Uchburchakli to'g'ri prizma asosining tomonlari 3, 4 va 5 ga teng. Prizmaning hajmi 18 ga teng bo'lsa, uning balandligi qanchaga teng bo'ladi?

  A) 12   B) 6   C) 9

  D) 3   E) 2

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

$V = S_{asos} \cdot H \Rightarrow$

$\Rightarrow 18 = 6 \cdot H \Rightarrow H = 3.$

Javobi: D.
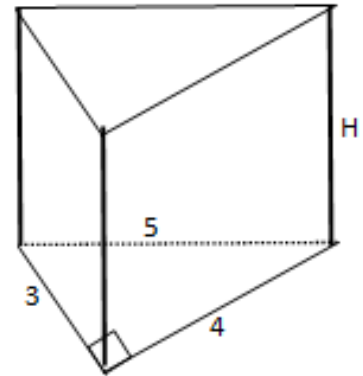
94. $\vec{a} = \{3;\ 6;\ -n\}$ va $\vec{b} = \{-2;\ m;\ 4\}$ vektorlar kollinear bo'lsa, n va m nechiga teng?

  A) $n = 6, m = -4$ B) $n = -6\ m = -4$

  C) $n = -4\ m = 6$ D) $n = 6\ m = 4$

  E) $n = 6\ m = -2$

Yechilishi: $\vec{a} = \{3; 6;\ -n\};\quad \vec{b} = \{-2; m; 4\};$

$\vec{a} = \lambda\vec{b} \Rightarrow \{3; 6;\ -n\} = \lambda \cdot \{-2; m; 4\} \Rightarrow$

$\Rightarrow \{3; 6;\ -n\} = \{-2\lambda; m\lambda; 4\lambda\} \Rightarrow$

$$\Rightarrow \begin{cases} -2\lambda = 3 \\ \lambda m = 6 \\ 4\lambda = -n \end{cases} \Rightarrow \begin{cases} \lambda = -\frac{3}{2} \\ m = \frac{6}{\lambda} \\ n = -4\lambda \end{cases} \Rightarrow \begin{cases} \lambda = -\frac{3}{2} \\ m = 6 : \left(-\frac{3}{2}\right) \\ n = -4 \cdot \left(-\frac{3}{2}\right) \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} m = -6 \cdot \frac{2}{3} \\ n = 6 \end{cases} \Rightarrow \begin{cases} m = -4; \\ n = 6. \end{cases} \quad \text{Javobi: A.}$$

95. Uchburchakning tomonlari sharga urinadi. Sharning radiusi 4 ga teng . Shar markazidan uchburchak tekisligigacha masofa 3 ga teng bo'lsa, uchburchakka ichki chizilgan aylananing radiusi qanchaga teng bo'ladi?
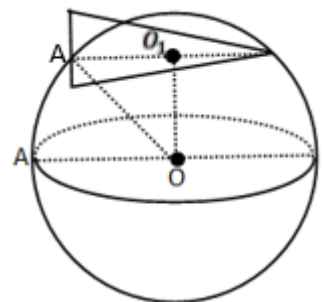
A) $\sqrt{7}$ B) 1   C) 3,5   D) 5   E) 2

Yechilishi: $OA = 4$; $OO_1 = 3$;

$O_1A =$? $O_1A^2 = OA^2 - OO_1^2 =$

$= 4^2 - 3^2 = 7 \Rightarrow$

$O_1A = \sqrt{7}$.   Javobi: A.

96. Piramidaning asosidagi barcha 2 yoqli burchaklari $60°$ ga teng. Pramida yon sirtining yuzi 36 ga teng bo'lsa, asosning yuzi qanchaga teng bo'ladi?

 A) 36   B) 18   C) $18\sqrt{2}$

 D) $18\sqrt{3}$ E) 24

Yechilishi: $S = \dfrac{S_{asos}}{cosa} \Rightarrow$

$\Rightarrow S_{asos} = 36 \cdot cos60° = 18 \Rightarrow$

$\Rightarrow S_{asos} = 18.$

Javobi: B.

97. Agar $tg\alpha + ctg\alpha = a\ (a > 0)$ bo'lsa,

$\sqrt{tga} + \sqrt{ctga} = a\ (a > 0)$ qiymati qanchaga teng bo'ladi?

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

D) $a + 2$ E) $\sqrt{a} - \sqrt{2}$

Yechilishi: $tg\alpha + ctg\alpha = a,\ (a > 0)$; $\sqrt{tga} + \sqrt{ctga} =$?

$(\sqrt{tga} + \sqrt{ctga})^2 = tga + 2\sqrt{tga \cdot ctga} + ctga =$

$= tga + ctga + 2 \cdot \sqrt{tga \cdot ctga} = a + 2\sqrt{1} = a + 2 \Rightarrow$

$\Rightarrow (\sqrt{tga} + \sqrt{ctga})^2 = a + 2 \Rightarrow \sqrt{tga} + \sqrt{ctga} = \sqrt{a+2}.$

Javobi: A.

98. Qiyidagi sonlarning eng kattasini toping?

 A) $sin170°$ B) $sin\ 20°$ C) $sin(-30°)$

 D) $sin(-250°)$ E) $sin\ 100°$

Yechilishi: A) $sin70° = sin(90° + 70°) = cos70°$

B) $sin20° = sin(90° - 70°) = cos70°$

C) $sin(-30°) = -\dfrac{1}{2}$

D) $sin(-250°) = -sin(270° - 20°) = cos20°$

E) $sin100° = sin(90° + 10°) = cos10°$.   Javobi: E.

99. $2cos^2 \frac{x}{2} = 1 + cos x + cos 2x$ tenglamani yeching?

A) $\frac{\pi}{4} + \frac{\pi k}{2}$ $k \in Z$ B) $\frac{\pi}{4} + \pi k$ $k \in Z$ C) $\frac{\pi k}{2}$ $k \in Z$

D) πk $k \in Z$ E) $\frac{\pi}{6} + \frac{\pi k}{2}$ $k \in Z$

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

$\Rightarrow 2 \cdot \frac{1+cosx}{2} = 1 + cos x + cos 2x \Rightarrow cos2x = 0 \Rightarrow$

$\Rightarrow 2x = \frac{\pi}{2} + k\pi \Rightarrow x = \frac{\pi}{4} + \frac{k\pi}{2},$ $k \in Z.$ Javobi: A.

100. $(cos x + 2) |x - 5|(x - 2) \leq 0$ tengsizlikni yeching.

A) $(-\infty ; 2] \cup \{5\}$ B) $(-\infty ; 2]$ C) $[2; 5]$

D) $\{5\}$ E) $\emptyset$

Yechilishi: $(cos x + 2)|x - 5|(x - 2) \leq 0 \Rightarrow$

$\Rightarrow \begin{cases} (cos x + 2) > 0 \\ |x - 5| \geq 0 \\ (x - 2) \leq 0 \end{cases} \Rightarrow \begin{cases} x = 5; \\ x \leq 2. \end{cases}$ Javobi: A.

101. Agar $sin x - \frac{1}{sin x} = -3$ bo'lsa, $sin^2 x + \frac{1}{sin^2 x}$ ning

qiymatini qanchaga teng bo'ladi?

A) 7   B) 8   C) 9   D) 11   E) 6

Yechilishi: $sin x - \frac{1}{sin x} = -3;$ $sin^2 x + \frac{1}{sin^2 x} = ?$

$sin^2 x - 2 \cdot sinx \cdot \frac{1}{sinx} + \frac{1}{sin^2 x} = 9 \Rightarrow$

$\Rightarrow sin^2 x + \frac{1}{sin^2 x} = 11.$ Javobi: D.

102. $tg\pi x^2 = tg(\pi x^2 + 2\pi x)$ tenglamaning eng kichik musbat

ildizni toping.

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

Yechilishi: $tg\pi x^2 = tg(\pi x^2 + 2\pi x);$

Bir ismli funksiyalar tengligidan: $tgx = tg\varphi \Rightarrow x - \varphi = k\pi;$

$$\pi x^2 - (\pi x^2 + 2\pi x) = k\pi \Rightarrow \pi x^2 - \pi x^2 - 2\pi x = k\pi \Rightarrow$$
$$2\pi x = -k\pi \Rightarrow 2x = -k \Rightarrow x = -\frac{k}{2} \Rightarrow k = -1 \Rightarrow x = \frac{1}{2}.$$

Javobi: A.

103. $\sin 75° - sin15°$ ni hisoblang.

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

Yechilishi: $\sin 75° - sin15° = 2cos45° \cdot sin30° =$

$= 2 \cdot \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{2}}{2}.$ Javobi: A.

104. Agar $\sin\alpha = \frac{3}{5}$, $\sin\beta = \frac{5}{13}$; $\frac{\pi}{2} < \alpha < \pi$ va $\frac{\pi}{2} < \beta <$
π bo'lsa, $\sin(\alpha - \beta)$ ning qiymati qanchaga teng.?

A) $-\frac{16}{65}$ B) $\frac{16}{65}$ C) $\frac{56}{65}$ D) $-\frac{56}{65}$ E) $-\frac{2}{13}$

Yechilishi: $\sin\alpha = \frac{3}{5}$, $\sin\beta = \frac{5}{13}$; $\frac{\pi}{2} < \alpha < \pi$ va
$\frac{\pi}{2} < \beta < \pi$; $\sin(\alpha - \beta) =?$

$\sin\alpha = \sqrt{1 - \cos^2\alpha}$;

$\cos\alpha = \sqrt{1 - \sin^2\alpha} = -\sqrt{1 - \frac{9}{25}} = -\frac{4}{5};$

$\cos\beta = -\sqrt{1 - \frac{25}{169}} = -\sqrt{\frac{144}{169}} = -\frac{12}{13}$;

$\sin(\alpha - \beta) = sin\alpha cos\beta - cos\alpha sin\beta =$
$= \frac{3}{5} \cdot \left(-\frac{12}{13}\right) - \left(-\frac{4}{5}\right) \cdot \frac{5}{13} = -\frac{36}{65} + \frac{20}{65} = \frac{-36+20}{65} = -\frac{16}{65}.$

Javobi: A.

105. $\cos^2(\pi - x) + \cos^2\left(\frac{\pi}{2} + x\right)$ ifodani soddalashtiring?

A) π B) Cos x   C) $\sin^2 x$ C) 2   E) 1

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

$= [\cos(\pi - x)]^2 + [\cos\left(\frac{\pi}{2} + x\right)]^2 = [cosx]^2 + [sinx]^2 = 1.$

Javobi: E.

1998-YIL, 12-AXBOROTNOMA

1. $(360 + x) \cdot 1002 = 731460$ dan x ni toping.

   A) 370   B) 270   C) 470   D) 730   E) 1090

   Yechilishi: $(360 + x) \cdot 1002 = 731460 \Rightarrow 360 + x = 730 \Rightarrow$

   $\Rightarrow x = 730 - 360 \Rightarrow x = 370.$ Javobi: A.

2. $\dfrac{244 \cdot 395 - 151}{244 + 395 \cdot 243}$ ni hisoblang.

   A) 1   B) 2   C) 470   D) 1/2   E) $1\frac{1}{2}$

   Yechilishi: $\dfrac{244 \cdot 395 - 151}{244 + 395 \cdot 243} = \dfrac{96380 - 151}{244 + 95985} = \dfrac{96229}{96229} = 1.$

   Javobi: A.

3. Qaysi tenglik qoldiqli bo'lishni ifodalaydi.

   1) $47 = 4 \cdot 11 + 3$ 2) $47 = 6 \cdot 6 + 11$

   3) $47 = 9 \cdot 5 + 2$ 4) $47 = 7 \cdot 7 - 2$

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

   Javobi: A.

4. x raqamining qanday eng katta qiymatida $(471 + \overline{2x3})$ soni 3 ga qoldiqsiz bo'linadi?

   A) 7   B) 8   C) 9   D) 4   E) 5

   Yechilishi: $(471 + \overline{2x3}):3 =$

   $= (471 + 2 \cdot 100 + 10 \cdot x + 3):3 =$

   $= (671 + 10 \cdot 7 + 3):3 = 248.$ Javobi: A.

5. Davri 0 yoki 9 dan faqrli bo'lgan cheksiz davriy o'nli kasrlarni ko'rsating

   $m = 2{,}3266\ldots,\ \ n = \dfrac{7}{99},\ \ p = \dfrac{5}{16},$

   $q = 7{,}14522\ldots,\ \ l = 3{,}222.$

   A) m, n B) m, q C) m, n, q D) m, n, p E) hammasi

   Yechilishi: $m = \dfrac{1}{0{,}33} = \dfrac{1}{\frac{33}{100}} = \dfrac{100}{33} = 3\dfrac{1}{33} = 3\dfrac{1 \cdot 3}{33 \cdot 3} =$

$$= 3\frac{3}{99} = 3,(03);$$
$$q = \frac{172}{99} = 1\frac{77}{99} = 1,(73);$$
$$l = \frac{17}{20} = 0,85. \qquad \text{Javobi: C.}$$

6. $m = 0,22(23), \quad n = 0,2(223), \quad l = 0,222(3)$ sonlarni o'sish tartibida yozing.

A) $n < m < l$ B) $l < m < n$ C) $m < n < l$
D) $m < l < n$ E) $n < l < m$

Yechilishi: $m = 0,22232323 \ldots$;
$n = 0,2223223223 \ldots$;
$l = 0,222333 \ldots \Rightarrow l > m > n \Rightarrow n < m < l.$ Javobi: A.

7. $m = \sqrt[4]{2,56}, \quad n = 3,4(25), \quad p = 3,142 \ldots$ va

$q = \sqrt{\sqrt{\sqrt{16}} + 2}$ sonlardan qaysilari irratsional son bo'ladi?

A) m, p B) p, q C) m, q D) p E) hammasi

Yechilishi: Davriy bo'lmagan cheksiz o'nli kasrga irratsional son deyiladi. $m = \sqrt[4]{2,56}; \quad n = 3,4(25)$
$p = 3,142 \ldots$;

$$q = \sqrt{\sqrt{\sqrt{16}} + 2}; \quad m = \sqrt{\sqrt{2,56}} = \sqrt{1,6} = 1,264911 \ldots ;$$

$$q = \sqrt{\sqrt{\sqrt{16}} + 2} = \sqrt{\sqrt{4} + 2} = \sqrt{2 + 2} = 2 \quad \text{Demak,}$$
$m; p.$

Javobi: A.

8. $\dfrac{3,21 \cdot 5,95 - 4,44}{2,21 \cdot 5,95 + 1,51}$ ni hisoblang.

A) 1   B) 2   C) ½   D) $1\frac{1}{2}$ E) 61/186

Yechilishi: $\dfrac{3,21 \cdot 5,95 - 4,44}{2,21 \cdot 5,95 + 1,51} = \dfrac{19,0995 - 4,44}{13,1495 + 1,51} = \dfrac{14,6595}{14,6595} = 1.$

Javobi: A.

9. $\dfrac{(5,2^2-4,8^2)\cdot(16,7^2-6,7^2)}{(12^2-11,4^2)\cdot(6,4^2-3,6^2)}$ ni hisoblang.
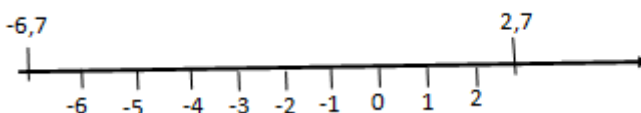
A) $2\dfrac{8}{21}$ B) $\dfrac{21}{5}$ C) $1\dfrac{8}{21}$ D) $7/50$ E) $7\dfrac{1}{7}$

Yechilishi: $\dfrac{(5,2^2-4,8^2)\cdot(16,7^2-6,7^2)}{(12^2-11,4^2)\cdot(6,4^2-3,6^2)}=$

$=\dfrac{(5,2-4,8)(5,2-4,8)(16,7-6,7)(16,7+6,7)}{(12-11,4)(12+11,4)(6,4-3,6)(6,4+3,6)}=\dfrac{0,4\cdot10\cdot10\cdot23,4}{0,6\cdot23,4\cdot2,8\cdot10}=$

$\dfrac{4\cdot10}{0,6\cdot28}==\dfrac{10}{4,2}=\dfrac{5}{2,1}=\dfrac{50}{21}=2\dfrac{8}{21}.$ Javobi: A.

10. Son o'qida -2 dan 4,7 birlik masofada joylashgan sonlarni aniqlang.

   A) $-6,7;\ 2,7$ B) $-6,7;\ -2,7$ C) $6,7;\ 2,7$

   D) $-6,7$ E) $-2,7$

   Yechilishi:

-6,7   2,7

                                 Javobi: A.

      -6   -5   -4 -3 -2 -1 0 1 2

11. $(2\dfrac{1}{2}-1\dfrac{3}{8})\cdot(3\dfrac{1}{2}-\dfrac{3}{6})\cdot1\dfrac{1}{3}$ ni hisoblang.

A) 4 B) 8 C)$4\dfrac{1}{2}$ D) 12 E) 3

Yechilishi: $(2\dfrac{1}{2}-1\dfrac{3}{8})\cdot(3\dfrac{1}{2}-\dfrac{3}{6})\cdot1\dfrac{1}{3}=(\dfrac{5}{2}-\dfrac{11}{8})\cdot(\dfrac{7}{2}-\dfrac{1}{2})\cdot$

$\dfrac{4}{3}==\dfrac{20-11}{8}\cdot\dfrac{7-1}{2}\cdot\dfrac{4}{3}=\dfrac{9\cdot6\cdot1}{2\cdot2\cdot3}=\dfrac{9}{2}=4\dfrac{1}{2}.$ Javobi: C.

12. $(12,5-x):5=(3,6+x):6$ tenglamani yeching.

   A) $5\dfrac{2}{11}$ B) $5\dfrac{3}{11}$ C) $5\dfrac{4}{11}$ D) $5\dfrac{1}{11}$ E) $5\dfrac{5}{11}$

Yechilishi: $(12,5-x):5=(3,6+x):6\Rightarrow$

$\Rightarrow\dfrac{12,5-x}{5}=\dfrac{3,6+x}{6}\Rightarrow(12,5-x)\cdot6=(3,6+x)\cdot5\Rightarrow$

$\Rightarrow75-6x=18+5x\Rightarrow11x=57\Rightarrow x=\dfrac{57}{11}=5\dfrac{2}{11}.$

Javobi: A.

13. $\left(\sqrt[6]{9+4\sqrt5}+\sqrt[3]{\sqrt5+2}\right)\cdot\sqrt[3]{\sqrt5-2}$ hisoblang.

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

Yechilishi: $\left(\sqrt[6]{9 + 4\sqrt{5}} + \sqrt[3]{\sqrt{5} + 2}\right) \cdot \sqrt[3]{\sqrt{5} - 2} =$

$= \sqrt[6]{9 + 4\sqrt{5}} \cdot \sqrt[6]{\left(\sqrt{5} - 2\right)^2} + \sqrt[3]{\left(\sqrt{5} + 2\right)\left(\sqrt{5} - 2\right)} =$

$= \sqrt[6]{9 + 4\sqrt{5}} \cdot \sqrt[6]{\left(5 - 4\sqrt{5} + 4\right)} + 1 =$

$= \sqrt[6]{\left(9 + 4\sqrt{5}\right) \cdot \left(9 - 4\sqrt{5}\right)} + 1 = \sqrt[6]{81 - 80} + 1 = 2.$

Javobi: A.

14. $m = 1107/1109$ va $n = 2216/2220$ sonlar uchun quyidagi munosabatlardan qaysi biri to'g'ri?

  A) $m < n$ B) $m > n$ C) $m = n$

  D) $n = m + 1$ E) $(2m + 2)/2220$

  Yechilishi: $m = \dfrac{1107}{1109} = \dfrac{1109 - 2}{1109} = 1 - \dfrac{2}{1109};$

  $n = \dfrac{2216}{2220} = \dfrac{2 \cdot 1108}{2 \cdot 1110} = \dfrac{1110 - 2}{1110} = 1 - \dfrac{2}{110} \Rightarrow n > m.$

  Javobi: A.

15. $c = \sqrt{12} + \sqrt{15}$ va $d = \sqrt{11} + \sqrt{17}$ sonlar uchun qaysi munosabat o'rinli?

  A) $c < d$ B) $c > d$ C) $c + 1 = d$

  D) $c = d$ E) $c^2 + 1 + \sqrt{7} = d^2$

  Yechilishi:

  $\begin{cases} c^2 = 12 + 15 + 2\sqrt{12} \cdot \sqrt{15} = 27 + 2\sqrt{180} \\ d^2 = 11 + 17 + 2\sqrt{11 \cdot 17} = 28 + 2\sqrt{187} \end{cases} \Rightarrow$

  $\Rightarrow c^2 < d^2 \Rightarrow c < d.$ Javobi: A.

16. O'zaro teskari sonlarni aniqlang?

  1. $\dfrac{\sqrt{5}}{3}$ va $\dfrac{3\sqrt{5}}{5}$;   2. $3 - \sqrt{2}$ va $3 + \sqrt{2}$;

  3. $\dfrac{2\sqrt{3}}{5}$ va $\dfrac{5\sqrt{3}}{6}$;   4. $\sqrt{2} + 1$ va $\sqrt{2} - 1$

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

Pirnazar DAVRONOV

Yechilishi: Ko'paytmasi 1 ga teng bo'lgan sonlar o'zaro teskari sonlar deyiladi: 1) $\frac{\sqrt{5}}{3} \cdot \frac{3\sqrt{5}}{5} = 1$;

2) $(3 - \sqrt{2}) \cdot (3 + \sqrt{2}) = 9 - 4 = 5$;

3) $\frac{2\sqrt{3}}{5} \cdot \frac{5\sqrt{3}}{6} = 1$;   4) $(\sqrt{2} + 1) \cdot (\sqrt{2} - 1) = 2 - 1 = 1$.

Demak, 1; 3; 4.   Javobi: A.

17. $\sqrt[4]{97 + 56\sqrt{3}}$ ni soddalashtiring.

A) $\sqrt{3} + 2$ B) $\sqrt{2} + 3$ C) $\sqrt{2} + \sqrt{3}$

D) $7 + 4\sqrt{3}$ E) $\sqrt{3} + 3$

Yechilishi: $\sqrt[4]{97 + 56\sqrt{3}} = \sqrt{\sqrt{97 + 56\sqrt{3}}} =$

$= \sqrt{\sqrt{97 + \sqrt{3136 \cdot 3}}} = \sqrt{\sqrt{97 + \sqrt{9408}}} =$

$= \sqrt{\sqrt{\frac{97 + \sqrt{9409 - 9408}}{2}} + \sqrt{\frac{97 - \sqrt{9409 - 9408}}{2}}} =$

$= \sqrt{\sqrt{\frac{97 + 1}{2}} + \sqrt{\frac{97 - 1}{2}}} = \sqrt{\sqrt{49} + \sqrt{48}} = \sqrt{7 + \sqrt{48}} =$

$= \sqrt{\frac{7 + \sqrt{49 - 48}}{2}} + \sqrt{\frac{7 - \sqrt{49 - 48}}{2}} = \sqrt{4} + \sqrt{3} = 2 + \sqrt{3}$.

Javobi: A.

18. a ning qanday qiymatida $\frac{a^3}{a^2 - 1}$ kasrning qanday qiymati 27/8 ga teng bo'ladi?

A) 3   B) 2   C) 27   D) 8   E) 9

Yechilishi: $\frac{a^3}{a^2 - 1} = \frac{27}{8} \Rightarrow a = 3$.   Javobi: A.

19. Agar $a - b = 12$ va $-a \cdot b + a^2 = 144$ bo'lsa, a ning qiymati qanchaga teng bo'ladi?

A) 12   B) -12   C) 36   D) 6   E) $\sqrt{3}$

Yechilishi: $\begin{cases} a - b = 12 \\ a^2 - ab = 144 \end{cases} \Rightarrow \begin{cases} a - b = 12 \\ a(a - b) = 144 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} a - b = 12 \\ a \cdot 12 = 144 \end{cases} \Rightarrow a = 12.$ Javobi: A.

20. $\dfrac{4}{x+3} + \dfrac{7}{\sqrt{x+3}} = \dfrac{1}{x^2+5x+6}$ tenglamada x ning qabul qilishi

mumkin bo'lgan qiymatlar to'plamini ko'rsating.

A) $(-3; -2) \cup (-2 \, \infty)$ B) $(-3; -2)$ C) $(-2; \infty)$

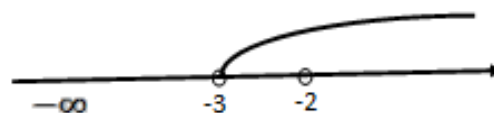D) $(-\infty; -2)$ E) $[-3; -2) \cup (-2; \infty)$

Yechilishi: $\dfrac{4}{x+3} + \dfrac{7}{\sqrt{x+3}} = \dfrac{1}{x^2+5x+6}$;

$x^2 + 5x + 6 = 0 \Rightarrow x_{1,2} = -\dfrac{5}{2} \pm \sqrt{\dfrac{25}{4} + 6} = -\dfrac{5}{2} \pm \dfrac{1}{2} \Rightarrow$

$\Rightarrow \begin{cases} x_1 = -3 \\ x_2 = -2 \end{cases} \Rightarrow x^2 + 5x + 6 = (x + 3)(x + 2);$

$x + 3 > 0 \Rightarrow x > -3 \Rightarrow$

$\Rightarrow x + 2 \neq 0 \Rightarrow x \neq -2;$

$(-3; -2) \cup (-2; -\infty).$ Javobi: A.

21. $f(x) = lg cos x$ funksiyaning qiymatlar to'plamini

toping.

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

D) $(-1; 0)$ E) $(0; \infty)$

Yechilishi: $f(x) = \lg cos x \Rightarrow \begin{cases} 10 > 1 \\ 0 < cos x \leq 1 \end{cases} \Rightarrow$

$\Rightarrow f(x) \leq 0 \Rightarrow (-\infty; 0].$ Javobi: A.

22. Quyidagilardan qaysilari o'suvchi funksiya hisoblanadi?

1) $y = 3^x$;   2) $y = (\sqrt[3]{10})^x$

3) $y = \left(\dfrac{9}{11}\right)^x$ 4) $y = (\dfrac{5}{3})^x$;   5) $y = 0{,}84^x$

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

Yechilishi: $y = a^x$ ko'rsatkichli funksiya $a > 1$ da

o'suvchi bo'ladi. Demak, 1), 2) va 4)   Javobi: A.

23. $\frac{5 \cdot 2^{32} - 4 \cdot 2^{30}}{4^{16}}$ ni hisoblang.

   A) 4 B) 2 C) 5 D) 16 E) ¼

   Yechilishi: $\frac{5 \cdot 2^{32} - 4 \cdot 2^{30}}{4^{16}} = \frac{5 \cdot 2^{32} - 2^2 \cdot 2^{30}}{(2^2)^{16}} = \frac{5 \cdot 2^{32} - 2^{32}}{2^{32}} =$

   $\frac{2^{32}(5-1)}{2^{32}} = 4.$

   Javobi: A.

24. $\frac{3^{4n+3} \cdot 3^{3n-2}}{3^{2n-1}}$ ni soddalashtirng?

   A) 3^{5n+2} B) 3^{5n+3} C) 3^{5n+1} D) 3^{5n-1} E) 3^{5n+4}

   Yechilishi: $\frac{3^{4n+3} \cdot 3^{3n-2}}{3^{2n-1}} = \frac{3^{7n+1}}{3^{2n-1}} = 3^{7n+1-(2n-1)} =$

   $3^{7n+1-2n+1} =$

   $= 3^{5n+2}.$ Javobi: A.

25. $(a+b)$ ni ab va $a^2 + b^2$ orqali ifodalang.

   A) $(a+b)^2 - 2ab$ B) $(a+b)^2 - ab$ C) $(a+b)^2 - 4ab$ D) $(a+b) \cdot ab$ E) $(a+b)^2 + 2ab$

   Yechilishi: $(a+b)^2 = a^2 + b^2 + 2ab \Rightarrow$

   $\Rightarrow a^2 + b^2 = (a+b)^2 - 2ab.$ Javobi: A.

26. $\frac{x^2 - x + 1}{x^4 + x^2 + 1}$ ni qisqartiring?

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

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

   Yechilishi: Maxraj suratga bo'linib, ko'paytuvchilarga ajratiladi. $\frac{x^2 - x + 1}{x^4 + x^2 + 1} = \frac{x^2 - x + 1}{(x^2 + x + 1)(x^2 - x + 1)} = \frac{1}{x^2 - x + 1}.$ Javobi: A.

27. $\frac{2a^2 + 4ab - 6b^2}{a^2 + 5ab + 6b^2}$ ni soddalashtiring?

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

   Yechilishi: $\frac{2a^2 + 4ab - 6b^2}{a^2 + 5ab + 6b^2}$

   $= \frac{2(a^2 + 2ab - 3b^2)}{a^2 + 5ab + 6b^2} = \frac{2(a-b)(a+3b)}{(a+2b)(a+3b)} =$

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

28. $10(ax - 1) = 2a - 5x - 9$ tenglama a ning qanday qiymatlarida cheksiz ko'p yechimga ega?

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

Yechilishia: $10(ax - 1) = 2a - 5x - 9$ ⇒

⇒ $10ax - 10 = -5x + 2a - 9$ ⇒

⇒ $\begin{cases} 10a = -5 \\ 2a - 9 = -10 \end{cases}$ ⇒ $a = -\frac{1}{2}.$ Javobi: A.

29. (Ox) o'qqa nisbatan $y = 2x + 3$ to'g'ri chiziqga simmetrik bo'lgan to'g'ri chiziqning tenglamasini ko'rsating?

A) $y = -2x - 3$ B) $y = 2x - 3$ C) $y = -2x + 3$

D) $y = 3x - 2$ E) $y = \frac{1}{2}x + \frac{1}{3}$

Yechilishi: 1) Boshlang'ich ordinata $b = 3$. Bundan $A(0; 3)$. Bunga simmetrik nuqta $A'(0; -3)$ bo'ladi

2) $\begin{cases} y = 2x + 3 \\ y = 0 \end{cases}$ ⇒

⇒ $x = -\frac{3}{2}$ ⇒ $B(-\frac{3}{2}; 0)$;

U holda A' va B nuqtalardan o'tuvchi to'g'ro chiziq hosil qilinadi.

$$\frac{x - 0}{-\frac{3}{2} - 0} = \frac{y - (-3)}{0 - (-3)} \Rightarrow -\frac{2x}{3} = \frac{y+3}{3} \Rightarrow$$
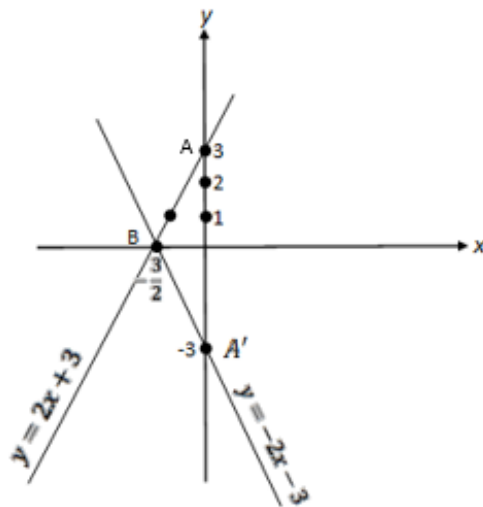
⇒ $y = -2x - 3.$

Javobi: A.

30. Ikki sonning yig'indisi 51 ga ayirmasi esa 21 ga teng. Shu sonlarni toping.

A) 36;15   B) 35;16   C) 37;14   D) 34;17   E) 33;18

Yechilishi: $\begin{cases} x + y = 51 \\ x - y = 21 \end{cases}$ + ⇒ $2x = 72 \Rightarrow x = 36 \Rightarrow y = 15.$

Javobi: A.

Pirnazar DAVRONOV

31. $\begin{cases} \dfrac{x}{4} + \dfrac{y}{4} = 2 \\ \dfrac{x}{6} + \dfrac{y}{3} = 2 \end{cases}$ tenglamalar sistemasini yeching?

    A) (4;4)   B) (-4;-4)   C) (-4;4)

    D) (4;-4)   E) cheksiz ko'p yechimga ega

Yechilishi: $\begin{cases} \dfrac{x}{4} + \dfrac{y}{4} = 2 \\ \dfrac{x}{6} + \dfrac{y}{3} = 2 \end{cases} \Rightarrow \begin{cases} x + y = 8 \\ x + 2y = 12 \end{cases} \Rightarrow$

$\Rightarrow -y = -4 \Rightarrow \begin{cases} x = 4; \\ y = 4. \end{cases}$ Javobi: A.

32. m ning qanday qiymatlarida $3x^2 + (3m - 15)x - 27 = 0$ tenglamaning ildizlari qarama qarshi sonlar bo'ladi ?

   A) 5   B) 0   C) -3,3   D) -5   E) 0; 5

Yechilishi: 1) $ax^2 + bx + c = 0 \Rightarrow b = 0, \ c < 0$ ga x_1 va x_2 qarama-qarshi ishorali bo'ladi.

$3m - 15 = 0 \Rightarrow m = 5; \ c = -27 < 0.$ Javobi: A.

33. $x^2 + px + 6 = 0$ tenglama ildizlari ayirmasining kvadrati 40 ga teng. p ning qiymatini toping.

A) -8 ; 8   B) 8   C) -8   D) $4 + \sqrt{10}$ E) $4 - \sqrt{10}$

Yechilishi:

$\begin{cases} x_1 + x_2 = -p \\ (x_1 - x_2)^2 = 40 \\ x_1 \cdot x_2 = 6 \end{cases} \Rightarrow \begin{cases} x_1^2 + x_2^2 + 2x_1 \cdot x_2 = p^2 \\ x_1^2 + x_2^2 - 2x_1 \cdot x_2 = 40 \\ x_1 \cdot x_2 = 6 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x_1^2 + x_2^2 + 12 = p^2 \\ x_1^2 + x_2^2 - 12 = 40 \end{cases} \Rightarrow 24 = p^2 - 40 \Rightarrow$

$\Rightarrow p^2 = 24 + 40 \Rightarrow p = \pm 8.$ Javobi: A.

34. $a > b > 0$ shartni qanoatlantiruvchi a va b sonlar uchun quyidagi munosabatlardan qaysilari o'rinli?

1) $a^3 > ab^2$;   2) $a^4 \geq a^2 b^2$;   3) $a^2 b^2 < b^4$;   4) $\dfrac{2}{a} > \dfrac{2}{b}$;

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

Yechilishi: 1) $a^3 > ab^2 \Rightarrow a^2 > b^2$; to'g'ri.

2) $a^4 \geq a^2 b^2 \Rightarrow a^2 \geq b^2$ to'g'ri emas.

3) $a^2 b^2 < b^4 \Rightarrow a^2 < b^2$ to'g'ri emas.

4) $\frac{2}{a} > \frac{2}{b} \Rightarrow 2b > 2a \Rightarrow a < b$ to'g'ri emas. Javobi: A.

35. $\begin{cases} \frac{x-1}{2} < \frac{x}{3} \\ \frac{x+1}{2} \geq \frac{x}{5} \end{cases}$ tengsizliklar sistemasi butun yechimlarining

yig'indisini toping.

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

Yechilishi: $\begin{cases} \frac{x-1}{2} < \frac{x}{3} \\ \frac{x+1}{2} \geq \frac{x}{5} \end{cases} \Rightarrow \begin{cases} 3x - 3 < 2x \\ 5x + 5 \geq 2x \end{cases} \Rightarrow \begin{cases} x < 3 \\ x \geq -\frac{5}{3} \end{cases} \Rightarrow$

$\Rightarrow -1 + 0 + 1 + 2 = 2.$ Javobi: A.

36. Arifmetik progressiya uchun quyidagi formulalardan qaysilari to'g'ri ?

   1) $a_1 - 2a_2 + a_3 = 0$;   2) $a_1 = a_3 - a_2$;   3) $n = \frac{a_n - a_1 + d}{d}$

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

   Yechilishi: 1) $a_1 - 2a_2 + a_3 = 0 \Rightarrow$

   $\Rightarrow 2a_2 = a_1 + a_3 = 0 \Rightarrow a_2 = \frac{a_1 + a_3}{2}$ to'g'ri;

   2) $a_1 = a_3 - a_2$ noto'g'ri;

   3) $n = \frac{a_n - a_1 + d}{d} \Rightarrow a_n - a_1 + d = dn \Rightarrow$

   $\Rightarrow a_n = a_1 + d(n-1)$ to'g'ri.   Javobi: E.

37. Quyidagi ketma-ketliklardan qaysilari geometrik progressiyani tashkil etadi?

   1) $a_n = \frac{2}{3} \cdot 2^n$;   2) $a_n = 3 \cdot 2^{-n} + 5$;   3) $b_n = (-\frac{1}{3})^n$.

   A) 1;3   B) 1;2   C) 2;3   D) 1;2;3   E) hech qaysisi

   Yechilishi: 1) $a_n = \frac{2}{3} \cdot 2^n$; $a_n = a_1 q^{n-1}$;

   $a_1 = \frac{4}{3}$; $a_2 = \frac{8}{3}$; $a_3 = \frac{16}{3}$; ...; $a_n = \frac{2}{3} \cdot 2^n$; progressiya;

2) $a_n = 3 \cdot 2^{-n} + 5$;

$a_1 = \frac{3}{2} + 5 = \frac{13}{2}$; $a_2 = \frac{3}{4} + 5 = \frac{23}{4}$; progressiya emas;

3) $b_n = (-\frac{1}{3})^n$;

$b_1 = -\frac{1}{3}$; $b_2 = \frac{1}{9}$; $b_3 = -\frac{1}{27}$; ... progressiya;

Javobi: A.

38. $y = -\frac{1}{3}\cos(3x + \frac{\pi}{4})$ funksiyaning hosilasini toping .

A) $sin(3x + \frac{\pi}{4})$ B) $-\frac{1}{3} sin(3x + \frac{\pi}{4})$ C) $\frac{1}{3}$
$sin(3x + \frac{\pi}{4})$

D) $- sin(3x + \frac{\pi}{4})$ E) $sin 3x$

Yechilishi: $y = -\frac{1}{3}\cos\left(3x + \frac{\pi}{4}\right) \Rightarrow$

$\Rightarrow y' = -\frac{1}{3}\left[-\sin\left(3x + \frac{\pi}{4}\right)\right] \cdot (3x + \frac{\pi}{4})' =$

$= \frac{1}{3}\sin\left(3x + \frac{\pi}{4}\right) \cdot 3 = \sin\left(3x + \frac{\pi}{4}\right).$ Javobi: A.

39. $y = e^x \cdot x^2$ funksiyaning hosilasini toping.

A) $e^x(x^2 + 2x)$ B) $e^x(x^2 + 2)$ C) $e^x(x^2 + 1)$
D) $e^x(x^2 + x)$ E) $2 e^x$

Yechilishi: $y' = e^x \cdot x^2 + e^x \cdot 2x = e^x(x^2 + 2x).$

Javobi: A.

40. $\int_0^2(|x| + 1)dx$ ni hisoblang.
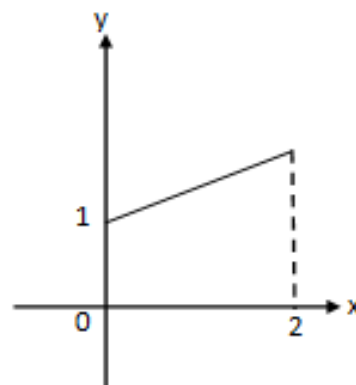
A) 4   B) 2   C) 3
D) 8   E) 1

Yechilishi: $y = |x| + 1$ funksiyaning
grafigiga $[0; 2]$ oraliqda abssissa
o'qidan yuqorida joylashgan. Modul
belgisi shunday tashlanadi.

$\int_0^2(|x| + 1)dx = \int_0^2(x + 1)dx =$

$= [\frac{x^2}{2} + x]_0^2 = \frac{1}{2} \cdot 2^2 + 2 = 4.$ Javobi: A.

268

41. Parallel ko'chirish natijasida grafiklari ustma-ust tushadigan funksiyalarni ko'rsating.

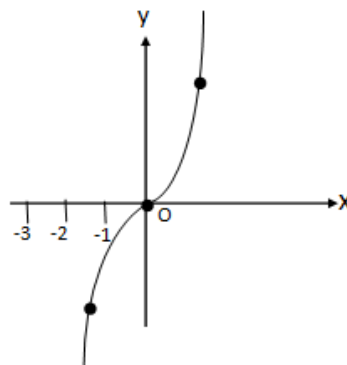1) $y = 3x^3$ 2) $-3x^3$;   3) $-\frac{1}{3}x^3$;   4) $\frac{1}{3}x^3$

A) bundaylari yuq   B) 1;2   C) 3;4
D) 1;3   E) hammasi

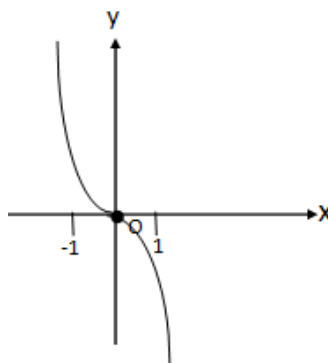Yechilishi: $\begin{cases} x' = x + a; \\ y' = y + b; \end{cases}$

1) $y = 3x^3$;

x	-2	-1	0	1	2
y	-24	-3	0	3	24

2) $y = -3x^2$;

x	-1	0	2
y	3	0	-3

3) $y = -\frac{1}{3}x^2$

x	-2	-1	0	1	2
y	2,6	-0,3	0	-0,3	2,6
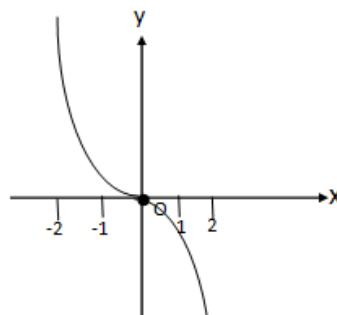
4) $y = \frac{1}{3}x^3$;

x	-2	-1	0	1	2
y	-2,6	-0,3	0	0,3	2,6

Javobi: A.

269
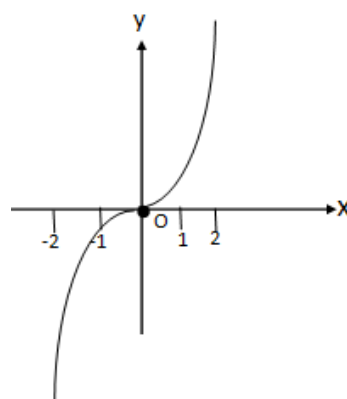
42. $y = log_3 x$ funksiyaning grafigi koordinata tekisligining qaysi choraklarida yotadi?

   A) 1, 4;　　　　B) 1;2　　　　　C) 2;3

   D) 3;4　　　　E)2;4

   Yechilishi: $y = log_3 x \begin{cases} 3 > 1 \\ x > 0 \end{cases} \Rightarrow$

   $\Rightarrow$　$I\ va\ IV$.

   Javobi: A.

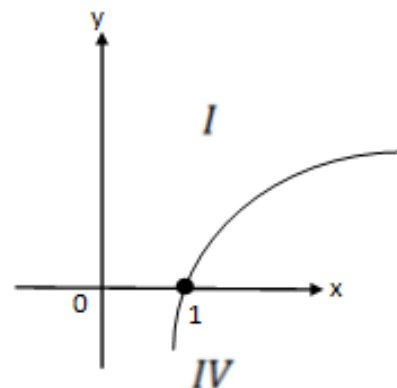43. $9 \cdot 16^x - 7 \cdot 12^x - 16 \cdot 9^x = 0$ tenglamaning ildizlari yig'indisini toping.

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

   Yechilishi:　$9 \cdot 16^x - 7 \cdot 12^x - 16 \cdot 9^x = 0 \Rightarrow$

   $\Rightarrow \frac{9 \cdot 16^x}{12^x} - 7 - \frac{16 \cdot 9^x}{12^x} = 0 \Rightarrow 9 \cdot \left(\frac{16}{12}\right)^x - 7 - 16 \cdot \left(\frac{9}{12}\right)^x = 0 \Rightarrow$

   $\Rightarrow 9 \cdot \left(\frac{4}{3}\right)^x - 7 - 16 \left(\frac{3}{4}\right)^x = 0 \Rightarrow \left(\frac{4}{3}\right)^x = y \Rightarrow \left(\frac{3}{4}\right)^x = \frac{1}{y} \Rightarrow$

   $\Rightarrow 9y - 7 - \frac{16}{y} = 0 \Rightarrow 9y^2 - 7y - 16 = 0 \Rightarrow$

   $\Rightarrow y = \frac{7 \pm \sqrt{49 - 4 \cdot 9 \cdot 16}}{2 \cdot 9} = \frac{7 \pm 25}{18} \Rightarrow \begin{cases} y_1 = -1; \\ y_2 = \frac{16}{9}; \end{cases}$

   1) $\left(\frac{4}{3}\right)^x \neq -1$;

   2)) $\left(\frac{4}{3}\right)^x = \frac{16}{9} \Rightarrow \left(\frac{4}{3}\right)^x = \left(\frac{4}{3}\right)^2 \Rightarrow x = 2$.　　Javobi: A.

44. Radiusga teng bo'lgan vatarning uchlaridan o'tkazilgan urinmalar hosil qilgan burchaklarni toping.

   A)$120°, 60°$　　B) $90°, 90°$

   C) $100°, 80°$　　D) $140°, 40°$

   E) $150°, 30°$

   Yechilishi: Chizmadan ma'lumki,

   $120°$;　$60°$.

   Javobi: A.
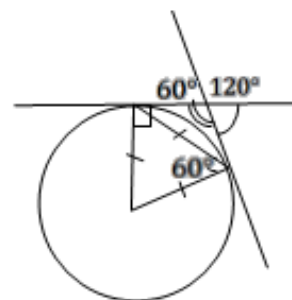
45. Perimetri 48 ga teng bo'lgan uchburchakning har bir tomoni 4 ga teng kesmaga bo'lindi. Bo'linish nuqtalari

tomonlarga parallel kesmalar bilan tutashtirilgan. Shu kesmalar uzunliklarining yig'indisini toping.

A) 72   B) 96 S   C) 24

D) 144   E) 36

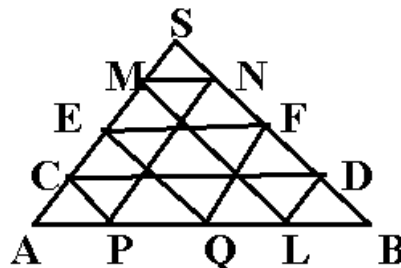Yechilishi: $CD + EF + MN + NP +$

$+FQ + DL + ML + EQ + CP = ?$

1) $AB = 4AP; \ CD = 3AP;$

$EF = 2AP; \ MN = AP;$

2) $AS = 4AC; \ NP = 3AC; \ QF = 2AC; \ DL = AC;$

3) $BS = 4BD \ ML = 3BD \ CP = BD$

$AB + AS + BS = 48 \ \Rightarrow \ 4BD + 4AP + 4AC = 48;$

$BD + AP + AC = 12;$

$6BD + 6AP + 6AC = 6(BD + AP + AC) = 6 \cdot 12 = 72.$

Javobi: A.

46. To'g'ri burchakli uchburchakning gipotenuzasi 13 ga, gipotenuzaga tushirilgan balandligi 6 ga teng. Katta katetning gipotenuzadai proyeksiyasini toping.

A) 9   B) 4   C) 5   D) 25   E) 7

Yechilishi: $6^2 = x \cdot (13 - x) \Rightarrow 36 = 13x - x^2 \Rightarrow$

$x^2 - 13x + 36 = 0 \Rightarrow$

$x_{1,2} = \dfrac{13}{2} \pm \sqrt{\dfrac{169}{4} - 36} = \dfrac{13}{2} \pm \sqrt{\dfrac{169-144}{4}} =$

$= \dfrac{13}{2} \pm \sqrt{\dfrac{25}{4}} = \dfrac{13}{2} \pm \dfrac{5}{2} \Rightarrow \begin{cases} x_1 = 4; \\ x_2 = 9. \end{cases}$ Javobi: A.
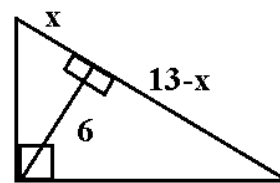
47. $A_1B_1C_1$ va $A_2B_2C_2$ uchburchaklar o'xshash. $\Delta A_2B_2C_2$ ning yuzi $\Delta A_1B_1C_1$ ning yuzidan 9 marta katta. $\Delta A_1B_1C_1$ ning 3 ga teng bo'lgan tomoniga mos bo'lgan $\Delta A_2B_2C_2$ ning tomonini toping.

A) 9   B) 27   C) 12

D) 6   E) 18

Pirnazar DAVRONOV

Yechilishi: $\frac{x}{3} = k$; $\frac{S_2}{S_1} = k^2 \Rightarrow$

$\Rightarrow \frac{9S_1}{S_1} = k^2 \Rightarrow$

$\Rightarrow k = 3 \Rightarrow \frac{x}{3} = 3 \Rightarrow$

$\Rightarrow x = 9.$ Javobi: A.

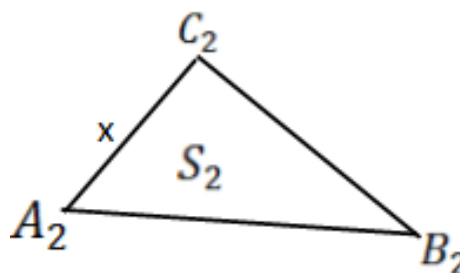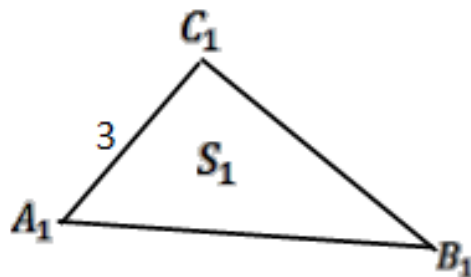48. Muntazam ko'pburchakning perimetri 60 ga unga ichki chizilgan aylananing radiusi 8 ga teng. Shu ko'pburchakning yuzini hisoblang.

A) 240   B) 480   C) 120

D) 60   E) 180

Yechilishi: $p = na \Rightarrow na = 60 \Rightarrow$

$\Rightarrow a = \frac{60}{n}$; $S_{ko'pburchak} = nS_\Delta$;

$S_\Delta = \frac{1}{2}ah = \frac{1}{2} \cdot \frac{60}{n} \cdot 8 \Rightarrow$

$\Rightarrow S_{ko'pburchak} = nS_\Delta = 240.$ Javobi: A.
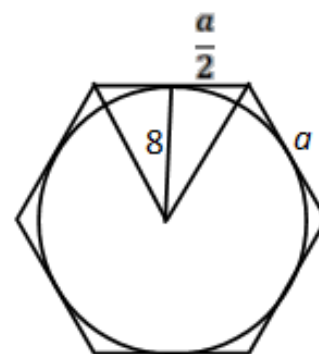
49. To'g'ri burchakli uchburchakning gipotenuzasi 12 ga teng. Bu uchburchakning uchlaridan 10 ga teng masafoda uchburchak tekisligidan tashqarida nuqta berilgan. Shu nuqtadan uchburchak tekisligigacha bo'lgan masofani toping.

A) 8   B) 6   C) 10

D) $\sqrt{44}$ E) 12

Yechilishi: Asosi to'g'ri burchakli uchburchak, yon qirralari teng piramida balandligi, asosga tashqi chizilgan aylana markazi bo'lgan, gipotenuza o'rtasiga tushadi. U holda

$h^2 = 10^2 - 6^2 = 64 \Rightarrow h = 8.$ Javobi: A.
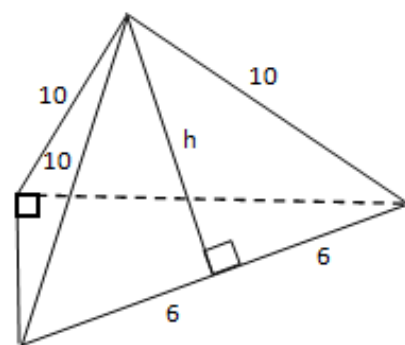
50. Ox o'qida shunday M nuqtani topingki undan $A(2; -3; 1)$ nuqtagacha bo'lgan masofa 7 ga teng bo'lsin.

A) $M_1(0; 0; 7)$ va $M_2(0; 0; -5)$

B) $M(0; 0; 7)$ C) $M(0; 0; -5)$

272

D) $M_1(0; 0; -2)$ va $M_2(0; 0; 6)$

E) $M_1(0; 0; 2)$ va $M_2(0; 0; -2)$

Yechilishi: $M(0; 0; z)$; $A(2; -3; 1)$; $|\overrightarrow{MA}| = 7$;

$\overrightarrow{MA} = \{2; -3; 1 - z\} \Rightarrow$

$|\overrightarrow{MA}| = \sqrt{2^2 + (-3)^2 + (1 - z)^2} =$

$\sqrt{4 + 9 + 1 - 2z + z^2} = 7 \Rightarrow z^2 - 2z + 14 = 49 \Rightarrow$

$\Rightarrow z^2 - 2z - 35 = 0 \Rightarrow z_{1,2} = 1 \pm \sqrt{1 + 35} = 1 \pm 6 \Rightarrow$

$\Rightarrow \begin{cases} z_1 = -5 \\ z_2 = 7 \end{cases} \Rightarrow M_1(0; 0; -5)$; $M_2(0; 0; 7)$.   Javobi: A.

51. n ning qanday qiymatida $\vec{a} = \{2; n; 6\}$ va $\vec{b} = \{1; 2; 3\}$ vektorlar kollenear bo'ladi?

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

Yechilishi: $\vec{a} = \{2; n; 6\}$; $\vec{b} = \{1; 2; 3\}$; $\vec{a} = \gamma\vec{b} \Rightarrow$

$\Rightarrow \{2; n; 6\} = \gamma\{1; 2; 3\} \Rightarrow \{2; n; 6\} = \{\gamma; 2\gamma; 3\gamma\} \Rightarrow$

$\Rightarrow \begin{cases} 2 = \gamma \\ n = 2\gamma \\ 6 = 3\gamma \end{cases} \Rightarrow \begin{cases} \gamma = 2; \\ n = 4; \\ \gamma = 2. \end{cases}$ Javobi: A.

52. Diagonali $\sqrt{3}$ ga teng bo'lgan kub sirtining yuzini toping.

A) 6   B) 3   C) 9

D) 4,5   E) 1

Yechilishi:

$d = \sqrt{3}$; $d^2 = a^2 + \left(a\sqrt{2}\right)^2 \Rightarrow$

$\Rightarrow \left(\sqrt{3}\right)^2 = a^2 + 2a^2 \Rightarrow 3a^2 = 3 \Rightarrow$

$a^2 = 1 \Rightarrow a = 1$; $S_t = 6a^2 = 6$.

    Javobi: A.
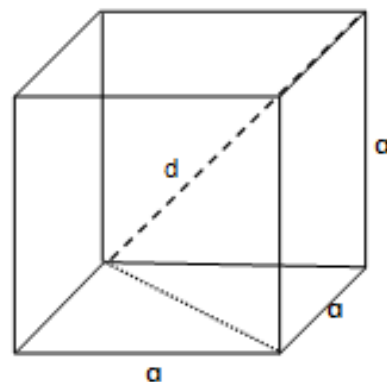
53. Diametri 50 ga teng ikkita vodoporovod quvurini, suv o'tkazish qobiliyati shu ikki quvurnikiga teng bo'lgan bitta quvur bilan almashtirish kerak. Katta quvurning diametrini toping.

A) $50\sqrt{2}$ B) 100   C) $50\sqrt{3}$ D) 70   E) 75

Pirnazar DAVRONOV

Yechilishi: $S_{kesim} = \pi R^2 = 625\pi$; $S_1 = S_2$;
$S = S_1 + S_2 \Rightarrow S = 2S_1 = 2 \cdot 625\,\pi \Rightarrow R^2 = 2 \cdot 625 \Rightarrow$
$\Rightarrow R = 25\sqrt{2} \Rightarrow d = 50\sqrt{2}.$ Javobi: A.

54. Agar $\sin\alpha + \cos\alpha = a$ bo'lsa, $|\sin\alpha - \cos\alpha|$ ni a
orqali ifodalang.

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

Yechilishi:

$\begin{cases} |\sin\alpha - \cos\alpha|^2 = \sin^2\alpha - 2\sin\alpha\cos\alpha + \cos^2\alpha \\ (\sin\alpha + \cos\alpha)^2 = a^2 \Rightarrow \sin^2\alpha + \cos^2\alpha + 2\sin\alpha\cos\alpha = a^2 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} 1 - \sin 2\alpha = |\sin\alpha - \cos\alpha|^2 \\ 1 + \sin 2\alpha = a^2 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} |\sin\alpha - \cos\alpha| = \sqrt{1 - \sin 2\alpha} \\ \sin 2\alpha = a^2 - 1 \end{cases} \Rightarrow$

$\Rightarrow |\sin\alpha - \cos\alpha| = \sqrt{1 - (a^2 - 1)} = \sqrt{2 - a^2}.$
Javobi: A.

55. Agar $tg\alpha + ctg\alpha = p$ bo'lsa, $tg^2\alpha + ctg^2\alpha$ ni p orqali
ifodalang

A) $p^2 - 2$ B) $-p^2 + 2$ C) $p^2 + 2$
D) $p^2 + 1$ E) $p^2 - 1$

Yechilishi: $tg\alpha + ctg\alpha = p$; $tg^2\alpha + ctg^2\alpha = ?$
$tg^2\alpha + 2tg\alpha ctg\alpha + ctg^2\alpha = p^2 \Rightarrow$
$\Rightarrow tg^2\alpha + ctg^2\alpha + 2 = p^2 \Rightarrow tg^2\alpha + ctg^2\alpha = p^2 - 2.$
Javobi: A.

56. $y = \cos(\frac{5}{2}x - \frac{5}{2})$ funksiyaning eng kichik musbat davrini
aniqlang.

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

Yechilishi: $y = \cos(\frac{5}{2}x - \frac{5}{2}) \Rightarrow \frac{T}{|x|} = \frac{2\pi}{\frac{5}{2}} = \frac{4\pi}{5}.$ Javobi: A.

57. $n = \cos 75°, \quad p = \text{tg}\, 75°\ q = \text{ctg}\, 75°\ m = \sin 75°$sonlarni kamayish tartibida yozing.

   A) $p > m > q > n$ B) $p > m > n > q$ C) $p > n > m > q$
   D) $m > p > q > n$ E) $q > p > m > n$

   Yechilishi: Birinchi chorakda burchar ortsa, sinus va tangensning qiymati ortib boradi. 1) $m = sin75^0$;
   $n = cos75^0 = cos(90° - 15°) = sin15°$;
   $m > n; \ 0 < n < \dfrac{1}{2}$;
   2) $p = tg75^0 > 1$;
   $q = ctg75^0 = ctg(90° - 15°) = tg15^0$;
   $p > q; \quad 0 < q < 1; \ p > m > q > n.$ Javobi: A.

58. $2\sin 2x = -1$ tenglamani yeching.

   A) $(-1)^{n+1}\dfrac{\pi}{12} + \dfrac{\pi n}{2}, \ n\epsilon Z$ B) $(-1)^{n}\dfrac{\pi}{12} + \dfrac{\pi n}{2}, \ n\epsilon Z$

   C) $(-1)^{n+1}\dfrac{\pi}{6} + \pi n, \ n\epsilon Z$ D) $(-1)^{n+1}\dfrac{\pi}{6} + \dfrac{\pi n}{2},$

   $n\epsilon Z$

   E) $(-1)^{n}\dfrac{\pi}{12} + 2\,\pi n, \quad n\epsilon z$

   Yechilishi: $2\sin 2x = -1 \Rightarrow \sin 2x = -\dfrac{1}{2} \Rightarrow$

   $2x = (-1)^{n+1} arcsin\dfrac{1}{2} + n\pi \Rightarrow 2x = (-1)^{n+1}\dfrac{\pi}{6} +$

   $n\pi \Rightarrow \ x = (-1)^{n+1}\dfrac{\pi}{12} + \dfrac{n\pi}{2}, \ n \in Z.$ Javobi: A.

59. $sin^2 3x - cos^2\, 3x \le -\dfrac{\sqrt{3}}{2}$ tengsizlikni eching.

   A) $\left[\dfrac{\pi}{36} + \dfrac{\pi n}{3}; \ \dfrac{\pi}{36} + \dfrac{\pi n}{3}\right], \ n\epsilon z$ B) $\left(\dfrac{\pi}{36} + \dfrac{\pi n}{3}; \ \dfrac{\pi}{36} + \dfrac{\pi n}{3}\right),$

   $n\epsilon z$ C) $\left[-\dfrac{\pi}{6} + 2\pi n; \ \dfrac{\pi}{6} + 2\pi n\right], n\epsilon z$

   D) $\left(-\dfrac{\pi}{6} + 2\pi n; \ \dfrac{\pi}{6} + 2\pi n\right), \ n\epsilon z$

   E) $\left[-\dfrac{\pi}{36}; \dfrac{\pi}{36}\right]$

   Yechilishi: $sin^2 3x - cos^2 3 \le -\dfrac{\sqrt{3}}{2} \Rightarrow$

   $\Rightarrow -\left(cos^2 3x - sin^2\, 3x\right) \le -\dfrac{\sqrt{3}}{2} \Rightarrow$

$$\Rightarrow cos^2 3x - sin^2 3x \geq \frac{\sqrt{3}}{2} \Rightarrow$$
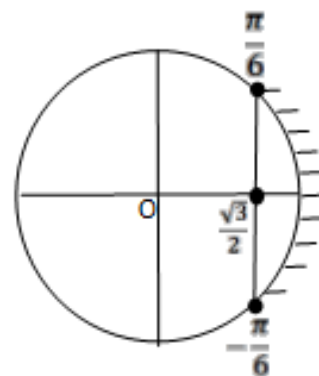
$$\Rightarrow cos6x \geq \frac{\sqrt{3}}{2} \Rightarrow -\frac{\pi}{6} + 2\pi n \leq 6x \leq \frac{\pi}{6} + 2\pi n, \Rightarrow$$

$$\Rightarrow -\frac{\pi}{36} + \frac{\pi n}{3} \leq x \leq \frac{\pi}{36} + \frac{\pi n}{3}, \ n \in Z. \qquad \text{Javobi: A.}$$

60. $\left(1\frac{1}{9} \cdot 0{,}27 - 3\frac{1}{3} \cdot 0{,}15\right) - 1500 \cdot (-0{,}1)^3$ ni hisoblang.

   A) 1,3   B) 1,4   C) 1,5   D) 1,6   E) 1,7

   Yechilishi: $\left(1\frac{1}{9} \cdot 0{,}27 - 3\frac{1}{3} \cdot 0{,}15\right) - 1500 \cdot (-0{,}1)^3 =$

   $$= \left(\frac{10}{9} \cdot \frac{27}{100} - \frac{10}{3} \cdot \frac{15}{100}\right) + 1500 \cdot 0{,}001 =$$

   $$= \left(\frac{3}{10} - \frac{5}{10}\right) + 1500 \cdot \frac{1}{1000} = \frac{3-5}{10} + \frac{15}{10} = \frac{-2+15}{10} = \frac{13}{10} = 1{,}3.$$

   Javobi: A.

61. Ikki xonali son bilan unig raqamlari o'rinlarini almashtirishdan hosil bo'lgan son ayirmasi quyidagilarning qaysi biriga qoldiqsiz bo'linadi?

   A) 5   B) 11   C) 9   D) 4   E) 6

   Yechilishi: $xy - yx = 10x + y - (10y + x) =$
   $= 10x + y - 10y - x = 9x - 9y = 9(x - y).$ Javobi: C.

62 $\frac{1}{1\cdot 2} + \frac{1}{2\cdot 3} + \frac{1}{3\cdot 4} + \cdots + \frac{1}{999\cdot 1000}$ ni hisoblang?

   A) 0,750   B) 1,125   C) 0,998   D) 1,450   E) 0,999

   Yechilishi: $\frac{1}{1\cdot 2} + \frac{1}{2\cdot 3} + \frac{1}{3\cdot 4} + \cdots + \frac{1}{999\cdot 1000} =$

   $$= 1 - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} \cdots + \frac{1}{998} - \frac{1}{999} + \frac{1}{999} - \frac{1}{1000} =$$

   $$= 1 - \frac{1}{1000} = \frac{1000-1}{1000} = \frac{999}{1000} = 0{,}999. \qquad \text{Javobi: E.}$$

63. $\frac{2}{3-x} + \frac{1}{2} = \frac{6}{x(3-x)}$ tenglama ildizlarining yig'indisini toping?

   A) 4   B) 7   C) 3   D) 10   E) 0

   Yechilishi: $\frac{2}{3-x} + \frac{1}{2} = \frac{6}{x(3-x)} \Rightarrow \begin{cases} x \neq 0 \\ 3 - x \neq 0 \end{cases} \Rightarrow \begin{cases} x \neq 0; \\ x \neq 3; \end{cases}$

$$4x + 3x - x^2 = 12 \Rightarrow x^2 - 7x + 12 = 0 \Rightarrow$$

$$\Rightarrow x_{1,2} = \frac{7}{2} \pm \sqrt{\frac{49}{4} - 12} = \frac{7}{2} \pm \frac{1}{2} \Rightarrow \begin{cases} x_1 = 3 \ chet \ ildiz \\ x_2 = 4 \end{cases} \Rightarrow$$

$$\Rightarrow x = 4. \qquad \text{Javobi: A.}$$

64. $x + y = 3; \ xy = 1; \ x^5 y + xy^5 = ?$

A) 47   B) 29   C) 51   D) 24   E) 18

Yechilishi: $x^5 y + xy^5 = xy(x^4 + y^4) = 1[(x^2)^2 + (y^2)^2] =$

$= [(x^2 + y^2)^2 - 2x^2 y^2] = [(x^2 + y^2)^2 - 2 \cdot 1] =$

$= [(x + y)^2 - 2xy]^2 - 2 = [3^2 - 2 \cdot 1]^2 - 2 = 47.$

Javobi: A.

65. Massasi 400g va konsentratsiyasi 8% bo'lgan eritma massasi 600 g va konsentratsiyasi 13% bo'lgan eritma bilan aralashtirildi . xosil bo'lgan aralashmaning konsentratsiyasini (%) toping?

A) 11   B) 12   C) 9   D) 10   E) 10,5

Yechilishi: $400g \Rightarrow 400 \cdot 0{,}08 = 32g$

$600g \Rightarrow 600 \cdot 0{,}13 = 78g \Rightarrow$

$\Rightarrow 400 + 600 = 1000g \Rightarrow 32 + 78 = 110;$

$\begin{matrix} 1000g \text{---} 100\% \\ 110 \text{---} x\% \end{matrix} \Rightarrow 1000x = 100 \cdot 110 \Rightarrow x = 11\%.$

Javobi: A.

66. Kesik konusga shar ichki chizilgan. Konusning ustki asosini yuzi 36π ga, ostki asosiniki esa 64π ga teng. Shar sirtining yuzini toping.

A) 172π B) 100π C) 144π D) 156π E) 192π

Yechilishi: $S_1 = 36\pi; \ S_2 = 64\pi;$

$S_1 = \pi r^2 \Rightarrow 36\pi = \pi r^2 \Rightarrow r = 6;$
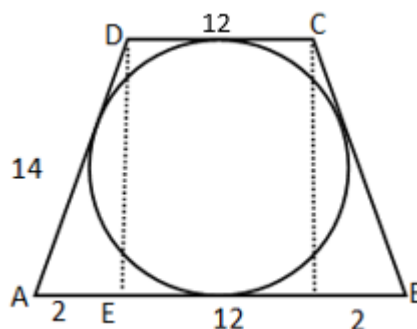
$S_2 = \pi R^2 \Rightarrow 64\pi = \pi R^2 \Rightarrow R = 8;$

$AB + CD = 2AD \Rightarrow$

$\Rightarrow 16 + 12 = 2AD \Rightarrow AD = 14;$

$DE^2 = 14^2 - 2^2 = 192 \Rightarrow$

$\Rightarrow DE = 8\sqrt{3} \Rightarrow R_{shar} = 4\sqrt{3};$

277

$$S_{shar} = 4\pi R^2 = 4\pi\left(4\sqrt{3}\right)^2 = 4 \cdot \pi \cdot 48 = 192\pi.$$

Javobi: E.

67. A, B raqamlar; AB va $5A$ esa ikki xonali sonlar. Agar $AB \cdot 3 = 5A$ bo'lsa, $A^2 + B^2$ ning qiymatini toping.

   A) 65   B) 13   C)50   D)37   E)26

   Yechilishi: $AB \cdot 3 = 5A \Rightarrow (10A + B) \cdot 3 = 50 + A \Rightarrow$
   $\Rightarrow 30A + 3B = 50 + A \Rightarrow 29A + 3B = 50 \Rightarrow$
   $$\Rightarrow \begin{cases} A = 1 \\ B = 7 \end{cases} \Rightarrow A^2 + B^2 = 1 + 49 = 50. \qquad \text{Javobi: C.}$$

68. $0,3^{-3} + \left(\frac{3}{7}\right)^{-1} + (-0,5)^{-2} \cdot \frac{3}{4} + (-1)^{-8} \cdot 6$ nihisoblang.

   A) $51\frac{5}{9}$ B) $42\frac{5}{9}$ C) $34\frac{2}{3}$ D) $48\frac{10}{27}$ E) $52\frac{2}{27}$

   Yechilishi: $0,3^{-3} + \left(\frac{3}{7}\right)^{-1} + (-0,5)^{-2} \cdot \frac{3}{4} + (-1)^{-8} \cdot 6 =$

   $$= \left(\frac{3}{10}\right)^{-3} + \left(\frac{3}{7}\right)^{-1} + \left(-\frac{1}{2}\right)^{-2} \cdot \frac{3}{4} + \frac{1}{(-1)^8} \cdot 6 =$$

   $$= \left(\frac{10}{3}\right)^{3} + \left(\frac{7}{3}\right)^{1} + \left(-\frac{2}{1}\right)^{2} \cdot \frac{3}{4} + 6 =$$

   $$= \frac{10^3}{3^3} + \frac{7}{3} + 4 \cdot \frac{3}{4} + 6 = \frac{1000}{27} + \frac{7}{3} + 9 = \frac{1000 + 63 + 243}{27} =$$

   $\frac{1306}{27} = 48\frac{10}{27}.$ Javobi: D.

69. Agar qavariq ko'pburchaklarning diagonallari 90 ta bo'lsa, uning tomonlari nechta bo'ladi?

   A)15   B)20   C)30   D)45   E) 12

   Yechilishi: $d = 90\, ta \Rightarrow 90 = \frac{n(n-3)}{2} \Rightarrow$
   $\Rightarrow 180 = n^2 - 3n \Rightarrow n^2 - 3n - 180 = 0 \Rightarrow$
   $$\Rightarrow n_{1,2} = \frac{3}{2} \pm \sqrt{\frac{9}{4} + 180} = \frac{3}{2} \pm \sqrt{\frac{729}{4}} = \frac{3}{2} \pm \frac{27}{2} \Rightarrow n = 15.$$

   Javobi: A.

70. Agar a toq son bo'lsa, quyidagi sonlardan qaysi biri albatta toq son bo'ladi?

   A)$a^2 + 27$ B) $5(a + 13)$ C) a^8

D) $\frac{a(a+3)}{2}$ E) $\frac{(a+1)(a+2)}{2}$

Yechilishi: A) $a = 2k + 1 \Rightarrow (2k + 1)^2 + 27 =$
$= 4k^2 + 4k + 1 + 27 = 4(k^2 + k) + 28.$ Natija juft;
C) $a^8 = (2k + 1)^8 = (2k)^8 + 8(2k)^7 + 28(2k)^6 +$
$+56(2k)^5 + 70(2k)^4 + 56(2k)^3 + 28(2k)^2 + 56k + 1 =$
$= 2 \cdot n + 1.$ Bu toq son.   Javobi: C.

71. Piramidaning to'la sirti 60 ga, unga ichki chizilgan
sharning radiusi 5 ga teng. Piramidaning hajmini toping.
A) 120   B) 80   C) 90   D) 100   E) 150
Yechilishi: $S_{p.to'la} = 60;$ $R_{shar} = 5;$ $V_p =?$
$V_p = \frac{S_{p.to'la} \cdot R_{shar}}{3} = \frac{60 \cdot 5}{3} = 100.$ Javobi: D.

72. $49^x + 49^{-x} = 7;$ $7^x + 7^{-x} =?$
A) 4   B) $\sqrt{7}$ C) $\sqrt{5}$ D)14   E) 3
Yechilishi: $49^x + 49^{-x} = 7;$ $7^x + 7^{-x} =?$
1) $49^x + 49^{-x} = 7^{2x} + 7^{-2x} = 7;$
2) $(7^x + 7^{-x})^2 = 7^{2x} + 7^{-2x} + 2 \cdot 7^x \cdot 7^{-x} =$
$= 7 + 2 \cdot 1 = 9 \Rightarrow 7^x + 7^{-x} = 3.$ Javobi: E.

73. Birinchi quvur hovuzni 3 soatda to'ldiradi, ikkinchisi esa 5
soatda. Ikkala quvur birgalikda hovuzni qancha vaqtda
to'diradi?
A)$1\frac{7}{8}$ B)$2\frac{1}{2}$ C)$2\frac{1}{5}$ D)$1\frac{4}{5}$ E) 2
Yechilishi: $\left(\frac{1}{3} + \frac{1}{5}\right) x = 1 \Rightarrow \frac{5+3}{15} x = 1 \Rightarrow$
$\Rightarrow 8x = 15 \Rightarrow x = \frac{15}{8} = 1\frac{7}{8}.$ Javobi: A.

74. $\frac{\log_3 12}{\log_{36} 3} - \frac{\log_3 4}{\log_{108} 3}$ ni hisoblang.
A) 3   B) 2   C) 1   D) 6   E)$\frac{1}{2}$
Yechilishi: $\frac{\log_3 12}{\log_{36} 3} - \frac{\log_3 4}{\log_{108} 3} = \frac{\log_3 3\cdot4}{\frac{1}{\log_3 4\cdot3^2}} - \frac{\log_3 4}{\frac{1}{\log_3 4\cdot3^3}} =$
$= \log_3 3 \cdot 4 \cdot \log_3 4 \cdot 3^2 - \log_3 4 \cdot \log_3 4 \cdot 3^3 =$

$= (log_3 3 + log_3 4)(log_3 4 + 2log_3 3) -$
$-log_3 4(log_3 4 + 3log_3 3) =$
$= (1 + log_3 4)(log_3 4 + 2) - log_3 4(log_3 4 + 3) =$
$= log_3 4 + 2 + log^2{}_3 4 + 3log_3 4 - log^2{}_3 4 - 3log_3 4 = 2.$
Javobi: B.

75. $1 + acosx = (a + 1)^2$ tenglama hech bo'lmaganda bitta yechimga ega bo'ladigan a ning nechta butun qiymati mavjud?

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

   Yechilishi: $1 + acosx = (a + 1)^2 \Rightarrow$

   $\Rightarrow \begin{cases} 1 + acosx = a^2 + 2a + 1 \\ -1 \le cosx \le 1 \Rightarrow cosx = a + 2 \Rightarrow \end{cases}$

   $\Rightarrow a = -3; -2; -1$ hamda 0.   Javobi: B.

76. $sin(\frac{1}{2}arccos\frac{1}{9})$ ni hisoblang.

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

   Yechilishi: $sin(\frac{1}{2}arccos\frac{1}{9}) = \sqrt{\frac{1 - cosarccos\frac{1}{9}}{2}} = \sqrt{\frac{1 - \frac{1}{9}}{2}} = \sqrt{\frac{\frac{8}{9}}{2}} =$

   $= \sqrt{\frac{8}{18}} = \sqrt{\frac{4}{9}} = \frac{2}{3}.$ Javobi: A.

77. $\frac{10}{x^2 + 8x + 41} + cos5y$ ifodaning eng katta qiymati nechaga teng bo'lishi mimkin?

   A) 1,8   B) 1,5   C) 1,4   D) 2   E) 2,5

   Yechilishi: $\frac{10}{x^2 + 8x + 41} + cos5y \Rightarrow \frac{10}{x^2 + 8x + 4^2 - 4^2 + 41} +$

   $cos5y \Rightarrow\Rightarrow \frac{10}{(x+4)^2 - 16 + 41} + cos5y = \frac{10}{(x+4)^2 + 25} + cos5y \Rightarrow$

   $\Rightarrow \begin{cases} x = -4 \\ cos5y = 1 \end{cases} \Rightarrow \frac{10}{25} + 1 = \frac{2}{5} + 1 = 0,4 + 1 = 1,4.$

   Javobi: C.

78. Agar $sin\frac{\alpha}{2}cos\frac{\alpha}{2} = -\frac{1}{2}$ va $\frac{3\pi}{2} < \alpha < 2\pi$ bo'lsa, $sin2\alpha$ ning qiymati qanchaga teng bo'ladi?

280

A)$-\dfrac{3\sqrt{7}}{8}$ B)$-\dfrac{2\sqrt{3}}{5}$ C)$-\dfrac{3\sqrt{5}}{8}$ D)$-\dfrac{\sqrt{2}}{2}$ E)$-\dfrac{1}{3}$

Yechilishi: $\sin\dfrac{\alpha}{2}\cos\dfrac{\alpha}{2}=-\dfrac{1}{2};\ \dfrac{3\pi}{2}<\alpha<2\pi;\ \ \sin2\alpha=?$

1) $\sqrt{\dfrac{1-\cos\alpha}{2}}+\sqrt{\dfrac{1-\cos\alpha}{2}}=-\dfrac{1}{2}\Rightarrow$

$\Rightarrow\dfrac{1-\cos\alpha}{2}+2\sqrt{\dfrac{1-\cos\alpha}{2}}\cdot\sqrt{\dfrac{1+\cos\alpha}{2}}+\dfrac{1+\cos\alpha}{2}=\dfrac{1}{4}\Rightarrow$

$\Rightarrow\dfrac{1-\cos\alpha}{2}+\dfrac{1+\cos\alpha}{2}+2\sqrt{\dfrac{1-\cos^2\alpha}{4}}=\dfrac{1}{4}\Rightarrow$

$\Rightarrow1-\cos\alpha+1+\cos\alpha+4\cdot\sqrt{\dfrac{\sin^2\alpha}{4}}=\dfrac{1}{2}\Rightarrow$

$\Rightarrow2+4\cdot\dfrac{1}{2}\sin\alpha=\dfrac{1}{2}\Rightarrow2+2\sin\alpha=\dfrac{1}{2}\Rightarrow$

$\Rightarrow2\sin\alpha=\dfrac{1}{2}-2\Rightarrow2\sin\alpha=-\dfrac{3}{2}\Rightarrow\sin\alpha=-\dfrac{3}{4}\Rightarrow$

$\Rightarrow\alpha=\arcsin\left(-\dfrac{3}{4}\right)\Rightarrow\alpha=-\arcsin\dfrac{3}{4};$

2) $\sin2\alpha=2\sin\alpha\cos\alpha=$

$=2\sin\left(-\arcsin\dfrac{3}{4}\right)\cos\left(-\arcsin\dfrac{3}{4}\right)=$

$=-2\sin\arcsin\dfrac{3}{4}\cos\arcsin\dfrac{3}{4}=$

$=-2\cdot\dfrac{3}{4}\cdot\sqrt{1-(\dfrac{3}{4})^2}=-\dfrac{3}{2}\cdot\sqrt{1-\dfrac{9}{16}}=-\dfrac{3}{2}\cdot\sqrt{\dfrac{7}{16}}=-\dfrac{3}{8}\sqrt{7}.$

Javobi: A.

79. Shaklda $AB=AC$ va $\angle BMC=80^0$ bo'lsa, $\angle ANB$ necha gradusga teng bo'ladi?

A) 50^0 B) 60^0 C)70^0 D)80^0 E)aniqlab bo'lmaydi
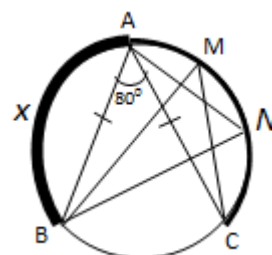
Yechilishi: $AB=AC,\ \angle BMC=80^0,\ \angle ANB=?$

Teng vatarlar teng yoylarni tortib turadi;

$x+x+160°=360°\Rightarrow$

$\Rightarrow\ 2x=200\Rightarrow x=100\Rightarrow$

$\angle ANB=\dfrac{100}{2}=50°.$

Javobi: A.

80. $x^2 + y^2 + 2(2x - 3y) + |z - xy| + 13 = 0.$ $x + y + z = ?$

A) 8   B)11   C)-5   D)-7   E) aniqlab bo'lmaydi

Yechilishi: $x^2 + y^2 + 2(2x - 3y) + |z - xy| + 13 = 0.$

$$x^2 + y^2 + 4x - 6y + |z - xy| + 13 = 0 \Rightarrow$$
$$\Rightarrow x^2 + 4x + 4 + y^2 - 6y + 9 + |z - xy| = 0 \Rightarrow$$
$$\Rightarrow (x + 2)^2 + (y - 3)^2 + |z - xy| = 0 \Rightarrow$$
$$\Rightarrow \begin{cases} (x + 2)^2 = 0 \\ (y - 3)^2 = 0 \\ |z - xy| = 0 \end{cases} \Rightarrow \begin{cases} x = -2 \\ y = 3 \\ z = xy = -2 \cdot 3 = -6 \end{cases} \Rightarrow$$
$$\Rightarrow x + y + z = -2 + 3 - 6 = -5.$$ Javobi: C.

81. k ning qanday qiymatida $f(x) = |\log_5(k - x)|$ va $g(x) = -|x - 7|$ funksiyalarning grafiklarini OX o'qida yotgan nuqtada kesishadi?

A)1   B)4   C)5   D)-1   E)8

Yechilishi: $f(x) = |\log_5(k - x)| \Rightarrow k - x > 0 \Rightarrow x < k;$
$g(x) = -|x - 7|.$

1) $\begin{cases} f(x) = |\log_5(k - x)| \\ f(x) = 0 \end{cases} \Rightarrow |\log_5(k - x)| = 0 \Rightarrow$
$\Rightarrow \log_5(k - x) = 0 \Rightarrow k - x = 1;$

2) $\begin{cases} g(x) = -|x - 7| \\ g(x) = 0 \end{cases} \Rightarrow -|x - 7| = 0 \Rightarrow$
$\Rightarrow x - 7 = 0 \Rightarrow x = 7;$

3) $\begin{cases} k - x = 1 \\ x = 7 \end{cases} \Rightarrow \begin{cases} k - 7 = 1 \\ x = 7 \end{cases} \Rightarrow k = 8.$ Javobi: E.

82. $\sqrt{5 - x^2} > x - 1$ tengsizlikni qanoatlantiruvchi butun sonlar nechta?

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

Yechilishi: $\sqrt{5 - x^2} > x - 1;$

1) $5 - x^2 \geq 0 \Rightarrow x^2 \leq 5 \Rightarrow |x| \leq \sqrt{5} \Rightarrow -\sqrt{5} \leq x \leq \sqrt{5};$

2) $5 - x^2 > x^2 - 2x + 1 < 0 \Rightarrow x^2 - x - 2 < 0 \Rightarrow$

$\Rightarrow -1 < x < 2. \quad x = -2; \ -1; \ 0; \ 1.$

Javobi: C.

83. $\left|\dfrac{x^5}{x^4-16}\right| = \dfrac{x^5}{16-x^4}$ tenglamaning barcha natural yechimlar yig'indisini toping.

A)3   B)1   C)6   D)10   E)15

Yechilishi: $\left|\dfrac{x^5}{x^4-16}\right| = \dfrac{x^5}{16-x^4} \Rightarrow \begin{cases} \dfrac{x^5}{x^4-16} \neq \dfrac{x^5}{16-x^2}; \\ -\dfrac{x^5}{x^4-16} = \dfrac{x^5}{16-x^2}. \end{cases}$

$x^2 - 16 \neq 0 \Rightarrow x^4 \neq 2^4 \Rightarrow x \neq \pm 2 \Rightarrow [1; 2) \Rightarrow x = 1.$

Javobi: B.

84. Agar $x^2 - x + q = 0$ tenglamaning x_1 va x_2 ildizlari $x_1^3 + x_2^3 = 19$ shartni qanoatlantirsa, q ning qiymati qanchaga teng?

A) -5   B) -2   C) -12   D) 1   E) -6

Yechilishi: $x^2 - x + q = 0; \quad x_1^3 + x_2^3 = 19; \quad q = ?$

$\begin{cases} x_1 + x_2 = 1 \\ x_1 \cdot x_2 = q \end{cases} \Rightarrow (x_1 + x_2)^3 = 1^3 \Rightarrow$

$\Rightarrow x_1^3 + 3x_1^2 x_2 + 3x_1 x_2^2 + x_2^3 = 1 \Rightarrow$

$\Rightarrow x_1^3 + x_2^3 + 3x_1 x_2(x_1 + x_2) = 1 \Rightarrow$

$\Rightarrow 19 + 3q \cdot 1 = 1 \Rightarrow 3q = -18 \Rightarrow q = -6.$ Javobi: E.

85. $(x - 2 - x^2)(2x + \frac{1}{e})^4 \log_{x^2+2x+2}(1 - \frac{x^2}{\pi}) \geq 0$

tengsizlikni qanoatlantiruvchi manfiy sonlar nechta?

A)cheksiz ko'p   B)1   C)∅   D)2   E)aniqlab bo'lmaydi

Yechilishi: $(x - 2 - x^2)\left(2x + \frac{1}{e}\right)^4 \log_{x^2+2x+2}\left(1 - \frac{x^2}{\pi}\right) \geq 0;$

$-(x^2 - x + 2)\left(2x + \frac{1}{e}\right)^4 \log_{x^2+2x+2}\left(1 - \frac{x^2}{\pi}\right) \geq 0;$

$(x^2 - x - 2)\left(2x + \frac{1}{e}\right)^4 \log_{x^2+2x+2}\left(1 - \frac{x^2}{\pi}\right) \leq 0;$

$x^2 - x - 2 > 0.$ Chunki, $D < 0;$

     U holda,

$$\left(2x + \frac{1}{e}\right)^4 \log_{x^2+2x+2}\left(1 - \frac{x^2}{\pi}\right) \le 0;$$

$$\left(2x + \frac{1}{e}\right)^4 = 0 \Rightarrow x = -\frac{1}{2e}; \text{ Shuningdek, } \left(2x + \frac{1}{e}\right)^4 > 0;$$

U holda, $\log_{x^2+2x+2}\left(1 - \frac{x^2}{\pi}\right) \le 0;\ x^2 + 2x + 2 > 0,$ chunki $D < 0;$

$x^2 + 2x + 2 \ne 1 \Rightarrow (x+1)^2 \ne 0 \Rightarrow x \ne -1;$

$1 - \frac{x^2}{\pi} > 0 \Rightarrow \frac{x^2}{\pi} < 1 \Rightarrow x^2 < \pi \Rightarrow |x| < \sqrt{\pi} \Rightarrow$

$\Rightarrow -\sqrt{\pi} < x < \sqrt{\pi};$ Bundan, $\left(-\sqrt{\pi}; -1\right) \cup (-1; 0)$

Javobi: A.

86. Tomoni $\sqrt{3}$ ga teng bo'lgan muntazam uchburchakning ichidagi ixtiyoriy nuqtadan uning tomonlarigacha bo'lgan masofalar yig'indisi qanchaga teng?

A) 3   B) 1,5   C) $\frac{3\sqrt{3}}{2}$

D) nuqtaning vaziyatiga bog'liq   E) $\frac{2\sqrt{3}}{2}$

Yechilishi: Muntazam uchburchakning ichidagi ixtiyoriy nuqtadan tomonlarigacha bo'lgan masofalar yig'indisi uning balandligiga teng bo'ladi.

$$h^2 = \sqrt{3}^2 - \left(\frac{\sqrt{3}}{2}\right)^2 = 3 - \frac{3}{4} = \frac{9}{4} \Rightarrow h = \frac{3}{2} = 1,5.$$

Javobi: B.

87. O'tkir burchakli uchburchak tomonlarining uzunliklari natural sonlardan iborat va ular ayirmasi 4 ga teng bo'lgan arifmetik progressiyani tashkil qiladi. Shu uchburchak kichik tomonining eng kichik qiymati nechaga teng bo'lishi mimkin?

A) 8   B) 15   C) 14   D) 12   E) 13

Yechilishi: O'tkir burchakli uchburchak uchun:

$$a^2 + b^2 > c^2;\ a, b = a + 4; c = a + 8;$$

U holda, $a^2 + (a+4)^2 > (a+8)^2 \Rightarrow$

$\Rightarrow a^2 + a^2 + 8a + 16 > a^2 + 16a + 64 \Rightarrow$

$\Rightarrow a^2 - 8a - 48 > 0 \Rightarrow$

$(a-12)(a+4) > 0 \Rightarrow$

$a > 12 \Rightarrow a = 13$
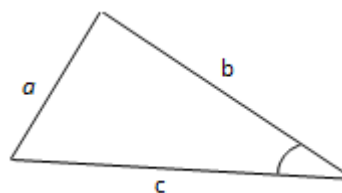
Javobi: E.

88. Ikki sonning yig'indisi ularning ayirmasidan 50% ga ortiq. Bu sonlar kvadratlarining yig'indisi ularning ko'paytmasidan necha foizga ko'p?

A) 420   B) 100   C)150   D) 240   E) 360

Yechilishi: $\begin{cases} x - y = a \\ x + y = a + 0.5a \end{cases} \Rightarrow \begin{cases} x - y = a \\ x + y = 1.5a \end{cases} \Rightarrow\Rightarrow$

$\begin{cases} x^2 - 2xy + y^2 = a^2 \\ x^2 + 2xy + y^2 = 2.25a^2 \end{cases}$

1) Qo'shsak: $2x^2 + 2y^2 = 3.25a^2 \Rightarrow x^2 + y^2 = \frac{3,25a^2}{2}$;

2) Ayirsak: $4xy = 1,25a^2 \Rightarrow xy = \frac{1,25a^2}{4}$;

3) $(x^2 + y^2) + xy = \frac{3,25a^2}{2} - \frac{1,25a^2}{4} = \frac{6,5a^2 - 1,25a^2}{4} = \frac{5,25a^2}{4}$;

5) $\begin{cases} \frac{1,25a^2}{4} - 100 \\ \frac{5,25a^2}{4} - x \end{cases} \Rightarrow \frac{1,25a^2}{4} x = \frac{5,25a^2}{4} \cdot 100 \Rightarrow$

$\Rightarrow 1,25x = 525 \Rightarrow 125x = 52500 \Rightarrow x = \frac{52500}{125} = 420.$

Javobi: A.

89. $5x^4 - 8x^2 + 1 = 0$ tenglamaning barcha ildizlari yig'indisini toping.

A)1,6   B)0   C)8   D)$\frac{1}{5}$ E) aniqlab bo'lmaydi

Yechilishi: Bikvadrat tenglamaning barcha ildizlar yig'indisi nolga teng. Haqiqatdan, $5x^4 - 8x^2 + 1 = 0 \Rightarrow$

$\Rightarrow x^2 = y \Rightarrow$

$$\Rightarrow 5y^2 - 8y + 1 = 0 \Rightarrow y_{1,2} = \frac{8 \pm \sqrt{64 - 4 \cdot 5 \cdot 1}}{2 \cdot 5} = \frac{8 \pm \sqrt{44}}{10} \Rightarrow$$

$$\Rightarrow \begin{cases} y_1 = \frac{8 - \sqrt{44}}{10} \\ y_2 = \frac{8 + \sqrt{44}}{10} \end{cases} \Rightarrow \begin{cases} y_1 = \frac{4 - \sqrt{11}}{5}; \\ y_2 = \frac{4 + \sqrt{11}}{5}; \end{cases}$$

1) $x^2 = \frac{4 - \sqrt{11}}{5} \Rightarrow x = \pm\sqrt{\frac{4 - \sqrt{11}}{5}} \Rightarrow \begin{cases} x_1 = \sqrt{\frac{4 - \sqrt{11}}{5}}; \\ x_2 = -\sqrt{\frac{4 - \sqrt{11}}{5}}; \end{cases}$

2) $x^2 = \frac{4 + \sqrt{11}}{5} \Rightarrow x = \pm\sqrt{\frac{4 + \sqrt{11}}{5}} \Rightarrow \begin{cases} x_3 = \sqrt{\frac{4 + \sqrt{11}}{5}}; \\ x_4 = -\sqrt{\frac{4 + \sqrt{11}}{5}}; \end{cases}$

$$x_1 + x_2 + x_3 + x_4 = \sqrt{\frac{4 - \sqrt{11}}{5}} - \sqrt{\frac{4 - \sqrt{11}}{5}} + \sqrt{\frac{4 + \sqrt{11}}{5}} -$$

$$- \sqrt{\frac{4 + \sqrt{11}}{5}} = 0. \quad \text{Javobi: B.}$$

90. $\frac{\sqrt{3}}{\sin 100^0} + \frac{1}{\cos 260^0}$ hisoblang.

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

Yechilishi: $\frac{\sqrt{3}}{\sin 100^0} + \frac{1}{\cos 260^0} = \frac{ctg 30^0}{\sin 100^0} + \frac{1}{\cos 260^0} =$

$= \frac{\cos 30^\circ}{\sin 30^0} \cdot \frac{1}{\sin 100^0} + \frac{1}{\cos(360^\circ - 100^\circ)} = \frac{\cos 30^0}{\sin 100^0 \cdot \sin 30^0} + \frac{1}{\cos 100^0} =$

$= \frac{\cos 100^\circ \cos 30^\circ + \sin 100^\circ \sin 30^\circ}{\sin 100^\circ \cos 100^\circ \sin 30^\circ} = \frac{\cos(100^\circ - 30^\circ)}{\frac{1}{2} \cdot \frac{1}{2} \cdot 2\sin 100^\circ \cos 100^\circ} =$

$= \frac{\cos 70^\circ}{\frac{1}{4} \cdot 2\sin(90^\circ + 10^\circ)\cos(90^\circ + 10^\circ)} = \frac{\cos(90^\circ - 20)}{\frac{1}{4} \cdot 2\cos 10^\circ \cdot (-\sin 10^\circ)} =$

$= -\frac{\sin 20^\circ}{\frac{1}{4} \cdot 2\sin 10^\circ \cos 10^\circ} = -\frac{4\sin 20^\circ}{\sin 20^\circ} = -4. \quad \text{Javobi: B.}$

91. Ikki tomonining yig'indisi 4ga va ular orasidagi burchagi 120^0 ga teng bo'lgan uchburchakning yuzi eng ko'pi bilan nechaga teng bo'lishi mumkin?

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

$S_\Delta = \frac{1}{2} \cdot a \cdot b \cdot sin120°;$

$a + b = 4 \Rightarrow a = 4 - b;$

$S_\Delta = \frac{1}{2} \cdot (4 - b) \cdot b \cdot sin(90° + 30°) =$
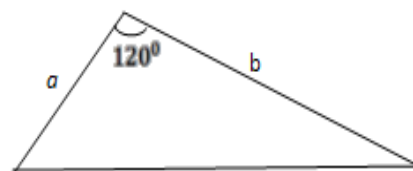
$= \frac{1}{2}(4b - b^2)cos30^0 = \frac{\sqrt{3}}{4}(4b - b^2)$

$\Rightarrow S'_\Delta = \frac{\sqrt{3}}{4}(4 - 2b) = 0 \Rightarrow$

$\Rightarrow S'_\Delta = 0 \Rightarrow \frac{\sqrt{3}}{4}(4 - 2b) = 0 \Rightarrow$

$\Rightarrow 4 - 2b = 0 \Rightarrow b = 2 \Rightarrow a = 4 - b \Rightarrow a = 4 - 2 \Rightarrow a = 2;$

$S_\Delta = \frac{1}{2} \cdot 2 \cdot 2 \cdot sin120^0 = \sqrt{3}.$ Javobi: A.

92. $y = \sqrt{sinx} + \sqrt{16 - x^2}$ funksiyaning aniqlanish sohasiga tegishli x ning butun qiymatlari nechta?

A) 3   B) 4   C) 5

D) 2   E) 1

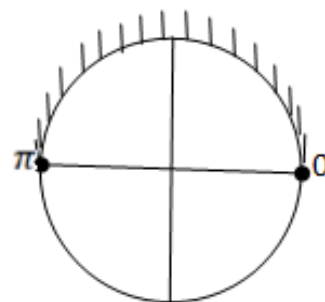Yechilishi: 1) $sinx \geq 0 \Rightarrow 0 \leq x \leq \pi \Rightarrow$

$\Rightarrow \pi = 3,14 \Rightarrow 0 \leq x \leq 3,14;$

2) $16 - x^2 \geq 0 \Rightarrow x^2 \leq 16 \Rightarrow$

$\Rightarrow |x| \leq 4 \Rightarrow -4 \leq x \leq 4;$

$x \in [0; \pi] \Rightarrow x = 0; 1; 2; 3.$

Javobi: A.

93. $f(x) = \begin{cases} 2x^2 + 1, |x| < 3 \\ 5x - 1, |x| \geq 3 \end{cases}$ funksiya berilgan. $f(x^2 + 7)$ funksiyani toing.

A) $5x^2 - 34$ B) $2x^2 + 8$ C) $5x^2 + 36$

D) $5x^2 + 34$ E) $2(x^2 + 7)^2 + 1$

Yechilishi: $|x| < 3 \Rightarrow -3 < x < 3 \Rightarrow$

$\Rightarrow -3 < x^2 + 7 < 3 \Rightarrow -10 < x^2 < -4 \Rightarrow \emptyset;$

2) $|x| \geq 3 \Rightarrow \begin{cases} x \geq 3 \\ x \leq -3 \end{cases} \Rightarrow \begin{cases} x^2 + 7 \geq 3 \\ x^2 + 7 \leq -3 \end{cases} \Rightarrow \begin{cases} x^2 \geq -4; \\ x^2 \leq -10 \Rightarrow \emptyset; \end{cases}$

Pirnazar DAVRONOV

Demak, $f(x) = 5x - 1 = 5(x^2 + 7) - 1 = 5x^2 + 34.$
Javobi: D.

94. $y = (k-2)x^2 - 3kx + 2$ va $y = kx^2 + kx + 4$
funksiyalarning grafiklari kesishmaydigan k ning barcha
butun qiymatlari yig'indisini toping.

A) 0   B)1   C) -2   D)3   E)5

Yechilishi: $\begin{cases} y = (k-2)x^2 - 3kx + 2 \\ y = kx^2 + kx + 4 \end{cases} \Rightarrow$

$\Rightarrow (k-2)^2 - 3kx + 2 = kx^2 + kx + 4 \Rightarrow$
$\Rightarrow kx^2 - 2x^2 - 3kx + 2 = kx^2 + kx + 4 \Rightarrow$
$\Rightarrow 2x^2 + 4kx + 2 = 0 \Rightarrow x^2 + 2kx + 1 = 0 \Rightarrow$

$\Rightarrow x_{1,2} = -\frac{2k}{2} \pm \sqrt{\frac{4k^2}{4} - 1} = -\frac{2k}{2} \pm \sqrt{\frac{4k^2 - 4}{4}} =$

$= -k \pm \sqrt{k^2 - 1} \Rightarrow k^2 - 1 < 0 \Rightarrow k^2 < 1 \Rightarrow |k| < 1 \Rightarrow$
$\Rightarrow -1 < k < 1; \ k = 0.$ Javobi: A.

95. Ikkita qo'shni tomonlarining markazlari orasidagi masofa
$2\sqrt{2}$ga teng bo'lgan kubga tashqi chizilgan shar sirtining
yuzini toping.

A)28π B)36π C)48π D)$18\sqrt{2}\pi$ E)$12\sqrt{3}\,\pi$

Yechilishi: $OO_1 = 2\sqrt{2}; \ \ S_{shar} =? \ \ OA = O_1A = \frac{a}{2};$

$OO_1{}^2 = OA^2 + O_1A^2 = 2OA^2 =$

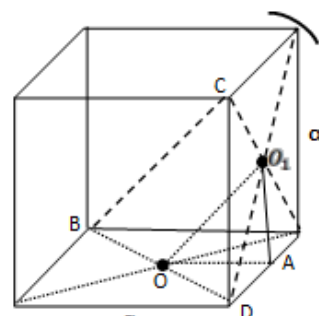$= 2\left(\frac{a}{2}\right)^2 = 2 \cdot \frac{a^2}{4} = \frac{a^2}{2} \Rightarrow$

$\Rightarrow (2\sqrt{2})^2 = \frac{a^2}{2} \Rightarrow 8 = \frac{a^2}{2} \Rightarrow$

$a^2 = 16 \Rightarrow a = 4 \Rightarrow BD = 4\sqrt{2} =$
$= (4\sqrt{2})^2 + 4^2 = 32 + 16 = 48$

$\Rightarrow R = \frac{BC}{2} \Rightarrow R = 2\sqrt{3} \Rightarrow S = 4\pi R^2 = 4 \cdot \pi \cdot (2\sqrt{3})^2 =$
$= 4\pi \cdot 4 \cdot 3 = 48\pi.$ Javobi: C.

96. $2x + 5x^3 = x^8 - 4x^4 + 4$ tenglama nechta manfiy ildizga
ega?

A)$\emptyset$ B)1   C)2   D)3   E)4

Yechilishi: $2x + 5x^3 = x^8 - 4x^4 + 4 \Rightarrow$

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

1) $(x^4 - 2)^2 \geq 0 \Rightarrow \begin{cases} x^4 - 2 = 0 \\ x^4 - 2 > 0 \end{cases} \Rightarrow \begin{cases} x = \pm\sqrt[4]{2} \\ x^4 > 2 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x = \pm\sqrt[4]{2} \\ |x| > \sqrt[4]{2} \end{cases} \Rightarrow \begin{cases} x = -\sqrt[4]{2}; \\ x = \sqrt[4]{2}; \\ (-\infty; -\sqrt[4]{2}) \cup (\sqrt[4]{2}; \infty). \end{cases}$

2) $x(2 + 5x^2) = 0 \Rightarrow \begin{cases} x = 0; \\ x^2 \neq -\dfrac{2}{5}. \end{cases}$

3) $x(2 + 5x^2) > 0 \Rightarrow$

a) $\begin{cases} x > 0; \\ x^2 > -\dfrac{2}{5}. \end{cases}$ b) $\begin{cases} x < 0 \\ x^2 < -\dfrac{2}{5} \end{cases}$ mumkin emas.

Demak, manfiy yechim mavjud emas.   Javobi: A.

97. $|x - 1|^2 - 8 = 2|x - 1|$ tenglama ildizlarining ko'paytmasini toping.

A)15   B)-3   C)5   D)-8   E)-15

Yechilishi: $|x - 1|^2 - 8 = 2|x - 1|;$

$|x - 1| = y \Rightarrow y^2 - 2y - 8 = 0 \Rightarrow \begin{cases} y_1 = -2; \\ y_2 = 4. \end{cases}$

1) $|x - 1| \neq -2;$

2) $|x - 1| = 4 \Rightarrow x - 1 = \pm 4 \Rightarrow \begin{cases} x_1 = -3 \\ x_2 = 5 \end{cases} \Rightarrow x_1 \cdot x_2 = -15.$

   Javobi: E.

98. $\dfrac{1}{100} + \dfrac{2}{100} + \cdots + \dfrac{N}{100} = 100N$ tenglikni qanoatlantituvchi natural N ni toping.

A)19999   B)9999   C)21999   D)999   E)1999

Yechilishi: $\dfrac{1}{100} + \dfrac{2}{100} + \cdots + \dfrac{N}{100} = 100N \Rightarrow$

$\Rightarrow \dfrac{1}{100}(1 + 2 + \cdots + N) = 100N \Rightarrow 1 + 2 + \cdots + N =$

$$= 10000N \Rightarrow 10000N = \frac{1+N}{2}N \Rightarrow 20000 = 1 + N \Rightarrow$$
$$\Rightarrow N = 19999. \qquad \text{Javobi: A.}$$

99. O'lchamlari $24m \times 15m$ bo'lgan zalni, tomoni 20sm bo'lgan kvadrat shaklidagi plitkalardan nechtasi bilan qoplash mumkin?
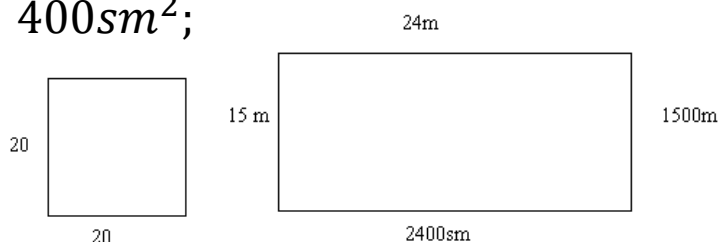
A)900   B)18000   C)9000   D)1800   E)6000

Yechilishi: $S = 24m \cdot 15m = 360m^2 = 3600000 sm^2$;
$S_1 = 20sm \cdot 20sm = 400sm^2$;
$\frac{S}{S_1} = 9000$.

Javobi: C.

100. Agar a natural son hamda $a \in (9; 17)$ bo'lsa, 6; 10 va a sonlarning o'rta arifmetigi quyida keltirilgan sonlardan qaysi biri?

A)10   B)12   C)8   D)18   E)13

Yechilishi: $a \in N$ va $a \in (9; 17)$;
$\frac{a+6+10}{3} = \frac{14+6+10}{3} = \frac{30}{3} = 10.$ Javobi: A.

101. 13 kishi bir-biri bilan salomlashganda, qo'l berib ko'rishishlar soni qancha bo'ladi?

A)169   B)156 C)78   D)130   E)143

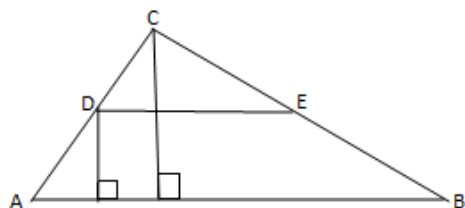Yechilishi: $\frac{n(n-1)}{2} \Rightarrow \frac{13(13-1)}{2} = 13 \cdot 6 = 78.$

Shuningdek, $C_{13}{}^2 = \frac{13!}{2!(13-2)!} = \frac{12 \cdot 13}{2} = 78.$ Javobi: C.

102. Uchburchakning asosiga parallel to'g'ri chiziq uning yuzini teng ikkiga bo'lsa, asosidan boshlab hisoblanganda, uning yon tomonlarini qanday nisbatda bo'ladi?

A)($\sqrt{2}$-1):1   B)1:1   C)$\frac{1}{2}$:1

D)($\sqrt{3}$-1):1   E) ($2\sqrt{2}$-1):1

Yechilishi: $S_{\Delta CDE} = S_{trapetsiya ABED}$

$$\frac{S_{\Delta ABC}}{S_{\Delta DEC}} = \frac{S_{trapetsiya} + S_{\Delta DEC}}{S_{\Delta DEC}} = k^2 \Rightarrow$$

$$\Rightarrow S_{trapetsiya} = S_{\Delta DEC} \Rightarrow$$

$$\Rightarrow \frac{2S_{\Delta DEC}}{S_{\Delta DEC}} = k^2 \Rightarrow k^2 = 2 \Rightarrow k = \sqrt{2};$$

2) $\frac{AC}{DC} = k \Rightarrow \frac{AD+DC}{DC} = k \Rightarrow$

$$\Rightarrow \frac{AD}{DC} + 1 = \sqrt{2} \Rightarrow \frac{AD}{DC} = \sqrt{2} - 1 \Rightarrow AD:DC = (\sqrt{2} - 1):1.$$

Javobi: A.

103. $\vec{a} \ va \ \vec{b}$ vektorlar 120^0 burchak hosil qiladi. Agar $|\vec{a}| = 3$ va $\vec{b} = 5$ bo'lsa, $|\vec{a} - \vec{b}|$ ning qiymati qanchaga teng bo'ladi?

A)2 B)8 C)7 D)6 E)10

Yechilishi: $(\vec{a}, ^\wedge \vec{b}) = 120^0$; $|\vec{a}| = 3$; $\vec{b} = 5$; $|\vec{a} - \vec{b}| = ?$

$$|\vec{a} - \vec{b}|^2 = (\vec{a} - \vec{b})^2 = \vec{a}^2 - 2\vec{a}\vec{b} + \vec{b}^2 =$$

$$= |\vec{a}|^2 + |\vec{b}|^2 - 2|\vec{a}||\vec{b}| \cdot cos120° =$$

$$= 3^2 + 5^2 - 2 \cdot 3 \cdot 5 \cdot cos(90° + 30°) =$$

$$= 9 + 25 + 30 \cdot sin30° = 34 + 30 \cdot \frac{1}{2} = 49 \Rightarrow |\vec{a} - \vec{b}| = 7.$$

Javobi: C.

104. Uchburchakning uchlari $(2; 2), (3; 3)$ va $(1; 4)$ nuqtalarda joylashgan. Shu uchburchakning medianalari kesishgan nuqtasining koordinatalarini toping.

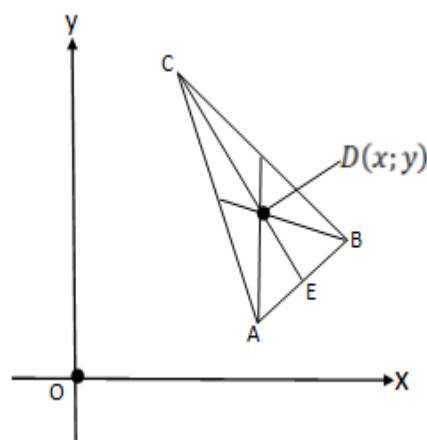A)(2;3) B)(2,5;3,5) C)(3,5;3)

D)(2;3,5) E)(1,5;2,5)

Yechilishi: $A(2; 2);$ $B(3; 3);$

$C(1; 4).$ $D(x; y) = ?$

$$\begin{cases} x = \frac{x_1 + x_2 + x_3}{3} = \frac{2+3+1}{3} = 2 \\ y = \frac{y_1 + y_2 + y_3}{3} = \frac{2+3+1}{3} = 3 \end{cases} \Rightarrow$$

$$\Rightarrow D(x; y) = D(2; 3).$$

Javobi: A.

105. $|x - 13| \cdot \log_2(x - 3) = 3(13 - x)$ tenglama ildizlatining yig'indisini toping.

A)39   B)130   C)169   D)24   E) 78

Yechilishi: $|x - 13| \cdot \log_2(x - 3) = 3(13 - x)$;

1) $x - 3 > 0 = x > 3$;   2) $x - 13 = 0 \Rightarrow x = 13$;

3) $x - 13 > 0 \Rightarrow (x - 13) \cdot \log_2(x - 3) = -3(x - 13) \Rightarrow$

$\Rightarrow \log_2(x - 3) = -3 \Rightarrow x - 3 = 2^{-3} \Rightarrow x = \frac{1}{8} + 3 = 3\frac{1}{8}$;

4) $x - 13 < 0 \Rightarrow (-x + 13) \cdot \log_2(x - 3) = 3(13 - x) \Rightarrow$

$\Rightarrow \log_2(x - 3) = 3 \Rightarrow x - 3 = 2^3 \Rightarrow x = 11$;

Demak, $x = 13$; $3\frac{1}{8}$; 11; $x = 3\frac{1}{8}$ chet ildiz;

  $x_1 + x_2 = 13 + 11 = 24$.   Javobi: D.

106. $\int_1^a (a - 4x)dx \geq 6 - 5a (a > 1)$ tengsizlikni qanoatlanturuvchi sonlar nechta?

A) 1   B) 2   C) 3   D) $\emptyset$ E) 4

Yechilishi: 1) $\int_1^a (a - 4x)dx = \int_1^a a\,dx - \int_1^a 4x\,dx =$

$= a \int_1^a dx - 4 \int_1^a x\,dx = ax \,|_1^a - 4 \cdot \frac{x^2}{2} \,|_1^a =$

$= ax|_1^a - 2x^2|_1^a = a[a - 1] - 2[a^2 - 1^2] =$

$= a^2 - a - 2a^2 + 2 = -a^2 - a + 2$;

2) $-a^2 - a + 2 \geq 6 - 5a \Rightarrow a^2 - 4a + 4 \leq 0 \Rightarrow$

  $a_{1,2} = 2 \pm \sqrt{4 - 4} = 2 \Rightarrow a = 2$.   Javobi: A.

107. Moddiy nuqta $S(t) = -\frac{7}{2}t^3 + 3t^2 - 5$ qonuniyat bo'yicha harakatlanayapti. Uning tezlanishi nolga teng bo'lganda, tezligi qanchaga teng bo'ladi?

A) 24   B) 18   C) 12   D) 6   E) 15

Yechilishi: $S(t) = -\frac{7}{2}t^3 + 3t^2 - 5$;

1) $v = S'(t) = -\frac{1}{6} \cdot 3t^2 + 3 \cdot 2t = -\frac{1}{2}t^2 + 6t \Rightarrow$

$\Rightarrow v = -\frac{1}{2}t^2 + 6t$;

2) $a = v' = S''(t) = \left(-\frac{1}{2}t^2 + 6t\right)' = -t + 6 \Rightarrow t = 6 \Rightarrow$

$\Rightarrow v = -\frac{1}{2} \cdot 6^2 + 6 \cdot 6 = -\frac{1}{2} \cdot 36 + 36 = 18 \Rightarrow v = 18$.

Javobi: B.

FOYDALANILGAN ADABIYOTLAR

1.O'zbekiston Respublikasi Prezidentining "Yoshlarni ma'naviy-axloqiy va jismoniy barkamol etib tarbiyalash, ularga ta'lim-tarbiya berish tizimini sifat jihatidan yangi bosqichga ko'tarish chora-tadbirlari to'g'risida"gi 2018-yil 14-avgustdagi PQ-3907 sojnli Qarori. - O'zbekiston Republikasi Prezidentining "Xalq ta'limi tizimiga oid farmon va qarorlari" to'plami. –Samarqand, 2018.

2.O'zbekiston Respublikasi Prezidentining "Xalq ta'limi tizimiga boshqaruvning yangi tamoyillarini joriy etish chora-tadbirlari to'g'risida"gi 2018-yil 5-sentabrdagi PQ-3931 sonli Qarori. - O'zbekiston Respublikasi Prezidentining "Xalq ta'limi tizimiga oid farmon va qarorlari" to'plami. –Samarqand, 2018.

3.O'zbekiston Respublikasi Prezidentining "Xalq ta'limi tizimini boshqarish tizimini takomillashtirish bo'yicha qo'shimcha chora-tadbirlari to'g'risida"gi 2018-yil 5-sentabrdagi PF-5538-sonli Farmoni. - O'zbekiston Respublikasi Prezidentining "Xalq ta'limi tizimiga oid farmon va qarorlari" to'plami. –Samarqand, 2018.

4.O'zbekiston Republikasi Prezidenti Shavkat Mirziyoyev huzurida 2019-yil 23-avgust kuni "Yoshlarni vatanparvarlik ruxida tarbiyalash va jamiyatda o'qituvchi mavqeini oshirish" masalalariga bag'ishlab o'tkazilgan videoselektr majlisi Bayoni. – 2019-yil 27-avgust, № 19750-hh.

5.2020-yil 24-yanvardagi O'zbekiston Respublikasi Prezidenti Shavkat Mirziyoyevning Oliy Majlisga Murojaatnomasi. –"Xalq so'zi" gazetasi. 2020-yil, 25-yanvar.

6. O'zbekiston Respublikasi Prezidentining "Matematika sohasidagi ta'lim sifatini oshirish va ilmiy-tadqiqotlarnirivojlantirish chora-tadbirlari to'g'risida"gi 2020-yil 7-maydagi PQ-4708-sonli Qarori.

7.O'zbek sovet ensiklopediyasi. 4-tom. –Toshkent, 1973.

8.Rahmatov M.A., Zaripov B.Z. Iste'dodli insonlar mamlakatning bebaho boyligidir. –Toshkent: "Zamin nashr" MChJ , 2019. – 160 bet.

9.Muxitdinov M.M., Ahmedov Sh.B., Xusanov N.O. Matematika: Algebraik tenglamalar va tengsizliklarga oid test savollari va ularning yechimlari. 1-kitob. -Toshkent: "Zamin nashr", 2019, -512 bet.

10.Muxitdinov M.M., Ahmedov Sh.B., Xusanov N.O. Matematika: Trigonometrik tenglamalar va tengsizliklar, xosila va integrallarga oid test savollari va ularning yechimlari. 2-kitob. -Toshkent: "Zamin nashr", 2019, -368 bet.

11.Muxitdinov M.M., Ahmedov Sh.B., Xusanov N.O. Matematika: Planimitriya va stereometriyaga oid test savollari va ularning yechimlari. 3-kitob. -Toshkent: "Zamin nashr", 2019, -312 bet.

12.Смышляев В.К. Развитие интереса к математике у учащихся старших классов (На материале внеклассной работы в школе-интернате). –Дис. … канд. пед.наук. – М.:1963.

13. Антонов Н.П., Вигодский М.Я., Никитин В.В., Санкин А.И. Элементар математика масалалари тўплами. – Тошкент: "Ўқитувчи" нашриёти. 1975. – 456 бет.

14. Ахборотнома. Ўқув юртларига кириш учун тест саволлари. –Тошкент, 2003.

15. Выгодский М.Я. Справочник по элементарной математике. – Москва: Наука, 1978. – 336 с.

16. Davronov P.Z., Raximov X.A., Moshonov M. Elementar matematikaning asosiy tushunchalari. – Samarqand, 2015. – 112 bet.

17. Jo'raev A. Matematikadan yon daftarcha. – Yakkabog', 2018. – 116 bet.

18. Куценко Э.Н., Мельникова Н.Н. Математикадан масалалар ечиш. 2 қисм. Геометрия масалалари. – Тошкент: "Ўқитувчи" нашриёти, 1987. – 136 бет.

19. Математика терминлари изоҳли луғати. –Т.: "Ўқитувчи" нашриёти, 1974. – 552 бет.

20. Мирзааҳмедов М.А., Сотиболдиев Д. Ўқувчиларни математик олимпиадаларга тайёрлаш. – Тошкент: "Ўқитувчи" нашриёти, 1993. – 424 бет.

M U N D A R I J A

Pirnazar DAVRONOV

MATEMATIKADAN

MISOL VA MASALALAR YECHISH

2-KITOB

"QAMAR MEDIA" NASHRIYOTI