Sonlar va amallar

1. Besh xonali $\overline{x853y}$ sonini 55 ga bo'lganda natural son hosil bo'ladi. x ning barcha qiymatlari yig'indisini toping.
A) 7 B) 11 C) 3 D) 14

2. $x; y; z$ butun sonlar bo'lib, $y < 0$ va $\frac{11}{12x} = -\frac{3}{4y} = \frac{12}{13z}$ bo'lsa, $x; y; z$ sonlarini o'sish tartibida joylashtiring.
A) $x < y < z$ B) $z < y < x$ C) $y < x < z$ D) $y < z < x$

Algebraik shakl almashtirishlar

3. $a^2 - b^2 + a + 7b - 12$ ko'phadning ko'paytuvchilaridan birini toping.
A) $a + b + 3$ B) $a + b - 4$ C) $a + b - 3$ D) $a + b + 4$

4. Agar $|a| \neq |b| \neq |c|$ va $\frac{a}{b+c} + \frac{b}{a+c} + \frac{c}{a+b} = -1$ bo'lsa, $\left(\frac{a^2}{b+c} + \frac{b^2}{a+c} + \frac{c^2}{a+b}\right) : (a + b + c)$ ning qiymatini toping.
A) 0   B) 2   C) -2 D) 1

5. Ifodani soddalashtiring:
$$\left(a^{\frac{1}{3}} + b + \frac{4b^2 - a^{\frac{2}{3}}}{\sqrt[3]{a} - b}\right) : \left(\frac{a^{\frac{1}{3}}}{\sqrt[3]{a^2} - b^2} - \frac{2}{\sqrt[3]{a} + b} \div \frac{1}{\sqrt[3]{a} - b}\right) \cdot \frac{2}{a^{\frac{1}{3}} + b}$$
A) $2b$ B) b C) $b \cdot \left(b - a^{\frac{1}{3}}\right)$ D) $2b : \left(a^{\frac{1}{3}} + b\right)$

6. Tenglama ildizlarining to'rtinchi darajalari yig'indisini toping. $x^2 + x - 1 = 0$.
A) 7   B) 3   C) 8   D) 4

7. Imtihonda belgilangan har bir to'g'ri javobga 4 ball berilib, har bir noto'g'ri javob uchun 1 ball chegiriladi. Belgilanmagan javoblar uchun ball berilmaydi ham, chegirilmaydi ham. Agar 50 ta savolli testdan o'quvchi 153 ball to'plagan bo'lsa, u nechta savolga javob belgilamagan?
A) 3 ta yoki 8 ta   B) 5 ta yoki 8 ta C) 5 ta yoki 9 ta   D) 5 ta yoki 3 ta

8. Arifmetik progressiyaning dastlabki 5 ta hadi yig'indisi 100 ga teng bo'lib, barcha hadlari natural sonlardan iborat. Bu progressiyaning eng kichik hadi nechaga teng bo'lishi mumkin?
A) $1 \leq a \leq 18$ B) $22 < a < 39$ C) $1 < a < 40$ D) $40 < a < 100$

9. $(\sin 161° + \sin 41°)(\sin 139° + \sin 19°) + (\sin 49° - \sin 109°)(\sin 131° - \sin 71°)$ ni soddalashtiring.
A) $\sin 22°$ B) 0   C) 1   D) $\cos 22°$

10. Hisoblang: $arcsin(sin17)$
A) 17   B) $17 - 5\pi$ C) $5\pi - 17$ D) 5π

11. Ifodani soddalashtiring:
$$\frac{1 - log_a^3 b}{(log_a b + log_b a + 1) \cdot log_a \frac{a}{b}} \cdot log_{b^2} a^4.$$
A) 8   B) 1   C) 4   D) 2

12. $2^x = 77$ bo'lsa, $|x - 7| + |x - 6|$ ifodani soddalashtiring.

A) $2x - 13$ B) 1 C) $13 - 2x$ D) -1

13. x ning qanday qiymatlarida $f(x) = \frac{|x^2 - 2x - 8|}{3} - \frac{2x^2}{x^2 - 16}$ funksiyaning hosilasi mavjud emas?

A) $-4; -2; 8$ B) $-2; 2; 4$ C) $-4; 2; 4$ D) $-4; -2; 4$

Tenglama va tengsizliklar

14. Tenglamani yeching: $x(x + 3) + (x + 3)\sqrt{\frac{x}{x+3}} - 2 = 0$.

A) -4 B) $-4; \frac{-3 + \sqrt{13}}{2}$ C) $-4; \frac{-3 + \sqrt{13}}{2}; \frac{-3 - \sqrt{13}}{2}$ D) $-4; 1$

15. Tenglamaning ildizlari ko'paytmasini toping:

$$\sqrt{21 - \sqrt{21 + x}} = x$$

A) 4 B) -20 C) -1 D) -5

16. $\left[\frac{2x-1}{3}\right] = x - 1$ tenglama nechta yechimga ega(bu yerda $[a] - a$ *ning butun qismi*).

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

17. $x^9|x^2 + 4x + 4| < 0$ tengsizlik $[-8; 1]$ kesmada nechta butun yechimga ega?

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

18. Tenglamalar sistemasini yeching:

$$\begin{cases} x \cdot 2^x - y \cdot 4^y = x \cdot 4^y - y \cdot 2^x \\ 3^x \cdot 9^y = 81 \end{cases}$$

A) $(-4; 4), (-2; 1)$ B) $(-4; 4), (2; 1)$ C) $(-4; -4), (2; 1)$ D) $(4-; 4), (-2; -1)$

19. Tenglamani yeching: $2\cos\left(2x + \frac{\pi}{9}\right) + \sqrt{3} = 0$.

A) $\begin{aligned} &x = -\frac{17\pi}{36} + 2\pi n, n \in \mathbb{Z}; \\ &x = \frac{13\pi}{36} + 2\pi k, k \in \mathbb{Z} \end{aligned}$ B) $\begin{aligned} &x = -\frac{17\pi}{36} + \pi n, n \in \mathbb{Z}; \\ &x = \frac{13\pi}{36} + \pi k, k \in \mathbb{Z} \end{aligned}$

C) $\begin{aligned} &x = \frac{17\pi}{36} + \pi n, n \in \mathbb{Z}; \\ &x = -\frac{13\pi}{36} + \pi k, k \in \mathbb{Z} \end{aligned}$ D) $\begin{aligned} &x = -\frac{17\pi}{18} + \pi n, n \in \mathbb{Z}; \\ &x = \frac{13\pi}{36} + \pi k, k \in \mathbb{Z} \end{aligned}$
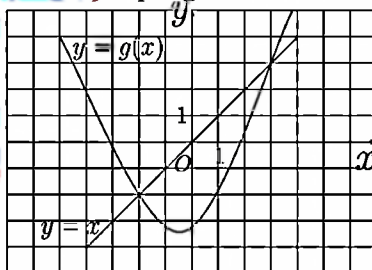
Funksiyalar

20. Agar $f(x) = (a + b - 4) \cdot x^3 + 2 \cdot x^2 + (b - 3) \cdot x$ juft funksiya berilgan bo'lsa, $f(b)$ ning qiymatini toping.

A) 18 B) 24 C) 7 D) 20

21. Chizmada $[-5; 4]$ kesmada berilgan $y = g(x)$ funksiya grafigi tasvirlangan. $g(x) \geq x$ tengsizlikni qanoatlantiradigan x ning barcha qiymatlarini toping.

A) $[-4; -2] \cup [3; 4]$ B) $[-5; -2] \cup [3; 4]$ C) $[-5; -3] \cup [2; 4]$ D) $[-2; 3]$

Matematik analiz asoslari

22. $y = x^2 - 4x + 5$ funksiya grafigining $(-1; 2)$ nuqtaga nisbatan simmetrik bo'lgan tenglamasini tuzing.

A) $y = -x^2 + 8x - 13$ B) $y = -x^2 - 8x - 17$ C) $y = -x^2 - 8x - 13$ D) $y = x^2 - 8x - 17$

23. $y = x^2 - |2x - 4|$ funksiya grafigiga $x = 3$ va $x = -3$ nuqtalarda o'tkazilgan urinmalarning orasidagi burchakni toping.

A) $arctg\frac{8}{15}$ B) $arctg\frac{12}{5}$ C) $arctg\frac{4}{3}$ D) $\frac{\pi}{4}$

Geometriya

24. To'g'ri burchakli uchburcha katetlari a va b ga teng, hamda a tomon qarshisidagi o'tkir burchak x ga teng bo'lsa, $cosx$ ni toping.

A) $\frac{a}{b}$ B) $\frac{b}{a}$ C) $\frac{a}{\sqrt{a^2+b^2}}$ D) $\frac{b}{\sqrt{a^2+b^2}}$

25. Muntazam uchburchakli prizmaga silindr ichki chizilgan. Agar prizmaning asosining tomoni $2\sqrt{3}$, balandligi 4 ga teng bo'lsa, silindr to'la sirtini toping.

A) 8π B) 9π C) 10π D) $8\sqrt{3}\pi$

26. Tomoni 18 ga teng bo'lgan $ABCD$ kvadrat berilgan. M nuqta BC tomonni teng ikkiga, N nuqta DC tomonni 2:1 nisbatda bo'ladi. $ABMN$ to'rtburchak yuzini toping.

A) 144   B) 189   C) 169   D) 196

27. Asoslari a va b, diagonallari m va n bo'lgan trapetsiya uchun $m^2 + n^2 = (a + b)^2$ bo'lsa, trapetsiyaning diagonallari orasidagi burchakni toping.

A) $60°$ B) $45°$ C) $30°$ D) $90°$

28. Teng yonli uchburchakning yon tomonlari a va asosi b ga teng bo'lsa, unga ichki va tashqi chizilgan aylana markazlari orasidagi masofani toping.

A) $\frac{a^2+ab}{\sqrt{4a^2-b^2}}$ B) $\frac{a^2-ab}{\sqrt{4a^2+b^2}}$ C) $\frac{a^2-ab}{\sqrt{4a^2-b^2}}$ D) $\frac{a^2+ab}{\sqrt{4a^2+b^2}}$

29. Koordinatalar tekisligida $|x + 3| + |y - 1| \le 2$ tengsizlik-ning yechimlari hosil qilgan soha yuzini toping.

A) 4   B) 12   C) 8   D) 32

30. Konusning balandligi 12 ga o'q kesimining perimetri 36 ga teng. Konus asosining markazidan yon sirtigacha bo'lgan masofani toping

A) 4,8   B) $\frac{30}{13}$ C) $\frac{60}{13}$ D) 6,4

To'plam, mulohazalar, ma'lumotlar tahlili, kombinatorika, ehtimollar nazariyasi va modellashtirish

31. 9 ta xatni 9 xil joyga 2 ta pochta hodimi necha xil usul bilan tarqatishi mumkin?
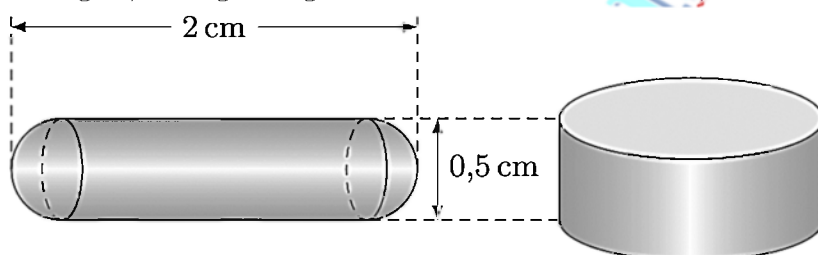
A) 162   B) 512   C) 1024   D) 81

32. Qutida 45 ta shar bor. Ulardan 17 tasi oq bo'lib, 2 ta oq bo'lmagan shar yo'qolib qoldi. Qutidan bitta shar olinganda oq bo'lish ehtimolini toping.

A) $\frac{17}{45}$ B) $\frac{17}{43}$ C) $\frac{17}{47}$ D) $\frac{17}{37}$

Geometriya (moslashtirishni talab qiladigan testlar)

Topshiriqlar $(33 - 35)$ **va javob varianatlari** $(A - F)$ **ni o'zaro moslashtiring.**

Quyidagi rasmda to'la sirti yuzlari teng bo'lgan ikkita turli shakldagi dorilar tasvirlangan. 1-rasmda ikki yoni ikki yarimshardan va o'rta qismi silindrsimon bir butun jismdan iborat bo'lgan kapsulali dori tasvirlangan. Uning umumiy uzunligi 2 cm ga va yarimshardan iborat bo'lgan qismining diametri esa 0,5 cm ga teng. 2-rasmda tasvirlangan silindrsimon tabletkaning balandligi 0,5 cm ga teng.

| A) $\frac{11}{32}$ |
| B) $\frac{3}{2}$ |
| C) $\frac{3}{8}$ |
| D) $\frac{1}{2}$ |
| E) $2\frac{1}{4}$ |
| F) $1\frac{1}{2}$ |

1-rasm   2-rasm

33. 2-rasmdagi silindrsimon tabletka asosining radiusini (cm)toping.

34. 2-rasmda tasvirlangan tabletkaning yon sirti yuzini (cm2) toping. ($\pi \approx 3$ deb oling)

35. 1-rasmda tasvirlangan tabletkaning hajmini (cm³)toping. ($\pi \approx 3$ deb oling)

Tenglama va tengsizliklar

36. Funksiya berilgan: $\quad y = \sqrt{log_{\frac{1}{5}}(x^2 - 2x + 1) + 1}$

a) Funksiyaning aniqlanish sohasini toping.
*Javob a)*_____

b) Funksiyaning aniqlanish sohasiga kiruvchi butun sonlar yig'indisini toping.
*Javob b)*_____

37. $\sqrt[3]{x - 3} + \sqrt[3]{x^2 - 9} = \sqrt[3]{x^2 + x - 12}$ tenglamani yeching

a) Tenglamaning nechta haqiqiy ildizi bor?
*Javob a)*_____

b) Tenglamaning barcha haqiqiy ildizlari yig'indisini toping.
*Javob b)*_____

Funksiyalar

38. Agar $x \neq 0$ da $3 \cdot f(x) + f\left(\frac{1}{x}\right) = 8x$ tenglik o'rinli bo'lsa,

a) $f(x) = 2$ tenglamaning haqiqiy ildizlari yig'indisini toping.
*Javob a)*_____

b) $y = f(x)$ funksiya uchun grafigi $A(1; 2)$nuqtadan o'tadigan boshlang'ich funksiyani toping.
*Javob b)*_____

Matematik analiz asoslari

39. Agar a va b natural sonlar uchun

$$3\sqrt{2 + \sqrt{2 + \sqrt{3}}} = a \cdot \cos\frac{\pi}{b}$$

tenglik o'rinli bo'lsa,

$a)$ $a + b$ ni toping.

*Javob a)*_____

$b)$ $\sin\frac{x}{a} = 0$ tenglamaning $[-7\pi; 7]$ kesmada nechta ildizi bor?

*Javob b)*_____

40. $M(2; -50)$ nuqtadan $f(x) = 7x^2 - 7x - 1$ funksiya grafigiga ikkita urinma o'tkazilgan.
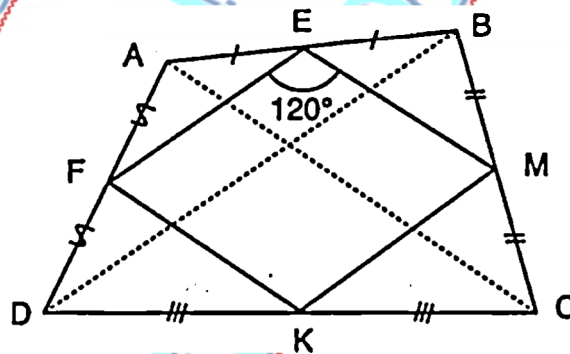
$a)$ Urinish nuqtalar absissalarining yig'indisini toping.

*Javob a)*_____

$b)$ Ox o'qi bilan o'tkir burchak hosil qilgan urinma tenglamasini toping.

*Javob b)*_____

Geometriya

41. Qavariq ABCD to'rtburchak va uning o'rtalarini tutashtiruvchi KFME to'rtburchak berilgan. AC=8, BD=6 ga teng.
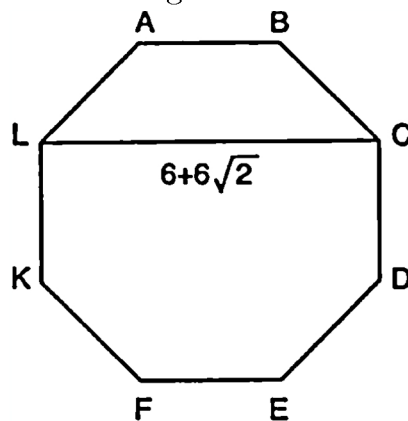

$a)$ KFME to'rtburchak yuzini toping.

*Javob a)*_____

$b)$ KFME to'rtburchak perimetrini toping.

*Javob b)*_____
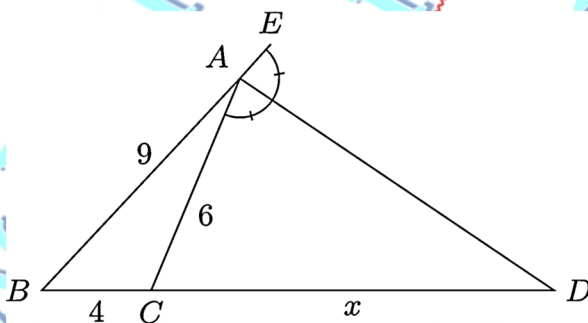
42. ABCDEFKL muntazam sakkizburchak berilgan.

a) AB ni toping.

Javob a)_____

b) Muntazam sakkizburchak yuzini toping.

Javob b)_____

43. AD-tashqi bissektrissa.

a) CD=x ni toping.   8

Javob a)_____

b) AD bissektrissa uzunligini toping.

Javob b)_____

44. Teng yonli uchburchakning yon tomonlari 17 va asosi 16 ga teng. Shu uchburchakni o'zining simmetriya o'qi atrofida 360° aylantirishdan hosil bo'lgan jismning

a) To'la sirti yuzini toping.

Javob a)_____

b) Hajmini toping.

Javob b)_____

To'plam, mulohazalar, ma'lumotlar tahlili, kombinatorika, ehtimollar nazariyasi va modellashtirish

45. Hajmi $0{,}5\,\text{m}^3$ bo'lgan muntazam to'rtburchakli prizma shaklidagi quticha yasash uchun temir tunukadan foydalanildi. Bunda ostki asosi uchun $1\,\text{m}^2$ 210000 so'mlik, qolgan yoqlari uchun esa $1\,\text{m}^2$ 30000 so'mlik tunuka sotib olindi.

a) Bunda eng kam harajat ketishi uchun prizma asosining tomoni qanday bo'lish kerak?
Javob a)_____

b) Qutichani yasash uchun jami qancha pul sarflangan?
Javob b)_____