2017-yil matematika variant yechimlari (spectrum)

15-variant

Bizning kanal : @axborotnoma

Adminsratorlar hayati : @axborotnoma_bot

Matematika yordam guruhi : @axborotnomaguruhi

Reklama xizmati : @axborotnoma_reklama

15-variant

1. Qarang: 8-variant 3-savol (60-bet).

2. $x^2 + y^2 - 6x + 8y = 0$ aylana va $4x + 3y = 0$ to'g'ri chiziq kesishishidan hosil bo'lgan vatar uzunligini toping.

Yechish:

$$\begin{cases} x^2 + y^2 - 6x + 8y = 0 \\ 4x + 3y = 0 \end{cases}$$

Aylana tenglamasini quyidagi ko'rinishda yozib olamiz: $x = -\frac{3}{4}y$

$$\frac{9}{16}y^2 + y^2 + {}^{3}6 \cdot \frac{3}{4_2}y + 8y = 0$$

$$\frac{25}{16}y^2 + \frac{27}{2}y = 0$$

$$y_1 = 0$$

$$\left(\frac{25}{16}y + \frac{25}{2}\right) = 0$$

$$x_1 = 0 \Rightarrow y_2 = -\frac{25}{2} : \frac{25}{16} = \frac{-25 \cdot 8}{25} = 8$$

$$x_2 = -\frac{3}{4} \cdot 8 = -6$$

Aylana va to'g'ri chiziq $A(0; 0)$ *va* $B(8; -6)$ *nuqtalarda kesishishadi:*

$$|AB| = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2} =$$

$$= \sqrt{64 + 36} = \sqrt{100} = 10.$$

Javob: 10.

3. $x^2 + 100x + 1 = 0$ kvadrat tenglamaning haqiqiy yechimlari $x^2 + mx + n = 0$ tenglamaning haqiqiy yechimlarining kublariga teng. $m^3 - 3mn$ ning qiymatini toping.

Yechish:

1) $x^2 + 100x + 1 = 0$ tenglamaning yechimlari x_1, x_2 bo'lsin: $\begin{cases} x_1 + x_2 = -100 \\ x_1 \cdot x_2 = 1 \end{cases}$

2) $x^2 + mx + n = 0$ tenglamaning yechimlari y_1, y_2 bo'lsin:

$\begin{cases} y_1 + y_2 = -m \\ y_1 \cdot y_2 = n \end{cases}$

3) $x_1 = y_1^3$, $x_2 = y_2^3$ misol shartga ko'ra:

$x_1 + x_2 = y_1^3 + y_2^3$

$-100 = (y_1 + y_2)(y_1^2 - y_1y_2 + y_2^2) =$

$= -m((y_1 + y_2)^2 - 3y_1y_2)$

$100 = m(m^2 - 3n)$

$100 = m^3 - 3mn.$

Javob: 100.

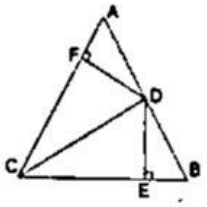
4. Qarang: 9-variant 22-savol (71-bet).

5. Qarang: 2-variant 12-savol (14-bet).

6. Qarang: 7-variant 29-savol (58-bet).

7. Teng tomonli ABC uchburchakning AB tomonidan olingan D nuqtadan AC va BC tomonlariga perpendikulyar tushirilgan. $|DF| \perp |AC|, |DE| \perp |BC|$, $|DF| = \sqrt{3}$, $|DE| = 2\sqrt{3}$ bo'lsa |DC| ni toping.

Yechish:



ABC – teng tomonli uchburchak.

$\angle A = \angle B = \angle C = 60°$

$DF \perp AC$, $DE \perp BC$,

$DF = \sqrt{3}$, $DE = 2\sqrt{3}$

ΔAFD to'g'ri burchakli $AF = x$,

$AD = 2x$, $DF = \sqrt{3}\,x$, $DF = \sqrt{3} = \sqrt{3}\,x$, $x = 1$

ΔDEB to'g'ri burchakli

$BE = y$, $DB = 2y$, $DE = \sqrt{3}\,y$

$DE = 2\sqrt{3} = \sqrt{3}\,y$, $y = 2$

$AB = 2x + 2y = 2(x + y) = 2(1 + 2) = 6$

ΔCED to'g'ri burchakli $CD^2 = CE^2 + DE^2$

$CE = CB - EB = 6 - 2 = 4$

$$CD = \sqrt{4^2 + (2\sqrt{3})^2} = \sqrt{16 + 12} = \sqrt{28} = 2\sqrt{7}.$$

Javob: $2\sqrt{7}$.

8. To'g'ri burchakli uchburchakda gipotenuza va kichik kateti yig'indisi 27 ga teng. Agar katta kateti $9\sqrt{3}$ ga teng bo'lsa, unga tashqi chizilgan doira yuzini toping.

Berilgan:

ABC – to'g'ri burchakli uchburchak

$AB = c$

$AC = b$

$BC = a$

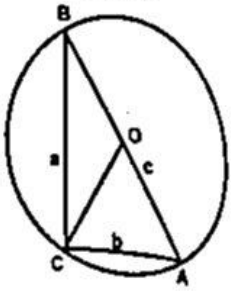
$c + b = 27$

$a = 9\sqrt{3}$

$R = ?$

$S_d = ?$

Yechish:



$R = CO = AB/2 = c/2$

Pifagor teoremasiga ko'ra

$c^2 = a^2 + b^2$, $b = 27 - c$

$c^2 = (9\sqrt{3})^2 + (27 - c)^2$

$c^2 - (27 - c)^2 = 81 \cdot 3$

$27 \cdot (2c - 27) = 81 \cdot 3$

$2c - 27 = 9$, $2c = 36$, $c = 18$

$$R = \frac{c}{2} = \frac{18}{2} = 9$$

$S_d = \pi R^2 = \pi \cdot 9^2 = 81\pi.$

Javob: 81π.

9. Qarang: 10-variant 15-savol (78-bet).

10. Qarang: 12-variant 28-savol (95-bet).

11. $5\frac{1}{3}x : \frac{5}{8} = 11\frac{1}{3} : 1\frac{8}{9}$ tenglamani yeching.

Yechish:

$a:b = c:d$ proporsiya

$$a = \frac{c \cdot b}{d}$$

$$5\frac{1}{3}x = 11\frac{1}{3} \cdot \frac{5}{8} : 1\frac{8}{9}$$

$$x = \frac{34}{3} \cdot \frac{5}{8} \cdot \frac{9}{17} : 5\frac{1}{3} = \frac{5 \cdot 3}{4} \cdot \frac{3}{16} = \frac{45}{64}.$$

Javob: $\frac{45}{64}$.

12. $\sqrt{x+1}+|x-4|\le 6$ tengsizlikning butun sonlardan iborat yechimlari yig'indisini toping.

Ja Yechish:

1) *aniqlanish sohasi:* $x+1\ge 0,\ x\ge -1$

2) $-1\le x<4$ da $|x-4|=4-x$

$\sqrt{x+1}+4-x\le 6$

$\sqrt{x+1}\le 2+x$

$x+1\le 4+4x+x^2$

$x^2+3x+3\ge 0,$

$x\in R,\ [-1;\ 4)$

3) $x\ge 4$ da $|x-4|=x-4$

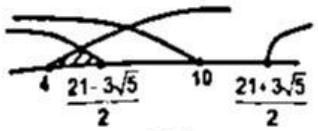
$\sqrt{x+1}+x-4\le 6$

$\sqrt{x+1}\le 10-x,\ -x\ge -10,\ x\le 10$

$x+1\le 100-20x+x^2$

$x^2-21x+99\ge 0$

$$x_{1,2}=\frac{21\pm\sqrt{45}}{2}=\frac{21\pm 3\sqrt{5}}{2}$$



$$\left[4;\frac{21-3\sqrt{5}}{2}\right]$$

Tengsizlikning yechimi $\left[-1;\frac{21-3\sqrt{5}}{2}\right]$.

Butun yechimlari $-1,\ 0,\ 1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7.$

Yig'indisi $-1+0+1+2+3+4+5+6+7=27.$

Javob: 27.

13. Qarang: 9-variant 11-savol (69-bet).

14. Hisoblang: $\dfrac{\left(5\frac{4}{45}-4\frac{1}{6}\right):5\frac{8}{15}}{\left(4\frac{2}{3}+0{,}75\right)\cdot 3\frac{9}{13}}$.

Yechish:

$$1)\left(5\frac{4}{45}-4\frac{1}{6}\right):5\frac{8}{15}=\left(5\frac{8}{90}-4\frac{15}{90}\right)\cdot\frac{15}{83}=$$

$$=\left(4\frac{98}{90}-4\frac{15}{90}\right)\cdot\frac{15}{83}=\frac{83}{90}\cdot\frac{15}{83}=\frac{1}{6}$$

$$2)\left(4\frac{2}{3}+0{,}75\right)\cdot 3\frac{9}{13}=\left(4\frac{2}{3}+\frac{3}{4}\right)\cdot\frac{48}{13}=$$

$$=4\frac{8+9}{12}\cdot\frac{48}{13}=\frac{65}{12}\cdot\frac{48}{13}=20$$

$$3)\ \frac{1}{6}:20=\frac{1}{6}\cdot\frac{1}{20}=\frac{1}{120}.$$

Javob: $\dfrac{1}{120}$.

15. $\log_x\sqrt{5}+\log_x(5x)-2{,}25=(\log_x\sqrt{5})^2$ tenglamani yeching.

Yechish:

$\log_x\sqrt{5}+\log_x(5x)-2{,}25=(\log_x\sqrt{5})^2$

logarifm xossasidan foydalanib yechamiz.

1) $\log_x\sqrt{5}=\frac{1}{2}\log_x 5,\ x>0,\ x\ne 1$

2) $\log_x 5x=\log_x 5+\log_x x=\log_x 5+1$

3) $(\log_x\sqrt{5})^2=(\frac{1}{2}\log_x 5)^2=\frac{1}{4}\log_x^2 5$

4) $\frac{1}{2}\log_x 5+\log_x 5+1-2{,}25=\frac{1}{4}\log_x^2 5$

$\log_x 5=a$

$\frac{a}{2}+a-1{,}25=\frac{1}{4}a^2$

$6a-5=a^2\to a^2-6a+5=0$

$a=1,\ a=5$

5) $\log_x 5=1,\ x=5$

$\log_x 5=5,\ x=\sqrt[5]{5}$.

Javob: $\sqrt[5]{5}$; 5.

16. Qarang: 8-variant 8-savol (60-bet).

17. $\begin{cases}|4+x|\le 7\\ |2x+3|\ge 9\end{cases}$ tengsizliklar sistemasi nechta butun yechimga ega?

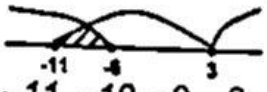
Yechish:

1) $|4+x|\le 7,\ -7\le 4+x\le 7,\ -11\le x\le 3$

2) $|2x+3|\ge 9\Leftrightarrow\begin{cases}2x+3\ge 9\\ 2x+3\le -9\end{cases}\Rightarrow$

$$\Rightarrow\begin{cases}2x\ge 6\\ 2x\le -12\end{cases}\Rightarrow\begin{cases}x\ge 3\\ x\le -6\end{cases}$$

3) yechimlarni umumlashtiramiz:



$-11, -10, -9, -8, -7, -6$, 3·7 ta butun yechimga ega.

Javob: 7.

18. **Qarang: 12-variant 21-savol (93-bet).**

19. $\sqrt[x^2]{a^3}\cdot\sqrt[2x-2]{a}\cdot\sqrt[4]{a^{-1}}=1$ tenglamani yeching.

Yechish:

1) Ildiz xossasiga ko'ra: $a^n\cdot a^k=a^{n+k}$

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

$$a^{\frac{3}{x^2-1}+\frac{1}{2x-2}-\frac{1}{4}}=a^0$$

2) $\frac{3}{x^2-1}+\frac{1}{2x-2}-\frac{1}{4}=0,\ x\neq\pm1$

$$\frac{3}{(x-1)(x+1)}+\frac{1}{2(x-1)}-\frac{1}{4}=0$$

$12+2(x+1)-(x^2-1)=0$

$12+2x+2-x^2+1=0,$

$x^2-2x-15=0.$

$x=-3,\ x=5.$

Javob: –3 va 5.

20. Ifodani soddalashtiring:

$$\left(\frac{9}{8}\sqrt{12}-4{,}5\sqrt{0{,}5}+2\frac{1}{4}\sqrt{2}-\frac{45}{8}\sqrt{\frac{1}{3}}\right):\frac{9}{4}\sqrt{\frac{1}{6}}.$$

Yechish:

$$\left(\frac{9}{8}\sqrt{12}-4{,}5\sqrt{0{,}5}+2\frac{1}{4}\sqrt{2}-\frac{45}{8}\sqrt{\frac{1}{3}}\right):\frac{9}{4}\sqrt{\frac{1}{6}}=$$

$$=\left(\frac{9}{8}2\sqrt{3}-\frac{9}{2}\cdot\frac{\sqrt{2}}{2}+\frac{9}{4}\sqrt{2}+\frac{9}{4}\sqrt{2}-\frac{45}{8}\cdot\frac{\sqrt{3}}{3}\right):$$

$$:\frac{9}{4}\frac{\sqrt{6}}{6}=\left(\frac{9\sqrt{3}}{4}-\frac{9\sqrt{2}}{4}+\frac{9\sqrt{2}}{4}-\frac{15\sqrt{3}}{8}\right):$$

$$:\frac{3\sqrt{6}}{8}=\frac{3\sqrt{3}}{8}\cdot\frac{8}{3\sqrt{6}}=\frac{1}{\sqrt{2}}=\frac{\sqrt{2}}{2}.$$

Javob: $\frac{\sqrt{2}}{2}$.

21. **Qarang: 12-variant 14-savol (92-bet).**

22. Agar $f(x)=ax^3+4x^2+b$ va $f'(2)=28$ bo'lsa, a ni toping.

Yechish:

$f(x)=ax^3+4x^2+b$ funksiyaning hosilasini topamiz:

$f'(x)=3ax^2+8x$

$f'(2)=3\cdot a\cdot 4+16=28$

$12a=12\Rightarrow a=1.$

Javob: 1.

23. $3-4\sin^2\alpha$ ifodani ko'paytma ko'rinishiga keltiring.

Yechish:

$3-4\sin^2\alpha$ ko'paytuvchilarga ajratamiz.

1) $\sin^2 a=\frac{1-\cos 2\alpha}{2}$

2) $3-4\cdot\frac{1-\cos 2\alpha}{2}=3-2+2\cos 2\alpha=$

$=1+2\cos 2\alpha=3\cos^2\alpha-\sin^2\alpha$

3) $(\sqrt{3}\cos\alpha-\sin\alpha)(\sqrt{3}\cos\alpha+\sin\alpha)=$

$$=4\cdot\left(\frac{\sqrt{3}}{2}\cos\alpha-\frac{1}{2}\sin\alpha\right)\cdot\left(\frac{\sqrt{3}}{2}\cos\alpha+\frac{1}{2}\sin\alpha\right)=$$

$=4\sin(60°-\alpha)\cdot\sin(60°+\alpha).$

Javob: $4\sin(60°-\alpha)\cdot\sin(\alpha+60°)$.

24. **Qarang: 1-variant 17-savol (6-bet).**

25. **Qarang: 11-variant 2-savol (82-bet).**

26. $\log_2 10\cdot\lg 8$ dan katta bo'lmagan natural sonlar nechta?

Yechish:

$$\log_2 10\cdot\lg 8=\frac{1}{\log_{10}2}\cdot\lg 8=\frac{\lg 8}{\lg 2}=$$

$$=\frac{\lg 2^3}{\lg 2}=\frac{3\lg 2}{\lg 2}=3$$

3 dan katta bo'lmagan natural sonlar 1 va 2 2 ta.

Javob: 2.

27. Agar $\alpha=7^{200}$ va $b=2^{700}$ bo'lsa, quyidagi munosabatlardan qaysi biri o'rinli bo'ladi?

Yechish:

$a = 7^{200}$, $b = 2^{700}$

$a = (7^2)^{100} = 49^{100}$

$b = (2^7)^{100} = 128^{100}$

$7^{200} < 2^{700}$, $a < b$.

Javob: a < b.

28. Qavariq to'rtburchakning ikkita ichki burchaklarning yig'indisi 110° ga, qolgan ikkita burchaklarning ayirmasi esa 20° ga teng. Eng katta burchakni toping.

Yechish:

Qavariq to'rtburchak burchaklari

$\alpha_1, \alpha_2, \alpha_3, \alpha_4$.

$$\begin{cases} \alpha_1 + \alpha_2 = 110^\circ \\ \alpha_3 - \alpha_4 = 20^\circ \\ \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 = 360^\circ \end{cases}$$

$\alpha_3 + \alpha_4 = 250^\circ$.

$\alpha_3 = 135^\circ$, $\alpha_4 = 115^\circ$.

$\alpha_1 + \alpha_2 = 110^\circ$.

Eng katta burchak 135°.

Javob: 135°.

29. $x^2 - (k + 1)x + k^2 + k - 22 = 0$ tenglama ildizlaridan biri 2 dan katta, ikkinchisi esa 2 dan kichik bo'lsa, k ning butun qiymatlari yig'indisini toping.

Yechish:

$x^2 - (k + 1)x + k^2 + k - 22 = 0$

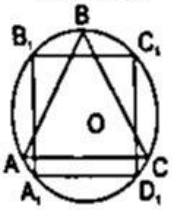
$x_1 > 2$, $x_2 < 2$

k ning butun qiymatlari yig'indisini toping.

Javob: a < b.

30. Tomoni 2 ga teng bo'lgan muntazam uchburchakka tashqi aylana chizilgan. Shu aylanaga ichki chizilgan kvadratning perimetrini toping.

Yechish:



ΔABC *muntazam*

$AB = 2$

$A_1B_1C_1D_1$ *– kvadrat*

$P_k = ?$

1) $A_1B_1C_1D_1$ *– kvadrat*

$A_1B_1 = a$

2) muntazam uchburchakka tashqi chizilgan aylana radiusi $R = \frac{b}{\sqrt{3}}$, $b = 2$,

$R = \frac{2}{\sqrt{3}}$.

3) kvadratga tashqi chizilgan aylana radiusi

$R = \frac{A_1C_1}{2}$

$A_1C_1 = a\sqrt{2}$,

$R = \frac{a\sqrt{2}}{2}$,

$a = R\sqrt{2}$.

$a = \frac{2}{\sqrt{3}} \cdot \sqrt{2} = \frac{2\sqrt{6}}{3}$

4) $P = 4a = 4 \cdot \frac{2\sqrt{6}}{3} = \frac{8\sqrt{6}}{3}$.

Javob: $\frac{8\sqrt{6}}{3}$.

31. Qarang: 11-variant 32-savol (87-bet).

32. HTML tilida Web sahifaga yuguvchan chiziq joylashtirish uchun qaysi teg ishlatiladi?

Yechish:

HTML – tilida veb sahifada yuguruvchan chiziq o'rnatish uchun <Marquee> </Marque> juft tegi ishlatiladi.

Javob: <Marquee> va </Marquee>.

33. Qarang: 3-variant 32-savol (27-bet).

34. Qarang: 14-variant 35-savol (111-bet).

35. Quyidagi mantiqiy tenglamaning yechimlari sonini aniqlang:
¬A ∨ B ∧ C = yolg'on

Yechish:

A	B	C	D= B ∧ C	¬A ∨ D
0	0	0	0	1
0	0	1	0	1
0	1	0	0	1
0	1	1	1	1
1	0	0	0	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

Javob: 3.

36. MS Excel. A1 = 23, B1 = 9 bo'lsa, =?(Остат(A1;B1)* *??(Сцепить(A1; " ";B1; " "));2) formulaning natijasi 25 bo'lishi uchun ? va ?? belgilarining o'rniga qo'yish mumkin bo'lgan funksiyalar to'g'ri berilgan javobni aniqlang.

Yechish:

ЛЕВСИМВ(matn; belgi soni)	*Matnning chap tomonidagi berilgan sondagi belgilarni ajratib oladi*
ЗНАЧЕН(matn)	*Matn ko'rinishidagi sonni songa o'tkazadi*
ДЛСТР(matn)	*Matndagi belgilar sonini aniqlaydi*
СТЕПЕНЬ(son; daraja ko'rsatkichi)	*Sonni darajaga ko'taradi*
СРЗНАЧ(son1; son2;...)	*son1, son2, ... larning o'rta arifmetik qiymatini aniqlaydi*
ЗНАК(son)	*Son manfiy bo'lsa –1, 0 bo'lsa 0, musbat bo'lsa, 1 qiymatga teng*
СЦЕПИТЬ(matn1; matn2;...)	*Bir nechta matnlarni ketma-ket ulaydi*
ОСТАТ(son; bo'luvchi)	*Sonni bo'luvchiga bo'lgandagi qoldiqni hisoblaydi*

=?(ОСТАТ(A1;B1)??(СЦЕПИТЬ(A1; " ";B1; " "));2) formuladan aniq ifodalarning qiymatlarini hisoblaymiz:*
1) =ОСТАТ(A1;B1) – A1 ni B1 ga bo'lgandagi qoldiqni aniqlaydi.
ОСТАТ(A1;B1) = Остат(23;9)=5
2) =СЦЕПИТЬ(A1; " ";B1; " ") – A1; " ";B1; " " satr kattaliklarni birin-ketin ulaydi.
СЦЕПИТЬ(A1; " ";B1; " ")= "23 9 " 5 ta belgidan iborat satrni hosil qiladi.
Natijamiz 25 ga teng bo'lishi uchun =ОСТАТ(A1;B1)??(СЦЕПИТЬ(A1; " ";B1; " ")) satrda "25" qismsatr uchrashi kerak. Demak, ?? o'rniga ДЛСТР funksiyasidan foydalanamiz:*
*=ОСТАТ(A1;B1)*ДЛСТР(СЦЕПИТЬ(A1; " ";B1; " "))=5*5=25 bo'ladi.*
Shunda ЛЕВСИМВ funksiyasidan foydalanib chapdan 2 ta simvolni ajratib olsak, formula natijasi 25 ga teng bo'ladi.
*=ЛЕВСИМВ(ОСТАТ(A1;B1)*ДЛСТР(СЦЕПИТЬ(A1; " ";B1; " "));2)=25*

Javob: Левсимв, Длстр.