Milliy sertifikat: matematika — namuna variant javoblari bilan

Rasmiy imtihon formati: **45 ta topshiriq, 150 daqiqa**. Bu variant: **45 ta topshiriq, 150 daqiqa**. Yopiq savollarda bitta to‘g‘ri javobni belgilang, ochiq savollarga qisqa javob yozing. Javoblar kaliti va izohlar oxirida.
Shu variantni **online** yechib, taxminiy ball va darajangizni bilish: talimtelekanali.uz/uz/milliy-sertifikat/matematika/

1. 84 va 126 sonlarining eng katta umumiy bo‘luvchisini (EKUB) toping.

A) 21 **B)** 42
C) 14 **D)** 252

2. Ifodaning qiymatini toping: $\left(\frac{3}{4}-0{,}5\right)\cdot 2{,}4+\frac{1}{5}$.

A) $0{,}6$ **B)** $-0{,}25$
C) $0{,}8$ **D)** $0{,}65$

3. Mahsulotning narxi $80\,000$ so‘m edi. Unga 15% chegirma qilindi. Mahsulotning yangi narxi necha so‘m?

A) $68\,000$ **B)** $12\,000$
C) $65\,000$ **D)** $92\,000$

4. 6 nafar ishchi bir xil unumdorlik bilan ishlab, ishni 12 kunda tugatadi. Xuddi shunday unumdorlikdagi 8 nafar ishchi shu ishni necha kunda tugatadi?

A) 16 **B)** 10
C) 14 **D)** 9

5. Ifodaning qiymatini toping: $\frac{2^7\cdot 4^3}{8^4}$.

A) 4 **B)** 2
C) $\frac{1}{2}$ **D)** 8

6. Kasrni qisqartiring: $\frac{x^2-9}{x^2+3x}$ ($x\neq 0$, $x\neq -3$).

A) $\frac{x-3}{x}$ **B)** $\frac{x+3}{x}$
C) -3 **D)** $\frac{x-3}{x+3}$

7. Ifodani soddalashtiring: $(a+3)^2-(a-3)^2$.

A) 18 **B)** $6a$
C) $2a^2+18$ **D)** $12a$

8. Tenglamani yeching: $\frac{x-1}{3}+\frac{x}{2}=3$.

A) $\frac{19}{5}$ **B)** $\frac{16}{5}$
C) 4 **D)** 6

9. x_1 va x_2 — $x^2-5x+3=0$ tenglamaning ildizlari. $x_1^2+x_2^2$ ning qiymatini toping.

A) 31 **B)** 19
C) 22 **D)** 25

10. Tenglamalar sistemasi berilgan: $\begin{cases} x+y=7, \\ x^2+y^2=29. \end{cases}$ x^3+y^3 ning qiymatini toping.

A) 273 **B)** 133
C) 203 **D)** 553

11. $-x^2+2x+15>0$ tengsizlikning butun yechimlari sonini toping.

A) 9 **B)** 8
C) 6 **D)** 7

12. $|2x-5|=x+1$ tenglama ildizlarining yig‘indisini toping.

A) 6 **B)** $\frac{14}{3}$
C) $\frac{22}{3}$ **D)** $\frac{4}{3}$

13. $y=\dfrac{\sqrt{12-x-x^2}}{x^2-1}$ funksiyaning aniqlanish sohasiga tegishli butun sonlar nechta?

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

14. $y=x^2-6x+c$ parabolaning uchi $y=2x-1$ to‘g‘ri chiziqda yotadi. c ning qiymatini toping.

A) -34 **B)** 14
C) 5 **D)** -4

15. (a_n) arifmetik progressiyada $a_5=11$ va $a_2+a_9=28$. Progressiyaning dastlabki 12 ta hadi yig‘indisini toping.

A) 168 **B)** 480
C) 552 **D)** 240

16. (b_n) geometrik progressiyada $b_2=6$ va $b_5=162$. Progressiyaning dastlabki 4 ta hadi yig‘indisini toping.

A) 54 **B)** 80
C) 26 **D)** 242

17. $4^x-3\cdot 2^{x+1}+8=0$ tenglama ildizlarining yig‘indisini toping.

A) 3 **B)** 6
C) 8 **D)** 2

18. Ifodaning qiymatini toping: $\dfrac{\log_2 81}{\log_2 3}+5^{\log_5 4}-\log_6 2-\log_6 18$.

A) 10 **B)** 4
C) 6 **D)** 2

19. $\tan\alpha=3$ bo‘lsa, $\dfrac{\sin^4\alpha-\cos^4\alpha}{\sin\alpha\cos\alpha}$ ifodaning qiymatini toping.

A) $-\frac{8}{3}$ **B)** $\frac{8}{3}$
C) $\frac{10}{3}$ **D)** $\frac{8}{5}$

20. $2\cos^2 x - \cos x - 1 = 0$ tenglamaning $[0;\ 2\pi]$ kesmadagi barcha ildizlari yig‘indisini toping.

A) 2π **B)** 3π

C) 4π **D)** $\frac{8\pi}{3}$

21. $f(x) = (x^2+1)\sqrt{2x+5}$ funksiya berilgan. $f'(2)$ ni hisoblang.

A) $\frac{41}{3}$ **B)** $\frac{77}{6}$

C) $\frac{4}{3}$ **D)** 12

22. a parametrning nechta butun qiymatida $f(x) = x^3 + ax^2 + 3x - 1$ funksiya butun son o‘qida o‘suvchi bo‘ladi?

A) 5 **B)** 6

C) 4 **D)** 7

23. $\int_0^2 |x^2 - 1|\,dx$ integralni hisoblang.

A) $\frac{2}{3}$ **B)** 2

C) $\frac{4}{3}$ **D)** $\frac{8}{3}$

24. Motorli qayiq daryo oqimi bo‘yicha 48 km masofani 3 soatda, oqimga qarshi xuddi shu masofani 4 soatda bosib o‘tdi. Daryo oqimining tezligini (km/soat) toping.

A) 2 **B)** 4

C) 14 **D)** 1

25. 300 g 20% li tuz eritmasiga necha gramm suv qo‘shilsa, 12% li eritma hosil bo‘ladi?

A) 120 **B)** 180

C) 240 **D)** 200

26. Qutida 5 ta qizil va 3 ta ko‘k shar bor. Qutidan tavakkaliga bir vaqtda 2 ta shar olinadi. Olingan sharlar har xil rangda bo‘lish ehtimolini toping.

A) $\frac{15}{64}$ **B)** $\frac{13}{28}$

C) $\frac{15}{28}$ **D)** $\frac{15}{56}$

27. To‘g‘ri burchakli uchburchakning gipotenuzasi 13 ga, bir kateti 5 ga teng. Uchburchakning yuzini toping.

A) 30 **B)** 60

C) $\frac{65}{2}$ **D)** 36

28. Teng yonli trapetsiyaning asoslari 6 va 16 ga, yon tomoni 13 ga teng. Trapetsiyaning yuzini toping.

A) 143 **B)** 132

C) 264 **D)** 110

29. Aylanada uzunligi 16 ga teng vatar o‘tkazilgan. Vatar aylana markazidan 6 ga teng masofada joylashgan. Shu aylana bilan chegaralangan doiraning yuzini toping.

A) 64π **B)** 292π

C) 20π **D)** 100π

30. $\vec{a}(2;-1)$ va $\vec{b}(1;3)$ vektorlar berilgan. m ning qanday qiymatida $\vec{a}+m\vec{b}$ vektor $\vec{a}$ vektorga perpendikulyar bo‘ladi?

A) -5 **B)** $\frac{1}{10}$
C) 5 **D)** $\frac{1}{5}$

31. Muntazam to‘rtburchakli piramida asosining tomoni 6 ga teng, yon yog‘i asos tekisligi bilan 60° burchak tashkil etadi. Piramidaning hajmini toping.

A) $36\sqrt{3}$ **B)** $108\sqrt{3}$
C) $36\sqrt{6}$ **D)** $12\sqrt{3}$

32. Konus asosining radiusi 6 ga, balandligi 8 ga teng. Shu konusga ichki chizilgan sharning hajmini toping.

A) 108π **B)** 36π
C) 288π **D)** 96π

33. Har bir ifodaga (a–c) uning qiymatini (A–F) mos qo‘ying.

A) 9 **B)** -4
C) 11 **D)** 4
E) 7 **F)** -8

a) $(\sqrt{7}-\sqrt{3})(\sqrt{7}+\sqrt{3})$ → ____

b) $\frac{x^2-4}{x-2}$ ifodaning $x=-6$ dagi qiymati → ____

c) $a^2+\frac{1}{a^2}$, agar $a+\frac{1}{a}=3$ bo‘lsa → ____

34. Har bir funksiyaga (a–c) uning qiymatlar to‘plamini (A–F) mos qo‘ying.

A) $[5;+\infty)$ **B)** $[0;3]$
C) $(-\infty;3)$ **D)** $[-3;3]$
E) $[-4;+\infty)$ **F)** $(3;+\infty)$

a) $y=x^2-6x+5$ → ____

b) $y=3-2^x$ → ____

c) $y=\sqrt{9-x^2}$ → ____

35. Har bir figura (a–c) uchun so‘ralgan kattalikning qiymatini (A–F) mos qo‘ying.

A) $8\sqrt{3}$ **B)** 27
C) 36π **D)** 9π
E) $81\sqrt{3}$ **F)** $4\sqrt{3}$

a) Tomoni 4 ga teng muntazam uchburchakning yuzi → ____

b) Diagonali $3\sqrt{3}$ ga teng kubning hajmi → ____

c) Tomoni 6 ga teng kvadratga ichki chizilgan doiraning yuzi → ____

36. Irratsional tenglamalarni yeching.

a) $\sqrt{x+7}=x+1$ tenglamaning ildizini toping.

b) $\sqrt{2x+3}+\sqrt{x+1}=5$ tenglamaning ildizini toping.

37. Logarifmik tenglama va tengsizlikni yeching.

a) $\log_3(x-2)+\log_3(x+4)=3$ tenglamaning barcha ildizlari yig‘indisini toping.

b) $\log_{\frac{1}{3}}(x^2-6x+8)\geq -1$ tengsizlikning butun yechimlari yig‘indisini toping.

38. Ko‘rsatkichli tengsizliklarni yeching.

a) $4^x-5\cdot 2^{x+1}+16\leq 0$ tengsizlikning butun yechimlari sonini toping.

b) $\left(\frac{1}{2}\right)^{x^2-4x}\geq \frac{1}{32}$ tengsizlikning butun yechimlari yig‘indisini toping.

39. Trigonometrik tenglamalarning ko‘rsatilgan oraliqdagi ildizlarini toping.

a) $2\sin^2 x-3\sin x+1=0$ tenglamaning $[0;2\pi]$ kesmadagi ildizlari yig‘indisini toping.

b) $\cos 2x+3\cos x-1=0$ tenglamaning $[-\pi;2\pi]$ kesmadagi ildizlari yig‘indisini toping.

40. Hosila yordamida quyidagilarni toping.

a) $f(x)=x^3-3x^2-9x+5$ funksiyaning $[-2;4]$ kesmadagi eng katta va eng kichik qiymatlari yig‘indisini toping.

b) $y=x^2-4x+7$ parabolaga $y=2x+1$ to‘g‘ri chiziqqa parallel qilib urinma o‘tkazilgan. Shu urinma va koordinata o‘qlari bilan chegaralangan uchburchak yuzini toping.

41. Integral yordamida figuralar yuzini hisoblang.

a) $y=x^2-2x$ parabola va $y=x+4$ to‘g‘ri chiziq bilan chegaralangan figura yuzini toping.

b) $y=\sqrt{x}$, $y=2-x$ chiziqlar va Ox o‘qi bilan chegaralangan figura yuzini toping.

42. Progressiyalarga doir masalalarni yeching.

a) Arifmetik progressiyada $a_3+a_9=26$ va $a_5=10$. Progressiyaning dastlabki 10 ta hadi yig‘indisini toping.

b) Geometrik progressiyada $b_2=6$, $b_5=48$. Uning dastlabki 6 ta hadi yig‘indisini toping.

43. ABC uchburchakda $AB=13$, $BC=14$, $AC=15$.

a) Uchburchakka tashqi chizilgan aylana radiusini toping.

b) Uchburchakka ichki chizilgan aylana BC tomonga K nuqtada urinadi, $AH-BC$ tomonga tushirilgan balandlik ($H-$ balandlik asosi). HK kesma uzunligini toping.

44. Muntazam to‘rtburchakli piramidaning asos tomoni 6 ga, yon qirrasi $\sqrt{34}$ ga teng.

a) Piramida hajmini toping.

b) Piramidaning to‘la sirti yuzini toping.

45. Matnli masala va ehtimollikka doir masalani yeching.

a) Ikki quvur birgalikda hovuzni 2 soatda to‘ldiradi. Birinchi quvur yolg‘iz o‘zi hovuzni ikkinchisidan 3 soat tezroq to‘ldiradi. Ikkinchi quvur yolg‘iz o‘zi hovuzni necha soatda to‘ldiradi?

b) Qutida 5 ta qizil va 4 ta ko‘k shar bor. Tavakkaliga bir vaqtda 3 ta shar olinadi. Ulardan aynan 2 tasi qizil bo‘lish ehtimolini toping.

Javoblar kaliti

1. B	**2.** C	**3.** A	**4.** D	**5.** B
6. A	**7.** D	**8.** C	**9.** B	**10.** B
11. D	**12.** C	**13.** A	**14.** B	**15.** D
16. B	**17.** A	**18.** C	**19.** B	**20.** C
21. A	**22.** D	**23.** B	**24.** A	**25.** D
26. C	**27.** A	**28.** B	**29.** D	**30.** C
31. A	**32.** B	**33.** a–D, b–B, c–E	**34.** a–E, b–C, c–B	**35.** a–F, b–B, c–D
36. a) 2; b) 3	**37.** a) 5; b) 6	**38.** a) 3; b) 14	**39.** a) 3*pi/2; b) 5*pi/3	**40.** a) -12; b) 1
41. a) 125/6; b) 7/6	**42.** a) 115; b) 189	**43.** a) 65/8; b) 1	**44.** a) 48; b) 96	**45.** a) 6; b) 10/21

Yechimlar va izohlar

1. 1) Sonlarni tub ko‘paytuvchilarga ajratamiz: $84 = 2^2 \cdot 3 \cdot 7$, $126 = 2 \cdot 3^2 \cdot 7$.
2) EKUB uchun umumiy tub ko‘paytuvchilarni eng kichik darajasi bilan olamiz: $2 \cdot 3 \cdot 7 = 42$.
3) 252 EKUK bo‘ladi (EKUB bilan adashtirmang). 21 va 14 esa umumiy bo‘luvchilar, lekin eng kattasi emas.
Tekshiruv: $84 : 42 = 2$, $126 : 42 = 3$, 2 va 3 o‘zaro tub. Javob: 42 (B).

2. 1) Qavs ichi: $\frac{3}{4} = 0{,}75$, $0{,}75 - 0{,}5 = 0{,}25$.
2) Ko‘paytirish: $0{,}25 \cdot 2{,}4 = 0{,}6$.
3) Qo‘shish: $\frac{1}{5} = 0{,}2$, $0{,}6 + 0{,}2 = 0{,}8$.
Tipik xatolar: $\frac{1}{5}$ ni qo‘shishni unutish ($0{,}6$); qavsni e'tiborsiz qoldirish ($0{,}75 - 1{,}2 + 0{,}2 = -0{,}25$); amallar tartibini buzish ($0{,}25 \cdot 2{,}6 = 0{,}65$).
Tekshiruv: $\frac{1}{4} \cdot \frac{12}{5} + \frac{1}{5} = \frac{3}{5} + \frac{1}{5} = \frac{4}{5} = 0{,}8$. Javob: C.

3. 1) Chegirma miqdori: $80\,000 \cdot 0{,}15 = 12\,000$ so‘m.
2) Yangi narx: $80\,000 - 12\,000 = 68\,000$ so‘m.
$12\,000$ — bu faqat chegirma miqdori, $92\,000$ — narx oshirilganda chiqadigan natija, $65\,000 - 80\,000 - 15\,000$ (foizni so‘m deb olish xatosi).
Tekshiruv: $80\,000 \cdot 0{,}85 = 68\,000$. Javob: A.

4. 1) Ishchilar soni ortsa, kunlar soni kamayadi — bu teskari proporsionallik.
2) Umumiy ish hajmi: $6 \cdot 12 = 72$ (ishchi-kun).
3) 8 ishchi uchun: $72 : 8 = 9$ kun.
Tipik xato: to‘g‘ri proporsiya tuzish $\frac{6}{12} = \frac{8}{x} \Rightarrow x = 16$.
Tekshiruv: $8 \cdot 9 = 72 = 6 \cdot 12$. Javob: 9 (D).

5. 1) Hamma sonlarni 2 asosga keltiramiz: $4^3 = (2^2)^3 = 2^6$, $8^4 = (2^3)^4 = 2^{12}$.
2) Surat: $2^7 \cdot 2^6 = 2^{13}$.
3) Bo‘linma: $2^{13} : 2^{12} = 2^1 = 2$.
Tipik xato: $(2^2)^3 = 2^5$ deb olish (darajalarni qo‘shish) — bunda 2^{12-12} emas, boshqa noto‘g‘ri natija chiqadi.
Tekshiruv: $\frac{128 \cdot 64}{4096} = \frac{8192}{4096} = 2$. Javob: B.

6. 1) Suratni kvadratlar ayirmasi bo‘yicha ajratamiz: $x^2 - 9 = (x - 3)(x + 3)$.
2) Maxrajdan umumiy ko‘paytuvchini chiqaramiz: $x^2 + 3x = x(x + 3)$.
3) $(x + 3)$ ga qisqartiramiz: $\frac{(x-3)(x+3)}{x(x+3)} = \frac{x-3}{x}$.
Tipik xato: x^2 larni «qisqartirib» $\frac{-9}{3x}$ yoki -3 kabi natija olish — qo‘shiluvchilarni qisqartirib bo‘lmaydi.
Tekshiruv: $x = 1$ da $\frac{1-9}{1+3} = -2$, $\frac{1-3}{1} = -2$. Javob: A.

7. 1) $(a+3)^2 = a^2+6a+9$, $(a-3)^2 = a^2-6a+9$.
2) Ayiramiz: $(a^2+6a+9)-(a^2-6a+9) = 12a$.
Yoki kvadratlar ayirmasi: $\big((a+3)-(a-3)\big)\big((a+3)+(a-3)\big) = 6\cdot 2a = 12a$.
Tipik xatolar: qavs oldidagi minusni hisobga olmaslik ($2a^2+18$), $2ab$ hadini unutish ($6a$ yoki 18).
Tekshiruv: $a=1$: $16-4=12=12\cdot 1$. Javob: D.

8. 1) Ikkala tomonni 6 ga ko‘paytiramiz: $2(x-1)+3x = 18$.
2) Qavsni ochamiz: $2x-2+3x = 18$, ya'ni $5x = 20$.
3) $x = 4$.
Tipik xatolar: $2(x-1)$ ni $2x-1$ deb ochish ($x=\frac{19}{5}$), ishorani adashtirish $2x+2$ ($x=\frac{16}{5}$).
Tekshiruv: $\frac{3}{3}+\frac{4}{2} = 1+2 = 3$. Javob: C.

9. 1) Diskriminant: $D = 25-12 = 13 > 0$, demak ikkita haqiqiy ildiz bor.
2) Viyet teoremasi: $x_1+x_2 = 5$, $x_1x_2 = 3$.
3) $x_1^2+x_2^2 = (x_1+x_2)^2 - 2x_1x_2 = 25-6 = 19$.
Tipik xatolar: $-2x_1x_2$ o‘rniga $+2x_1x_2$ olish (31), 2 ni unutish (22), faqat $(x_1+x_2)^2$ ni hisoblash (25).
Tekshiruv: $x_{1,2} = \frac{5\pm\sqrt{13}}{2}$, $x_1^2+x_2^2 = \frac{2(25+13)}{4} = \frac{76}{4} = 19$. Javob: B.

10. 1) $(x+y)^2 = x^2+2xy+y^2$, ya'ni $49 = 29+2xy$. Bundan $xy = 10$.
2) $x^3+y^3 = (x+y)^3 - 3xy(x+y) = 343 - 3\cdot 10\cdot 7 = 343-210 = 133$.
3) Tekshiruv: sistemaning yechimlari $x=5,\ y=2$ (yoki aksincha); $125+8=133$. To‘g‘ri.
Tipik xatolar: 3 ko‘paytuvchini unutish ($343-70=273$), ishorani adashtirish ($343+210=553$), $(x^2+y^2)(x+y) = 203$ deb olish.
Javob: 133 (B).

11. 1) Tengsizlikni -1 ga ko‘paytiramiz, belgi almashadi: $x^2-2x-15 < 0$.
2) Ildizlar: $x^2-2x-15 = (x-5)(x+3) = 0$, ya'ni $x=-3$ va $x=5$.
3) Oraliqlar usuli: parabola shoxlari yuqoriga qaragan, shuning uchun ifoda ildizlar orasida manfiy: $-3 < x < 5$.
4) Butun yechimlar: $-2,-1,0,1,2,3,4$, jami 7 ta.
Tipik xatolar: chegaralarni ham qo‘shish (9), faqat bittasini qo‘shish (8).
Tekshiruv: $x=4$ da $-16+8+15 = 7 > 0$ ✓; $x=5$ da $-25+10+15 = 0$, qat'iy tengsizlik bajarilmaydi ✓.
Javob: 7 (D).

12. 1) Shart: $x+1 \ge 0$, ya'ni $x \ge -1$.
2) $x \ge \frac{5}{2}$ bo‘lsa: $2x-5 = x+1$, bundan $x=6$. Bu qiymat $x \ge \frac{5}{2}$ shartini qanoatlantiradi.
3) $x < \frac{5}{2}$ bo‘lsa: $-(2x-5) = x+1$, ya'ni $-2x+5 = x+1$, bundan $x=\frac{4}{3}$. Bu qiymat $x<\frac{5}{2}$ va $x\ge -1$ shartlarini qanoatlantiradi.
4) Ildizlar yig‘indisi: $6+\frac{4}{3} = \frac{22}{3}$.
Tekshiruv: $x=6$ da $|7| = 7$ ✓; $x=\frac{4}{3}$ da $|\frac{8}{3}-5| = \frac{7}{3}$ va $\frac{4}{3}+1 = \frac{7}{3}$ ✓.
Tipik xatolar: faqat bitta ildizni olish (6 yoki $\frac{4}{3}$), ildizlarni ayirish ($\frac{14}{3}$).
Javob: $\frac{22}{3}$ (C).

13. 1) Ildiz ostidagi ifoda manfiy bo‘lmasligi kerak: $12-x-x^2 \ge 0$, ya'ni $x^2+x-12 \le 0$, $(x+4)(x-3) \le 0$. Bundan $-4 \le x \le 3$.
2) Maxraj nolga teng bo‘lmasligi kerak: $x^2-1 \ne 0$, ya'ni $x \ne \pm 1$.
3) $[-4;3]$ oraliqdagi butun sonlar: $-4,-3,-2,-1,0,1,2,3$, jami 8 ta. Ulardan -1 va 1 ni chiqaramiz: $8-2=6$ ta qoladi.
Tekshiruv: qolgan sonlar $-4,-3,-2,0,2,3$, jami 6 ta ✓.
Tipik xatolar: maxrajni hisobga olmaslik (8), faqat $x\ne 1$ ni chiqarish (7).
Javob: 6 (A).

14. 1) Parabola uchining absissasi: $x_0 = -\frac{b}{2a} = \frac{6}{2} = 3$.
2) Uchining ordinatasi: $y_0 = 9 - 18 + c = c - 9$.
3) Uch to‘g‘ri chiziqda yotadi: $y_0 = 2 \cdot 3 - 1 = 5$. Demak, $c - 9 = 5$, bundan $c = 14$.
Tekshiruv: $y = x^2 - 6x + 14 = (x-3)^2 + 5$, uchi $(3;5)$; $2 \cdot 3 - 1 = 5$ ✓.
Tipik xatolar: $x_0 = -3$ deb olish ($c = -34$), $y_0 = 5$ ni c deb yozish, ishorani adashtirish ($c + 9 = 5$, $c = -4$).
Javob: 14 (B).

15. 1) $a_5 = a_1 + 4d = 11$ va $a_2 + a_9 = 2a_1 + 9d = 28$.
2) Birinchi tenglamani 2 ga ko‘paytiramiz: $2a_1 + 8d = 22$. Ikkinchi tenglamadan ayiramiz: $d = 6$. U holda $a_1 = 11 - 24 = -13$.
3) $a_{12} = a_1 + 11d = -13 + 66 = 53$.
4) $S_{12} = \frac{a_1 + a_{12}}{2} \cdot 12 = \frac{-13+53}{2} \cdot 12 = 20 \cdot 12 = 240$.
Tekshiruv: $S_{12} = \frac{2a_1 + 11d}{2} \cdot 12 = 6 \cdot (-26 + 66) = 240$ ✓.
Tipik xatolar: 2 ga bo‘lishni unutish (480), $a_1 + a_{12}$ o‘rniga $a_2 + a_9$ ni olish ($6 \cdot 28 = 168$), a_1 ishorasini adashtirish (552).
Javob: 240 (D).

16. 1) $b_5 = b_2 q^3$, ya'ni $162 = 6q^3$. Bundan $q^3 = 27$, $q = 3$.
2) $b_1 = \frac{b_2}{q} = \frac{6}{3} = 2$.
3) $S_4 = \frac{b_1(q^4 - 1)}{q - 1} = \frac{2(81-1)}{2} = 80$.
Tekshiruv: hadlar $2, 6, 18, 54$; yig‘indisi $2 + 6 + 18 + 54 = 80$ ✓.
Tipik xatolar: 4-hadni yig‘indi deb olish (54), 3 ta had yig‘indisini topish (26), 5 ta had yig‘indisini topish (242).
Javob: 80 (B).

17. 1) $4^x = (2^x)^2$ va $3 \cdot 2^{x+1} = 6 \cdot 2^x$.
2) $t = 2^x > 0$ deb belgilaymiz: $t^2 - 6t + 8 = 0$, bundan $t = 2$ yoki $t = 4$. Ikkalasi ham musbat.
3) $2^x = 2$ dan $x = 1$; $2^x = 4$ dan $x = 2$.
4) Ildizlar yig‘indisi: $1 + 2 = 3$.
Tekshiruv: $x = 1$ da $4 - 12 + 8 = 0$ ✓; $x = 2$ da $16 - 24 + 8 = 0$ ✓.
Tipik xatolar: t qiymatlarining yig‘indisini (6) yoki ko‘paytmasini (8) javob deb olish, faqat bitta ildizni yozish (2).
Javob: 3 (A).

18. 1) Yangi asosga o‘tish formulasiga ko‘ra: $\frac{\log_2 81}{\log_2 3} = \log_3 81 = 4$.
2) Asosiy logarifmik ayniyatga ko‘ra: $5^{\log_5 4} = 4$.
3) $\log_6 2 + \log_6 18 = \log_6 36 = 2$. Ikkala had ham minus ishora bilan kelgani uchun ifodadan 2 ayriladi.
4) Natija: $4 + 4 - 2 = 6$.
Tekshiruv: $3^4 = 81$ ✓; $6^2 = 36$ ✓.
Tipik xatolar: ishorani adashtirib 2 ni qo‘shish (10), birinchi hadni $\log_2 27$ deb olish.
Javob: 6 (C).

19. 1) Kvadratlar ayirmasi: $\sin^4\alpha - \cos^4\alpha = (\sin^2\alpha - \cos^2\alpha)(\sin^2\alpha + \cos^2\alpha) = \sin^2\alpha - \cos^2\alpha$.
2) Ifoda: $\frac{\sin^2\alpha - \cos^2\alpha}{\sin\alpha\cos\alpha} = \frac{\sin\alpha}{\cos\alpha} - \frac{\cos\alpha}{\sin\alpha} = \tan\alpha - \cot\alpha$.
3) $\tan\alpha = 3$, $\cot\alpha = \frac{1}{3}$, demak $3 - \frac{1}{3} = \frac{8}{3}$.
Tipik xatolar: ishorani almashtirish ($-\frac{8}{3}$), $\tan\alpha + \cot\alpha = \frac{10}{3}$ deb olish.
Tekshirish: $\sin^2\alpha = \frac{9}{10}$, $\cos^2\alpha = \frac{1}{10}$, $\sin\alpha\cos\alpha = \frac{3}{10}$; $\frac{8/10}{3/10} = \frac{8}{3}$. Javob: B.

20. 1) $t = \cos x$ belgilaymiz: $2t^2 - t - 1 = 0$, $t_1 = 1$, $t_2 = -\frac{1}{2}$.
2) $\cos x = 1$: $[0; 2\pi]$ da $x = 0$ va $x = 2\pi$ (kesma uchlari ham kiradi!).
3) $\cos x = -\frac{1}{2}$: $x = \frac{2\pi}{3}$ va $x = \frac{4\pi}{3}$.
4) Yig‘indi: $0 + 2\pi + \frac{2\pi}{3} + \frac{4\pi}{3} = 4\pi$.
Tipik xatolar: $x = 2\pi$ ni unutish (2π); ildizlarni $1/2$ va -1 deb topish ($\frac{\pi}{3} + \pi + \frac{5\pi}{3} = 3\pi$).
Tekshirish: $x = \frac{2\pi}{3}$ da $2 \cdot \frac{1}{4} + \frac{1}{2} - 1 = 0$ ✓. Javob: C.

21. 1) Ko‘paytma hosilasi: $f'(x) = 2x\sqrt{2x+5} + (x^2+1)\cdot(\sqrt{2x+5})'$.
2) Murakkab funksiya: $(\sqrt{2x+5})' = \frac{2}{2\sqrt{2x+5}} = \frac{1}{\sqrt{2x+5}}$.
3) $x=2$: $\sqrt{9}=3$, $f'(2) = 4\cdot 3 + \frac{5}{3} = 12 + \frac{5}{3} = \frac{41}{3}$.
Tipik xatolar: ichki hosila 2 ni unutish ($12 + \frac{5}{6} = \frac{77}{6}$); hosilalarni shunchaki ko‘paytirish ($\frac{4}{3}$).
Tekshirish: $\frac{36+5}{3} = \frac{41}{3}$. Javob: A.

22. 1) $f'(x) = 3x^2 + 2ax + 3$. Funksiya $\mathbb{R}$ da o‘suvchi bo‘lishi uchun barcha x da $f'(x) \geq 0$ bo‘lishi kerak (hosila alohida nuqtalarda 0 bo‘lishi mumkin).
2) Bosh koeffitsiyent $3 > 0$, demak $\frac{D}{4} = a^2 - 9 \leq 0$, ya'ni $-3 \leq a \leq 3$.
3) Butun qiymatlar: $-3, -2, -1, 0, 1, 2, 3$ — jami 7 ta.
Tipik xato: $a = \pm 3$ ni chiqarib tashlash (5 ta). $a = 3$ da $f'(x) = 3(x+1)^2 \geq 0$, faqat $x = -1$ da nol — funksiya baribir o‘suvchi.
Tekshirish: $a = 4$ da $D/4 = 7 > 0$, hosila manfiy oraliq bor — mos emas. Javob: D.

23. 1) $[0;1]$ da $x^2 - 1 \leq 0$, $[1;2]$ da $x^2 - 1 \geq 0$. Integralni bo‘lamiz.
2) $\int_0^1 (1-x^2)dx = \left(x - \frac{x^3}{3}\right)\Big|_0^1 = \frac{2}{3}$.
3) $\int_1^2 (x^2-1)dx = \left(\frac{x^3}{3} - x\right)\Big|_1^2 = \frac{2}{3} - \left(-\frac{2}{3}\right) = \frac{4}{3}$.
4) Yig‘indi: $\frac{2}{3} + \frac{4}{3} = 2$.
Tipik xato: modulni e'tiborsiz qoldirish: $\int_0^2 (x^2-1)dx = \frac{8}{3} - 2 = \frac{2}{3}$.
Tekshirish: ikkala bo‘lak musbat, yig‘indi 2. Javob: B.

24. 1) Oqim bo‘yicha tezlik: $48 : 3 = 16$ km/soat; oqimga qarshi: $48 : 4 = 12$ km/soat.
2) $v + u = 16$, $v - u = 12$ (v — qayiqning xususiy tezligi, u — oqim tezligi).
3) Ayiramiz: $2u = 4$, $u = 2$ km/soat ($v = 14$).
Tipik xatolar: ayirmani ikkiga bo‘lmaslik (4), qayiq tezligini javob deb olish (14).
Tekshirish: $(14+2)\cdot 3 = 48$, $(14-2)\cdot 4 = 48$ ✓. Javob: A.

25. 1) Tuz massasi: $300 \cdot 0{,}2 = 60$ g — suv qo‘shganda o‘zgarmaydi.
2) Yangi eritma massasi: $60 : 0{,}12 = 500$ g.
3) Qo‘shilgan suv: $500 - 300 = 200$ g.
Tipik xatolar: foizlar ayirmasidan to‘g‘ridan-to‘g‘ri hisoblash ($300 \cdot 0{,}4 = 120$ yoki $300 \cdot 0{,}6 = 180$).
Tekshirish: $\frac{60}{500} = 0{,}12 = 12\%$ ✓. Javob: D.

26. 1) Barcha imkoniyatlar: $C_8^2 = \frac{8\cdot 7}{2} = 28$.
2) Qulay hollar (1 qizil va 1 ko‘k): $5 \cdot 3 = 15$.
3) $P = \frac{15}{28}$.
Tipik xatolar: qaytarib olish deb hisoblash ($\frac{5}{8}\cdot\frac{3}{8} = \frac{15}{64}$); faqat bitta tartibni olish ($\frac{5}{8}\cdot\frac{3}{7} = \frac{15}{56}$); bir xil rang ehtimolini topish ($\frac{10+3}{28} = \frac{13}{28}$).
Tekshirish: $\frac{15}{28} + \frac{13}{28} = 1$ ✓. Javob: C.

27. 1) Pifagor teoremasi: ikkinchi katet $\sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12$.
2) Yuz: $S = \frac{1}{2}\cdot 5 \cdot 12 = 30$.
Tipik xatolar: $\frac{1}{2}$ ni unutish (60); gipotenuzani katet deb olish ($\frac{5\cdot 13}{2} = \frac{65}{2}$).
Tekshirish: $5^2 + 12^2 = 25 + 144 = 169 = 13^2$ ✓. Javob: A.

28. 1) Kichik asos uchlaridan katta asosga balandliklar tushiramiz. Katta asosda hosil bo‘lgan chetki kesmalar $\frac{16-6}{2} = 5$ ga teng.
2) To‘g‘ri burchakli uchburchakdan balandlik: $h = \sqrt{13^2 - 5^2} = \sqrt{144} = 12$.
3) Yuz: $S = \frac{6+16}{2}\cdot 12 = 11 \cdot 12 = 132$.
Tipik xatolar: balandlik o‘rniga yon tomonni olish ($11 \cdot 13 = 143$), ikkiga bo‘lishni unutish (264).
Tekshiruv: $5^2 + 12^2 = 169 = 13^2$, demak $h = 12$ to‘g‘ri va $S = 132$. Javob: B.

29. 1) Markazdan vatarga tushirilgan perpendikulyar vatarni teng ikkiga bo‘ladi: yarmi 8.
2) Radius: $R = \sqrt{8^2 + 6^2} = \sqrt{100} = 10$.
3) Doira yuzi: $S = \pi R^2 = 100\pi$.
Tipik xatolar: vatarning yarmini radius deb olish (64π), vatarni bo‘lmasdan olish ($16^2 + 6^2 = 292$), aylana uzunligini hisoblash (20π).
Tekshiruv: $64 + 36 = 100$, $R = 10$, $S = 100\pi$. Javob: D.

30. 1) $\vec{a} + m\vec{b} = (2 + m;\ -1 + 3m)$.
2) Perpendikulyarlik sharti — skalyar ko‘paytma nolga teng: $(2 + m) \cdot 2 + (-1 + 3m) \cdot (-1) = 0$.
3) $4 + 2m + 1 - 3m = 0 \Rightarrow 5 - m = 0 \Rightarrow m = 5$.
Tipik xato: $\vec{b}$ ga perpendikulyarlik shartini yozish ($m = \frac{1}{10}$) yoki ishorani adashtirish (-5).
Tekshiruv: $m = 5$ da vektor $(7; 14)$, $(7; 14) \cdot (2; -1) = 14 - 14 = 0$. Javob: C.

31. 1) Yon yoq va asos orasidagi burchak — apofema va uning asosdagi proyeksiyasi orasidagi burchak. Proyeksiya asos markazidan tomon o‘rtasigacha bo‘lgan masofa: $\frac{6}{2} = 3$.
2) Balandlik: $h = 3 \cdot \tan 60^\circ = 3\sqrt{3}$.
3) Hajm: $V = \frac{1}{3} \cdot 6^2 \cdot 3\sqrt{3} = \frac{1}{3} \cdot 36 \cdot 3\sqrt{3} = 36\sqrt{3}$.
Tipik xatolar: $\frac{1}{3}$ ni unutish ($108\sqrt{3}$), proyeksiya sifatida yarim diagonal $3\sqrt{2}$ ni olish ($36\sqrt{6}$).
Tekshiruv: $36 \cdot 3\sqrt{3}/3 = 36\sqrt{3}$. Javob: A.

32. 1) Konusning o‘q kesimi — asosi 12, yon tomonlari $\sqrt{6^2 + 8^2} = 10$ bo‘lgan teng yonli uchburchak. Shar radiusi shu uchburchakka ichki chizilgan aylana radiusiga teng.
2) Uchburchak yuzi: $S = \frac{1}{2} \cdot 12 \cdot 8 = 48$; yarim perimetr: $p = \frac{10+10+12}{2} = 16$.
3) $r = \frac{S}{p} = \frac{48}{16} = 3$.
4) Shar hajmi: $V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \cdot 27 = 36\pi$.
Tipik xatolar: $\frac{4}{3}$ o‘rniga 4 ni olish (108π), konus radiusini olish (288π), konus hajmini hisoblash (96π).
Tekshiruv: $r = 3$, $\frac{4 \cdot 27}{3} = 36$. Javob: B.

33. a) Kvadratlar ayirmasi: $(\sqrt{7})^2 - (\sqrt{3})^2 = 7 - 3 = 4 \rightarrow$ D.
b) $\frac{x^2-4}{x-2} = \frac{(x-2)(x+2)}{x-2} = x + 2$; $x = -6$ da $-6 + 2 = -4 \rightarrow$ B. (Xato: $x - 2 = -8$ deb olish.)
c) $\left(a + \frac{1}{a}\right)^2 = a^2 + 2 + \frac{1}{a^2} = 9 \Rightarrow a^2 + \frac{1}{a^2} = 9 - 2 = 7 \rightarrow$ E. (Xatolar: 9 yoki $9 + 2 = 11$.)
Tekshiruv: a–D (4), b–B (-4), c–E (7).

34. a) $y = (x - 3)^2 - 4$, parabola tarmoqlari yuqoriga, eng kichik qiymat -4: $E(y) = [-4; +\infty) \rightarrow$ E. (Xato: ozod hadni olish, $[5; +\infty)$.)
b) $2^x > 0$ va istalgan musbat qiymatni qabul qiladi, demak $3 - 2^x < 3$: $E(y) = (-\infty; 3) \rightarrow$ C.
c) $0 \le 9 - x^2 \le 9$ ($x \in [-3; 3]$), demak $0 \le y \le 3$: $E(y) = [0; 3] \rightarrow$ B. (Xato: aniqlanish sohasi $[-3; 3]$ ni yozish.)
Tekshiruv: a–E, b–C, c–B.

35. a) $S = \frac{a^2\sqrt{3}}{4} = \frac{16\sqrt{3}}{4} = 4\sqrt{3} \rightarrow$ F. (Xato: $a \cdot h = 4 \cdot 2\sqrt{3} = 8\sqrt{3}$, ikkiga bo‘lmaslik.)
b) Kub diagonali $d = a\sqrt{3}$, demak $a = 3$, $V = 3^3 = 27 \rightarrow$ B. (Xato: diagonalni qirra deb olish, $(3\sqrt{3})^3 = 81\sqrt{3}$.)
c) Ichki chizilgan doira radiusi $r = \frac{6}{2} = 3$, $S = 9\pi \rightarrow$ D. (Xato: $r = 6$ deb olish, 36π.)
Tekshiruv: a–F, b–B, c–D.

36. a) Shart: $x + 1 \ge 0$, ya'ni $x \ge -1$. Kvadratga oshiramiz: $x + 7 = x^2 + 2x + 1 \Rightarrow x^2 + x - 6 = 0 \Rightarrow x = 2$ yoki $x = -3$. $x = -3$ shartni qanoatlantirmaydi (chet ildiz). Tekshiruv: $\sqrt{9} = 3 = 2 + 1$. Javob: 2.
b) $\sqrt{2x + 3} = 5 - \sqrt{x + 1}$, kvadratga oshiramiz: $2x + 3 = 25 - 10\sqrt{x + 1} + x + 1 \Rightarrow 10\sqrt{x + 1} = 23 - x$ (shart $x \le 23$). Yana kvadratga oshiramiz: $100x + 100 = 529 - 46x + x^2 \Rightarrow x^2 - 146x + 429 = 0$. $D = 146^2 - 4 \cdot 429 = 21316 - 1716 = 19600$, $\sqrt{D} = 140$, $x = \frac{146 \pm 140}{2}$: $x = 143$ yoki $x = 3$. $x = 143 > 23 -$ chet ildiz. Tekshiruv: $\sqrt{9} + \sqrt{4} = 3 + 2 = 5$. Javob: 3.

37. a) Aniqlanish sohasi: $x-2>0$ va $x+4>0$, ya'ni $x>2$. Logarifmlarni birlashtiramiz: $(x-2)(x+4)=3^3=27$, ya'ni $x^2+2x-35=0$, bundan $x=5$ yoki $x=-7$. $x=-7$ sohaga kirmaydi (uni qo'shib -2 deb javob berish — tipik xato). Yagona ildiz 5, yig'indi 5. Tekshiruv: $\log_3 3+\log_3 9=1+2=3$ ✓.
b) Asos $\frac{1}{3}<1$, shuning uchun tengsizlik belgisi o'zgaradi: $0<x^2-6x+8\le 3$. $x^2-6x+5\le 0\Rightarrow 1\le x\le 5$. $x^2-6x+8>0\Rightarrow x<2$ yoki $x>4$. Kesishma: $[1;2)\cup(4;5]$. Butun yechimlar: 1 va 5, yig'indisi 6. Tekshiruv: $x=1$ da $\log_{1/3}3=-1\ge -1$ ✓; $x=5$ da ham 3 chiqadi ✓; $x=3$ da ifoda $-1<0$, aniqlanmagan ✓.

38. a) $2^{x+1}=2\cdot 2^x$. $t=2^x>0$ desak: $t^2-10t+16\le 0$, $(t-2)(t-8)\le 0$, $2\le t\le 8$. Demak, $2^1\le 2^x\le 2^3$, ya'ni $1\le x\le 3$. Butun yechimlar: $1,2,3$ — jami 3 ta. Tekshiruv: $x=1$: $4-20+16=0\le 0$ ✓.
b) $\frac{1}{32}=\left(\frac12\right)^5$. Asos $\frac12<1$ bo'lgani uchun belgi o'zgaradi: $x^2-4x\le 5$, $(x-5)(x+1)\le 0$, $-1\le x\le 5$. Butun yechimlar: $-1,0,1,2,3,4,5$, yig'indisi 14. (Belgini o'zgartirmaslik xatosi $x\le -1$ yoki $x\ge 5$ ga olib keladi.) Tekshiruv: $x=5$: $\left(\frac12\right)^5=\frac{1}{32}$ ✓.

39. a) $t=\sin x$: $2t^2-3t+1=0$, $t=1$ yoki $t=\frac12$. $[0;2\pi]$ da: $\sin x=1\Rightarrow x=\frac{\pi}{2}$; $\sin x=\frac12\Rightarrow x=\frac{\pi}{6},\ \frac{5\pi}{6}$. Yig'indi: $\frac{\pi}{2}+\frac{\pi}{6}+\frac{5\pi}{6}=\frac{3\pi}{2}$.
b) $\cos 2x=2\cos^2x-1$: $2\cos^2x+3\cos x-2=0$, $\cos x=\frac12$ yoki $\cos x=-2$ (yechimsiz). $x=\pm\frac{\pi}{3}+2\pi k$. $[-\pi;2\pi]$ ga tushadiganlari: $-\frac{\pi}{3},\ \frac{\pi}{3},\ \frac{5\pi}{3}$ ($-\frac{5\pi}{3}<-\pi$, $\frac{7\pi}{3}>2\pi$). Yig'indi: $-\frac{\pi}{3}+\frac{\pi}{3}+\frac{5\pi}{3}=\frac{5\pi}{3}$. Tekshiruv: $x=\frac{5\pi}{3}$: $\cos\frac{10\pi}{3}=-\frac12$, $-\frac12+\frac32-1=0$ ✓.

40. a) $f'(x)=3x^2-6x-9=3(x-3)(x+1)$, kritik nuqtalar $x=-1$ va $x=3$ (ikkalasi kesmada). $f(-2)=-8-12+18+5=3$, $f(-1)=-1-3+9+5=10$, $f(3)=27-27-27+5=-22$, $f(4)=64-48-36+5=-15$. Eng katta 10, eng kichik -22, yig'indi -12. (Faqat uchlarni hisoblash xatosi $3+(-15)=-12$ ga tasodifan yaqin emas — kritik nuqtalarni albatta tekshiring.)
b) Urinma burchak koeffitsiyenti 2: $y'=2x-4=2\Rightarrow x_0=3$, $y_0=9-12+7=4$. Urinma: $y=2(x-3)+4=2x-2$. U Oy ni $(0;-2)$ da, Ox ni $(1;0)$ da kesadi. Yuza: $\frac12\cdot 1\cdot 2=1$. Tekshiruv: $x^2-4x+7=2x-2\Leftrightarrow (x-3)^2=0$ — bitta umumiy nuqta ✓.

41. a) Kesishish: $x^2-2x=x+4\Rightarrow x^2-3x-4=0$, $x=-1$, $x=4$. Oraliqda to'g'ri chiziq yuqorida. $S=\int_{-1}^{4}(-x^2+3x+4)\,dx=\left[-\frac{x^3}{3}+\frac{3x^2}{2}+4x\right]_{-1}^{4}=\left(-\frac{64}{3}+24+16\right)-\left(\frac13+\frac32-4\right)=\frac{56}{3}+\frac{13}{6}=\frac{125}{6}$.
Tekshiruv: $\frac{(x_2-x_1)^3}{6}=\frac{125}{6}$ ✓.
b) $\sqrt{x}=2-x\Rightarrow x=1$ (nuqta $(1;1)$). $y=2-x$ Ox ni $x=2$ da kesadi. Figura $[0;1]$ da $y=\sqrt{x}$ ostida, $[1;2]$ da $y=2-x$ ostida: $S=\int_0^1\sqrt{x}\,dx+\int_1^2(2-x)\,dx=\frac23+\frac12=\frac76$. (Ikki chiziq orasidagi $\int_0^1(2-x-\sqrt{x})dx=\frac56$ — bu Oy bilan chegaralangan boshqa figura, tipik xato.)

42. a) $a_3+a_9=2a_6=26\Rightarrow a_6=13$. $d=a_6-a_5=3$, $a_1=a_5-4d=-2$. $S_{10}=\frac{2a_1+9d}{2}\cdot 10=\frac{-4+27}{2}\cdot 10=115$. Tekshiruv: $a_{10}=-2+27=25$, $S_{10}=\frac{-2+25}{2}\cdot 10=115$ ✓.
b) $q^3=\frac{b_5}{b_2}=8\Rightarrow q=2$, $b_1=3$. $S_6=\frac{3(2^6-1)}{2-1}=189$. Tekshiruv: $3+6+12+24+48+96=189$ ✓.

43. a) $p=\frac{13+14+15}{2}=21$, Geron formulasi: $S=\sqrt{21\cdot 8\cdot 7\cdot 6}=84$. $R=\frac{abc}{4S}=\frac{13\cdot 14\cdot 15}{336}=\frac{2730}{336}=\frac{65}{8}$.
b) $AH=\frac{2S}{BC}=12$. $BH=\sqrt{13^2-12^2}=5$ (H kesma ichida, chunki $CH=\sqrt{225-144}=9$, $5+9=14$). Urinma kesmasi: $BK=p-AC=21-15=6$. $HK=BK-BH=6-5=1$. Tekshiruv: $CK=p-AB=8$, $BK+CK=14$ ✓.

44. a) Asos diagonalining yarmi $\frac{6\sqrt2}{2}=3\sqrt2$. Balandlik $h=\sqrt{34-18}=4$. $V=\frac13\cdot 6^2\cdot 4=48$.
b) Apofema: $l=\sqrt{h^2+3^2}=\sqrt{16+9}=5$ (yoki $\sqrt{34-9}=5$). Yon sirt: $4\cdot\frac12\cdot 6\cdot 5=60$. To'la sirt: $60+36=96$. (Faqat yon sirtni yozish — 60 — tipik xato.) Tekshiruv: yon qirra $\sqrt{4^2+(3\sqrt2)^2}=\sqrt{34}$ ✓.

45. a) Birinchi quvur x soatda, ikkinchisi $x+3$ soatda to'ldirsin. $\frac{1}{x}+\frac{1}{x+3}=\frac12\Rightarrow 2(2x+3)=x(x+3)\Rightarrow x^2-x-6=0$, $x=3$ ($x=-2$ mos emas). Ikkinchi quvur: $3+3=6$ soat. Tekshiruv: $\frac13+\frac16=\frac12$ ✓. (Javob sifatida 3 ni yozish — tipik xato.)
b) Barcha imkoniyatlar: $C_9^3=84$. Qulay: $C_5^2\cdot C_4^1=10\cdot 4=40$. $P=\frac{40}{84}=\frac{10}{21}$. Tekshiruv: $C_4^3+C_5^1C_4^2+C_5^2C_4^1+C_5^3=4+30+40+10=84$ ✓.

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