MATEMATIKA

1. [1,3 ball]

a va b natural sonlar uchun $a \cdot b = 30$ bo‘lsa, $a + 2b - 1$ **ifodaning eng kichik qiymatini toping.**

A) *16*

B) *15*

C) *12*

D) *31*

2. [2,2 ball]

Hisoblang: $7,2\,(1) - 4,4\,(2) + \dfrac{31}{90}$

A) *3,1(3)*

B) *3,1(2)*

C) *2,1(3)*

D) *2,1(2)*

3. [2,2 ball]

Do‘kon 3 kunda jami 175 kg kartoshka sotdi. Agar ikkinchi kun uchinchi kunga nisbatan 1,5 marta ko‘p, birinchi kun esa ikkinchi kunga nisbatan 2,4 marta kam kartoshka sotgan bo‘lsa, **do‘kon birinchi kun necha kilogramm kartoshka sotgan?**

A) *35*

B) *44*

C) *56*

D) *27*

4. [2,2 ball]

Xonaga eni hamda bo‘yi 2,4 m va 4 m bo‘lgan gilam to‘shalgan. Agar xonaning eni hamda bo‘yi 4 m va 6 m bo‘lsa, **xona yuzining necha foizini gilam egallagan?**

A) *55*

B) *40*

C) *60*

D) *45*

5. [1,3 ball]

Ifodaning qiymatini toping: $\left(\sqrt{4-\sqrt{7}}+\sqrt{4+\sqrt{7}}\right)^2$

A) *7*

B) *14*

C) *11*

D) *22*

6. [1,3 ball]

Quyidagi sonlarni **o‘sish tartibida joylashtiring**:
$a=6$, $b=4\sqrt{2}$, $c=2\sqrt{10}$

A) $a<b<c$

B) $c<b<a$

C) $b<a<c$

D) $c<a<b$

7. [2,2 ball]

Soddalashtiring: $\left(\sqrt{7}+1-\sqrt{3}\right)\left(\sqrt{7}+\sqrt{3}-1\right)$

A) $5+2\sqrt{3}$

B) $3-2\sqrt{3}$

C) $5-2\sqrt{3}$

D) $3+2\sqrt{3}$

8. [2,2 ball]

Agar $\{a_n\}$ arifmetik progressiyada $a_{10}+a_{12}=25$ va $a_{20}+a_{22}=45$ bo‘lsa, $a_{11}+a_{21}$ **ni toping.**

A) *25*

B) *35*

C) *30*

D) *20*

9. [2,2 ball]

Agar $\{b_n\}$ geometrik progressiyada $b_3 = 18$ va $S_3 = 26$ bo'lsa, b_1 **ni toping.**

A) *8 yoki 16*

B) *6 yoki 36*

C) *2 yoki 32*

D) *4 yoki 64*

10. [1,3 ball]

Agar $x - y = 5$ bo'lsa, $6x + 5 - 6y$ **ning qiymatini toping.**

A) *35*

B) *25*

C) *30*

D) *40*

11. [2,2 ball]

Agar $n = -3$, $m = -2$ va $k = 3$ bo'lsa, $\left(\frac{4n^2}{m}\right)^2 \cdot \frac{k}{m^2n^2} : \frac{k^3}{(mn)^3} \cdot \frac{mk^2}{n^3}$ **ning qiymatini toping.**

A) 288

B) 48

C) -48

D) 144

12. [1,3 ball]

Soddalashtiring: $\frac{\cos 3\alpha + \cos \alpha}{\sin 3\alpha - \sin \alpha}$

A) $\operatorname{tg} \alpha$

B) $\operatorname{ctg} \alpha$

C) $2 \operatorname{ctg} \alpha$

D) $2 \operatorname{tg} \alpha$

13. [2,2 ball]

$2 \cdot \left(\sin^4 \frac{\pi}{8} + \cos^4 \frac{3\pi}{8} + \sin^4 \frac{5\pi}{8} + \cos^4 \frac{7\pi}{8} \right)$ ni **hisoblang**.

A) *3,5*

B) *2*

C) *3*

D) *1*

14. [2,2 ball]

$3^{3x} - 2 \cdot 3^{2x} + 9 \cdot 3^{x-2} = 0$ tenglamaning **barcha haqiqiy ildizlari yig‘indisini (agar u bitta bo‘lsa, shu haqiqiy ildizni) toping.**

A) -1

B) *0,5*

C) *0*

D) *1*

15. [2,2 ball]

$\log_7 (3x+5) + \sqrt{\log_7^2 (2x+5)} = 0$ tenglama **nechta haqiqiy ildizga ega?**

A) *3*

B) *1*

C) *0*

D) *2*

16. [1,3 ball]

$2x^2 - 5x - 3 = 0$ tenglamaning ildizlari x_1 va x_2 bo‘lsa, $\frac{1}{x_1} + \frac{1}{x_2}$ **ni hisoblang.**

A) $-\frac{3}{5}$

B) $-\frac{5}{3}$

C) $\frac{5}{3}$

D) $\frac{3}{5}$

17. [2,2 ball]

$\frac{x^2}{3} + \frac{48}{x^2} = 10\left(\frac{x}{3} - \frac{4}{x}\right)$ tenglamaning **haqiqiy ildizlari yig'indisini toping.**

A) *10*

B) *6*

C) *−1*

D) *4*

18. [1,3 ball]

$\sqrt{x+18} < 2 - x$ tengsizlikni **yeching.**

A) $(-18; -1)$

B) $[-18; -2)$

C) $(-18; 2)$

D) $[-18; +\infty)$

19. [2,2 ball]

$\frac{5x+3}{x^2+x-2} > 1$ tengsizlikning **barcha butun yechimlari yig'indisini toping.**

A) *9*

B) *10*

C) *15*

D) *14*

20. [1,3 ball]

Quyidagi funksiyalardan **qaysi biri toq funksiya?**

A) $y = x^4 + ctgx$

B) $y = \frac{x^2}{1 + lgx}$

C) $y = \sin x \cdot \left(1 + x^2\right)$

D) $y = \sqrt{x} + x^4$

21. [2,2 ball]

Agar $f(x) = x^2 - 1$ va $g(x) = 3 - 2x$ bo‘lsa, $f(g(x))$ **ni toping.**

A) $4x^2 - 12x + 8$

B) $4x^2 + 12x - 8$

C) $5 - 2x^2$

D) $4x^2 - 6x + 8$

22. [2,2 ball]

$f(t) = t^4 - 2t^2 + 1$ bo‘lsa, $f'(1)$ **ni hisoblang.**

A) *0*

B) *4*

C) *2*

D) *8*

23. [2,2 ball]

$f(x) = \dfrac{1}{1 - \cos(-x + 8\pi)}$ funksiyaning **boshlang‘ich funksiyasini toping.**

A) $\dfrac{1}{2}\operatorname{tg}\dfrac{x}{2} + C$

B) $-\dfrac{1}{2}\operatorname{ctg}\dfrac{x}{2} + C$

C) $-\operatorname{ctg}\dfrac{x}{2} + C$

D) $-\operatorname{tg}\dfrac{x}{2} + C$

24. [1,3 ball]

Ikki to‘g‘ri chiziqning kesishishidan hosil bo‘lgan qo‘shni burchaklarning ayirmasi 20° ga teng bo‘lsa, **bu burchaklardan kichigini toping.**

A) 90°

B) 80°

C) 60°

D) 70°

25. [1,3 ball]

ABC teng yonli ($AB = BC$) uchburchakning BD medianasi uzunligi 4 cm ga teng. Agar ABD uchburchak perimetri 12 cm ga teng bo‘lsa, ABC **uchburchak perimetrini (cm) toping.**

A) *9*

B) *8*

C) *16*

D) *18*

26. [2,2 ball]

Aylana 13 : 14 : 9 nisbatda uchta yoyga bo‘lingan va bo‘linish nuqtalari tutashtirilib uchburchak hosil qilingan. Agar hosil bo‘lgan uchburchakning kichik tomoni $\sqrt[4]{12}$ cm ga teng bo‘lsa, **aylanaga tashqi chizilgan muntazam uchburchakning yuzini (cm^2) toping.**

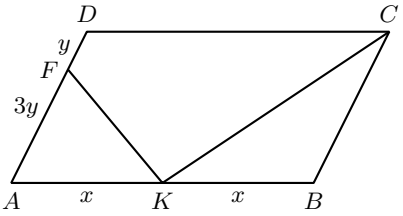
A) $2\sqrt[4]{3}$

B) 9

C) 36

D) $3\sqrt{3}$

27. [2,2 ball]



Chizmadagi $ABCD$ parallelogrammning yuzi 64 cm^2 ga teng bo‘lsa, $FKCD$ **to‘rtburchakning yuzini (cm^2) toping.**

Bunda $\dfrac{AF}{FD} = 3$, $\dfrac{AK}{KB} = 1$ ga teng.

A) *52*

B) *36*

C) *48*

D) *28*

28. [2,2 ball]

Muntazam sakkizburchakka ichki va tashqi aylanalar chizilgan. Agar ichki chizilgan aylananing radiusi $r = 2 + \sqrt{2}$ cm bo‘lsa, **bu aylanalar hosil qilgan halqaning yuzini (cm^2) toping.**

A) 4π

B) 8π

C) 2π

D) $\sqrt{2}\pi$

29. [2,2 ball]

α tekislik va uni kesib o‘tmaydigan AB kesma berilgan. AB kesmaning uchlaridan α tekislikkacha bo‘lgan eng qisqa masofalar $AA_1 = 2$ cm va $BB_1 = 7$ cm ga teng.

A **uchidan boshlab hisoblaganda** AB **kesmani** $3 : 2$ **nisbatda bo‘luvchi nuqtadan** α **tekislikkacha bo‘lgan eng qisqa masofani (cm) toping.**

A) *5*

B) *3*

C) *4,5*

D) *4*

30. [2,2 ball]

Agar $|\overrightarrow{a}| = 5$ va $\left|\overrightarrow{b}\right| = 4$ ga teng bo‘lib, bu vektorlar orasidagi burchak $60°$ ga teng bo‘lsa, $5\overrightarrow{a} - \overrightarrow{b}$ **vektorning uzunligini toping.**

A) 21

B) 9

C) $\sqrt{41}$

D) $\sqrt{541}$

31. [2,2 ball]

$U = \{x| \ -10 \leq x \leq 10, \ x \in Z\}$ universal to‘plam hamda uning $A = \{x| \ -7 \leq x \leq 3, \ x \in Z\}$ va $B = \{x| \ -3 \leq x \leq 7, \ x \in Z\}$ qism to‘plamlari bo‘lsin.

$(A \cup B)'$ **to‘plamning elementlari sonini toping.** Bunda $(A \cup B)'$ to‘plam $A \cup B$ to‘plamning to‘ldiruvchisi.

A) *2*

B) *6*

C) *8*

D) *4*

32. [2,2 ball]

Qopchada har biri 8 tadan moviy va qizil sharlar bor.

Ketma-ket olingan ikki shardan ikkalasining ham moviy bo‘lish ehtimolligini toping.

A) $\frac{1}{4}$

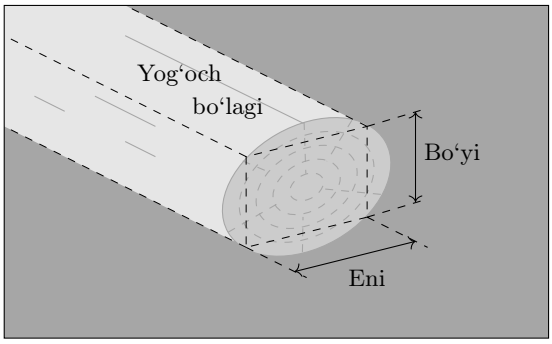
B) $\frac{7}{15}$

C) $\frac{7}{30}$

D) $\frac{1}{8}$

Topshiriqlar (33-35) va javob variant (A-F) larini o‘zaro moslashtiring.

Uzunligi 6 m va asosining radiusi 5 dm ga teng bo‘lgan silindrsimon shakldagi yog‘och bo‘lagidan eng katta hajmli to‘g‘ri burchakli parallelepiped shaklidagi yog‘och ustun yasaldi.



A) *30*

B) 3

C) 50

D) 25

E) $33\frac{1}{3}$

F) *3000*

33. [2,2 ball]

Yasalgan ustun asosining yuzini (dm^2) toping.

34. [2,2 ball]

Yasalgan ustunning hajmini (m^3) toping.

35. [2,2 ball]

Ustun yasash natijasida (jarayonida) yog‘och bo‘lagining necha foizi chiqindiga chiqqan? ($\pi \approx 3$ deb oling)

36. Tenglamani yeching: $(x-1)^4 + 2x = x^2 + 73$

[1,5 ball]

a) Tenglama nechta haqiqiy ildizga ega?

Javob: a) _____

[1,7 ball]

b) Tenglamaning haqiqiy ildizlari ko‘paytmasini toping.

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.

37. Tenglamani yeching: $\sin 7x \cdot \cos x = \sin 6x$

[1,5 ball]

a) Tenglamaning eng kichik musbat ildizini toping.

Javob: a) _____

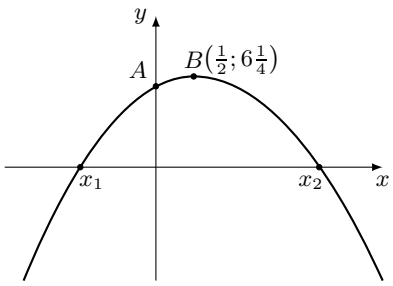
[1,7 ball]

b) Tenglama $x \in [-\pi; \pi]$ kesmada nechta haqiqiy ildizga ega?

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.

38. Quyidagi chizmada $f(x) = ax^2 + bx + 6$ funksiyaning grafigi tasvirlangan. Parabola uchi $B\left(\frac{1}{2}; 6\frac{1}{4}\right)$ nuqtada joylashgan bo‘lib, $f(x)$ funksiya grafigi Oy o‘qini A nuqtada, Ox o‘qini esa abssissalari x_1 va x_2 $(x_1 < x_2)$ bo‘lgan nuqtalarda kesib o‘tgan.



[1,5 ball]

a) $\dfrac{x_2}{x_1}$ ni toping.

Javob: a) _____

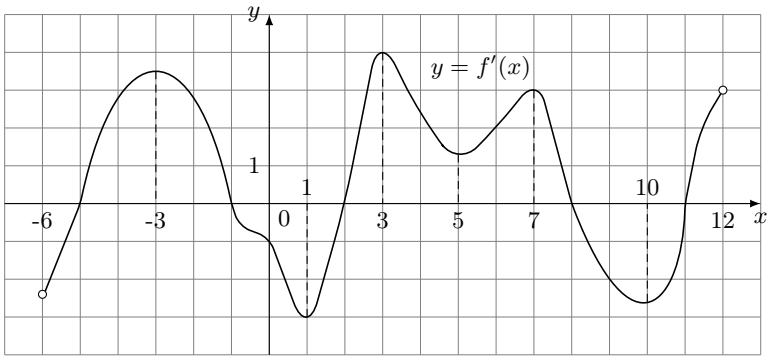
[1,7 ball]

b) A va B nuqtalar orasidagi masofani toping.

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.

39. Quyidagi chizmada $(-6;12)$ oraliqda aniqlangan $y = f'(x)$ funksiyaning grafigi tasvirlangan. Bunda $y = f'(x)$ funksiya $y = f(x)$ funksiyaning hosilasi.



[1,5 ball]

a) $y = f(x)$ **funksiyaning** $(-6;12)$ **oraliqdagi lokal maksimum nuqtalari sonini toping.**

Javob: a) _____

[1,7 ball]

b) $y = f(x)$ **funksiyaning** $(-6;12)$ **oraliqdagi lokal minimum nuqtalari sonini toping.**

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.

40. Bizga $f(x) = 2\sqrt{x}$ va $g(x) = 2x$ funksiyalar berilgan bo‘lsin.

[1,5 ball]

a) $f(x)$ **va** $g(x)$ **funksiyalar nechta umumiy nuqtaga ega?**

Javob: a) _____

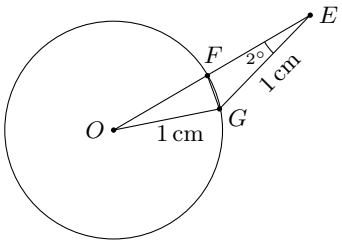
[1,7 ball]

b) $f(x)$ **va** $g(x)$ **funksiyalar grafiklari bilan chegaralangan shakl yuzini hisoblang.**

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.

41. Quyidagi chizmada radiusi 1 cm ga teng va markazi O nuqtada bo‘lgan aylana tasvirlangan. F va G nuqtalar aylanaga tegishli bo‘lib, O, F va E nuqtalar bir to‘g‘ri chiziqda yotadi. Bunda $\angle GEF = 2^\circ$ va $GE = 1$ cm.



[1,5 ball]

a) $\angle EGF$ **ni toping.**

Javob: a) _____

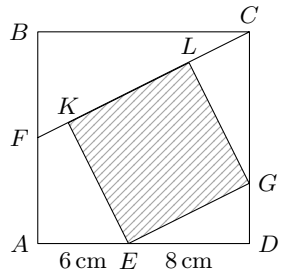
[1,7 ball]

b) $\angle EFG$ **ni toping.**

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.

42. $ABCD$ kvadratning ichki sohasida chizmadagi kabi $KLGE$ kvadrat joylashtirilgan. Bunda $AE = 6$ cm va $ED = 8$ cm.



[1,5 ball]

a) CG kesma uzunligini (cm) toping.

Javob: a) _____

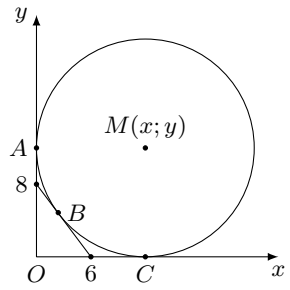
[1,7 ball]

b) $KLGE$ kvadratning yuzini (cm^2) toping.

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.

43. Koordinatalar tekisligida markazi M nuqtada bo‘lgan aylana Oy o‘qiga A nuqtada, Ox o‘qiga esa C nuqtada urinadi (rasm). Koordinatalari (6;0) va (0;8) bo‘lgan nuqtalarni tutashtirishdan hosil bo‘lgan kesma aylanaga B nuqtada urinadi.



[1,5 ball]

a) Aylana radiusini toping.

Javob: a) _____

[1,7 ball]

b) Aylana markazidan koordinata boshigacha bo‘lgan masofani toping.

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.

44. Uchi S nuqtada bo‘lgan $SABC$ muntazam uchburchakli piramida yon qirrasining uzunligi asosining tomonidan 2 marta katta. SAB uchburchakda AH balandlik va ABC uchburchakda BM mediana o‘tkazilgan.

[1,5 ball]

a) AH kesma uzunligining BH kesma uzunligiga nisbatini toping.

Javob: a) _____

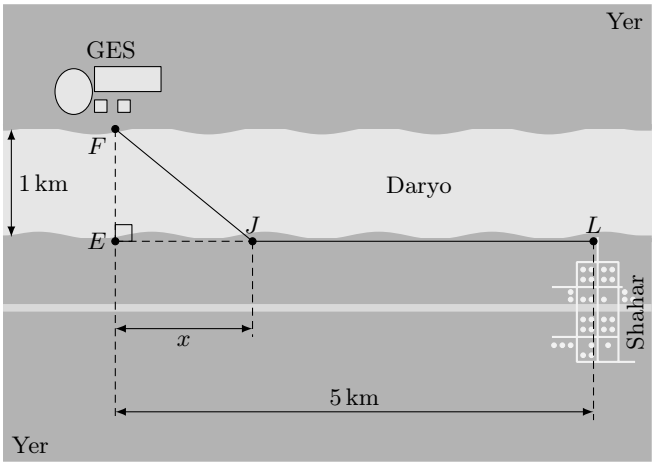
[1,7 ball]

b) MH kesma uzunligining BH kesma uzunligiga nisbatini toping.

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.

45. Shaharni elektr energiyasi bilan ta’minlash maqsadida ikki xil kabeldan foydalanilgan. Daryo tubidan o‘tadigan FJ uzunlikdagi kabelning har bir kilometri uchun 7500$ dan va qirg‘oq bo‘ylab (yer ostidan) JL masofaga tortilgan kabelning har bir kilometri uchun 6000$ dan pul to‘langan. Bunda daryoning kengligi FE=1 km, EL=5 km va $EL \perp FE$ bo‘lib, eng kam pul ($) sarflab F nuqta(stansiya)dan L nuqta(shahar)ga kabel tortib borilgan.



[1,5 ball]

a) Qirg‘oq bo‘ylab JL masofaga tortilgan kabel uchun qancha mablag‘ ($) sarflangan?

Javob: a) _____

[1,7 ball]

b) Daryo tubidan FJ masofaga tortilgan kabel uchun qancha mablag‘ ($) sarflangan?

Javob: b) _____

Diqqat! Javoblaringizni javoblar varaqasiga ko‘chirib yozing.