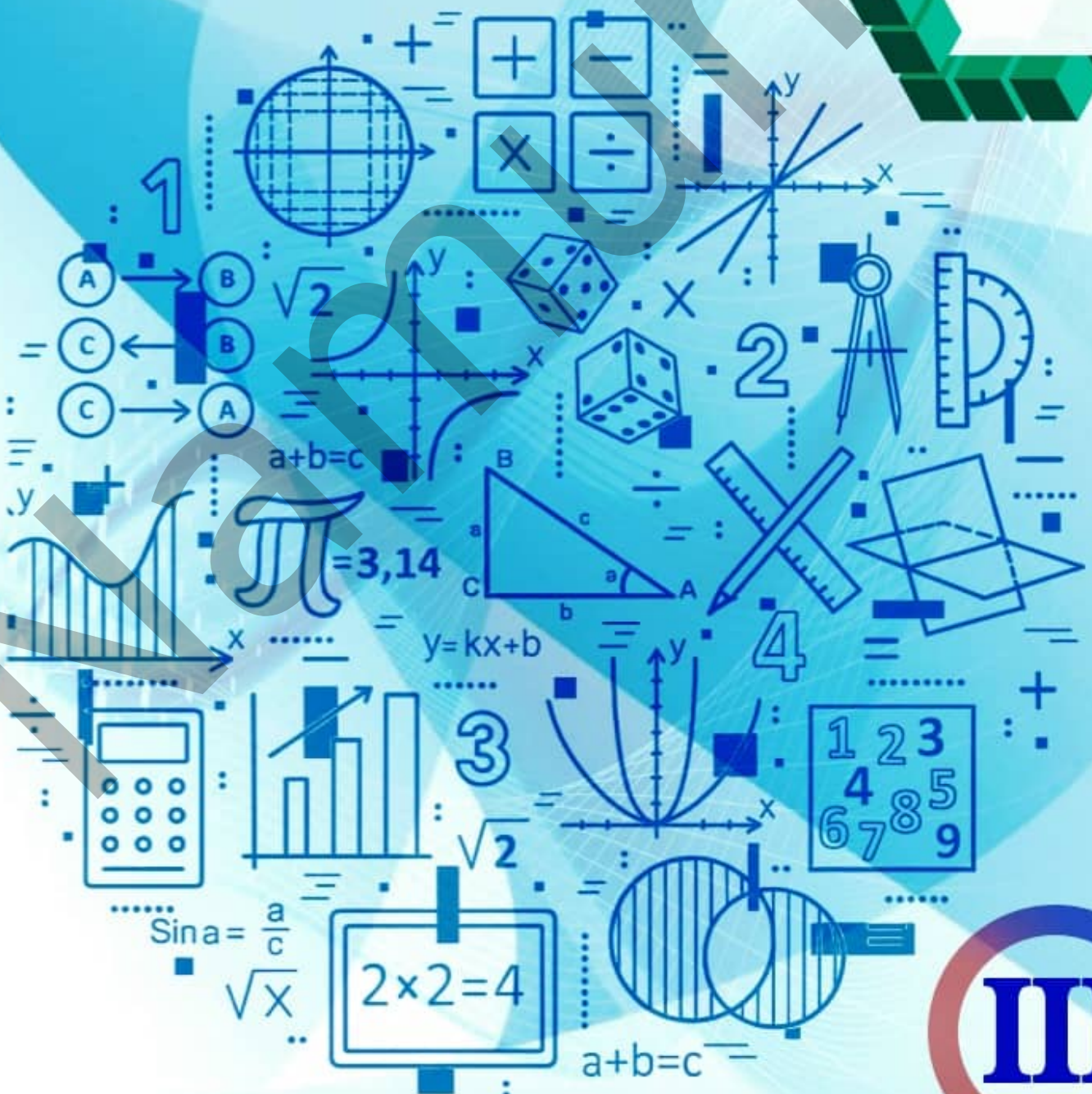
Ilm sari dadil qadamlar

DARAJA

ALGEBRA

IDC



III

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Hasan Suyunov **Otabek Asatov**

D A R A J A - III

Toshkent – 2025

Ushbu misol va masalalar to‘plami “Al-Beruniy” nomidagi ixtisoslashtirilgan maktablar, akademik litseylar hamda matematika fani bo‘yicha chuqurlashtirilgan tayyorlov kurslariga qatnashuvchilar uchun mo‘ljallangan.

To‘plamda har bir mavzu ikki asosiy qismga bo‘lingan:

“Ustoz bilan ishlash uchun topshiriqlar” – bu bo‘limda siz mavzuning nazariy qismini o‘qituvchingiz rahbarligida chuqur o‘rganasiz. Har bir topshiriq mantiqiy fikrlashni faollashtirishga va amaliy bilimlarni mustahkamlashga yo‘naltirilgan.

“Mustaqil ishlash uchun topshiriqlar” – bu bo‘limda siz ustoz bilan o‘rgangan bilimlaringizni mustaqil ravishda mustahkamlaysiz. Savollar chuqur fikrlash, tahlil qilish va bilimni mustahkamlashga xizmat qiladi.

Mazkur yondashuv orqali o‘quvchi o‘z bilimini bosqichma-bosqich rivojlantiradi, mantiqiy fikrlashni shakllantiradi va yuqori natijalarga erishishga tayyor bo‘ladi.

Ushbu o’quv qo’llanmamizni yaratishda yaqindan yordam bergan Baxromov Azizxon, Abdusattorov Ahmadjon, Ergashev Jasur, Narzullayev Mirjalol va Axmedov Navro’zga o’z minnatdorchiligimizni bildiramiz.

Mundarija:

Javoblarni ko'rish uchun yuqoridagi QR kodni skanerlang

1. Birhad va ko'phad tushunchasi. Birhadlar va ko'phadlar ustida amallar

Ustoz bilan ishlash uchun topshiriqlar

1 **Quyida berilgan ifodalardan birhad va ko'phadlarni belgilang.**

Algebraik ifodalar	Birhad ✓ ✗	Ko'phad ✓ ✗	Algebraik ifodalar	Birhad ✓ ✗	Ko'phad ✓ ✗
$2a$	✓	✗	$5x^{-3}y^2$		
$\frac{2}{5}b$			$a+2b$		
$\frac{3}{2a}$	✗	✗	x^2-y^2		
$\frac{3}{2a}$			$\frac{a+b}{a-b}$		
$-3a^2b$			a^2+a-1		
$\frac{10}{9}x^3y^2$			$ab-\frac{1}{3}a^2b^3$		

2 **Birhadlarni standart shaklga keltiring.**

a) $7m^2 \cdot 2m =$

b) $4c \cdot 5c \cdot \frac{1}{10}c =$

c) $(-5x^2) \cdot (-8x^4) =$

d) $0,5a \cdot 4b \cdot 3c =$

e) $3a^2ba^3b =$

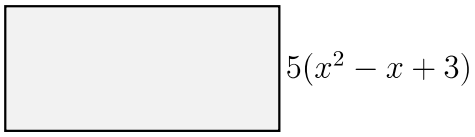
f) $\frac{1}{2}x^2 \cdot 4x^2y^3 =$

g) $0,75mn \cdot 4m^3n^3 =$

h) $-3p \cdot 4q^2 \cdot (-2p^2q) =$

6 **Quyidagi shakllarning perimetrlarini toping.**

a)



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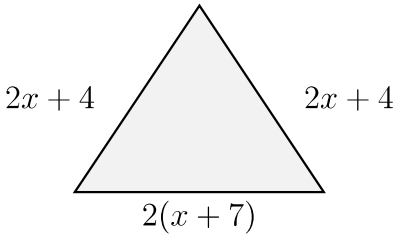

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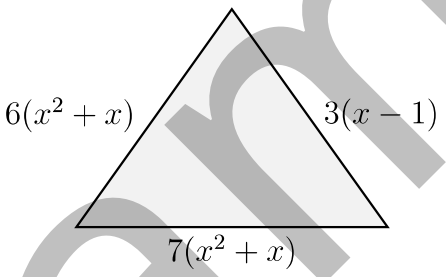
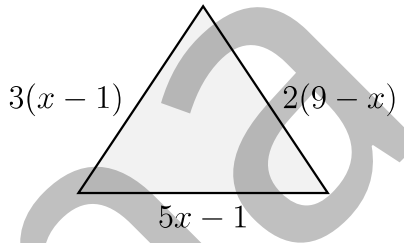
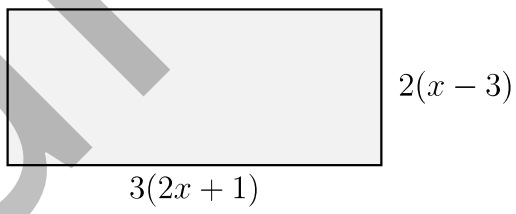


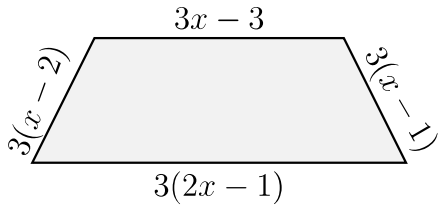
d)



e)

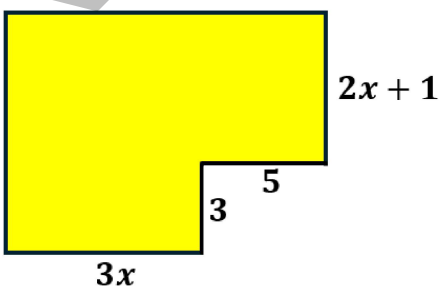


f)

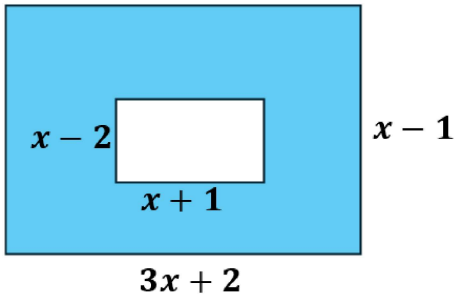


7 **Rasmda berilgan shakllarning bo'yalgan qismlar yuzasini toping.**

a)



b)



c) $p+q=11$ va $p^2q+q+pq^2+p=33$ bo'lsa, $pq=?$

d) $a-b=3$ va $ab=7$ bo'lsa, $\dfrac{a^2b-ab^2-1}{2a-2b+1}=?$

e) $3ax+6ay-3bx-6by=14$ va $a-b=7$ bo'lsa, $x+2y=?$

5 $a-b=b-c=5$ **bo'lsa:**

a) $a-c=?$

b) $ab-ac-b^2+bc=?$

c) $a-2b+c=?$

d) $a^2-ab-ac+bc=?$

6 $a=2025^3-2025^2$ va $b=2024^3+2024^2$ bo'lsa, a va b sonlarni taqqoslang.

7 $a=27^3-27^2$, $b=26^2\cdot 27+26\cdot 27^2$, $c=26^3+26^2$ bo'lsa, a, b va c sonlarni o'sish tartibida joylashtiring.

8 **Ko'phadni ko'paytuvchilarga ajrating.**

a) $2x^2+3x+4xy+6y+10xz+15z=$

b) $8x^2y-12xy^2+6xz-9yz+4xt-6yt=$

5 **Tenglamani yeching**

a) $x^2 + 7x - (x-4)(x+4) = 37$

b) $(x+5)^2 - 3x - (x-2)(x+2) = 41$

c) $(x-1)(x+1) + 6x - (x+4)^2 = -9$

d) $(x+2)^2 - (x-3)^2 + 5x = 13$

e) $x^3 - 2x - (x-1)(x^2+x+1) = 27$

f) $2x^2 - (x+6)x - (x-2)(x+2) = 11$

g) $(x^2-9) - (x-3)(x+3) + 3x = 21$

h) $x^3 + 3x - (x+1)(x^2-x+1) = 33$

i) $x^2 - (x+4)(x-1) + 9x = 43$

j) $(x+3)^2 - (x^2-4) + 4x = 25$

6 **Hisoblang.**

a) $\dfrac{41^2 - 11^2}{37^2 - 2 \cdot 37 \cdot 7 + 7^2} =$

b) $\dfrac{49^2 + 2 \cdot 49 \cdot 15 + 15^2}{67^2 - 9} =$

c) $\dfrac{101^2 - 19^2}{36^2 - 9^2} =$

d) $\dfrac{215^2 - 115^2}{220^2 - 120^2} =$

Mustaqil ishlash uchun topshiriqlar

1 a, b, c **va** d **musbat sonlar uchun** $a > b$, $c > d$ **bo'lsa, quyidagilardan qaysilari doim to'g'ri?**

a) $a + c > b + d$

b) $a - c > b - d$

c) $a \cdot c > b \cdot d$

d) $\frac{a}{c} > \frac{b}{d}$

2 $a > b > 0$ **tengsizlik uchun quyida berilgan tengsizliklarni isbotlang.**

a) $3a + b > a + 3b$

b) $a^2b - ab^2 > 0$

c) $a^2 > b^2$

d) $2(a + 2) < 3a + b + 4$

e) $\frac{1}{b} - \frac{1}{a} > 0$

f) $a^2 - b^2 > 2(b - a)$

3 **Agar** $-\frac{1}{2} \leq x \leq \frac{1}{3}$ **va** $-2,5 \leq y \leq 7,5$ **bo'lsa, berilgan ifodalarning eng kichik qiymatini toping.**

a) $-4x + 6y$

b) $\frac{9y - 4x}{13}$

c) $\frac{43}{x + y}$

d) $\frac{-47}{2x - 3y}$

5 **Agar $a < 0 < b < c$ bo'lsa quyidagi ifodalarni soddalashtiring.**

a) $|a-b| + |b-c| =$

b) $|b-a| + |c-a| =$

c) $|c-2a| - |2b-3c| =$

d) $|a| + a + |b| + b + |c| + c =$

e) $-|a-b| - |3b-5c| =$

f) $-|3b+2c| - |2a-3b| =$

6 **Quyida berilgan tengliklardan qaysilari doimo to'g'ri?**

a) $|a| = a$

b) $|a| = -a$

c) $|a|^2 = a^2$

d) $|2x| = 2|x|$

e) $|a| \cdot |b| = |a \cdot b|$

f) $\dfrac{|a|}{|b|} = \left|\dfrac{a}{b}\right|$ bunda, $b \neq 0$.

7 **Tenglamani yeching**

a) $|x| = x$

b) $|x| = -x$

c) $|2x+7| = 2x+7$

d) $|3-5x| + 3 = 5x$

e) $|4x-12| - 4x = -12$

f) $\left|\dfrac{1}{2}x - 3\right| + 0,5x = 3$

Mustaqil ishlash uchun topshiriqlar

1 **Hisoblang.**

a) $\sqrt{EKUB(36;81)\cdot EKUK(36;81)}=?$

b) $\sqrt{EKUB(45;295)\cdot EKUK(45;295)}=?$

2 **a va b sonlarni taqqoslang.**

a) $a=\sqrt{12}+\sqrt{27}, \quad b=9$

b) $a=\sqrt{2}+\sqrt{3}, \quad b=\sqrt{10}$

c) $a=\sqrt{5}-2, \quad b=2-\sqrt{3}$

d) $a=2\sqrt{3}+\sqrt{5}, \quad b=4\sqrt{2}$

3 **Hisoblang.**

a) $3+8\sqrt{3}+\dfrac{2}{7+4\sqrt{3}}=$

b) $\dfrac{7}{5+3\sqrt{2}}+6+3\sqrt{2}=$

c) $\dfrac{17}{\sqrt{18}+1}+7-3\sqrt{2}=$

d) $6+4\sqrt{10}+\dfrac{\sqrt{18}}{\sqrt{5}-\sqrt{2}}=$

e) $\dfrac{1}{4-2\sqrt{3}}+\dfrac{1}{4+2\sqrt{3}}=$

f) $\dfrac{1}{7+4\sqrt{3}}+\dfrac{1}{7-4\sqrt{3}}=$

g) $\dfrac{1}{\sqrt{5}+2}+\dfrac{8}{\sqrt{5}+1}=$

h) $\dfrac{3+\sqrt{8}}{3-\sqrt{8}}+\dfrac{3-\sqrt{8}}{3+\sqrt{8}}=$

i) $\dfrac{6-\sqrt{3}}{6+\sqrt{3}}-\dfrac{6+\sqrt{3}}{6-\sqrt{3}}=$

j) $\dfrac{-3}{2-\sqrt{7}}+\dfrac{2}{3+\sqrt{7}}=$

17. Kvadrat tenglamaga keltiriladigan tenglamalar. Bikvadrat tenglamalar

Ustoz bilan ishlash uchun topshiriqlar

1 **Tenglamalarni yeching.**

a) $\dfrac{x}{x-2}=\dfrac{9}{x}$

b) $\dfrac{x+1}{x-1}=\dfrac{6}{x}$

c) $\dfrac{x-2}{x+8}=\dfrac{-1}{x+4}$

d) $\dfrac{x+6}{x-3}=\dfrac{20}{x-2}$

e) $\dfrac{x+2}{2x+3}=\dfrac{2x-3}{3x-2}$

f) $\dfrac{2x-4}{x+1}=\dfrac{3x-8}{2x-3}$

g) $\dfrac{3x+2}{4x+3}=\dfrac{4x-1}{6x-3}$

h) $\dfrac{3x+1}{6x-1}=\dfrac{4x-1}{4x+3}$

2 **Tenglamalarni yeching.**

a) $5x+\dfrac{2}{x}=7$

b) $3+\dfrac{4}{x^2}=\dfrac{7}{x}$

9 a) **Quyida berilgan jadvaldagi tenglamalar orasidan ildizlari yig'indisi 3 ga tenglarini ajrating.**

	Tenglamalar	✓ / ✗
1	$x^2+3x-4=0$	✗
2	$x^2-3x+2=0$	✓
3	$2x^2-6x+1=0$	
4	$-x^2-3x+9=0$	
5	$-2x^2-3x+10=0$	
6	$\frac{1}{5}x^2-3x-7=0$	
7	$\frac{2}{3}x^2-2x-1=0$	
8	$3x^2-9x-15=0$	
9	$-\frac{5}{18}x^2+\frac{5}{6}x-2=0$	
10	$-5x^2+15x-1=0$	

b) **Quyida berilgan jadvaldagi tenglamalar orasidan ildizlari ko'paytmasi 5 ga tenglarini ajrating.**

	Tenglamalar	✓ / ✗
1	$x^2-7x+5=0$	✓
2	$x^2-5x+6=0$	✗
3	$x^2-6x+5=0$	
4	$-x^2+19x+5=0$	
5	$2x^2-18x+10=0$	
6	$-2x^2+21x-5=0$	
7	$3x^2-11x+5=0$	
8	$7x^2-40x+35=0$	
9	$\frac{1}{5}x^2-2x-1=0$	
10	$\frac{3}{5}x^2-12x+3=0$	

10 **Quyida berilgan jadvalni to'ldiring.**

Tenglamalar	x_1+x_2	$x_1\cdot x_2$	$x_1+x_2+x_1\cdot x_2$	$x_1\cdot x_2-x_1-x_2$	$x_1^2\cdot x_2+x_2^2\cdot x_1$
$x^2-4x+2=0$					
$x^2+5x-3=0$					
$2x^2-4x-7=0$					

20. Matnli masalalar

Ustoz bilan ishlash uchun topshiriqlar

1 Ikkita ketma-ket kelgan natural sonlar ko'paytmasi 132 ga teng bo'lsa, shu sonlarni toping.

2 Ikkita ketma-ket kelgan juft sonlar ko'paytmasi 168 ga teng. Shu sonlarni toping.

3 Bir son ikkinchisidan 8 ga katta. Agar bu sonlar ko'paytmasi 65 ga teng bo'lsa, shu sonlarni toping.

4 Bir son ikkinchisidan 7 ga kichik. Agar bu sonlar ko'paytmasi -42 ga teng bo'lsa, shu sonlarni toping.

5 To'g'ri to'rtburchakning eni $x + 3$ m, bo'yi esa $2x - 1$ m ga teng. Agar to'g'ri to'rtburchakning yuzi 60 m^2 bo'lsa, uning tomonlarini toping.

6 To'g'ri to'rtburchakning yuzi 60 m^2 ga teng. Agar uning bo'yi enidan 7 m ga ortiq bo'lsa, bu to'g'ri to'rtburchakning perimetrini toping.

7 Hasanning yoshi akasi yoshidan 3 ga kichik. 4 yildan keyin ularning yoshlari ko'paytmasi 700 ga teng bo'ladi. Hasanning yoshini toping.

8 Ikkita sonning yig'indisi 16 ga, ko'paytmasi esa 48 ga teng. Shu sonlarni toping.

19 **Berilgan ma'lumotlardan foydalanib, jadvalni to'ldiring.**

	Funksiyalar	kesishadi	o'zaro perpendikulyar bo'ladi	o'zaro parallel bo'ladi	ustma-ust tushadi
a)	$y=x+7$ $y=3x+4$				
b)	$y=2x-7$ $y=2x+5$	✗	✗	✓	✗
c)	$y=4x-1$ $y=-\frac{1}{4}x+3$	✓	✓	✗	✗
d)	$y_1=2x+4$ $3y=6x+12$				
d)	$y=\frac{x+1}{3}$ $y=\frac{1}{3}x+7$				
e)	$y=\frac{4}{5}x-7$ $y=-\frac{5}{4}x-7$				
f)	$y=4x-5$ $3y=-4x+1$				
g)	$y+x=1$ $y-x=1$				
h)	$2y+3x=4$ $3y-2x=4$				
f)	$4x-2y-1=0$ $-x-2y+6=0$				
i)	$\frac{x-3}{3}=\frac{y-1}{2}$ $\frac{4x-5}{3}=-\frac{8y+1}{9}$				
j)	$\frac{2x}{-3}+y=4$ $\frac{3y}{2}-x=4$				

20 a ning qanday qiymatida $y=4x-1$ va $y=(a-3)x+6$ funksiyalar o'zaro parallel bo'ladi?

21 $y=(2a-1)x+5$ va $y=(3a-2)x+7$ funksiyalar o'zaro parallel bo'lsa, a ning qiymatini toping.

22. Kvadrat funksiya

Ustoz bilan ishlash uchun topshiriqlar

1 **Berilgan funksiyalar grafigini yasang.**

a) $y = 3x^2$,

b) $y = -x^2$,

c) $y = -\frac{1}{2}x^2$,

d) $y = \frac{1}{3}x^2$

2 **$y = ax^2$ kvadrat funksiya quyida berilgan nuqtalardan o'tishi ma'lum bo'lsa, a ni toping.**

a) $(2; 4)$

b) $(-3; 18)$

c) $(4; -8)$

d) $(4; 7)$

e) $(\frac{1}{2}; -\frac{1}{8})$

f) $(-0,5; 0,75)$

3 **Quyida $y = ax^2$ funksiya uchun yozilgan tasdiqlardan qaysilari doim to'g'ri?**

a) Ushbu parabola koordinatalar boshidan o'tadi.
b) $a > 0$ bo'lganda, parabola tarmoqlari yuqoriga yo'nalgan bo'ladi.
c) $a > 0$ bo'lganda, parabola tarmoqlari pastga yo'nalgan bo'ladi.
d) Parabola uchi koordinatalar boshida joylashgan bo'ladi.
e) Parabola uchi $(0; 1)$ nuqtada joylashgan bo'ladi.
f) Parabola doimo $(1; 1)$ nuqtadan o'tadi.
g) $a < 0$ bo'lganda, parabola tarmoqlari yuqoriga yo'nalgan bo'ladi.
h) $a > 0$ bo'lganda funksiya koordinata tekisligining I va II choraklaridan o'tadi.
i) $a < 0$ bo'lganda funksiya koordinata tekisligining I va II choraklaridan o'tadi.
j) $a = -1$ bo'lganda prabola $(-2; 4)$ nuqtadan o'tadi.

Mustaqil ishlash uchun topshiriqlar

1 Agar ketma-ketlikning umumiy hadi formulasi $a_n = n + 3$ bilan ifodalansa, $a_1 + a_4$ ni toping.

2 Ketma-ketlikning umumiy hadi formulasi $b_n = 2b + 5$ ko'rinishida bo'lsa, $b_5 - b_2$ ni hisoblang.

3 **Ketma-ketliklarni keyingi uchta hadini toping.**

a) 7, 5, 8, 6, 9, ...

b) 42, 45, 15, 18, 6, ...

c) $15\frac{3}{8}, 14\frac{1}{8}, 12\frac{7}{8}, 11\frac{5}{8}, 10\frac{3}{8}, ...$

d) $0,2; -1; 5; -25; ...$

4 Agar ketma-ketlikning n-hadi formulasi $a_n = \dfrac{1}{n \cdot (n+1)}$ formula bilan ifodalansa, $a_1 + a_2 + a_3 + ... + a_{15}$ ni toping.

5 Agar ketma-ketlikning n-hadi formulasi $a_n = \sqrt{n^2 - 6n + 9}$ formula bilan ifodalansa, $a_5 - a_2 + a_3^2$ ni hosblang.

6 Agar ketma-ketlik $a_{n+1} = 2a_n + 7$ rekurent formula bilan ifodalansa va $a_1 = -9$ bo'lsa, a_4 ni hisoblang.

7 Agar ketma-ketlik $a_{n+3} = a_n^2 + a_n + 2$ rekurent formula bilan ifodalansa va $a_1 = -1$ bo'lsa, a_{10} ni hisoblang.

15 $\dfrac{101+102+103+...+119}{1+2+3+...+19}=$

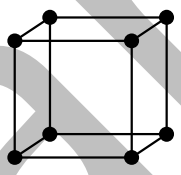
16 $\dfrac{100001+100003+100005+...+199999}{1+3+5+7+...+99999}=?$

17 **Hisoblang.**

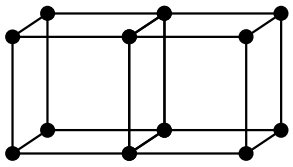
a) $10^2-9^2+8^2-7^2+...+2^2-1^2=$

b) $45^2-44^2+43^2-42^2+...+3^2-2^2=$

18 **Tayoqchalar yordamida kub yasaldi va har bir uchiga sharchalar joylashtirildi. Keyingi har bir bosqichda bu holat rasmdagidek davom ettirildi. Agar birinchi bosqich uchun 12 ta tayoqcha va 8 ta sharcha ya'ni jami 20 ta element ishlatilgan bo'lsa:**



1-bosqich



2-bosqich

a) 4-bosqichda nechta sharcha ishlatilgan?

b) 6-bosqichda nechta tayoqcha ishlatilgan?

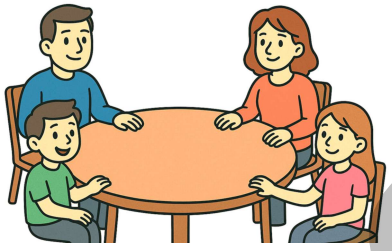
c) 10-bosqichda nechta element ishlatilgan?

d) 7-bosqichdagi tayoqchalar soni nechinchi bosqichdagi sharchalar soniga teng?

55 Bizda 3 ta uchburchak, 2 ta kvadrat va 5 ta yulduzcha bor.

Bu shakllarni 9 ta bolani har biriga bittadan tegadigan qilib necha xil usulda taqsimlash mumkin?

56 Ota, ona, o‘g‘il va qizdan iborat oilani doira shaklidagi stol atrofida nechta usulda joylashtirish mumkin?



57 6 ta do’st doira shaklidagi stol atrofida nechta usulda joylashtirish mumkin?

58 Taqinchoq 7 ta turli rangli toshlardan iborat. Quyidagi shartlarga mos bu toshlardan necha xil rasmdagidek taqinchoq yasash mumkin?

a) toshlarni burish mumkin lekin ag’darish mumkin emas

b) ag’darish mumkin

59 5 ta kitobdan 2 tasini necha xil usulda sotib olish mumkin?