

④

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 0, 1, 2, 3, 4

Bitinchi birliklar xonasiga 5 ta usul bor
oʻnliklarga 5 ta usul, yuzliklarga 4 xil
chunki yuzliklarda 0 oʻqat nashmaydi.

$$5 \cdot 5 \cdot 4 = 100 \text{ ta}$$

⑦ Toʻrtta hakamning har biri bitta ishtirok-
chiga 1 yoki 2 qoʻyadi, Demak bitta
ishtirokchi

$2 \cdot 2 \cdot 2 \cdot 2 = 16 \text{ ta}$ xil usulda bahola-
rish mumkin.

⑧ $A = \{a, b, c, d, e, f\}$

$\{a, b, c, e, f\}$ elementi toʻplamni barcha
qism toʻplamlarining har biriga d element-
ni qoʻshishda A toʻplamni d element

qatnashgan qism toʻplamlari hasil boʻladi.

$\{a, b, c, e, f\}$ qism toʻplamlari $2^5 = 32 \text{ ta}$

⑩ $A = \{a, b, c, d, e, f\}$. $\{a, d, e, f\}$

toʻplamni barcha qism toʻplamlariga b
elementni qoʻshishda, $\{a, d, e, f\}$ qism

toʻplamlari $2^4 = 16$

$$(14) A = \{x \mid x = 2n, n \in \mathbb{N}\}$$

$$B = \{x \mid x = 2n+1, n \in \mathbb{N}\}$$

$$A \cup B = \mathbb{N} \setminus \{1\}$$

A va B to'plamlar birlashmasida 1 dan boshqa barcha natural sonlar qatnashadi.

$$(28) a^2 - b^2 = 49 \quad a, b \in \mathbb{N}$$

$$(a-b)(a+b) = 1 \cdot 49 = 7 \cdot 7$$

$$\begin{cases} a-b=1 \\ a+b=49 \end{cases} \Rightarrow \begin{matrix} a=25 \\ b=24 \end{matrix} \quad \begin{matrix} 3a-2b = 3 \cdot 25 - 2 \cdot 24 \\ = 75 - 48 = 27 \end{matrix}$$

$$(33) \text{NBS}(\text{EKUB}(811, 659, 1019)) = \text{NBS}(1) = 1$$

(43)

1) loga loga log 5, loga log 5 > 0 bolishi kerak.

• log 5 > 1, 5 > 10 manoga ega emas.

3) log loga log 5 \Rightarrow loga log 5 > 0 \Rightarrow log 5 > 1
5 > 10 manoga ega emas.

2) loga loga(a+1) \Rightarrow loga(a+1) > 0 \Rightarrow
 \Rightarrow a+1 > 1 \Rightarrow manoga ega.

47) $y = \frac{y}{x} - 2$, $\frac{y}{x} \neq 0 \Rightarrow y \neq -2 \Rightarrow$

Qimmatlar sohasi $(-\infty; -2) \cup (-2; +\infty)$

48) $y = \arccos 2^x$, $-1 \leq 2^x \leq 1$

$2^x > -1$ doimo o'rinli.

$2^x \leq 1 \Rightarrow x \leq 0$

Aniqlanish sohasi $(-\infty; 0]$

51) $f(x)$ $(-\infty; \infty)$ da aniqlangan

$y = 2f(x-1) - 7$ dan $(-\infty; \infty)$ da aniqlangan

chunki x istalgan qiymatni qabul qila oladi.

52) $y = 2f(x-1) - 7$ istalgan x da

aniqlangan. Uning kamayish yoki o'sishini aniqlab bo'lmaydi.

Demak, funksiya haqida faqat monotonligini aytish mumkin.

$$(54) f(x) + x f\left(\frac{x}{2x-1}\right) = 2$$

$$x \rightarrow \frac{x}{2x-1}$$

$$f\left(\frac{x}{2x-1}\right) + \frac{x}{2x-1} f(x) = 2$$

$$f\left(\frac{x}{2x-1}\right) + \frac{1}{x} f(x) = \frac{2}{x}$$

$$f(x) \left(-\frac{x}{2x-1} - \frac{1}{x}\right) = 2 \left(1 - \frac{1}{x}\right)$$

$$f(x) = \frac{x^2 - 2x + 1}{(2x-1)x} = \frac{2(x-1)}{x}$$

$$f(x) = \frac{4x-2}{x-1}$$

$$(62) f(x) = 2x^2 - x$$

$$x_0 = 4$$

$$x - x_0 = \Delta x$$

$$x - 4 = 0,1$$

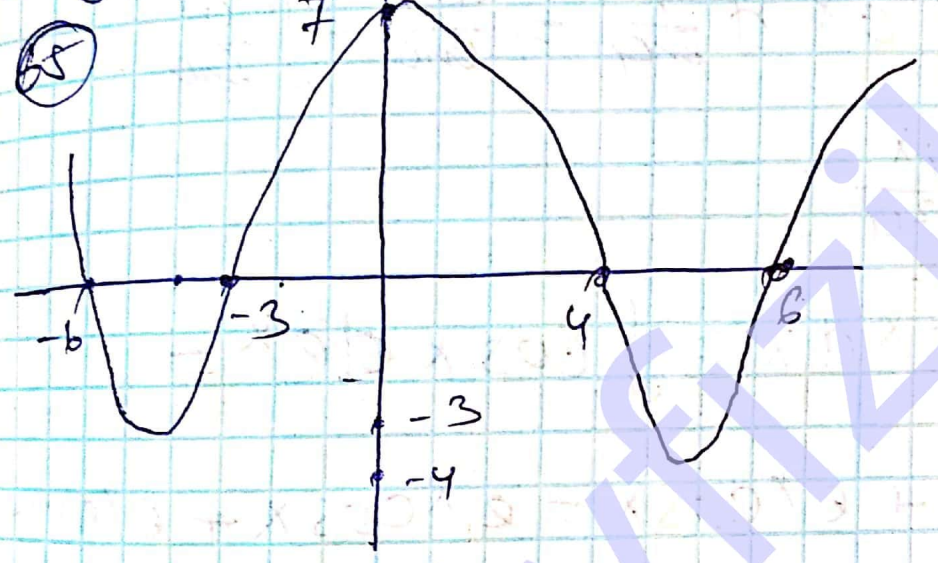
$$x = 4,1$$

$$\Delta y = f(x) - f(x_0) = f(4,1) - f(4) = 1,52$$

Funksiya o'rttirmasi: $y = f(x)$ funksiya bitir $[a, b]$ kesmada aniqlangan va x_0 shu kesmada biror nuqta bolsin, x argumentning keyingi qiymati bolsa, $x - x_0 = \Delta x$

ga argument o'rttirmasi deyiladi,
 $f(x) - f(x_0)$ funksiyaning qiymatlar
 orasidagi farqqa. **FUNKSIYA**
ORTTIRMASI deyiladi.

$$\Delta y = f(x) - f(x_0)$$



$x \in [-6; -4]$	$f(x) \leq 0$	$f'(x) \leq 0$
$x \in [-4; -3]$	$f(x) \leq 0$	$f'(x) \geq 0$
$x \in [-3; 0]$	$f(x) \geq 0$	$f'(x) \geq 0$
$x \in [0; 4]$	$f(x) \geq 0$	$f'(x) \leq 0$
$x \in [4; 5]$	$f(x) \leq 0$	$f'(x) \leq 0$
$x \in [5; 6]$	$f(x) \leq 0$	$f'(x) \geq 0$

Agar funksiya $[a; b]$ oraligida o'suvchi
 bo'lsa, o'sha oraligida funksiya kabilasini
 musbat, kamayuvchi holatda manfiy.

$$(70) \quad \varphi(t) = 2t^3 + 9t + 3$$

$$a(t) = \varphi'(t) = 6t^2 + 9$$

$$a_{\min} = a(0) = 6 \cdot 0^2 + 9 = 9$$

$$(78) \quad \int x a^x = \int x \cdot \frac{1}{\ln a} d a^x =$$

$$= \frac{a^x x}{\ln a} - \int a^x d \frac{x}{\ln a} = \frac{a^x x}{\ln a} - \int \frac{a^x}{\ln a} =$$

$$= \frac{a^x x}{\ln a} - \frac{a^x}{\ln^2 a}$$

$$(80) \quad \int \cos x e^x dx = \int \cos x e^x =$$

$$= \int e^x \sin x + e^x \cos x = e^x \cos x + e^x \sin x$$

$$- \int e^x d \sin x = e^x (\cos x + \sin x) -$$

$$\int e^x \cos x + C$$

$$= \int e^x \cos x = e^x (\cos x + \sin x) + C$$

$$\int e^x \cos x = \frac{e^x}{2} (\cos x + \sin x) + C$$

$$\textcircled{82} \int_{-1}^1 (\operatorname{tg} x + \sin x) dx = 0$$

$\operatorname{tg} x + \sin x = \sin x \left(\frac{1}{\cos x} + 1 \right)$ funksiyer
 toq. Uning boslanq: chiqarilgan funktsiyer
 funksiyer bələdi. $f(x) = f(-x)$

$$\textcircled{83} \int_{-\pi}^{\pi} |\sin 2x| dx = 2 \int_0^{\pi} |\sin 2x| dx =$$

$$= 2 \left(\int_0^{\frac{\pi}{2}} \sin 2x dx - \int_{\frac{\pi}{2}}^{\pi} \sin 2x dx \right) =$$

$$= 2 \left(-\frac{1}{2} \cos 2x \Big|_0^{\frac{\pi}{2}} + \frac{1}{2} \cos 2x \Big|_{\frac{\pi}{2}}^{\pi} \right) =$$

$$= -\cos 2\pi + \cos 0 + \cos 2\pi - \cos 2\pi = 4$$

$$\textcircled{85} \int_0^2 x e^{x^2} dx = \int_0^2 \frac{1}{2} e^{x^2} dx^2 = \frac{1}{2} \frac{e^{x^2}}{2} \Big|_0^2 = \frac{e^4 - 1}{2}$$

$$\textcircled{88} \int_0^1 \sqrt{x} \sqrt{x} \sqrt{x} dx = \int_0^1 x^{\frac{3}{2}} dx = \frac{x^{\frac{3}{2}+1}}{\frac{3}{2}+1} \Big|_0^1 = \frac{8}{15}$$

$$\sin x \cos x = -0,25 \quad 1,6 < x < 3,1$$

$x \rightarrow \text{II}$ chorakda. Ya'ni $\sin x > 0$ $\cos x < 0$

$$\begin{cases} \sin^2 x + \cos^2 x = 1 \\ 2 \sin x \cos x = -0,5 \end{cases}$$

$$(\sin x - \cos x)^2 = 1,5$$

$$\cos x - \sin x = -\sqrt{1,5}$$

108 $16 \sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ \sin 90^\circ =$

$$= 16 \sin 30^\circ \sin 90^\circ \sin 10^\circ \sin(60^\circ - 10^\circ) \sin(60^\circ + 10^\circ) =$$

$$= 16 \cdot \frac{1}{2} \cdot 1 \cdot \frac{\sin 30^\circ}{4} = 1$$

110 $\lg \tan 1^\circ + \lg \tan 2^\circ + \dots + \lg \tan 89^\circ =$

$$= \lg \tan 1^\circ + \dots + \lg \tan 45^\circ + \lg \cot 44^\circ + \dots + \lg \cot 1^\circ$$

$$= \lg \tan 45^\circ = 0$$

115 $(0,3)^{2x+4+6+\dots+2x} > (0,3)^{72}$

$$2x+4+6+\dots+2x < 72$$

$$x^2 + x < 72 \Rightarrow (x+9)(x-8) < 0$$

$$x \in (-9; 8)$$

$x \in \mathbb{N}$ holganida

$$x \in \{1, 2, 3, 4, 5, 6, 7\}$$

$$(116) \quad \arccos x \geq \arcsin x \quad | + \arcsin x$$

$$2 \arcsin x > \arcsin x + \arccos x = \frac{\pi}{2}$$

$$\arcsin x > \frac{\pi}{4} \Rightarrow x > \sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$$

$$\begin{cases} -1 \leq x \leq 1 \\ x > \frac{\sqrt{2}}{2} \end{cases} \quad x \in \left(\frac{\sqrt{2}}{2}; 1 \right]$$

$$(125) \quad |2 - |1 - |x|| = 1$$

$$2 - |1 - |x|| > 0 \quad \text{h\u00f3lsiu.} \quad \cup \quad \text{haldg}$$

$$|1 - |x|| = 1 \Rightarrow x = 0, 2, -2$$

$$2 - |1 - |x|| < 0 \quad \text{h\u00f3lsiu.}$$

$$|1 - |x|| \geq 3$$

$$1 - |x| \geq 3 \quad \text{h\u00f3lsa,} \quad |x| = -2 \quad \emptyset$$

$$1 - |x| \leq -3 \quad \text{h\u00f3lsa,} \quad |x| = 4 \Rightarrow x = \pm 4$$

Tenglama 5 ta yechimga ega,

$$(130) \quad (x^2 - x - 3)^2 - (x^2 - x - 3) - 3 = x$$

$$\begin{cases} x^2 - x - 3 = t \quad \text{deb belgilasak,} \\ t^2 - t - 3 = x \end{cases}$$

$$(x - t)(x + t) - \cancel{(x - t)} = -x + t$$

$$(x - t)(x + t) = 0 \Rightarrow \begin{cases} x = x^2 - x - 3 \\ -x = x^2 - x - 3 \end{cases}$$

$$x^2 - 2x - 3 = 0$$

$$x = 3 \quad x = -1$$

$$x^2 - 3 = 0$$

$$x = \pm \sqrt{3}$$

$$x = \pm \sqrt{3}; 3; -1$$

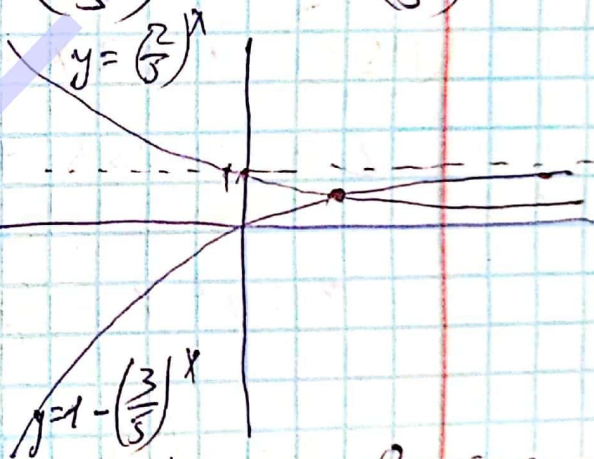
$$(134) \quad x^4 = 68 - 48\sqrt{2} = 4(17 - 12\sqrt{2}) =$$

$$4(9 - 2\sqrt{9 \cdot 8} + 8) = 4(3 - 2\sqrt{2})^2 =$$

$$= 4(\sqrt{2} - 1)^4$$

$$x = \sqrt{2}(\sqrt{2} - 1) = 2 - \sqrt{2}$$

$$(141) \quad \left(\frac{2}{5}\right)^x + \left(\frac{3}{5}\right)^x = 1 \Rightarrow \left(\frac{2}{5}\right)^x = 1 - \left(\frac{3}{5}\right)^x$$



Demak, tenglamanya
sistemanya

$$\text{nya. } x = 1$$

$$(146) \quad \lg|x| + \lg|y| = 1 + \lg 4$$

$$\lg|x| \cdot \lg|y| = \lg 4$$

$$\lg|x| + \lg|y| - \lg|x| \lg|y| - 1 = 0$$

$$(\lg|x| - 1)(\lg|y| - 1) = 0$$

$$\lg|x| = 1 \Rightarrow x = \pm 10 \Rightarrow \lg|y| = \lg 4 \Rightarrow y = \pm 4$$

$$\lg|y| = 1 \Rightarrow y = \pm 10 \Rightarrow \lg|x| = \lg 4 \Rightarrow x = \pm 4$$

Sistemanya sistemanya

$$(148) \quad \lg x = 0,52$$

$x^{100} \rightarrow n$ xonvolsi son bo'lsin. n holatg

$$10^{n-1} \leq x^{100} < 10^n$$

$$n-1 \leq \lg x^{100} < n$$

$$n-1 \leq 100 \cdot 0,52 < n \Rightarrow \begin{matrix} n > 52 \\ n < 53 \end{matrix}$$

$$n = 53$$

$$(152) \quad 4^{\lg x} \cdot 2^{\lg x} = 64$$

$$2^{3 \lg x} = 2^6 \Rightarrow \lg x = 2 \Rightarrow x = 100$$

$$(154) \quad \sin 2x + \cos 2x = 2 \operatorname{tg} x + 1$$

$$2 \sin x \cos x + \cos^2 x - \sin^2 x = 2 \frac{\sin x}{\cos x} + \sin^2 x + \cos^2 x$$

$$2 \sin^2 x + \frac{2 \sin x}{\cos x} - 2 \sin x \cos x = 0$$

$$\sin x \left(\sin x + \frac{1}{\cos x} - \cos x \right) = 0$$

$$\sin x \cdot \sin x (1 - \operatorname{tg} x) = 0$$

$$\sin x = 0$$

$$x = \pi n$$

$$\operatorname{tg} x = 1$$

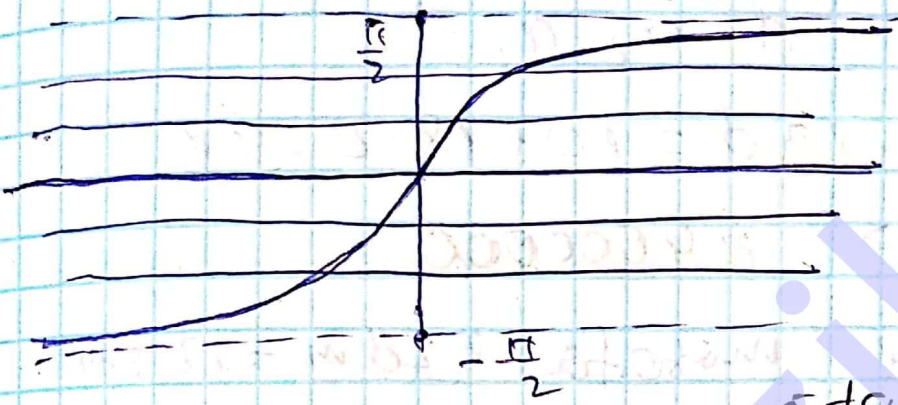
$$x = \frac{\pi}{4} + \pi n$$

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$$\cos(12 \operatorname{arctg} x) = 1$$

$$12 \operatorname{arctg} x = 2\pi k$$

$$\operatorname{arctg} x = \frac{\pi k}{6}$$



- k=0
- k=1
- k=2
- k=-1
- k=-2

5 ta ildizga ega

157

$$\left\lfloor \frac{x}{4} \right\rfloor + \left\lfloor \frac{2x}{4} \right\rfloor + \left\lfloor \frac{3x}{4} \right\rfloor = 9$$

$$x - \left\lfloor \frac{x}{4} \right\rfloor + \frac{2x}{4} - \left\lfloor \frac{2x}{4} \right\rfloor + \frac{3x}{4} - \left\lfloor \frac{3x}{4} \right\rfloor = 9$$

$$1,5x - 9 = \left\lfloor \frac{x}{4} \right\rfloor + \left\lfloor \frac{2x}{4} \right\rfloor + \left\lfloor \frac{3x}{4} \right\rfloor$$

$$\begin{cases} 0 \leq \left\lfloor \frac{x}{4} \right\rfloor < 1 \\ 0 \leq \left\lfloor \frac{2x}{4} \right\rfloor < 1 \\ 0 \leq \left\lfloor \frac{3x}{4} \right\rfloor < 1 \end{cases} \Rightarrow \begin{cases} 0 \leq 1,5x - 9 < 3 \\ 6 \leq x < 8 \end{cases}$$

Ekan $B(x, 4) = 1$ shartini $x = 7$ qanoat-
kontinuali.

$$(163) \quad S_n = n^2 + 9n$$

$$S_1 = a_1 = 1 + 9 = 10$$

$$S_2 = a_1 + a_2 = 10 + a_2 = 4 + 18 = 22 \Rightarrow$$

$$a_2 = 12; \quad \therefore d = a_2 - a_1 = 2$$

$$a_{20} = a_1 + 19d = 10 + 19 \cdot 2 = 48$$

$$(165) \quad M_1 \rightarrow p: 40000000$$

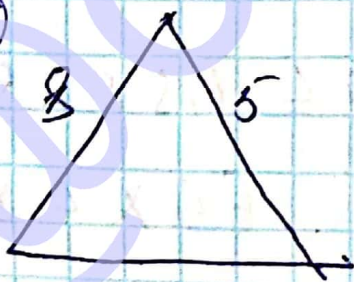
Xaritada qiy masofa $1,2 \text{ km} = 12 \text{ sm}$

$$\begin{aligned} \text{Xarita qiy masofa} &= 12 \cdot 40000000 \text{ sm} = \\ &= 48 \cdot 10^6 \text{ sm} \end{aligned}$$

$$M_2 \rightarrow p: 30000000$$

$$\text{Xaritada qiy masofa} = \frac{48 \cdot 10^6}{3 \cdot 10^6} = 16 \text{ sm}$$

(175)



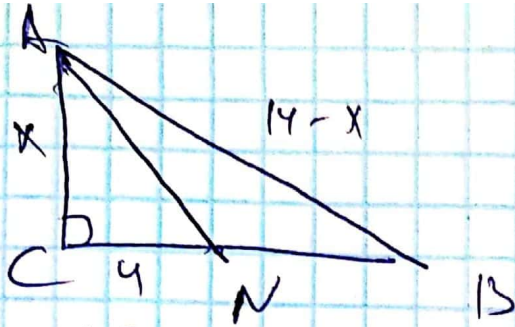
bōlgonidan

$$\begin{cases} 8 + 5 > x \\ x < 8 - 5 \end{cases}$$

$$x \in (3; 13) \quad x \in \mathbb{N}$$

$$P_{\min} = 4 + 8 + 5 = 17$$

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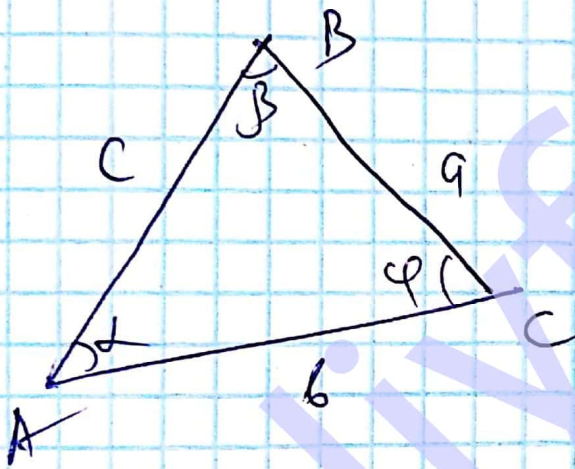
$$NB = y, \quad AB = 14 - x, \quad AC = x$$

$$CN = 4$$

$$\frac{AC}{CN} = \frac{AB}{NB} \quad \frac{x}{4} = \frac{14-x}{y} \Rightarrow y = \frac{(14-x) \cdot 4}{x}$$

$$CB = \frac{(14-x) \cdot 4}{x} + 4 = \frac{56}{x}; \quad S_{ABC} = \frac{1}{2} AC \cdot CB = \frac{1}{2} x \cdot \frac{56}{x} = 28$$

181



$$\begin{cases} \angle A + \angle B = 180^\circ \\ \angle A + \angle B + \angle C = 180^\circ \end{cases}$$

$$2\alpha = \varphi$$

$$\frac{\sin \alpha}{\sin \varphi} = \frac{a}{c} = \frac{2}{3}$$

$$\frac{1}{2 \cos \alpha} = \frac{2}{3} \Rightarrow \cos \alpha = \frac{3}{4}$$

$$b^2 + c^2 - 2bc \cos \alpha = a^2$$

$$b^2 + \left(\frac{3a}{2}\right)^2 - 2b \cdot \frac{3a}{2} \cos \alpha = a^2$$

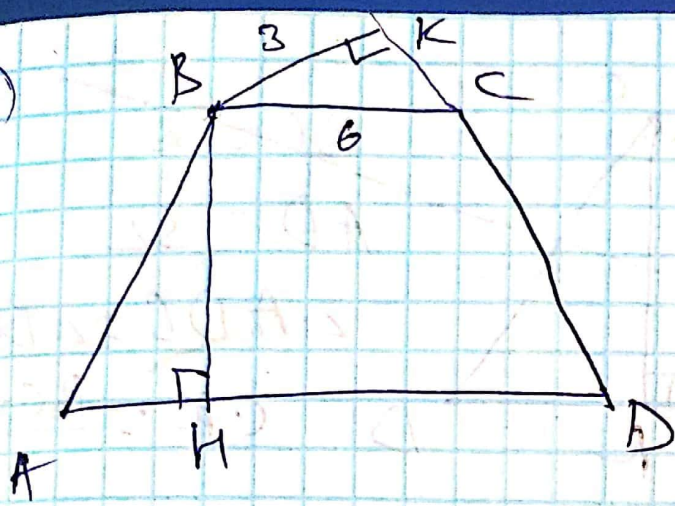
$$b^2 + \frac{9a^2}{4} - 3ab \cdot \frac{3}{4} - a^2 = 0$$

$$4b^2 - 9ab + 5a^2 = 0$$

$$(4b - 5a)(b - a) = 0$$

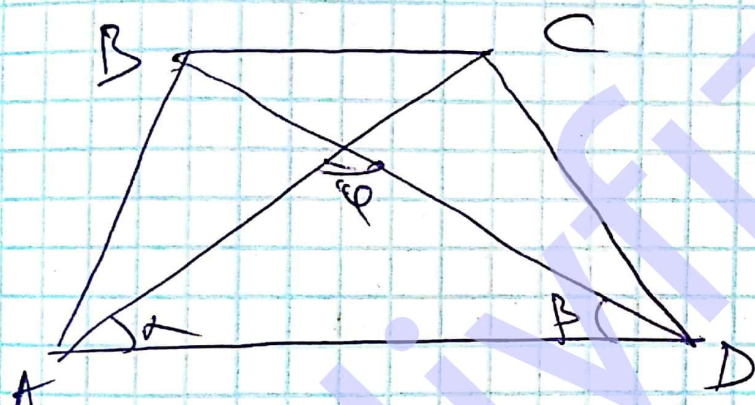
$$b = \frac{5a}{4}, \quad b = a$$

182



$BC = 6 \text{ m}$
 $BK = 3 \text{ m}$
 $\sin \angle KCB = \frac{3}{6} = \frac{1}{2}$
 $\angle KCB = 30^\circ$
 $\angle BCD = \angle ABC = 150^\circ$
 $\angle BAH = 30^\circ$

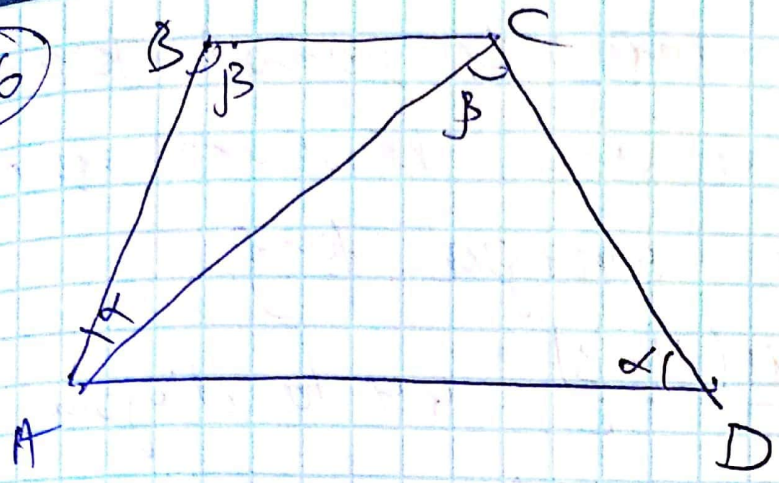
184



$AC = 13$
 $BD = \sqrt{125}, h = 5$
 $\sin \alpha = \frac{5}{13} \quad \sin \beta = \frac{5}{\sqrt{125}}$

$$\begin{aligned}
 S &= \frac{1}{2} d_1 d_2 \sin \varphi = \frac{1}{2} d_1 d_2 \sin(180^\circ - \alpha - \beta) = \\
 &= \frac{1}{2} d_1 d_2 \sin(\arcsin \frac{5}{13} + \arcsin \frac{5}{\sqrt{125}}) = \\
 &= \frac{1}{2} \cdot 13 \cdot \sqrt{125} \left(\frac{5}{13} \cdot \frac{2}{\sqrt{5}} + \frac{5}{\sqrt{125}} \cdot \frac{12}{13} \right) = \\
 &= \frac{1}{2} \cdot 13 \cdot 5\sqrt{5} \cdot \frac{22}{13\sqrt{5}} = 55
 \end{aligned}$$

(186)



$BC = 8, AD = 32$

$\angle ADC = \angle BAC$

$\angle CAD = \angle BCA$

Demak,

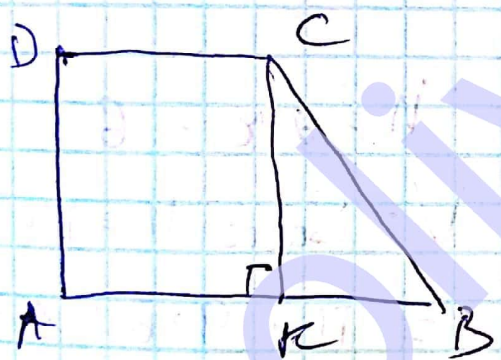
$\angle ABC = \angle ACD = \beta$

$$\frac{\sin \alpha}{\sin \beta} = \frac{BC}{AC} \Rightarrow \frac{\sin \alpha}{\sin \beta} = \frac{AC}{AD}$$

$P = \frac{BC \cdot AD}{AC^2} \quad AC = \sqrt{BC \cdot AD}$

$AC = \sqrt{8 \cdot 32} = 16$

(188)



$DC = 4, AB = BC = 10$

$AK = DC = 4 \Rightarrow KB = 6 \Rightarrow$

$\Rightarrow CK = 8 \Rightarrow DA = 8$

$S_{ABCD} = \frac{AB + DC}{2} \cdot DA = \frac{10 + 4}{2} \cdot 8 = 56$

(181)

$\vec{a}(-1; 2), \vec{b}(-2; 1), \vec{c}(-3; 2)$

$(2\vec{a} - k\vec{b}) \cdot \vec{c} = 0$

$2\vec{a} - k\vec{b} = (-2 + 2k; 4 - k)$

$(-2 + 2k)(-3) + (4 - k)2 = 0$

$6 - 6k - 2k + 8 = 0 \Rightarrow k = \frac{14}{4}$

193) Prizmaning diagonal kesimlar soni Prizma asos ko'pchag'ining diagonalalar soniga teng,

$$\frac{n(n-3)}{2} = \frac{11(11-3)}{2} = 44 \text{ ta diagonal kesim}$$

187) Ko'pg'alar volumi.

Q - qisqalar soni

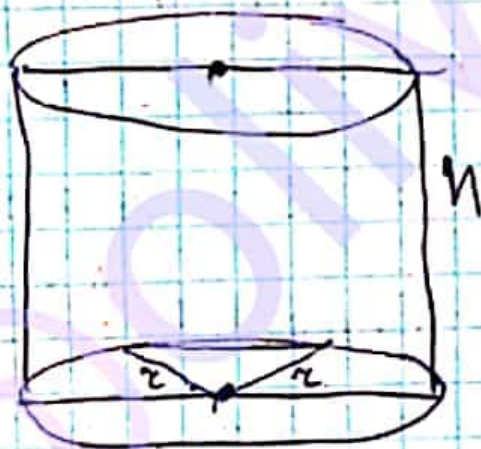
Y - yo'qlar soni

U - uchlar soni

$$Q + 2 = 2U + Y$$

$$Q = 7 + 6 - 2 = 11$$

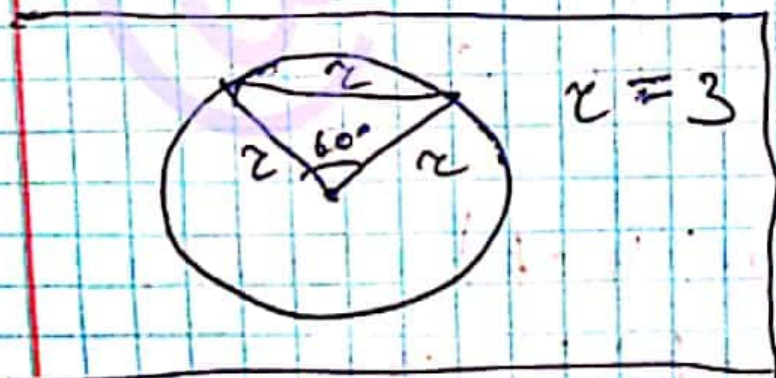
195)



$$h = 2r = 6$$

$$V = S_{\text{asos}} \cdot h = \pi r^2 h =$$

$$= \pi \cdot 9 \cdot 6 = 54\pi$$



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Solved by Bosimbekov B