Часть 1

Олимпиада: **Математика, 11 класс (1 часть)**

Шифр: **21102367**

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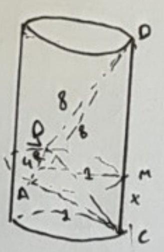
Вариант 24



Заметим, что любая образующая параллельна оси цилиндра. Если (·) D и (·) C лежат на бок. поверхности, т.е. они лежат на образующей. Чем больше CD, тем меньше $|(BA);(DC)|$ => R_{min} при наибольшей CD => (·) C и (·) D лежат на основаниях цилиндра

] $BM \perp DC$ => они принадлежат плоскости сечения || основаниям

$BD = \sqrt{64 - 2^2} = \sqrt{60}$

$BC = \sqrt{49 - 4} = \sqrt{45}$ $\qquad AM = \sqrt{49 - x^2}$

~~$[(\cdot)D\ (ABC)] = DB^2 -$~~

] $MC = x$ => $BM = \sqrt{45 - x^2}$

~~$DA^2 =$~~ $\{60 - DM^2 = 45 - x^2 => DM = \sqrt{15 + x^2}$

~~$\cos(\angle DBC) = \frac{60 + 45 - (\sqrt{15 + x^2} + x)^2}{2 \cdot 60 \cdot 45}$~~

$DM^2 = AM^2 + 64 => 15 + x^2 = 49 - x^2 + 64 => 2x^2 = 88 => x^2 = 44 => x = 2\sqrt{11}$

$DC = 2\sqrt{11} + \sqrt{15 + 44} = 2\sqrt{11} + \sqrt{69}$

Ответ: $DC = 2\sqrt{11} + \sqrt{69}$

< 64

$+ 40b^2 + 60 < 0$

$40b^2 - 64$

$40b^2 - 64 < -4$

$t \in [-4; 40b^2 - 64]$

$t \in [-4; 60 - 40b^2]$

$b = 1 \Rightarrow$

$a_1^2 + 21da_1 + 108d^2 < 60 + 9a_1 + 36d$

$S =$ Черновик.

$= \frac{2a_1 + 8d}{2} 9 = 9(a_1 + 4d) = 9a_1 + 36d$

$\begin{cases} a_5 \cdot a_{18} > S - 4 \\ a_{10} \cdot a_{13} < S + 60 \end{cases} \Leftrightarrow \begin{cases} (a_1 + 4d)(a_1 + 17d) > 9a_1 + 36d - 4 \\ (a_1 + 9d)(a_1 + 12d) < 9a_1 + 36 + 60 \end{cases} \Leftrightarrow$

$\Leftrightarrow \begin{cases} a_1^2 + 21ad + 68d^2 - 9a_1 - 36d + 4 > 0 \\ a_1^2 + 21ad + 108d^2 - 9a_1 - 36d - 60 < 0 \end{cases} \Leftrightarrow \begin{cases} a_1^2 + (21d - 9)a + 68d^2 - 36d + 4 > 0 \\ a_1^2 + (21d - 9)a + 108d^2 - 36d - 60 < 0 \end{cases}$

$< 60 - 40d^2$

$D_1 =$

$68d^2 - 36d + 4 = 4(17d^2 - 9d + 1)$

$\frac{9 \pm \sqrt{81 - 68}}{2} = \frac{9 \pm \sqrt{13}}{2}$

$a_1^2 + (21d - 9)a + 100d^2 - 36d - 60 \mid a_1 + 4d$

$a_1^2 + 4ad \qquad a_1 + 17d - 9$

$(17d - 9)a + \dots$

$\sim\sim < 64$

$\sim + 40d^2 + 60 < 0$

$40d^2 - 64$

$40d^2 - 64 < -4$

$60 - 40d^2$

$t \in [-4; 40d^2 - 64]$

$t \in [-4; 60 - 40d^2]$

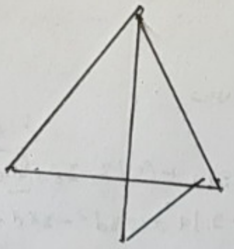
$d = 1 \Rightarrow$

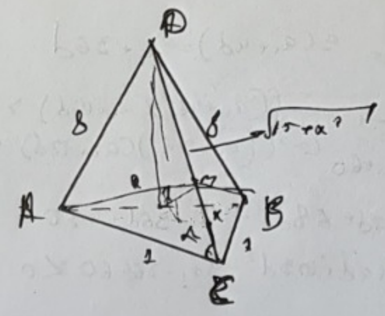
$\frac{17}{4}$, $\frac{68}{4}$, $9 \cdot 13 \cdot 2$, $3 \cdot 13$

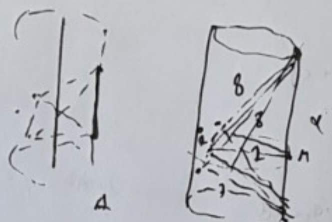
$\frac{(-21+13)d}{2}$; $\frac{13-34d}{2} = (-4d)(9-17d)$

$(a_1+4d)(a_1-9+17d) > -4$

Черновик.



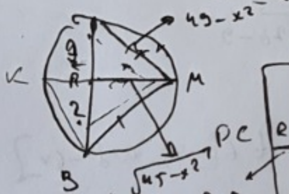


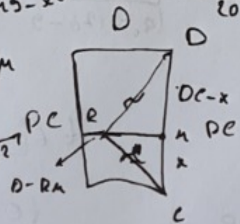


$DR = \sqrt{8^2 - \left(\frac{7}{2}\right)^2} = \sqrt{64 - \frac{49}{4}} = \frac{\sqrt{207}}{2}$

$CR = \frac{\sqrt{3}}{2} \cdot 7$

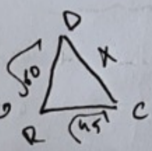
$\begin{array}{r} 64 \\ \times 4 \\ \hline 256 \\ -49 \\ \hline 207 \end{array}$





$RM = \sqrt{RC^2 - x^2} = \sqrt{\frac{3}{4} \cdot 49 - x^2}$

$\sin\alpha = \frac{AM}{7}$

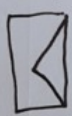


$AM = \sqrt{49 - x^2}$ $\frac{3}{4} \cdot 49 - x^2 + \frac{207}{4} + (DC - x)^2 = 0$

$\frac{7}{2}$ $49 - x^2 = \frac{49}{4} + \frac{3}{4} \cdot 49 - x^2 = 49 - x^2$

$49 - x^2 = 64 - DM^2 \Rightarrow DM^2 =$

$= 64 - 49 + x^2 = \sqrt{15 + x^2}$



$\begin{array}{r} 64 \\ -49 \\ \hline 15 \end{array}$

D $\frac{D}{BM} = \frac{BM}{BR}$

$BR \cdot D = BM^2$

$\frac{D}{BM} = \frac{BM}{RM} \Rightarrow$ $D \cdot RM = BM^2$

$15 + x^2 =$

$45 = x^2 + 45 - x^2$

$x^2 + 15 = 49 - x^2$

$\begin{array}{r} 64 \\ -45 \\ \hline 3 \end{array}$ $\begin{array}{r} 64 \\ +49 \\ \hline 103 \\ -15 \\ \hline 88 \end{array}$

Черновик.

№ 2.

$d > 0 \Rightarrow \quad S = \frac{2a_1 + d(n-1)}{2} \cdot n \Rightarrow$ $\quad a_1, a_2 \in \mathbb{Z}$

$S_9 = \frac{2a_1 + 8d}{2} \cdot 9 = (a_1 + 4d)9$

$a_5 \cdot a_{18} > S - 4$

$a_{10} \cdot a_{13} < S + 60$

$$\begin{cases} (a_1+4d)(a_1+17d) > 9(a_1+4d) - 4 \\ (a_1+9d)(a_1+12d) < 60 + 9(a_1+4d) \end{cases}$$

$a_1 \cdot ?$

$a_1^2 + 21a_1d + 68d^2 > 9a_1 + 36d - 4$

$\boxed{a_1^2 + (21d - 9)a_1 + 68d^2 - 36d + 4 > 0}$

$D = (21d-9)^2 - 4(68d^2 - 36d + 4) = 441d^2 - 378d + 81 - 272d^2 + 144d - 16 = 169d^2 - 234d + 65$

$169d^2 - 234d + 81 = (13d - 9)^2$

$\boxed{d > \frac{9}{13}}$

$\frac{9 - 21d \pm (13d - 9)}{2} = \frac{(-21+13)d}{2}; \quad \frac{18 - 34d}{2} = (-4d) \quad (9 - 17d)$

$\boxed{(a_1 + 4d)(a_1 - 9 + 17d) > -4}$

$a_1^2 + 21da_1 + 108d^2 < 60 + 9a_1 + 36d$

$\boxed{a_1^2 + (21d - 9)a_1 + 108d^2 - 36d - 60 < 0}$

$D = 441d^2 - 378d + 81 - 432d^2 + 144d - 240 = 9d^2 - 234d + 39^2$

$68d^2 - 36d + 4 = 34d^2$

$17d^2 - 9d + 1$

$-6 \pm \sqrt{36 - 12} = -6 \pm \sqrt{24}$

$-6 + \sqrt{24} < -6 + 5 = -1$

$-6 - \sqrt{24} \wedge$

$-6 - \sqrt{24} > -6 - 5 > -11$

$-6 + \sqrt{24} < -1$

$a_1^2 + 12a_1 + 32 - 54 > 0$

$a_1^2 + 12a_1 + 39 - 20 < 0$

$a_1^2 + 12a_1 + 36 > 0$

$a_1^2 + 12a_1 + 12 < 0$

$(a_1 + 6)^2 > 0$

$\frac{6 \pm \sqrt{36 - 12}}{2} = \quad 6 \pm \sqrt{24} = 6 \pm \sqrt{24}$

$a = -6 \pm 36 - 48$

$a_1 = \frac{-6 \pm \sqrt{36 - 12}}{2} =$

$= -6 \pm \sqrt{16} = -6 \pm 4 =$

$= -2; -10$

$a = \frac{-12 \pm \sqrt{144 - 48}}{2} =$

$(a+2)(a+10)$

$-6a-2b<10$ Чернетка

$a^2+b^2 \le -6a-2b$

$(a+3)^2-9+(b+1)^2-1\le 0$

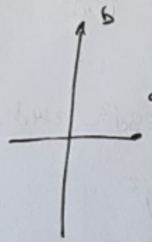
$$\left[\begin{array}{l}\begin{cases}(a+3)^2+(b+1)^2\le 10\\ 3a+b>-5\end{cases}\\ \begin{cases}a^2+b^2<10\\ 3a+b<-5\end{cases}\end{array}\right.$$

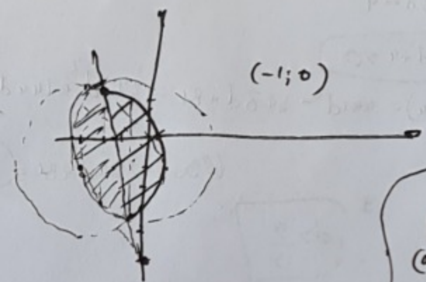
$3a+b>-5 \Rightarrow b>-5-3a$

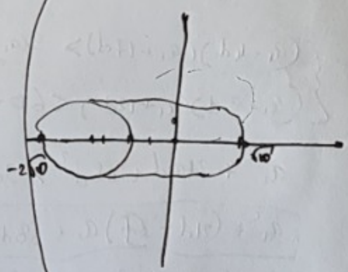
$x^2-2a+a^2+y^2-2b+b^2-10 < x^2-2a+y^2-2b$

x^2-2a+y^2-2b

$a=\frac{-5}{3}$







$(x+1)^2+y^2\le 10$

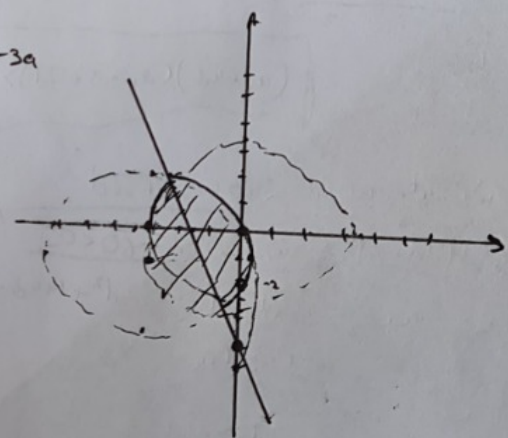
$b=0$
$(a+3)^2=9$

$a+3=\pm 3$
$a=-6$

$b+1=$
$b=-2$

$$\begin{cases}a^2+b^2\le -6a-2b\\ -6a-2b<10\end{cases} \Leftrightarrow \begin{cases}(a+3)^2+(b+1)^2\le 10\\ 3a+b>-5\end{cases} \quad b>-5-3a$$

$$\begin{cases}a^2+b^2\le 10\\ -6a-2b>10\end{cases} \Leftrightarrow \begin{cases}a^2+b^2\le 10\\ 3a+b<-5\end{cases}$$



$b=-5-3a$

$a^2+25+30a+9a^2=10$

$10a^2$

$a\in[-\sqrt{10};\ -3+\sqrt{10}]$

$b\in ...$

$a\in[-\sqrt{10};0] \Rightarrow$

математика и кл.

Чистовик

№1.

т.к. $a_n \in \mathbb{Z} \Rightarrow \begin{cases} d \in \mathbb{Z} \\ d \geq 0 \end{cases} \Rightarrow d \in \mathbb{N}.$

$S = \frac{2a_1 + 8d}{2} \cdot 9 = 9(a_1 + 4d)$

$\begin{cases} a_5 \cdot a_{18} > S - 4 \\ a_{10} \cdot a_{13} < S + 60 \end{cases} \Leftrightarrow \begin{cases} (a_1 + 4d)(a_1 + 17d) > 9(a_1 + 4d) - 4 \\ (a_1 + 9d)(a_1 + 12d) < 9(a_1 + 4d) + 60 \end{cases} \Leftrightarrow$

$\Leftrightarrow \begin{cases} (a_1 + 4d)(a_1 - 9 + 17d) > -4 \\ (a_1 + 4d)(a_1 - 9 + 17d) < 60 - 40d^2 \end{cases}$

$\exists (a_1 + 4d)(a_1 - 9 + 17d) = t \Rightarrow \begin{cases} t > -4 \\ t < 60 - 40d^2 \end{cases}$

При $d > 1$ получаем: $\begin{cases} t > -4 \\ t < -100 \end{cases} \Rightarrow t \in \varnothing \Rightarrow d = 1$

$\begin{cases} (a_1 + 4)(a_1 + 8) > -4 \\ (a_1 + 4)(a_1 + 8) < 20 \end{cases} \Leftrightarrow \begin{cases} a_1^2 + 12a_1 + 36 > 0 \\ a_1^2 + 12a_1 + 12 < 0 \end{cases} \Leftrightarrow \cancel{a \in} \begin{cases} (a+6)^2 > 0 \\ a \in (-6 - \sqrt{24}; -6 + \sqrt{24}) \end{cases}$ $(a \in \mathbb{Z}) \Leftrightarrow$

$\Leftrightarrow \begin{cases} a \neq 6 \\ \cancel{a \in [-10; -2]} \\ a \in [-10; -2] \end{cases} \Rightarrow \begin{cases} a \in [-10; -6) \cup (-6; -2] \\ a \in \mathbb{Z} \end{cases}$

Ответ: $a \in \{-10; -9; -8; -7; -5; -4; -3; -2\}$.

$x^2 + 16 = 49 - x^2$

Часть 2

Олимпиада: **Математика, 11 класс (2 часть)**

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ID профиля: **378514**

Вариант 24

Чистовик

№4

$\exists\, a = 3^{\alpha_1} \cdot 11^{\beta_1}$
$b = 3^{\alpha_2} \cdot 11^{\beta_2}$ $\quad \not\Rightarrow$
$c = 3^{\alpha_3} \cdot 11^{\beta_3}$

$НОК(a;b;c) = 3^{19} \cdot 11^{15} \Rightarrow \begin{cases} \max(\alpha_i) = 19 \\ \max(\beta_i) = 15 \end{cases}$

$НОД(a;b;c) = 33 \Rightarrow \begin{cases} a \vdots 33 \\ b \vdots 33 \\ c \vdots 33 \end{cases} \Leftrightarrow \begin{cases} \alpha_i \geq 1 \\ \beta_i \geq 1 \end{cases}$

$\begin{cases} \min(\alpha_i) = 1 \\ \min(\beta_i) = 1 \end{cases}$

(1) Способов выбрать среди α_i ~~β_j~~ такие, что одно из них $= 1$, другое $= 19$, а $\alpha_3 \neq 1; 19$ (всего α_3 может принимать $19-2 = 17$ знач.) $\Rightarrow (1) = 3 \cdot 2 \cdot 1 \cdot 17 = 6 \cdot 17 = 102$

(2) $\left[\begin{array}{l} \alpha_3 = 1 \\ \alpha_3 = 19 \end{array}\right. \Rightarrow 2C_3^2 = 6 \Rightarrow (1) + (2) = 102 + 6 = 108$

(3) Способов выбрать среди β_i $\begin{cases} \beta_i = 1 \\ \beta_j = 15 \\ \beta_k \neq 1; 15 \end{cases} \Leftrightarrow$ $\quad$ (3) $13 \cdot 3 \cdot 2 = 6 \cdot 13 = 78$

(4) $\begin{cases} \beta_i = 1 \\ \beta_j = 15 \\ \left[\begin{array}{l} \beta_k = 1; \\ \beta_k = 15 \end{array}\right. \end{cases} \Leftrightarrow$ $\quad (4) = 2 \cdot C_3^2 = 6 \Rightarrow (3) + (4) = 6 + 78 = 84$

$((1)+(2)) \cdot ((3)+(4)) = 102 \cdot 84 = 8568$

Ответ: 8568

Черновик

№5.

ОДЗ: $\begin{cases} 29-x>0 \\ 29-x\neq 1 \\ x+49>0 \\ x+1\neq 0 \\ \frac{x}{7}+7\neq 1 \\ -x-1>0 \end{cases} \Leftrightarrow \begin{cases} x<29 \\ x\neq 28 \\ x>-49 \\ x\neq 0 \\ x\neq -42 \\ x<-1 \end{cases} \Leftrightarrow x\in(-49;-1)\setminus\{-42\}.$

На ОДЗ $\sqrt{(x+1)^2}=|x+1|$ раскрывается со знаком „–"

$\exists$ ~~a = 29~~ $b=\ln(29-x)$, ~~a+b+c≠0~~ $\begin{cases} a\neq 0 \\ b\neq 0 \\ c\neq 0 \end{cases}$

$a=\ln\left(\frac{x}{7}+7\right)$

$c=\ln(-x-1)$

Имеем: $\frac{2a}{b}$; $\frac{b}{2c}$; $\frac{2c}{a}$

~~1) $\exists\ \frac{2a}{b}=\frac{2c}{a} \Leftrightarrow 2a^2=2bc \Rightarrow a^2=bc$~~

~~$\left[\begin{array}{l} \frac{b}{2c}-1=\frac{2a}{b} \\ \frac{b}{2c}-1=\frac{2c}{a} \end{array}\right. \Leftrightarrow \frac{b^2-2bc-2ac}{2cb}=0$~~

~~1) $\begin{cases} \frac{2a}{b}=\frac{b}{2c} \\ \frac{2c}{a}-1=\frac{2a}{b} \end{cases} \Rightarrow \begin{cases} 4ac=b^2 \\ \frac{2c}{a}-1=\frac{2a}{b} \end{cases} \Leftrightarrow \begin{array}{l} 4ac-b^2=0 \\ 2cb-ab-2a^2=0 \end{array}$~~

1) $\begin{cases} \frac{2a}{b}=\frac{b}{2c} \\ \frac{2c}{a}-1=\frac{b}{2c} \end{cases} \Leftrightarrow \begin{cases} 4ac=b^2 \\ 4c^2-2ac=ab \end{cases}$ $\Rightarrow$

$(2c-b)(2c+b)-2ac-ab+4ac=0 \Rightarrow$

$\Rightarrow (2c-b)(2c+b)+a(2c-b)=0 \Rightarrow$

$\Rightarrow (2c-b)(2c+b+a)=0 \Rightarrow$

$\Rightarrow \left[\begin{array}{l} 2c=b \\ 2c+b+a=0 \end{array}\right. \Leftrightarrow \left[\begin{array}{l} \ln\frac{(x+1)^2}{29-x}=0 \\ \ln\left((x+1)^2\cdot(29-x)\left(\frac{x+49}{7}\right)\right)=0 \end{array}\right. \Leftrightarrow \left[\begin{array}{l} (x+1)^2=29-x \\ (x+1)^2\cdot(29-x)\left(\frac{x+49}{7}\right)=1 \end{array}\right.$

На ОДЗ $29-x>30$, ~~$(x+1)^2$~~, $\frac{x+49}{7}<7$ $\Rightarrow$ $2c+b+a\neq 0 \Rightarrow$ $x^2+2x+1+x-29=0 \Leftrightarrow x^2+3x-28=0 \Rightarrow$

$\Rightarrow \begin{cases} x=4;-7 \\ ОДЗ \end{cases} \Rightarrow \boxed{x=-7}$

2

(2) Исследим

$$\begin{cases} \dfrac{2c}{a} = \dfrac{b}{2c} \\ \left[\begin{array}{l} \dfrac{2a}{b} - 1 = \dfrac{b}{2c} \\ \dfrac{2a}{b} - 1 = \dfrac{2c}{a} \end{array}\right. \end{cases} \Leftrightarrow \begin{cases} 4c^2 = ab \\ \left[\begin{array}{l} 4ac - 2bc - b^2 = 0 \\ 2a^2 - ab - 2cb = 0 \end{array}\right. \end{cases} \Rightarrow$$

$$\cancel{(2c-b)(2c+b) + 4ac - 2bc - ab}$$

$$\rightarrow 2a^2 - 4c^2 - 2cb = 0 \Leftrightarrow a^2 - 2c^2 - cb = 0 \Leftrightarrow a^3 - 2ac^2 - 4c^3 = 0$$

$$\Leftrightarrow a^2 - 2c^2 - \frac{4c^3}{a} = 0 \Leftrightarrow$$

$$\boxed{a = 2c}$$

(3)

$$\begin{cases} \dfrac{a}{b} = \dfrac{c}{a} \\ \left[\begin{array}{l} \dfrac{b}{2c} - 1 = \dfrac{2a}{b} \\ \dfrac{b}{2c} - 1 = \dfrac{2c}{a} \end{array}\right. \end{cases} \Leftrightarrow \begin{cases} a^2 = bc \\ \left[\begin{array}{l} b^2 - 2bc = 2ac \\ ab - 2ac = 4c^2 \end{array}\right. \end{cases} \Leftrightarrow \cancel{\boxed{b = 2c}}$$

$$b^2 - 2a^2 = 2a \cdot \frac{a^2}{b} \Leftrightarrow$$

$$\Leftrightarrow 2a^3 - b^3 + 2ab = 0$$

$$b = 2a$$

(2) $\frac{x}{7} + 7 = (x+1)^2 \Leftrightarrow x^2 + 2x + 1 = \frac{x}{7} + 7 \Leftrightarrow 7x^2 + 14x + 7 = x + 49 \Leftrightarrow$

$\Leftrightarrow 7x^2 + 13x - 42 = 0 \Rightarrow \begin{cases} x = \dfrac{-13 \pm \sqrt{169 + 1176}}{2 \cdot 7} = \dfrac{-13 \pm 35}{14} = -\dfrac{12}{14} = -\dfrac{6}{7} \\ \text{ОДЗ} \end{cases}$

(3) $29 - x = \frac{x}{7} + 7 \Leftrightarrow 203 - 7x = x + 49 \Rightarrow 8x = 154 \Rightarrow \begin{cases} x \in \varnothing \\ \text{ОДЗ} \end{cases}$

Ответ: $\left[\begin{array}{l} x = -7 \\ x = -\dfrac{6}{7} \end{array}\right.$

черновик

$28 \cdot 4 = 112$

$x = -3 \pm \sqrt{9+112} = -3 \pm \sqrt{121} =$

Черновик:

$НОД(a;b;c) = 33 = 3^1 \cdot 11^1$

$НОК(a;b;c) = 3^{19} \cdot 11^{15}$

$a = 3^{\alpha} \cdot 11^{\beta}$

$b = 3^{\gamma} \cdot 11^{\theta}$

$c = 3^{\omega} \cdot 11^{\tau}$

наим. общ. кратное

66 . 2

$d_1 \; d_2 \; d_3$

1 19 x

19 1 x

1 x 19

19 x 1

x 19 1

19 1 19

1 15

$\log_{\sqrt{29-x}}\left(\frac{x}{7}+7\right)$ $\quad \log_{(x+1)^2}(29-x)$ $\quad \log_{\sqrt{\frac{x}{7}+7}}(-x-1)$ 3

ОДЗ: $29-x>0$ $\quad x<29$

$29-x\neq 1$ $\quad x\neq 28$

$\frac{x+49}{7}>0$ $\quad \cancel{x>-49}$

$x\neq 0$ $\quad x\neq 0$

$9-x>0$ $\quad \cancel{x<9}$

$\frac{x+49}{7}\neq 1$ $\quad x\neq 7-49=-42$

$-x-1>0$ $\quad x<-1$ $\quad x>-49$ $\quad x\neq 0$ $\quad x\neq -42$

$\boxed{ОДЗ \; x\in(-49;-1)\setminus\{-42\}}$

$\log_{\sqrt{29-x}}\left(\frac{x}{7}+7\right) = \log_{(x+1)^2}(29-x)$

$2\log_{29-x}\left(\frac{x+49}{7}\right) = 2\log_{29-x}|x+1|$

$2\log_{(29-x)}\left(\frac{x}{7}+7\right); \; \frac{1}{2}\log_{|x+1|}(29-x); \; 2\log_{\frac{x}{7}+7}(-x-1)$

$a = \frac{x}{7}+7$

$b = 29-x$

$c = -x-1$

$\frac{4\ln a}{\ln b} = \frac{1}{2}\frac{\ln b}{\ln|c|} \iff \frac{4\ln a\ln|c| - \ln^2 b}{\ln b \cdot \ln|c|} = 0$

$\ln\left(\frac{x}{7}+7\right)\cdot\ln(|x+1|)$

$2\log_b a \quad \frac{1}{2}\log_c b \quad 2\log_a c$ $\quad \ln^2 a = \ln b \cdot \ln c$

$\log_b a = \log_a c \iff \frac{\ln a \cdot \ln a - \ln b \cdot \ln c}{\ln b \cdot \ln a} = 0$

$\cancel{2\log_a c - 1 = \frac{2\ln a}{\ln b}}$

$2\log_a c - 1 = 2\log_b a \iff 2\left(\frac{\ln c \cdot \ln b - \ln^2 a}{\ln a \cdot \ln b}\right) - 1 = 0$ $\quad 4\ln^2 c \; 4\ln a\ln c - \ln a \ln b = 0$

$2\log_a c - 1 = \frac{1}{2}\log_c b \Rightarrow \frac{2\ln c}{\ln a} - 1 - \frac{1}{2}\frac{\ln b}{\ln c} \iff$

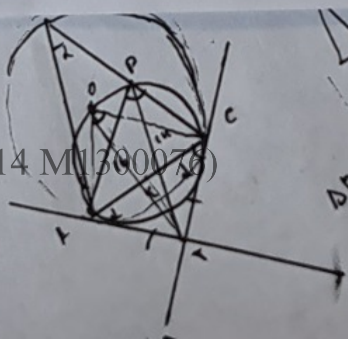
4
17
6
102

1 19 1
1 1 19
19 1 1
19 19 1
19 1 19
1 19 19 1 x 3

1
13
6
36

98
6
84

108
84
408
816
8568 (?)



AK=KC

ΔOAS=ΔOCS

$\frac{PK \cdot AC}{2} = 30$ $\frac{PK \cdot KC}{2} = 14$

a : 33
b : 33
c : 33

Черновик

$$\overset{3}{28}\cdot 4 = 112$$

$$x=\frac{-3\pm\sqrt{9+112}}{2}=\frac{-3\pm\sqrt{121}}{2}=\frac{-3\pm 4}{2}=4;\,-2$$

$\cancel{a^{\alpha}}$ $3^{\alpha_1}\cdot 11^{\beta_1}=a$ $\quad 1\le\alpha_1\le 19 \quad -19$
$\quad 1\le\beta\le 15 \quad -15$

$b=3^{\alpha_2}\cdot 11^{\beta_2}$ $\quad 1\le\alpha_2\le 19 \quad -19$
$\quad 1\le\beta_2\le 15 \quad -15$

$c=3^{\alpha_3}\cdot 11^{\beta_3}$ $\quad -19$
$\quad -15$

$\cancel{\alpha_i\cdot\beta}$ $\alpha_i=19$ $\Rightarrow \exists$ 3 способа выбрать $\alpha_i=19$
$\beta_i=15$ $\quad \exists$ 3 способ. выбрать $\beta_i=15$

$19\cdot 15\cdot 19\cdot 5\cdot 9$

$\cancel{a_{3}-x=a}$ $\quad b_{\frac{x}{7}-7}=a \quad b_{29-x}=b \quad b(x-1)=c$

1) $\frac{2a}{b}$ $\quad \frac{b}{2c}$ $\quad \frac{2c}{a}$ $\quad$ (1) $f(3)$

$\frac{2a}{b}=\frac{b}{2c}\Leftrightarrow$ $\boxed{4ac=b^2}$

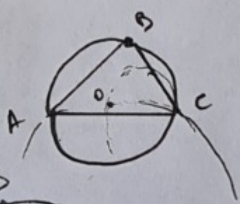
$\frac{2c}{a}-1=\frac{2a}{b}\Leftrightarrow$ $\quad 2cb-ab-2a^2=0$ $\qquad ab-2ac$

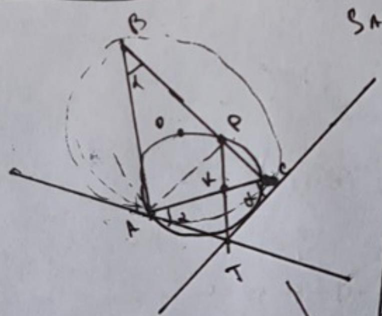
$\frac{2c}{a}-1=\frac{b}{2c}\Leftrightarrow$ $\quad 4c^2-2ac-ab=0$ $\qquad \cancel{4c^2+b^2}$ $\quad 4c^2-b^2=2ac+ab-4ac$

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

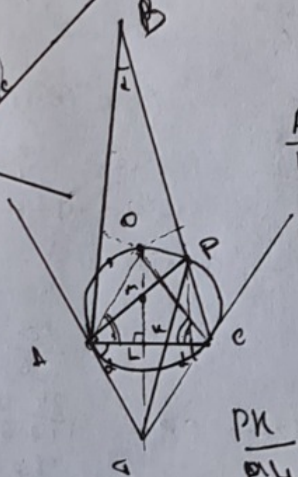
$2cb-2a^2=2c^2-2ac$ $\qquad (2c-b)(2c+b-a)=0$

$c^2+a^2=ac+cb \Rightarrow c(a+b)=a^2+c^2$



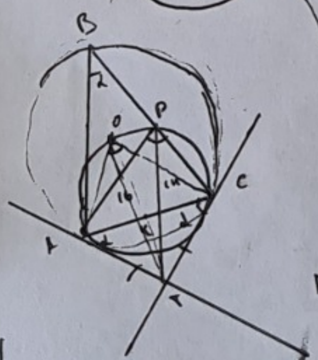


$S_{APK}=16$
$S_{CPK}=14$



$\frac{AK}{KC}=\frac{16}{14}=\frac{8}{7}$

$AK=\frac{8}{7}KC$



$AK=KC$

$D^{OAJ}=D$ $\quad$ 0е5

$\frac{PK}{PL}=\frac{AC}{AL}=2$

$\frac{PK\cdot AC}{2}=30 \quad \frac{PK\cdot KC}{2}=14 \quad \frac{PK\cdot AK}{AQ}=16$

$\begin{cases} h\cdot AC=60 \\ h\cdot KC=28 \\ h\cdot\frac{8}{7}KC=32 \end{cases}$

Черновик.

$2\log_b a \qquad \frac{1}{2}\log_c b \qquad 2\log_a c$

1) $2\log_b a = 2\log_a c \Leftrightarrow \frac{\ln^2 a - \ln b \cdot \ln c}{\ln a \cdot \ln b} = 0 \Rightarrow \ln^2 a = \ln b \cdot \ln c$

$2\log_b a + 1 = 2\log_a c \Leftrightarrow 2\left(\frac{\ln^2 a - \ln b \cdot \ln c}{\ln a}\right) + 1 = 0$

2) $2\log_b a = \frac{1}{2}\log_c b \Leftrightarrow \frac{4\ln a \ln c - \ln^2 b}{2\ln b \cdot \ln c} = 0 \Rightarrow \ln^2 b = 4\ln a \ln c$

$2\log_a c - 1 = 2\log_b a = \cancel{2(\ln c \ln b - \ln^2 b} =$

$= \frac{2\ln c \cdot \ln b - 2\ln^2 a - \ln a \ln b}{\ln a \cdot \ln b} = 0$

$2\ln c \cdot \ln b - \ln a \ln b - 2\ln^2 a = 0$

$\ln b(2\ln c - \ln a) - 2\ln^2 a = 0$

$(2\log_a c) - 1 = \frac{1}{2}\log_c b \Leftrightarrow 4\log_a c - 2 - \log_c b = 0 \Leftrightarrow \frac{4\ln^2 c - \ln b \cdot \ln a - 2\ln a \cdot \ln c}{\ln} = 0$

$4\ln^2 c - \ln b \cdot \ln a - \frac{\ln^2 b}{2} = 0$

$8\ln^2 c - 2\ln b \cdot \ln a - \ln^2 b = 0$

6, 29, 7, 203

13, 35, 12

1

42, 28, 336, 84, 1176, 169, 1245

6, 29, 7, 203, 7, 196

$= 35$, 35, 125, 105

$\frac{x}{7} + 7 = (x+1)^2$

$x^2 + 2x + 1 = \frac{x}{7} + 7$

$7x^2 + 14x + 7 - x - 49 = 0$

$7x^2 + 13x - 42 = 0$

169 +

42

42, 28, 336, 84, 1176, 169, 1245

$7x^2 + 13x - 42 = 0$

$x = -13 \pm 169 +$

1245 | 5, 249, 10, 24, 20, 45

17, 17, 119, 17, 289