Часть 1

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

Шифр: **21102796**

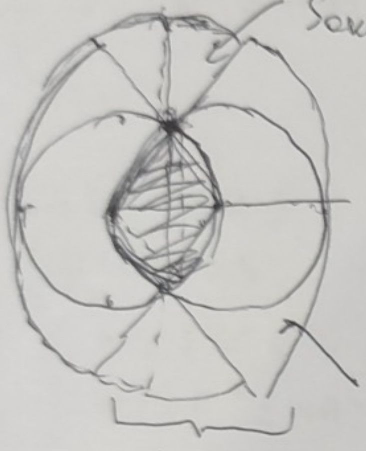
ID профиля: **336267**

Вариант 18

Чистовик ①
№1

Чистовик ④

Заметим, что прямая $b = 2a - 2,5$ отсекает от обеих окр-тей дуги равные 45^0 и проходит г/з их точки пересечения. (Т.к. расстояние от ок-тей до прямой равно $\frac{\sqrt{5}}{2} = \frac{2}{2}$.)



Заметим что $S_{искомое} = 2S_{сектора} + 4S_{окр.}$

$$S_{сектора} = \frac{\Pi \cdot R_{нов}^2}{4} = \frac{\Pi \cdot 4 \cdot 5}{4} = 5\Pi$$

$$S_{окр} = \frac{\Pi R_{близко}^2}{4} = \frac{5\Pi}{4}$$, Получим:

$R_{нов.} = 2R = 2\sqrt{5}$

$R_{близко} = \sqrt{5}$

$$S_{искомое} = 2 \cdot 5\Pi + \frac{5\Pi}{4} \cdot 4 = 15\Pi$$

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Черновик (2)

Черновик (3)

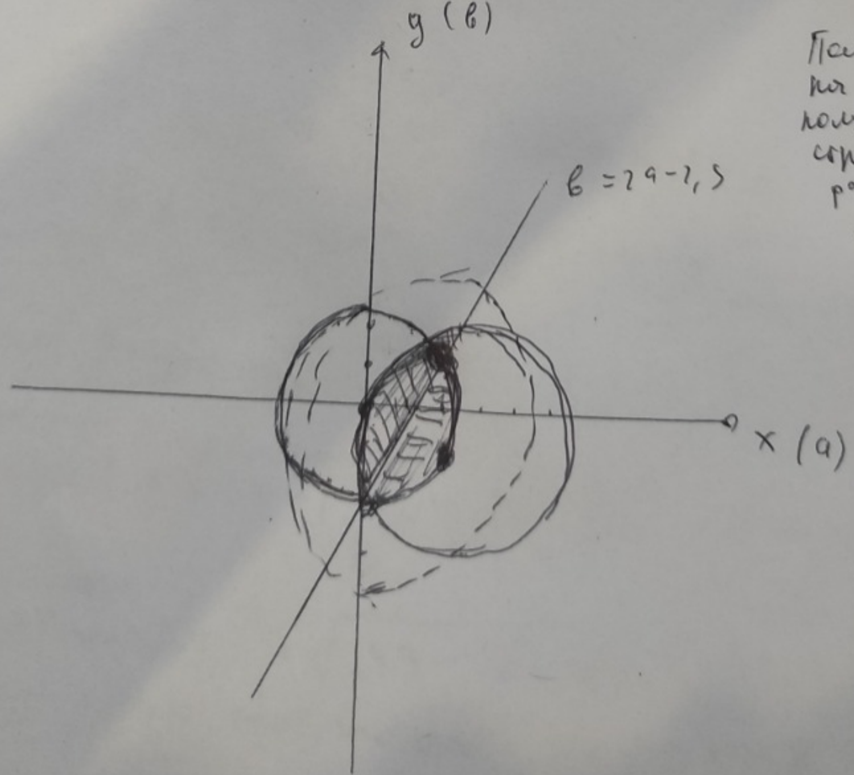
$$\begin{cases} (x-a)^2+(y-b)^2 \le 5 & (1) \\ a^2+b^2 \le \min(4a-2b,\ 5) & (2) \end{cases}$$

(2):

$$\left[\begin{array}{l} \begin{cases} 4a-2b \ge 5 \\ a^2+b^2 \le 5 \end{cases} \\ \begin{cases} 4a-2b \le 5 \\ a^2+b^2 \le 4a-2b \end{cases} \end{array}\right. \qquad \left[\begin{array}{l} \begin{cases} 2b \le 4a-5 \\ a^2+b^2 \le 5 \end{cases} \\ \begin{cases} 2b \ge 4a-5 \\ (a-2)^2+(b-1)^2 \le 5 \end{cases} \end{array}\right.$$

Получим:

$$\left[\begin{array}{l} \begin{cases} (x-a)^2+(y-b)^2 \le 5 \\ a^2+b^2 \le 5 \\ b \le 2a-2,5 \end{cases} \\ \begin{cases} (x-a)^2+(y-b)^2 \le 5 \\ (a-2)^2+(b-1)^2 \le 5 \\ b \ge 2a-2,5 \end{cases} \end{array}\right.$$



Получим, что при каждой точке получившейся пл-сти строятся окр-сть радиусов $\sqrt{5}$

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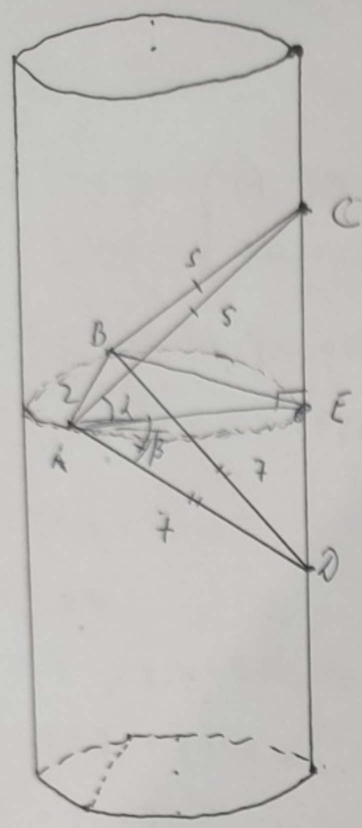
Чистовик ②

№2



1) AB ∥ пл-сти основания

Опустим $AE \perp CD$ ($BE \perp CD$)

Из равенства $\triangle ACD = \triangle BCD$ (3м сторонам) $\Rightarrow$

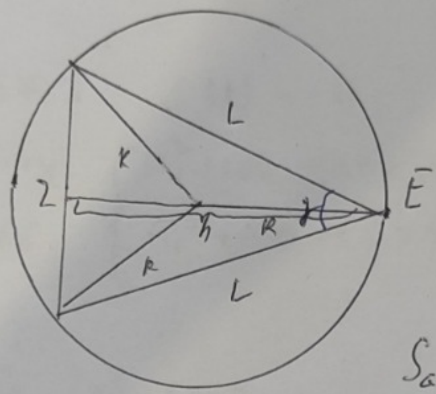
$\Rightarrow \triangle AED = \triangle BED \Rightarrow BE = AE \Rightarrow ABE \perp CD \Rightarrow$

$ABE \parallel$ пл-сти осн.

2) Пусть $AE = L$, $\angle CAE = \alpha$, $\angle EAD = \beta$

$L = CA \cos\alpha = AD\cos\beta = 7\cos\beta = 5\cos\alpha$

3) в пл-сти ABE:



$S_\triangle = L^2 \cdot \sin\gamma \cdot \frac{1}{2}$

по т. Пифагора:

$h^2 + 1^2 = L^2$

$h = \sqrt{L^2 - 1}$

$S_\triangle = 2 \cdot h \cdot \frac{1}{2} = \sqrt{L^2-1} \Rightarrow$

$L^2 \cdot \sin\gamma = 2\sqrt{L^2-1}$

$\sin\gamma = \dfrac{2\sqrt{L^2-1}}{L^2}$

по т. синусов:

$$\frac{2}{\sin\gamma} = 2R \Rightarrow R = \frac{L^2}{2\sqrt{L^2-1}} \Rightarrow$$

$$\Rightarrow 4R^2(L^2-1) = L^4 \Rightarrow L^4 - 4R^2L^2 + 4R^2 = 0.$$

$$L^2 = \frac{4R^2 \pm \sqrt{16R^4 - 16R^2}}{2} = \frac{4R^2 + 4R^2\sqrt{R^2-1}}{2} = 2R^2 + 2R^2\sqrt{R^2-1}$$

$$CD = 5\sin\alpha + 7\sin\beta = 5\sqrt{1-\cos^2\alpha} + 7\sqrt{1-\cos^2\beta} =$$

$$= \sqrt{25 - \underbrace{(5\cos\alpha)^2}_{L}} + \sqrt{49 - \underbrace{(7\cos\beta)^2}_{L}} = \sqrt{25 - L^2} + \sqrt{49 - L^2} =$$

$$= \sqrt{25 - 2R^2 - 2R^2\sqrt{R^2-1}} + \sqrt{49 - 2R^2 - 2R^2\sqrt{R^2-1}},$$ Заметим, что

наименьший при условии того, что $\sqrt{R^2-1} \geq 0 \Rightarrow R = 1$. Тогда

Отв: $CD = \sqrt{23} + \sqrt{47}$

Черновик (1)

№1

$S = a_1 + a_2 + a_3 + \dots a_7 =$, $a_n \in Z$

$a_n = a_1 + k(n-1) \Rightarrow k \in Z,\ z > 0 \Rightarrow k \in N$

$= a_1 + a_1 + k + a_3 + 2k + \dots a_1 + 6k = 7a_1 + \frac{6k+0}{2} \cdot 7 = 7a_1 + 21k$

$\begin{cases} a_9 \cdot a_{10} < S + 44 \\ a_7 \cdot a_{12} > S + 20 \end{cases}$ $\begin{cases} (a_1 + 8k)(a_1 + 9k) < 7a_1 + 21k + 44 \\ 7a_1 + 21k + 20 < (a_1 + 6k)(a_1 + 11k) \end{cases}$

$\begin{cases} a_1^2 + 17ka_1 + 72k^2 < 7a_1 + 21k + 44 \quad (1) \\ 7a_1 + 21k + 20 < a_1^2 + 17ka_1 + 66k^2 \quad (2) \end{cases}$ сложим оба ур-я.

$20 + 72k^2 < 44 + 66k^2$

$6k^2 < 24$

$k^2 < 4$, т.к. $k \in N$, то $k = 1$ в (1) и (2)

$\begin{cases} a_1^2 + 17a_1 + 72 < 7a_1 + 21 + 44 \\ 7a_1 + 21 + 20 < a_1^2 + 17a_1 + 66 \end{cases}$ $\begin{cases} a_1^2 + 10a_1 + 72 < 65 \\ a_1^2 + 10a_1 + 66 > 41 \end{cases}$

$\begin{cases} a_1^2 + 10a_1 + 7 < 0 \\ (a_1 + 5)^2 > 0 \end{cases}$ $\rightarrow (a_1 + 5)^2 - 25 + 7 < 0$

верно при всех доп. a_1

$(a_1 + 5)^2 < 18 \Rightarrow \left[\begin{array}{l} a_1 + 5 = \pm 4 \\ a_1 + 5 = \pm 2 \\ a_1 + 5 = \pm 1 \end{array} \right.$

$\left[\begin{array}{l} a_1 = -9 \\ a_1 = -1 \\ a_1 = -7 \\ a_1 = -3 \\ a_1 = -4 \\ a_1 = -6 \end{array} \right. \Rightarrow$ Отв: $a_1 = (-9; -7; -6; -4; -3; -1)$

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Черновик

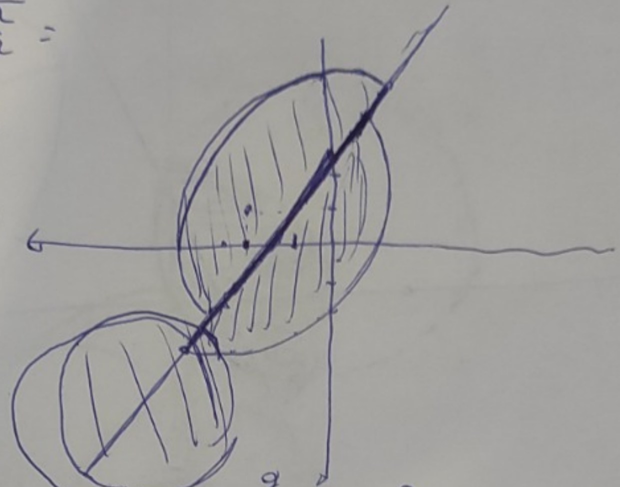
$CD = 5\sin\alpha + 7\cos\beta$

$= 5\sqrt{1-\cos^2\alpha} + 7\sqrt{1-\cos^2\beta}$.

$\cos\alpha = \frac{L}{5} \quad \cos\beta = \frac{L}{7}$

$= 5\sqrt{1-\frac{L^2}{25}} + 7\sqrt{1-\frac{L^2}{7^2}} =$

$= \sqrt{25-L^2} + \sqrt{49-L^2}$



$a^2+b^2 \le \min(4a-2b, 5)$

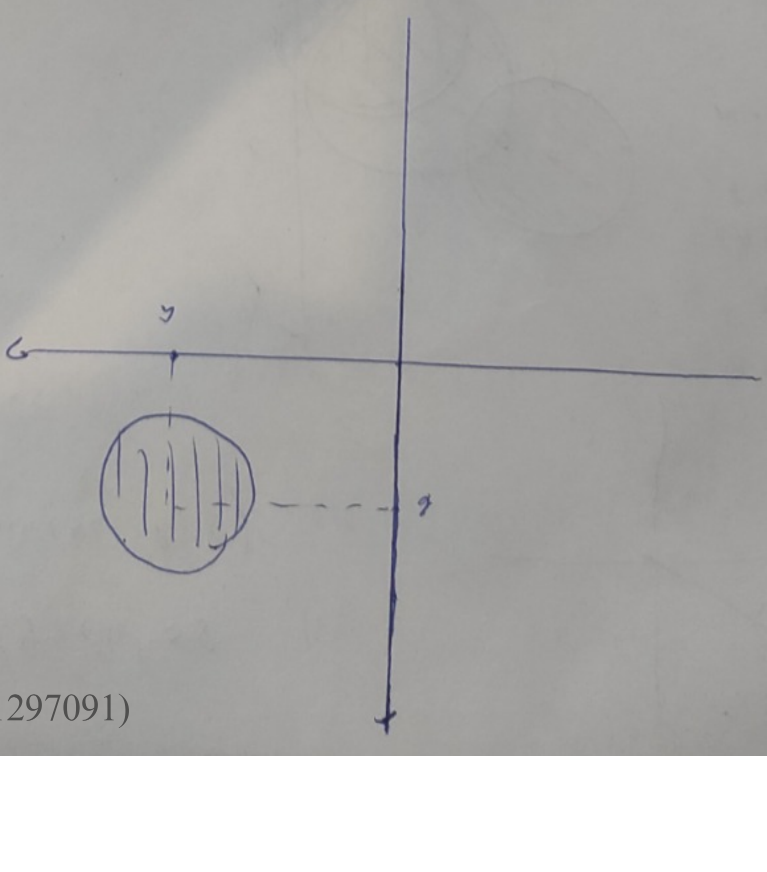
$\left[\begin{array}{l} \begin{cases} 4a-2b>5 \\ a^2+b^2\le 5 \end{cases} \\ \begin{cases} 4a-2b<5 \\ a^2+b^2 \le 4a-2b \end{cases} \end{array}\right.$

$\left[\begin{array}{l} \begin{cases} 4a>2b+5 \\ a^2+b^2\le 5 \end{cases} \\ \begin{cases} 4a\ge 2b+5 \\ (a-2)^2-4+(b+1)^2-1\le 0 \end{cases} \end{array}\right.$

$b<2a-\frac{5}{2}$

$\left[\begin{array}{l} \begin{cases} 4a>2b+5 \\ a^2+b^2\le 5 \end{cases} \\ \begin{cases} 4a\le 2b+5 \\ (a-1)^2+(b+1)^2\le 5 \end{cases} \end{array}\right.$

$b>2a-\frac{5}{2}$



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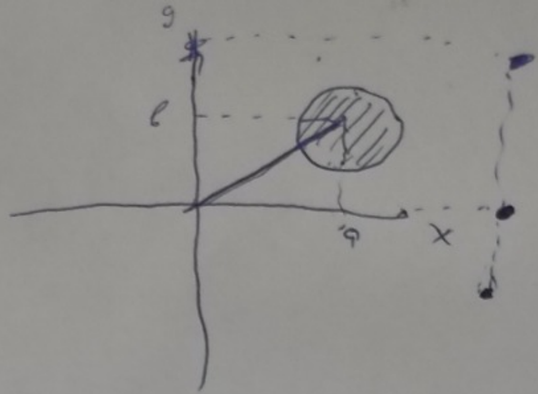
$$\begin{cases} (x-a)^2+(y-b)^2 \le 5 \\ a^2+b^2 \le \min(4a-2b;\ 5) \end{cases}$$



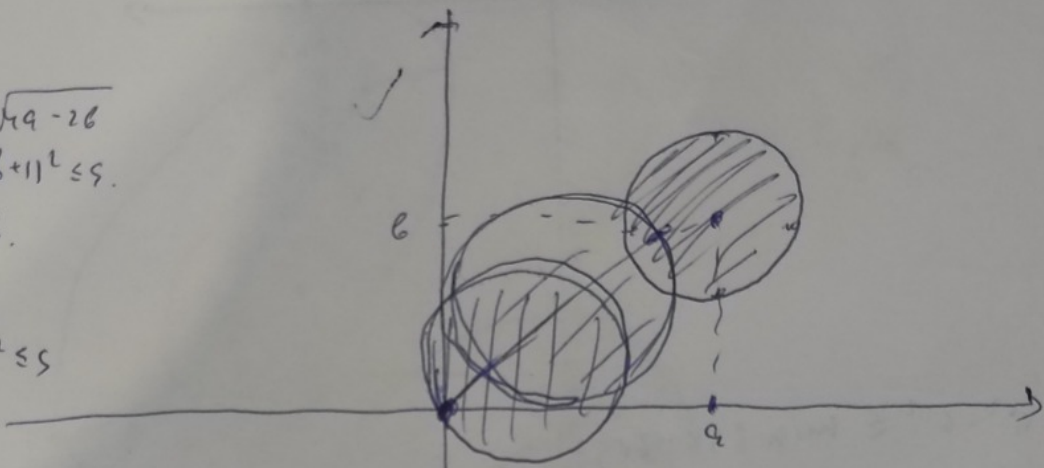
$\sqrt{a^2+b^2} \le \sqrt{5}$

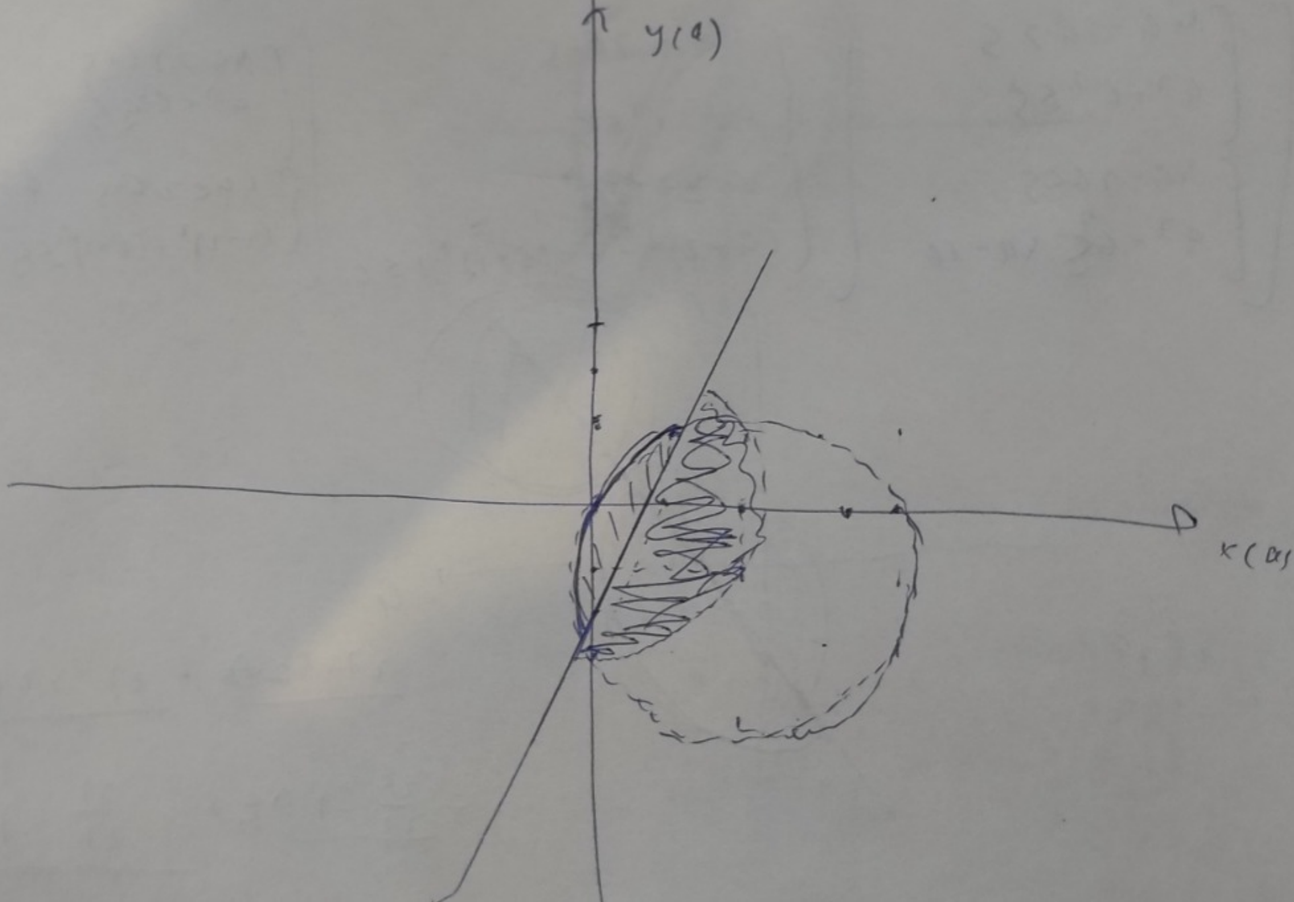
$4a-2b < 5$

$\sqrt{a^2+b^2} \le \sqrt{4a-2b}$

$$\left[\begin{array}{l} \begin{cases} 4a \le 5+2b \\ (a-2)^2+(b+1)^2 \le 5 \end{cases} \\ \begin{cases} a^2+b^2 \le 5 \\ 4a > 5+2b \end{cases} \end{array}\right.$$

$$\left[\begin{array}{l} \begin{cases} 2b > 4a-5 \\ (a-2)^2+(b+1)^2 \le 5 \end{cases} \\ \begin{cases} 2b < 4a-5 \\ a^2+b^2 \le 5 \end{cases} \end{array}\right.$$





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№2. Черновик

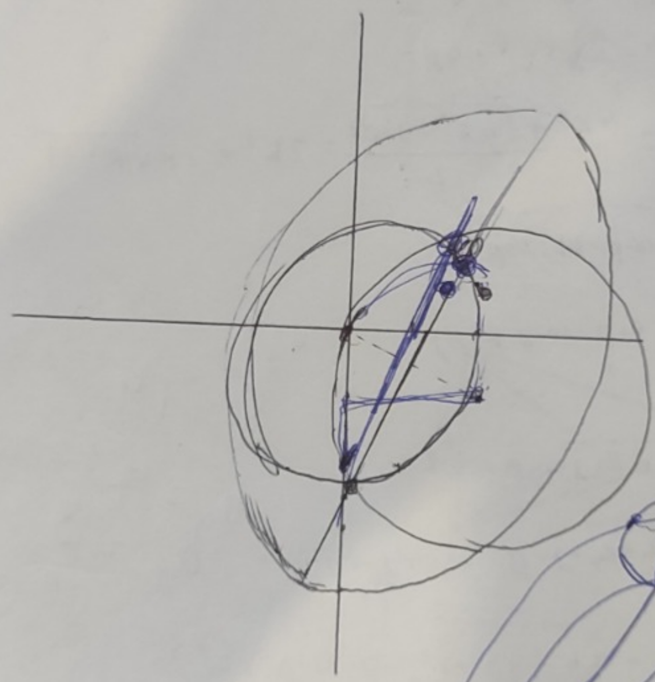
Черновик

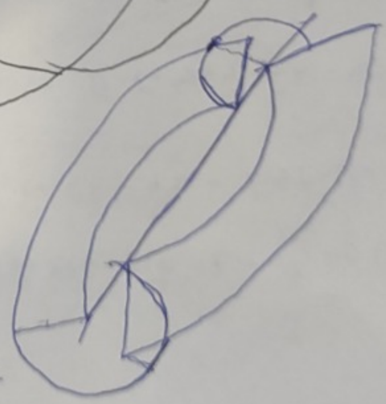
$$\begin{cases}(x-a)^2+(y-b)^2\le 5 & (1)\\ a^2+b^2\le \min(4a-2b,\,5) & (2)\end{cases}$$

(2)

$$\left[\begin{array}{l}\begin{cases}4a-2b\ge 5\\ a^2+b^2\le 5\end{cases}\\ \begin{cases}4a-2b\le 5\\ a^2+b^2\le 4a-2b\end{cases}\end{array}\right. \qquad \left[\begin{array}{l}\begin{cases}2b\le 4a-5\\ a^2+b^2\le 5\end{cases}\\ \begin{cases}2b\ge 4a-5\\ (a-2)^2+(b-1)^2\le 5\end{cases}\end{array}\right.$$

Получи





$x^2+y^2=5$

$(x-2)^2+(y-1)^2=5$

$y=\pm\sqrt{5-x^2}$

$y=\sqrt{5-(x-2)}+1$

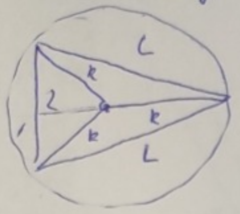
$\sqrt{5-x^2}=\sqrt{5-(x-2)^2}+1$

$CD^2=49+25-70\cos(\alpha+\beta)$

Черновик

$L=7\cos\alpha$

$L=5\cos\beta$.



$4a-2b=5$

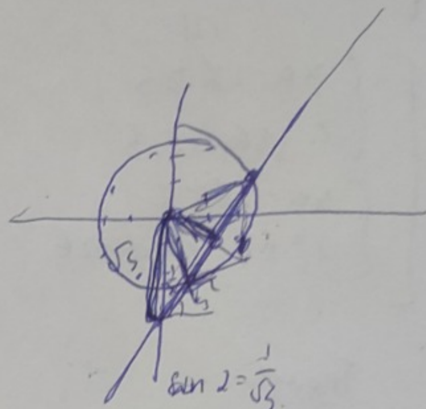
$4a=2b+5$ ∅ в ℕ

$h=\sqrt{L^2-1}$

$\frac{2}{\sin\gamma}=2R$

$R=\frac{1}{\sin\gamma}$; $L^2\cdot\frac{1}{2}\cdot\sin\gamma=S$

$\sin\gamma=\frac{2S}{L^2}$



$S=\frac{1}{2}\cdot2\cdot\sqrt{L^2-1}$

$R=\frac{L^2}{2S}=\frac{L^2}{2\sqrt{L^2-1}}$

$4R^2(L^2-1)=L^4$

$L^4-4R^2L^2+4R^2$

$\sin\alpha=\frac{1}{\sqrt{3}}$

$L^2=\frac{4R^2\mp\sqrt{16R^4-16R^2}}{2}=2R^2+2R\sqrt{R^2-1}$

$CD=\sqrt{74-70\cos\alpha\cos\beta-\sin\alpha\sin\beta}$

$$\begin{cases}CD^2=74-70(\cos\alpha\cos\beta-\sin\alpha\sin\beta)\\ 7\sin\alpha\mp5\sin\beta=CD.\end{cases}$$

$S\cdot10=S_{10}$

$49\sin^2\alpha+25\sin^2\beta\mp70\sin\alpha\sin\beta=CD^2$

$S=14.$

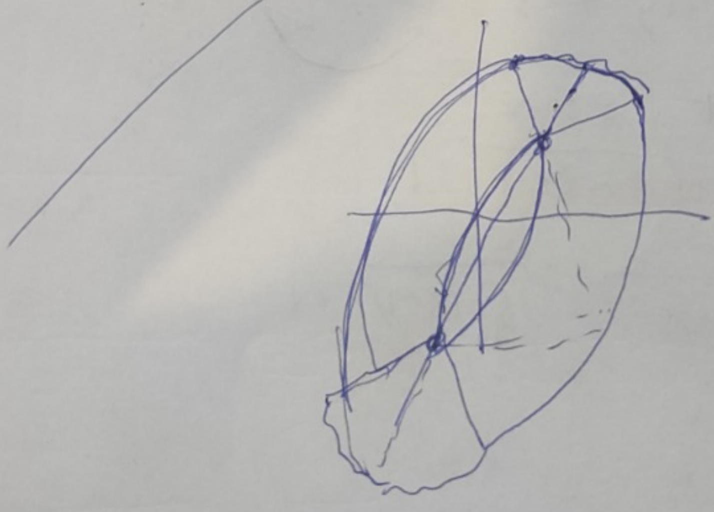
$-70\sin\alpha\sin\beta=49-49\cos^2\alpha+25-25\cos^2\beta-CD^2$

$a_9=7$

$a_{10}=8$

$CD^2=74-70(\cos\alpha\cos\beta+74-49\cos^2\alpha-25\cos^2\beta-CD^2)$

$CD^2=49\cos^2\alpha-70\cos\alpha\cos\beta+25\cos^2\beta+CD^2$



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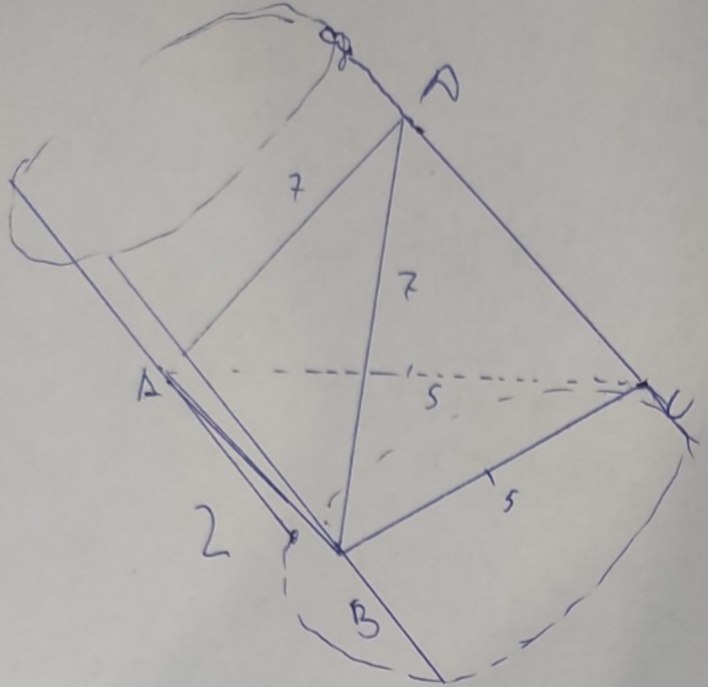
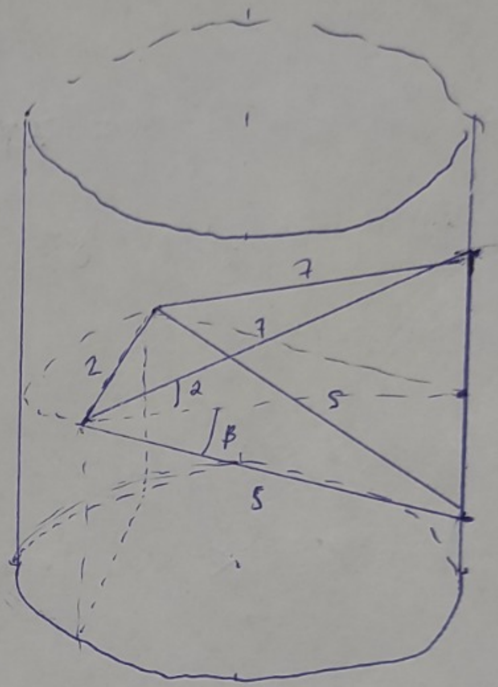
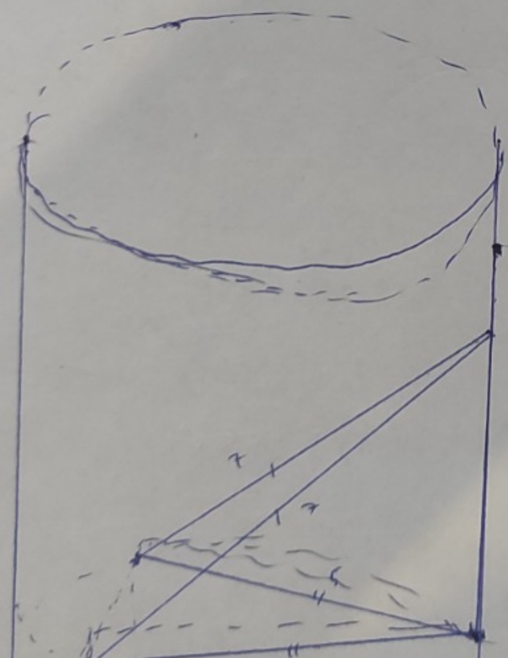
№2. Черновик



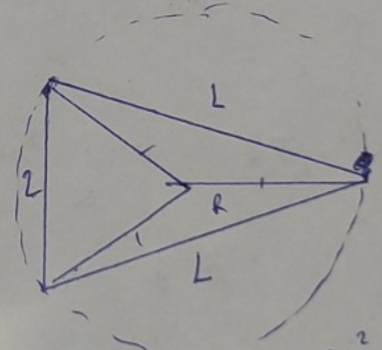
$CD \in (2; 12)$

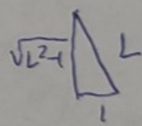
$BC + BD > CD \quad CD < 12.$





$\frac{668}{45}$





$2R = \frac{2}{\sin\gamma}$

$CD^2 = 7^2 + 5^2 - 70\cos(\alpha+\beta)$

$L = 7\cos\alpha \qquad \cos\alpha = \frac{L}{7}$

$L = 5\cos\beta \qquad \cos\beta = \frac{L}{5}$

$L^2 \cdot \frac{\sin\alpha}{2} = \sqrt{L^2-1}\cdot 2 \cdot \frac{1}{2}$

$\sin\alpha = \frac{2\sqrt{L^2-1}}{L^2}$

$2R = \frac{2}{\sin\alpha} = \frac{L^2}{\sqrt{L^2-1}}$

$R = \frac{L^2}{2\sqrt{L^2-1}}$

$R^2 =$

Черновик

$S = a_1 + a_2 + a_3 + a_4 \dots a_7$

$a \in Z$

$\frac{6k+1k}{2} \cdot 6k =$

$= 21k$

$a_7 \cdot a_{12} > S + 20$

$a_9 \cdot a_{10} < S + 44$

$a_1 - ?$

$\frac{6k+0k}{2} \cdot 7$

$a_n = a_1 + kn$

$S = 7a_1 + k + 2k + 3k + \dots 7k = 7a_1 + \frac{7+1}{2} \cdot 7k = 7a_1 + 28k$

$$\begin{cases} (a_1+7k)(a_1+12k) > 7a_1 + 28k + 20 \\ (a_1+9k)(a_1+10k) < 7a_1 + 28k + 44 \end{cases}$$

$$\begin{cases} a_1^2 + 19ka_1 + 84k^2 > 7a_1 + 28k + 20 \\ a_1^2 + 19k + 90k^2 < 7a_1 + 28k + 44 \end{cases} \quad \begin{cases} a_1^2 + \cancel{19ka_1} + 84k^2 > \cancel{7a_1 + 28k} + 20 \\ \cancel{7a_1 + 28k} + 44 > a_1^2 + \cancel{19ka_1} + 90k^2 \end{cases}$$

$84k^2 + 44 > 20 + 90k^2$

$24 > 6k^2$

$4 > k^2 \Rightarrow k \in Z \quad k = 1$

$\begin{array}{r} 84 \\ -48 \\ \hline 36 \end{array}$

$(a_1+6)^2 \geq 0, \ a_1 \in \mathbb{R}$

$$\begin{cases} a_1^2 + 19a_1 + 84 > 7a_1 + 48 \\ a_1^2 + 19a_1 + 90 < 7a_1 + 76 \end{cases} \quad \begin{cases} a_1^2 + 12a_1 + 36 \geq 0 \\ a_1 + 12a_1 + 14 < 0 \end{cases}$$

$(a+6)^2 - 36 + 14 < 0$

$(a+6)^2 < 36 - 14 = 22$. $\cancel{(a+6)}$

$$\left[\begin{array}{ll} (a+6)^2 = 16 & a+6 = \pm 4 \\ (a+6)^2 = 4 & a+6 = \pm 2 \\ (a+6)^2 = 1 & a+6 = \pm 1 \end{array}\right. \quad \left[\begin{array}{l} a = -10 \\ a = -2 \\ a = -8 \\ a = -4 \\ a = -7 \end{array}\right.$$

$a = -5$.

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Часть 2

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

Шифр: **21102796**

ID профиля: **336267**

Вариант 18

Чистовик ①

№5

$\log_{\sqrt{\frac{x}{3}+3}}(6x-14) = 2\log_{(\frac{x}{3}+3)}(6x-14)$ (если $x \in (0;3)$) $= 2\frac{\lg(6x-14)}{\lg(\frac{x}{3}+3)} \equiv a$

$\log_{6x-14}(x-1)^2 = 2\frac{\lg(x-1)}{\lg(6x-14)} \equiv b$

$\log_{x-1}(\frac{x}{3}+3) = \frac{\lg(\frac{x}{3}+3)}{\lg(x-1)} \equiv c.$

Заметим, что $abc = 4$

Пусть $a = b$. Тогда $c+1 = a$, $c = a-1$

$a^2(a-1) = 4$

$a^3 - a^2 - 4 = 0$

a	1	-1	0	-4
2	1	1	2	0

$(a-2)(\underbrace{a^2+a+2}_{D<0}) = 0 \Rightarrow a = 2$ - ед. реш. $\Rightarrow c = 1$

с) Пусть $c = 1$. Тогда $\frac{x}{3}+3 = x-1$; $x+9 = 3x-3$ $x = 6$

Проверим a и b.

$a = 2\cdot\frac{\lg(36-14)}{\lg(2+3)} = 2\frac{\lg 22}{\lg 5}$, $b = 2\frac{\lg 5}{\lg 22}$, $a \neq b$

1) Пусть $a = 1$. Тогда $(6x-14)^2 = \frac{x}{3}+3$

$3(6x)^2 - 2\cdot 6\cdot 14x + 14^2 = \frac{x}{3}+3$

$6x - 14 = \sqrt{\frac{x}{3}+3}$ (*) $\Rightarrow b = \frac{\lg(x-1)}{\lg(\frac{x}{3}+3)}$, $c = \frac{\lg(\frac{x}{3}+3)}{\lg(x-1)} \Rightarrow$

$\frac{x}{3}+3 = x-1 \Rightarrow x = 6$ ⌀ был (*)

3) Пусть $b = 1$ тогда $x^2-2x+1 = 6x-14$

$x^2-8x+15 = 0 \Rightarrow x = 5$, $x = 3$. $x = 5$ перед

При $x = 3$

$c = \frac{\lg 4}{\lg 2}$, $a = 2\frac{\lg 4}{\lg 4} \Rightarrow a = c$ - верно $\Rightarrow$ $\boxed{x = 3 \text{ реш.}}$

Черновик (2)

№4.

Т.к. НОД(a; b; c) = 15 $a = 15k_1$, $b = 15k_2$, $c = 15k_3$. Причем $k_1 \not\vdots k_2 \not\vdots k_3$

$3^{15} \cdot 5^{18} \vdots a \vdots b \vdots c$

Заметим: $abc = 3^3 \cdot 5^3 k_1 k_2 k_3 = \underbrace{3^3 k_1}_{x_1} \cdot \underbrace{5^3 k_2}_{x_2} \cdot \underbrace{k_3}_{x_3}$

Получим: $3^{15} \cdot 5^{18} = x_1 x_2 x_3$.

· Т.к. x_1 и x_2, x_3 взаимнопростые, то.

$x_1 = 3^{15}$

$x_2 = 5^{18}$ $\Rightarrow$ $\left[\begin{array}{l} k_1 = 3^{15}, 3^{14}, 3^{12}, 3^{11} \\ k_2 = 5^{18}, 5^{17}, 5^{16}, 5^{15} \\ k_3 = 1 \end{array}\right.$ 4 числа, 4 числа, 1 число.

$x_3 = 1$

Тогда кол-во троек $n = 4^2 \cdot 3!$ ← кол-во перестановок $= 16 \cdot 6 = \boxed{72}$

кол-во различ. комбинаций чисел

№6.

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$a = k_1 \cdot 3^{15} \cdot 5^{\frac{?}{?}}$

$b = k_2 \cdot 3^{15} 5^{18}$

$c = k_3 \cdot 3^{15} \cdot 5^{15}$

$\log_{\left(\frac{x}{3}+3\right)^{\frac{1}{2}}} 6x-14$

140R - ...

100D - ...

$2\log_{\frac{x}{3}+3}(6x-14) = \log_{6x-14}(x-1)^{2}$

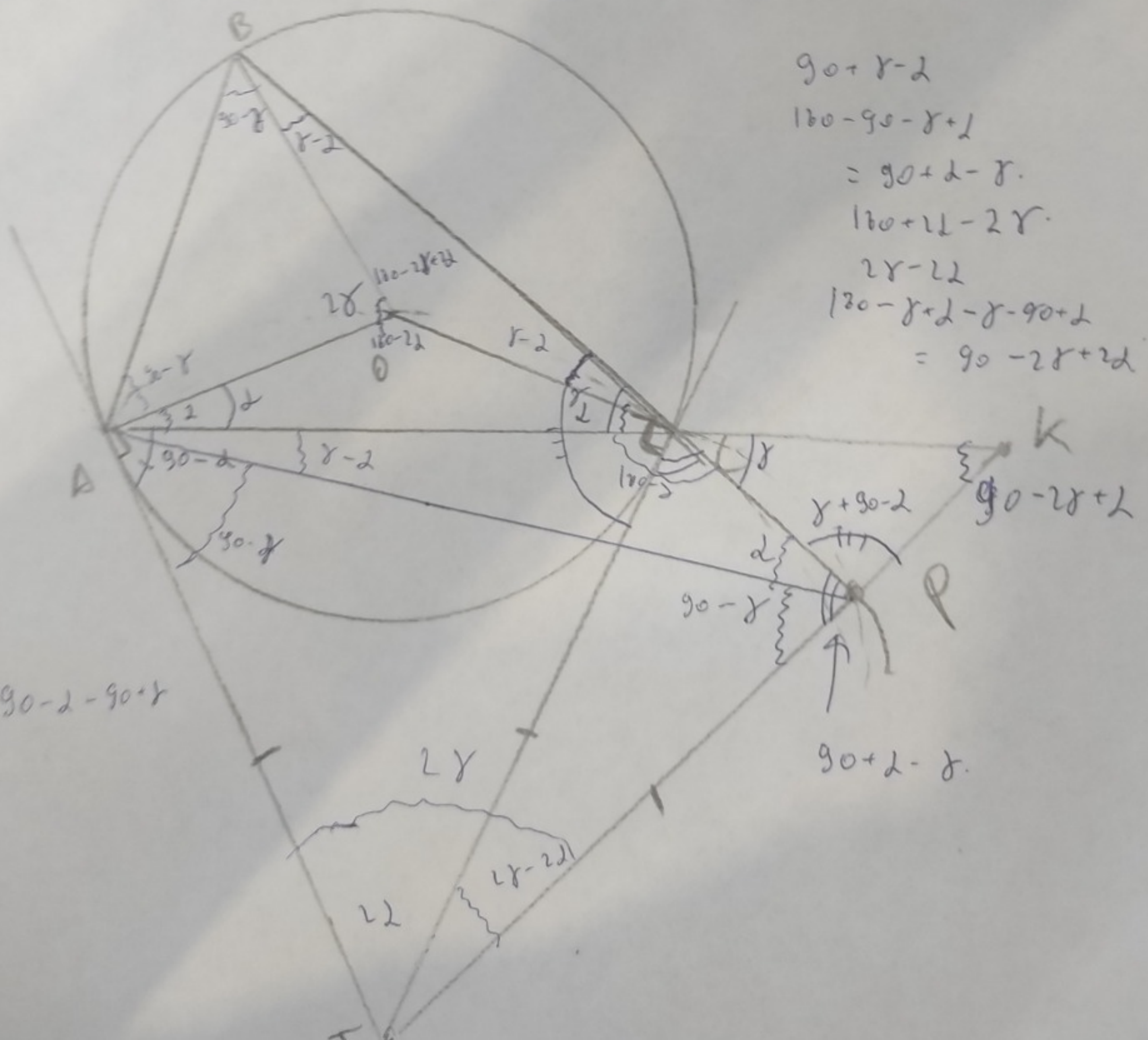
$2\log_{\frac{x}{3}+3}(6x-14) = \log_{x-1}\left(\frac{x}{3}+3\right)$

$90-\alpha+90-\gamma+\alpha+\gamma$

$360-180+2\gamma-2\alpha-180+2\alpha$

$180-90+\alpha-2\gamma =$

$= 90+\alpha-2\gamma.$



$90+\gamma-\alpha$

$180-90-\gamma+\alpha$

$= 90+\alpha-\gamma.$

$180+2\alpha-2\gamma.$

$2\gamma-2\alpha$

$180-\gamma+\alpha-\gamma-90+\alpha$

$= 90-2\gamma+2\alpha$

$90-\alpha-90+\gamma$

$90+\alpha-\gamma.$

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$3^{13} \cdot 5^{18} \vdots a$

$\vdots b$

$\vdots c$

$a : 3 \,\vdots\, 5$

$b : 8 \,\vdots\, 3$

$c : \cancel{18} \,\vdots\, 5$

$a : 3 : 5$

$c : 3 : 5$

$b \mid 3 \; \cancel{5}$

$b, c, a : 3 ; 5$

$a = 15 p_1$

$b = 15 p_2$

$c = 15 p_3$

$3^{12} \cdot 5^{15} = p_1 p_2 p_3$

$\frac{3^{14} \cdot 5^{17}}{b}$

$p_1 = 5^{15}$

$p_2 = 3^{12}$

$p_3 = 1$

$a = 15 \cdot 5^{15}$

$b = K \cdot 3^{12}$

$c = 15$

$x > 14$

№5

$$\frac{\log_2 (6x-14)^2}{\log_2 (\frac{x}{3}+3)}, \quad \frac{\log_2 (x-1)^2}{\log_2 (6x-14)}, \quad \frac{\log_2 (\frac{x}{3}+3)}{\log_2 (x-1)}$$

$$2\frac{\log_2 (6x-14)}{\log_2 (\frac{x}{3}+3)}, \quad 2\frac{\log_2 (x-1)}{\log_2 (6x-14)}, \quad \frac{\log_2 (\frac{x}{3}+3)}{\log_2 (x-1)}$$

$\log_2^2 (6x-14) = \log_2 (x-1) \cdot \log_2 (\frac{x}{3}+3)$

$\log_a b - \log_a a = \log_b c$

$\log_a \frac{b}{a} = \log_b c$

$$\frac{\log_n \frac{b}{a}}{\log_n a} = \frac{\log_n c}{\log_n b}$$

$a \quad b c$

$a = c \qquad c+1 = a$

$\frac{a}{c} = 1 \qquad c + \frac{a}{c} = a$

$\frac{c^2+a}{c} = a \quad c^2 + a = ac.$

$\log_2^2(6x-14) = \log_2(\frac{x}{3}+3)\log_1(x-1)$

$\frac{\log_2(\frac{x}{3}+3)}{\log_2(x-1)} + 1 = \frac{2\log(6x-14)}{\log_2(\frac{x}{3}+1)}$

$\log_2^2(6x-14) = \log_2(\frac{x}{3}+3)\log_2(x-1)$

$\frac{\log^2(\frac{x}{3}+3)(\log_2(x-1))}{\log_2(x-1)} = 2\log 6x-1$

$2\log_a b \quad 2\log_b c \quad \log_c a.$

$\begin{cases} 2\log_a b = 2\log_b c. \\ 2\log_c a + 1 = \log_a b \end{cases}$

$\begin{cases} \ln b^2 = \ln c \cdot \ln a. \\ \frac{\ln a + \ln c}{\ln c} = \frac{\ln b}{\ln a} \end{cases} \qquad \begin{cases} (\ln b)^2 = \ln a \ln c \\ (\ln a)^2 + \frac{\ln a \cdot \ln c}{(\ln b)^2} = \ln b \cdot \ln c. \end{cases}$

$(\ln a)^2 + (\ln b)^2 = \ln b \ln c.$

$\begin{cases} 2\ln_a b = \ln_c a \\ 2\ln_a b^2 = 2\ln_b c^2 + \ln_b b \end{cases} \qquad \ln b^2 \ln b = (\ln c^2 + \ln b)\ln a.$

$\frac{\ln b^2}{\ln a} = \frac{\ln c^2}{\ln b} + \frac{\ln b}{\ln b} =$

$2\log_{\left(\frac{x}{3}+3\right)}(6x-14),\ 2\log_{6x-14}(x-1),\ \log_{x-1}\left(\frac{x}{3}+3\right)$

$2\frac{\ln(6x-14)}{\ln\left(\frac{x}{3}+3\right)},\ 2\frac{\ln(x-1)}{\ln(6x-14)},\ \frac{\ln\left(\frac{x}{3}+3\right)}{\ln(x-1)}=c$

$a\ b\ c$ $\qquad x+9=3x-3$

$abc=4.$ $\qquad x=6.$

$a=b.$

$c+1=a.\quad c=a-1$

$a^2(a-1)=4.$

$a^3-a^2-4=0.$

$a=2\quad b=2\quad c=1$

	1	-1	0	-4
2	1	1	2	0

$x^2-x+2=0$

$\cancel{(x-2)(x}$

$x=\frac{1\pm\sqrt{1-8}}{}\ \varnothing$

$\boxed{a=2,\ b=2,\ c=1}$

$\frac{x}{3}+3=x-1$

$x+9=3x-3$

$12=2x\ \boxed{x=6}\ \varnothing$

$36-14=22$

$\frac{\ln(x-1)^2}{\ln(6x-14)}=1$

$(x-1)^2=6x-14$

$x^2-2x+1=6x-14.$

$x^2-8x+15=0.$

$x=5$

$x=3.$

$2\frac{\ln 16}{\ln\frac{5}{3}}\quad 2\frac{\ln 4}{\ln 4}$

$6x-14=\sqrt{\frac{x}{3}+3}.$

$b=2\frac{\lg x-1}{\lg\left(\frac{x}{3}+3\right)}\quad c=\frac{\lg\left(\frac{x}{3}+3\right)}{\lg(x-1)}$

$x-1=\frac{x}{3}+3.$

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$\cancel{2(\alpha+x)+x+y=180}$

$\cancel{2\alpha+2x+x+y=180}$

$\cancel{2\alpha=180-3x-y}$

$2(\alpha+x)+2(x+y)=180$

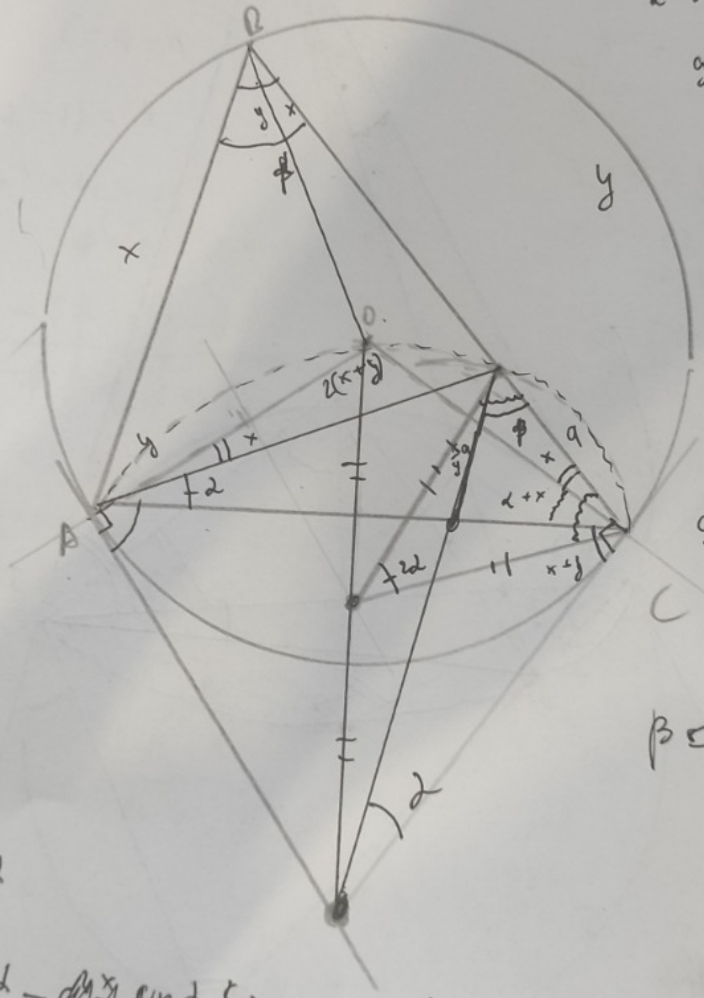
$2\alpha=180-4x-2y$

$\alpha=90-2x-y$

$90+x$

$\frac{a}{y}=\frac{b}{x}$

$b=\frac{x}{y}a$



$2\alpha+2x+2x+2y=180$

$\alpha+2x+y=90$

$\alpha=90-2x-y$

$90+x+\alpha+\beta=180$

$\beta=90-x-\alpha$

$\beta=90-x-90+2x+y$

$=x+y$

$S_1=a^2\frac{x}{y}\frac{\sin\alpha}{2}$

$S_2=xy\frac{\sin\alpha}{2}-a\frac{x}{y}\frac{\sin\alpha}{2}\;\{x(y-a)\frac{\sin\alpha}{2}$

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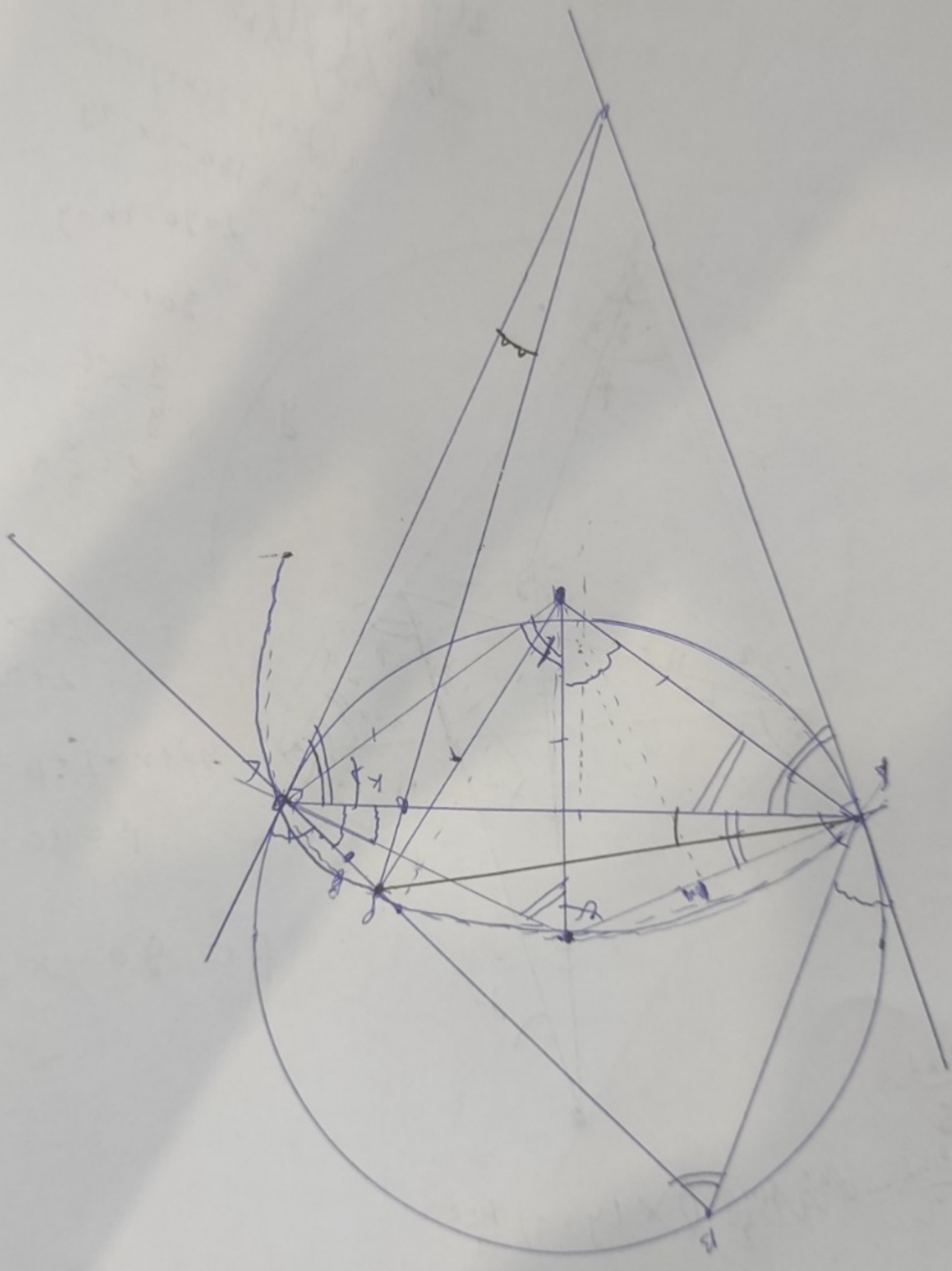

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