Часть 1

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

Шифр: **21100864**

ID профиля: **375550**

Вариант 20

Чистовик

№1

$\exists \begin{cases} a_1 = a \\ a_2 = a+b \end{cases} \Rightarrow \quad a_1 + (a+b) + \ldots + (a+4b) = S = \quad 5(a+2b)$

тогда

$\begin{cases} (a+5b)(a+10b) > 5(a+2b)+15 \\ (a+7b)(a+8b) < 5(a+2b)+39 \end{cases}$

$\begin{cases} a^2+15ab+50b^2 > 5a+10b+15 \\ a^2+15ab+56b^2 < 5a+10b+39 \end{cases}$

$5a+10b+39 > a^2+15ab+50b^2+6b^2 > 5a+10b+15+6b^2;$

$39-15 > 6b^2 \Rightarrow \quad b^2 < 4 \Rightarrow \quad b = 0; 1; -1 \quad (b \in \mathbb{N}) \Rightarrow \boxed{b=1}$

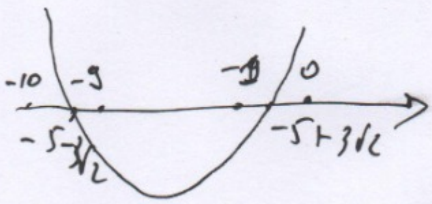
$\begin{cases} a^2+15a+50 > 5a+25 \\ a^2+15a+56 < 5a+39 \end{cases}$

$\begin{cases} a^2+10a+25>0 \quad \Rightarrow a \neq -5 \quad (a+5)^2>0 \\ a^2+10a+7<0 \quad \Rightarrow \quad a_{\text{корн}} = -5 \pm \sqrt{25-7} = -5 \pm \sqrt{18} = -5 \pm 3\sqrt{2} \quad a \in (-5-3\sqrt{2}; \end{cases}$

$5 > 3\sqrt{2} > 4 \quad \Rightarrow \quad a \in [-5-4; -5+4] \cdot \quad a \in [-9; -1] \quad -5+3\sqrt{2})$

$\downarrow \quad \downarrow \quad \downarrow \qquad a \neq -5$

$25 > 18 > 16$



Ответ: $a = -9; -8; -7; -6; -4; -3; -2; -1 = a_1$

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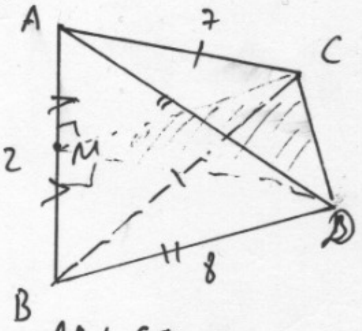
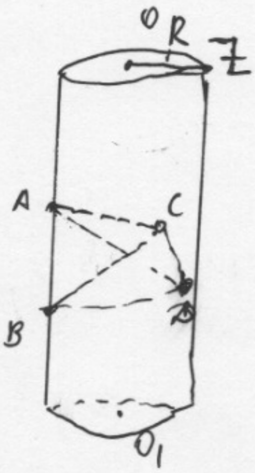
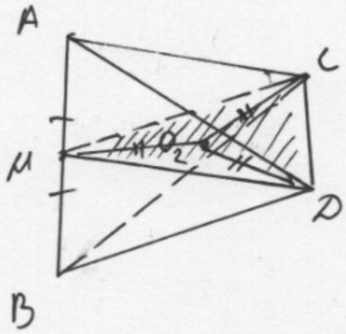
Чистовик

№2







$AB \perp CD$ т.к

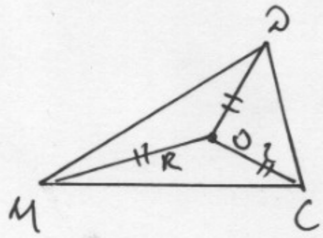
плоскость CDM – плоскость

симметрии $ABCD$ $\overset{(*)}{\Rightarrow}$ AB лежит на поверхности цилиндра $\left(\begin{cases} CD \perp OO_1 \\ \text{и } CD \perp AB \end{cases} \right) \Rightarrow$

$\Rightarrow OO_1 \parallel AB$

Заметим, что в плоскости CDM лежит проекция $(\cdot)O$ на CDM $(\cdot O_2)$: $O_2C = O_2D = O_2M$ = радиусу цилиндра R, т.к. MCD – перпендикулярное сечение цилиндра $(MCD \perp AB)$ и $\{M; C; D\} \in$ поверхности цилиндра

$\sphericalangle$ $\triangle MCD$:



Знаем, что $MC = \sqrt{-MA^2+AC^2} = \sqrt{49-1} = \sqrt{48}$ $(\triangle MAC)$ и что $MD = \sqrt{BD^2-BM^2} = \sqrt{8^2-1^2} = \sqrt{64-1} = \sqrt{63} > \sqrt{48}$,

тогда $MO+OD \geq MD = \sqrt{63} \Rightarrow 2R \geq \sqrt{63} \Rightarrow R_{min} = \frac{\sqrt{63}}{2} \Rightarrow$

$\Rightarrow R_{min}$, когда $O_2 \in MD \Rightarrow \angle DCM = 90° \Rightarrow$

$\Rightarrow CD^2 + MC^2 = MD^2 \Rightarrow CD^2 = 63 - 48 = 15 \Rightarrow CD = \sqrt{15}$

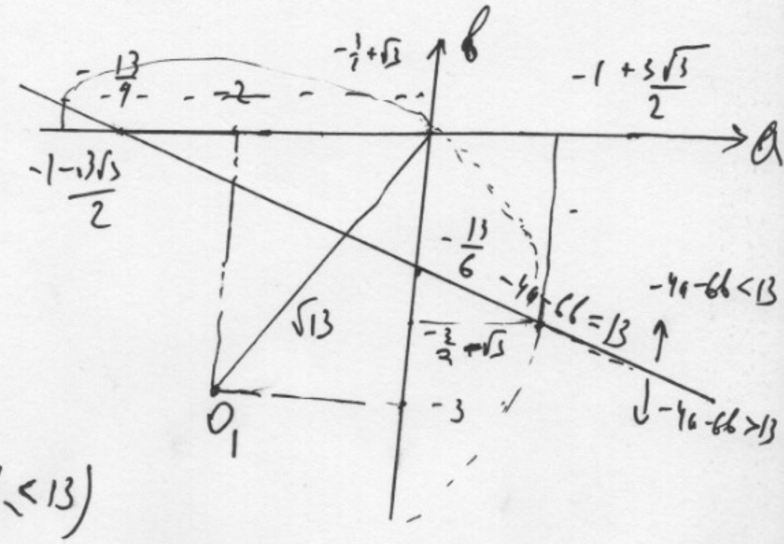
Ответ: $\sqrt{15}$

(*) $DM \perp AB$; $CM \perp AB \Rightarrow CDM \perp AB \Rightarrow CD \perp AB$

Чистовик

№3

$$\begin{cases}(x-a)^2+(y-b)^2 \leqslant 13\\ a^2+b^2 \leqslant \min(-4a-6b;13)\end{cases}$$



$a^2+b^2 \leq -4a-6b$

$a^2+4a+4+b^2+6b+9 \leq 13$

$(a+2)^2+(b+3)^2 \leq 13$ $\quad (-4a-6b \leq 13)$

ω_1 : $(\cdot)O_1$; $R=\sqrt{13}$

пересекает прямую $-4a-6b=13$ в 2-х точках

$$\begin{cases}-4a-6b=13\\ (a+2)^2+(b+3)^2 = 13\end{cases} \qquad a=-\frac{13}{4}-\frac{3}{2}b$$

$\left(\frac{3}{2}b+\frac{13}{4}-2\right)^2+(b+3)^2=13$

$\frac{9}{4}b^2+b^2+\left(\frac{13-8}{4}\right)^2+9+2\cdot\frac{3}{2}b\cdot\frac{13-8}{4}+6b=13$

$\frac{13}{4}b^2+\cancel{\frac{25}{16}+9}+\frac{15}{4}b+\frac{24}{4}b=13-9-\frac{25}{16}$ $\quad |\cdot 16$

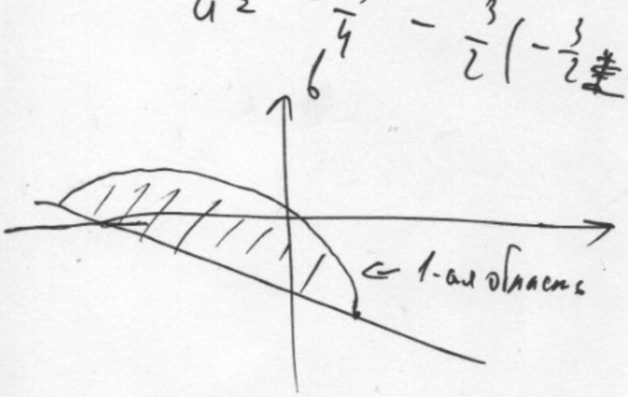
$4\cdot 13b^2+15\cdot 4b+24\cdot 4b = 13\cdot 16-9\cdot 16-25$

$4\cdot 13b^2+39\cdot 4b = 4\cdot 16-25 = 6^2\cdot 4... -25=39$ $\quad |:13$

$4b^2+3\cdot 4b=3$

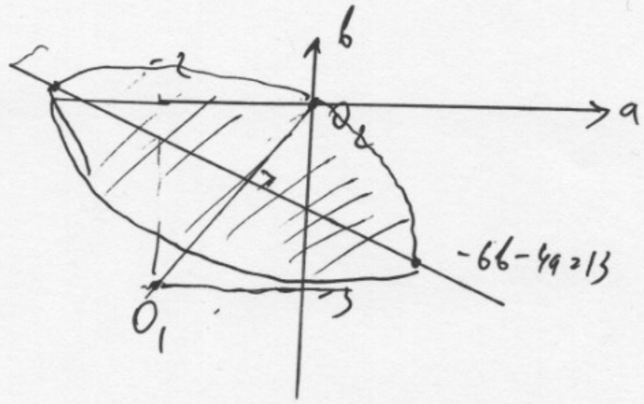
$b=\frac{-6\pm\sqrt{36+12}}{4}=-\frac{3}{2}\pm\sqrt{3}$

$a=-\frac{13}{4}-\frac{3}{2}\left(-\frac{3}{2}\pm\sqrt{3}\right)=\left[\begin{array}{l}-\frac{13}{4}-\left(-\frac{9}{4}+\frac{3\sqrt{3}}{2}\right)=-1-\frac{3\sqrt{3}}{2}\\ -\frac{13}{4}-\left(-\frac{9}{4}-\frac{3\sqrt{3}}{2}\right)=-1+\frac{3\sqrt{3}}{2}\end{array}\right.$



Чистовик

w) $a^2+b^2 \le 13$



$$\begin{cases} a^2+b^2=13 \\ -4a=13+6b \end{cases}$$

$a = -\frac{13}{4} - \frac{3}{2}b$

$\left(-\frac{13}{4}-\frac{3}{2}b\right)^2+b^2=13$

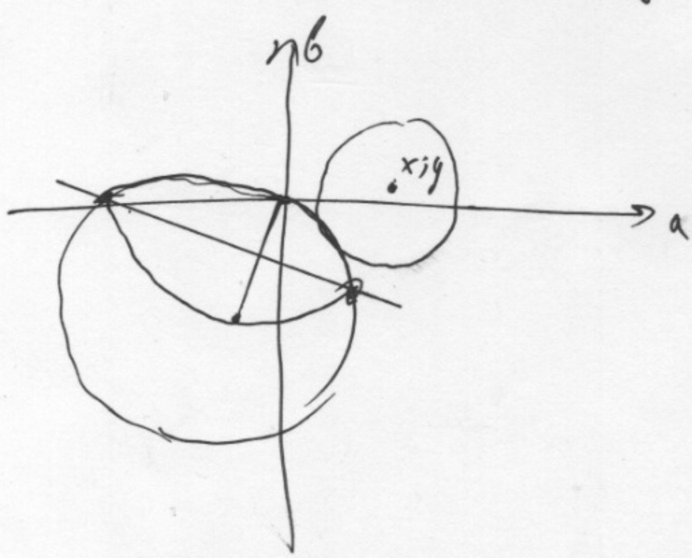
$\frac{13^2}{16}+\frac{9}{4}b^2+2\cdot\frac{3b}{2}\cdot\frac{13}{4}+b^2=13$

$\frac{13}{4}b^2+\frac{13\cdot 3b}{4}=\frac{13\cdot16-13\cdot13}{16} \quad \Big|\cdot\frac{16}{13}$

$4b^2+4\cdot3b=16-13$

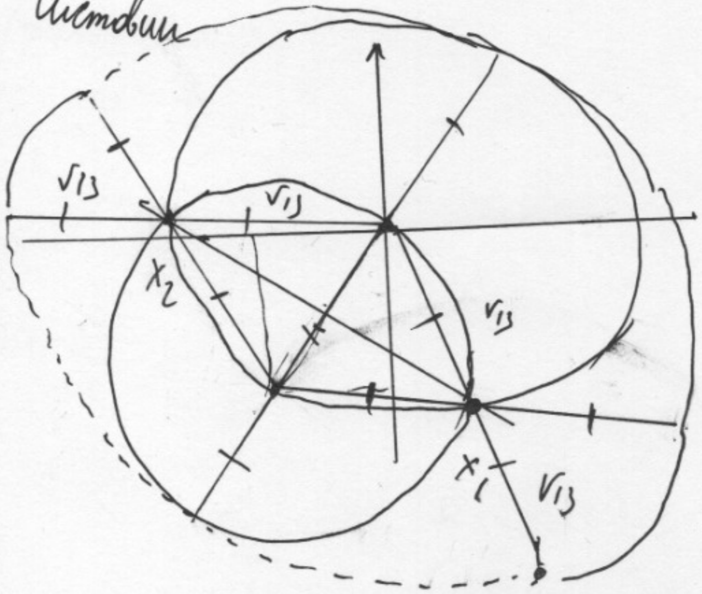
$4b^2+4\cdot3b=3$ → те же точки, что и $(a+2)^2+(b+3)^2=13$

$(a-x)^2+(b-y)^2\le13$ должно касаться закрашенной фигуры или залезать на неё: , значит $x;y$ принадлежит следующей области:



Чистовик

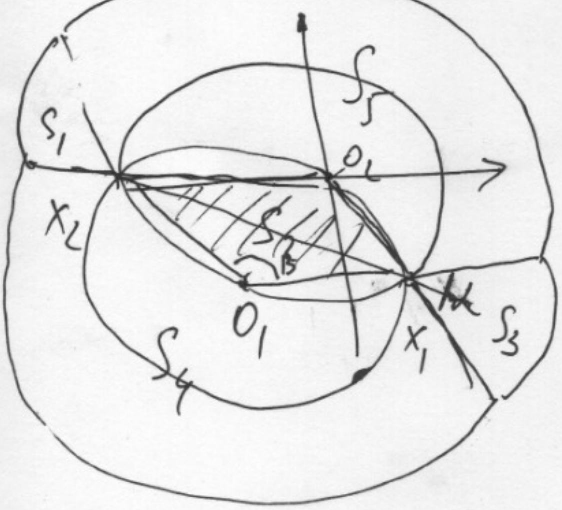
№3



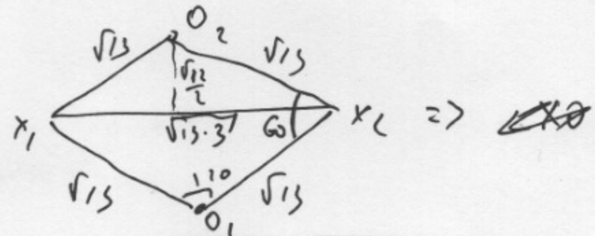
2 симметричные части равные тем же частям кругов (в °-ной мере), только с радиусами равными: $\sqrt{13}+\sqrt{13}$ (сумма радиусов $(a-x)^2+(b-y)^2$ и $a^2+b^2=min$)

и 2-м частям кругов с радиусом $\sqrt{13}$ и (•) X_1 и X_2

$$S = S_1+S_2+S_3+S_4+S_5 = 2\cdot\pi R^2\cdot\frac{\alpha}{180^\circ} + 2\cdot\pi R_2^2\cdot\frac{\beta}{180^\circ} - S_2$$



S_2:



$$X_1X_2 = \sqrt{(a_1-a_2)^2+(b_1-b_2)^2} = \sqrt{\left(-1-\frac{3\sqrt{3}}{2}-\left(-1+\frac{3\sqrt{3}}{2}\right)\right)^2+\left(-\frac{3}{2}+\sqrt{3}-\left(-\frac{3}{2}+\sqrt{3}\right)\right)^2} =$$

$$= \sqrt{(3\sqrt{3})^2+(2\sqrt{3})^2} = \sqrt{9\cdot 3+4\cdot 3} = \sqrt{13\cdot 3}$$

Тогда $\angle X_1O_1X_2 = 120^\circ$ (из $\triangle X_1O_1X_2$) $= \angle X_1O_2X_2$ (по Th. косинусов)

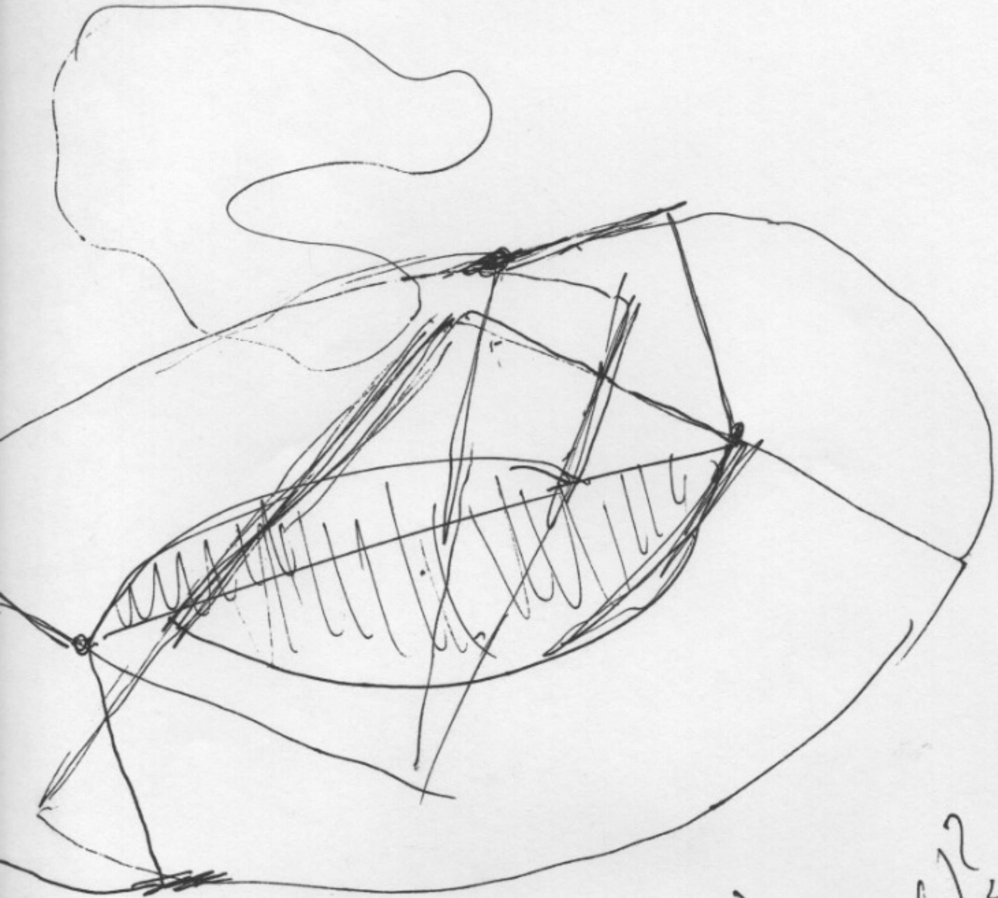
$$S_2 = 2\cdot\frac{\sqrt{13}}{2}\cdot\sqrt{13}\cdot\sqrt{3} = 13\sqrt{3}$$

$$S_{общее} = 2\cdot\pi\cdot\sqrt{13}^2\cdot\frac{\alpha}{180} + 2\cdot\pi\cdot(2\sqrt{13})^2\cdot\frac{120}{180} - 13\sqrt{3} = 2\pi\left(13\cdot\frac{60}{180}+\frac{120}{180}\cdot 13\cdot 4\right)$$

α || $\angle O_1X_2X_1$

$$-13\sqrt{3} = 2\pi\cdot\left(13\cdot\frac{1}{3}+\frac{8}{3}\cdot 13\right) - 13\sqrt{3} = 6\cdot 13\pi - 13\sqrt{3} = \boxed{78\pi - 13\sqrt{3}}$$

Ответ: $78\pi - 13\sqrt{3}$



$(x-a)^2+(y-b)^2=13$

$b=\frac{-6\pm\sqrt{36+12}}{4}=$

$=\frac{-6\pm\sqrt{48}}{4}=-\frac{3}{2}\pm\sqrt{3}$

$-4a-6b=13$

$4a=-13-6b$

$a=-\frac{13}{4}-\frac{3}{2}b$

$\frac{9}{4}b^2+2\cdot\frac{3}{2}\cdot\frac{5}{4}b+\frac{25}{16}+b^2+6b+9=4$

$\frac{9+4}{4}b^2+\frac{15}{4}b+\frac{24}{4}b=4-\frac{25}{16}$

$\left(-\frac{13}{4}-\frac{3}{2}b+2\right)^2+\left(b+3\right)^2=13$

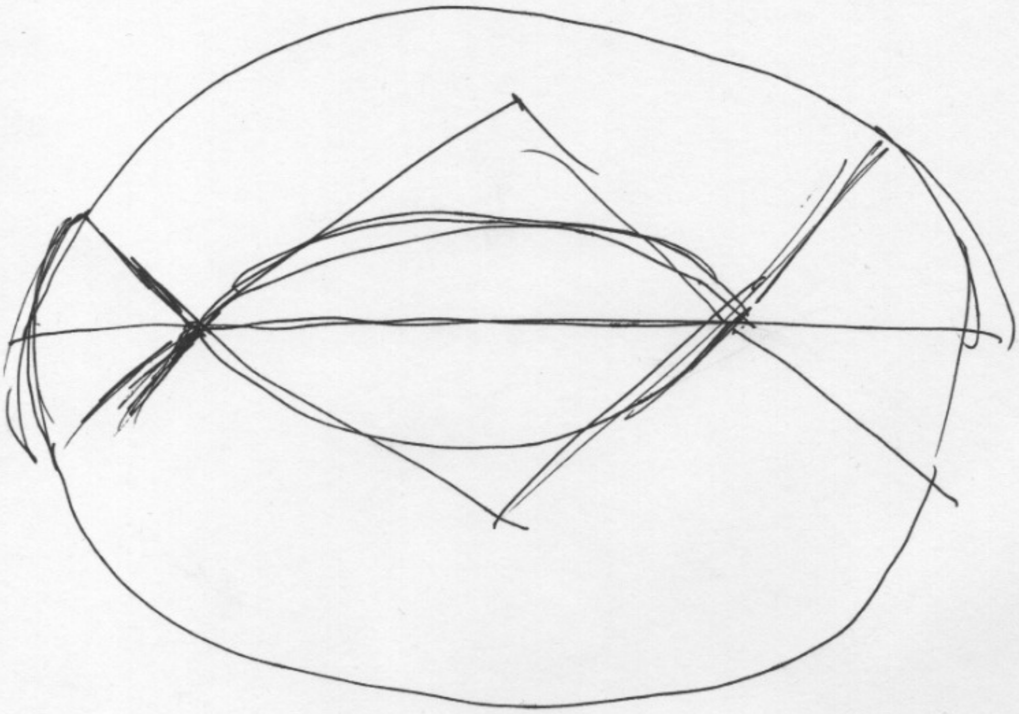
$\frac{13}{4}b^2+\frac{39}{4}b=\frac{64-25}{16}$

$13\cdot4b^2+39\cdot4b=39$

$\left(\frac{3}{2}b+\frac{13-8}{4}\right)^2+(b+3)^2=13$

$4b^2+3\cdot4b=3$

26/21



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$\cancel{a+1}2 \quad a+2$

$a \quad a+1 \quad a+2 \ldots$

$$\begin{cases} a^2+15a+50 > 5a+10+15 \\ a^2+15a+56 < 5a+10+39 \end{cases} \quad (a+5)^2$$

$$\begin{cases} a^2+10a+40-15>0 \\ a^2+10a+46-39<0 \end{cases} \Rightarrow \begin{cases} a^2+10a+25>0 \quad a+5 \\ a^2+10a+7<0 \end{cases}$$

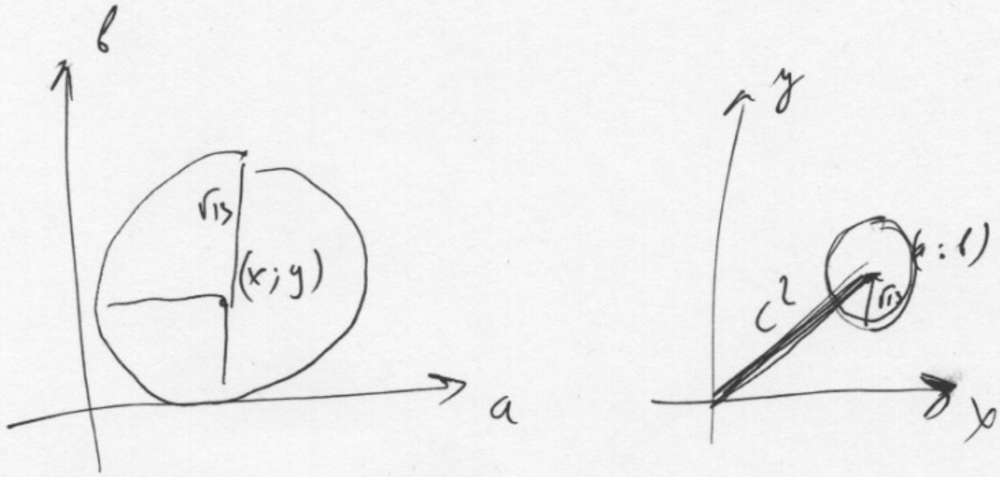
7

$$a = \frac{-10 \pm \sqrt{100-28}}{2} = -5 \pm \sqrt{25-7} = -5 \pm \sqrt{18} = -5 \pm 3\sqrt{2}$$

$25 \quad 9 \cdot 2 = 18 \quad 16$

$5 > 3\sqrt{2} \approx 4.2 > 4$

$-5 \pm$



$$(a-x)^2+(b-y)^2 \leq 13$$

$$= 4a-6b$$

w|

$a_1 \quad a_1+b \quad a_1+2b \quad a_1+3b \quad a_1+4b\ldots$

$$5a_1+\frac{4\cdot 5}{2}b = 5 \Rightarrow \boxed{5(a_1+2b)=5}$$

$$\begin{cases} (a_1+5b)(a_1+10b) > 5(a_1+2b)+15 \\ (a_1+7b)(a_1+8b) < 5\cdot(a_1+2b)+39 \end{cases}$$

$$\begin{cases} a_1^2+15a_1b_1+50b^2 > 5a_1+10b+15 \\ a_1^2+15a_1b_1+56b^2 < 5a_1+10b+39 \end{cases}$$

$$b^2 = 1;4;9 \ldots$$

$$a_1^2+15a_1b_1+50b^2+6b^2 < 5a_1+10b+15+6b^2 < 5a_1+10b+39$$

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$$\boxed{b=1} \qquad 6b^2 < 39-15=24 \qquad \boxed{b^2<4}$$

№3 $(x-a)^2+(y-b)^2 \le 13$

$a^2+b^2 \le \min(-4a-6b\,;13)$

$a;b$ буд.

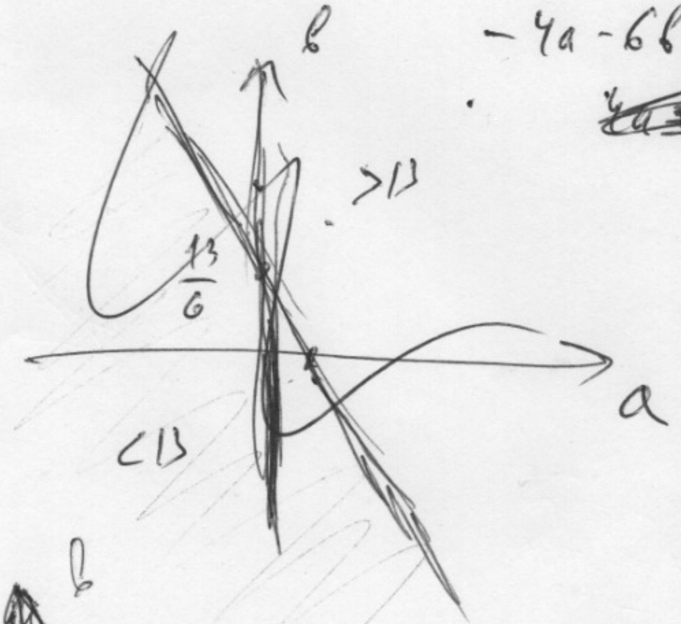
если $a;b>0$, то неверно

или a или $b<0$

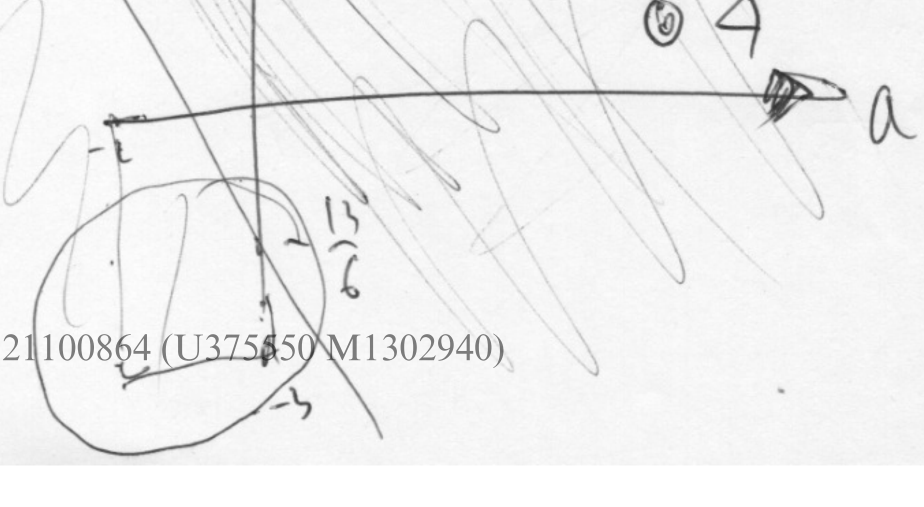
$-4a-6b \le 13$

$\cancel{4a+6b}$ $6b=-13-4a$

$b=\frac{13}{6}-\frac{2}{3}a$



$a^2+b^2 \le$ ...



$-4a-6b \le 13$

$a^2+b^2 \le -4a-6b$

$a;b \le 0$

$a^2+4a+b^2+6b \le 0$

$a^2+4a+4+b^2+6b+9 \le 13$

$(a+2)^2+(b+3)^2 \le 13$

w1:

$a; \; a+b \quad a+2b \ldots$

$b>0 \quad b, a \in \mathbb{R}$

$a+(a+b) \ldots + a+4b = 5a + \frac{4\cdot5}{2}b = 5(a+2b) = S$

$$\begin{cases} (a+5b)(a+10b) > 5(a_1+2b)+15 \\ (a+7b)(a+8b) \le 5(a_1+2b)+39 \end{cases}$$

$$\begin{cases} a^2+15ab+50b^2 > 5a+10b+15 \\ a^2+15ab+56b^2 \le 5a+10b+39 \end{cases}$$

$a^2+15ab+50b^2 > 5a+10b+15 \Rightarrow$

$\Rightarrow a^2+15ab+56b^2 =$

$5a+10b+39 >$ $= a^2+15ab+50b^2+6b^2 > 5a+10b+15+6b^2$

$6b^2 < 39-15 = 24 \Rightarrow b^2<4 \Rightarrow b = \pm 1, 0 \Rightarrow \boxed{b=1}$

$$\begin{cases} (a+5)(a+10) > 5a+10+15 \\ (a+7)(a+8) \le 5a+10+39 \end{cases}$$

$$\begin{cases} a^2+15a+50 > 5a+25 \\ a^2+15a+56 \le 5a+49 \end{cases}$$

$\boxed{a \ne 5}$

$$\begin{cases} a^2+10a+25>0 \\ a^2+10a+7<0 \end{cases}$$

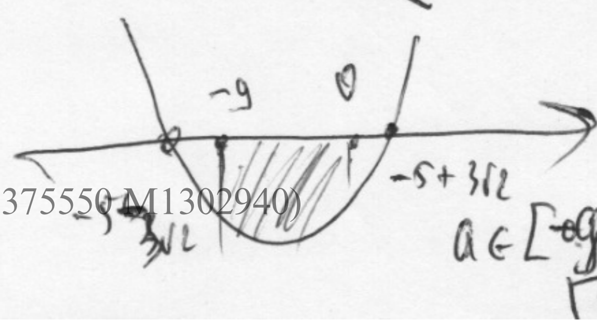
$a = \frac{-10 \pm \sqrt{100-28}}{2} = -5 \pm \sqrt{25-7} = -5 \pm \sqrt{18} = -5 \pm 3\sqrt{2}$

25 18 16

$5 > 3\sqrt{2} > 4$

$-5+5=0$

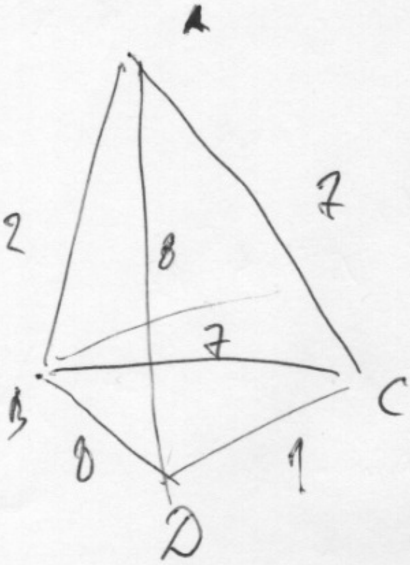
$-5-4 = -9$



$a \in [-9, -8 \ldots 0]$

$\boxed{a \ne -5}$

№52



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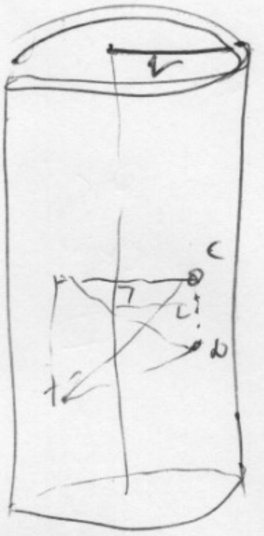
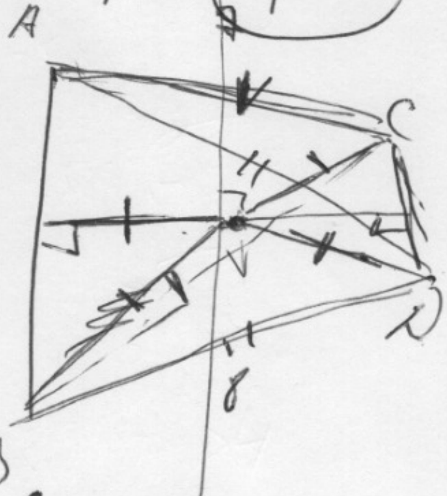


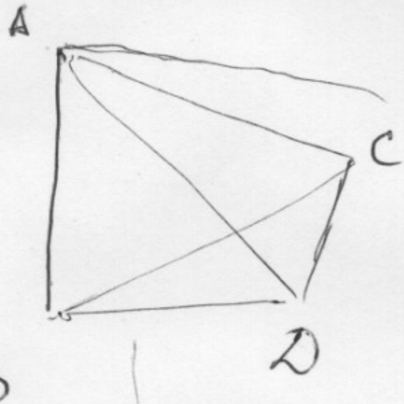
2R меньше чем $5\sqrt{2}$

$\boxed{\sqrt{65}}$

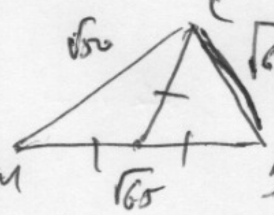
МСБ Прям



r-min

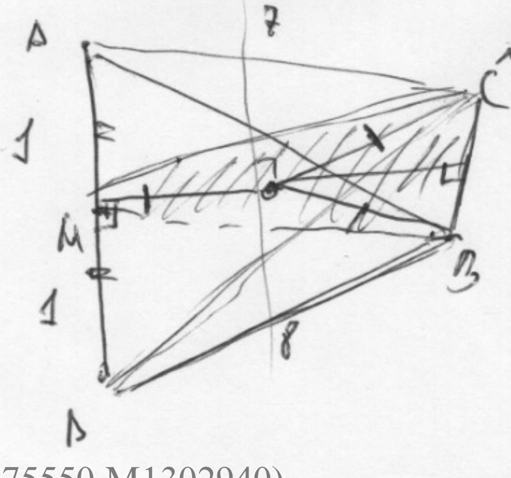


$\frac{a}{\sin\alpha} = 2R$



$\sqrt{65-50} = \sqrt{15}$.

$ab \cdot \sin\gamma = S$



S — симметрии.

$\sqrt{49+1} = \sqrt{50} = \sqrt{25\cdot 2} = 5\sqrt{2}$

$\sqrt{64+1} = \sqrt{65} = \sqrt{65}$

13·5

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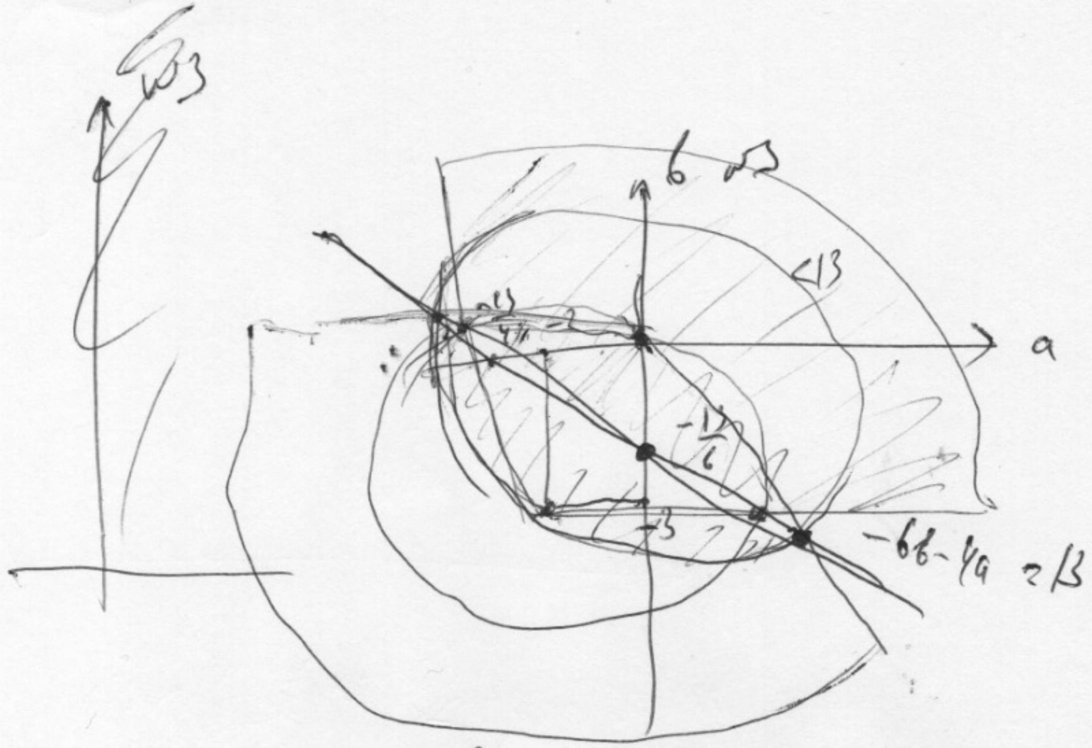


$(a+4)^2+(b+6)^2 \leq 13$

$$\left[\begin{aligned}&(a+4)^2+(b+6)^2 = 13\\ &-6b-4b = 13\end{aligned}\right.$$

$(a+4)^2+(b+3)^2 = -6b-4a$

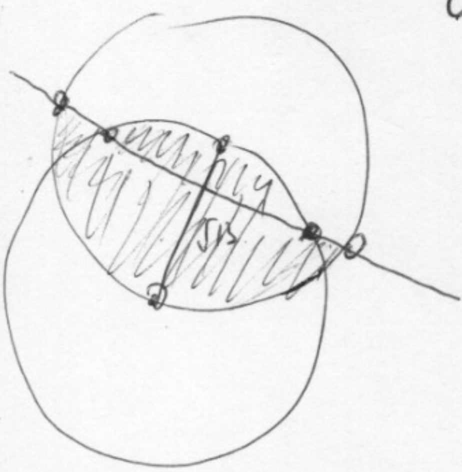
$a+4a+4+b^2+6b+9+6b+4a = 0$

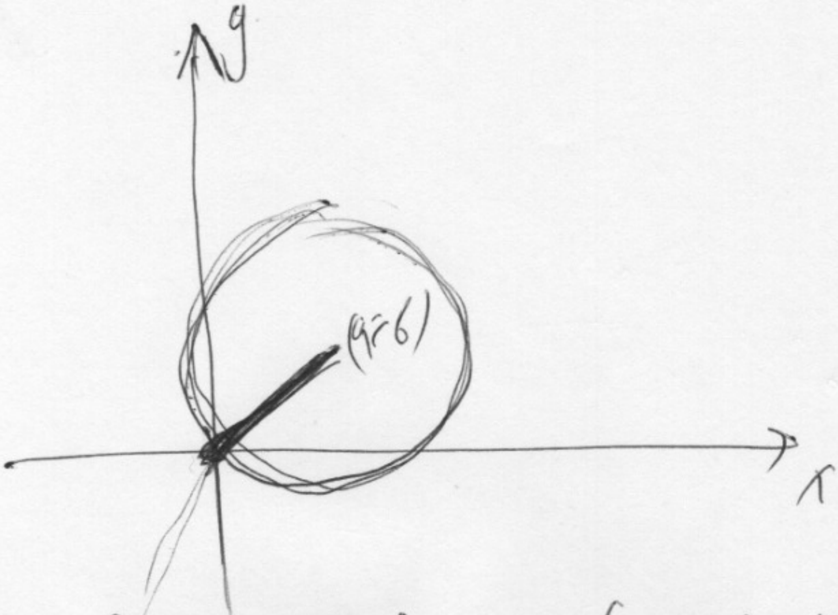
$a^2+4a+4+b^2+6b+9+$

$a^2+4a+4+b^2+6b+9 = 13$

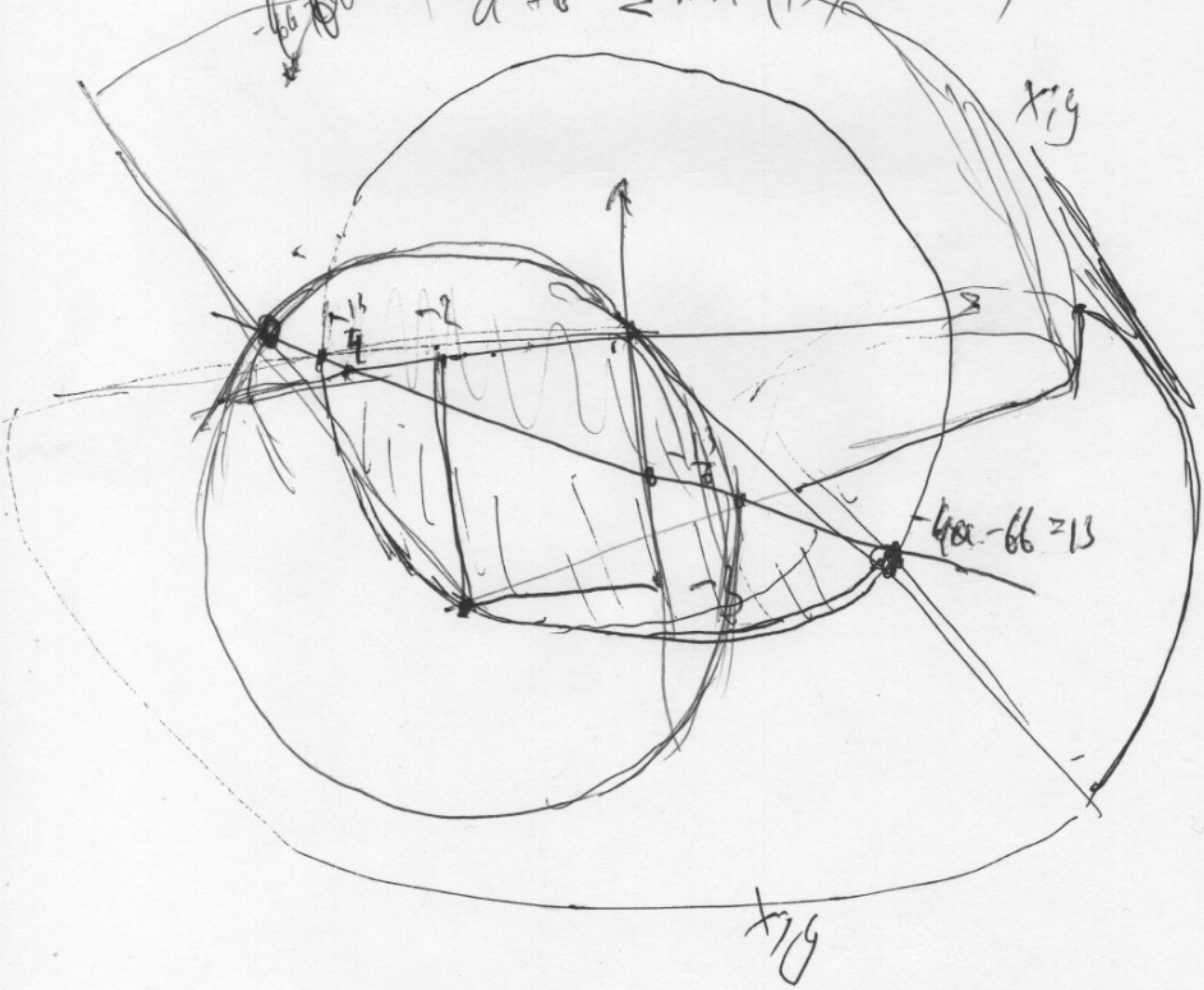
$b = -\frac{13}{6} = \frac{2}{3}a$

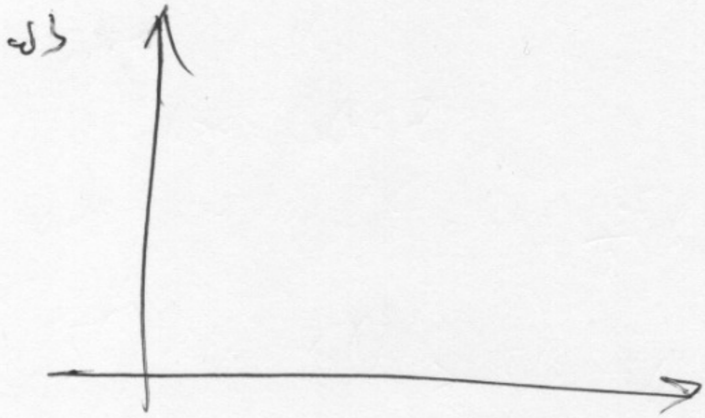
$(x-a)^2+(y-b)^2 \leq 13$





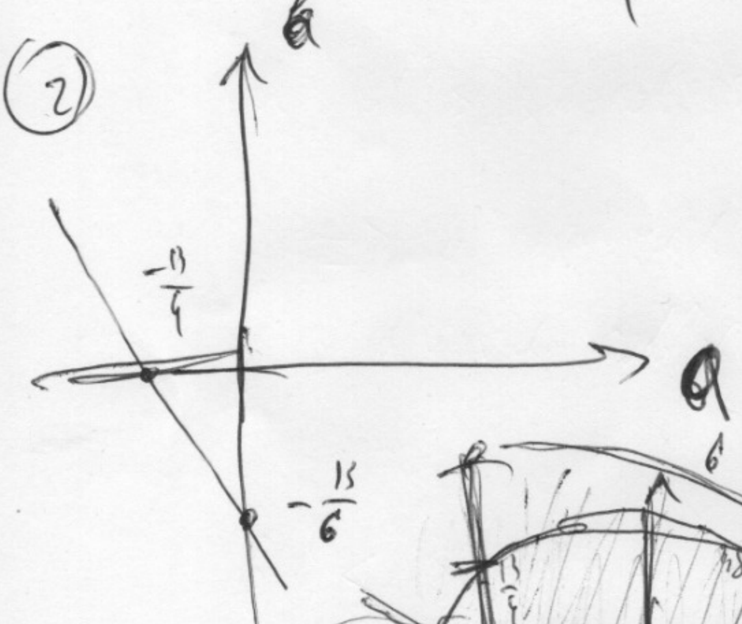
$$a^2+b^2 \le \min(13, -6a-4b)$$





1) $\begin{cases} (a-x)^2+(b-y)^2 \le 13 \\ a^2+b^2 \le \min(-4a-6b;\ 13) \end{cases}$

(2)



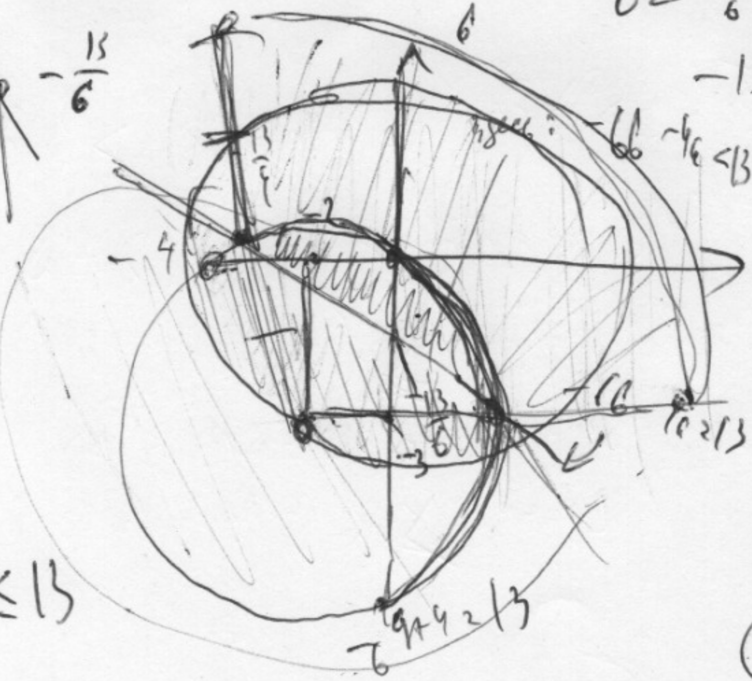
$-4a-6b=13$

$6b=-13-4a$

$b=-\frac{13}{6}-\frac{2}{3}a$

$0=-\frac{13}{6}-\frac{2}{3}a \quad |\cdot 6$

$-13-4a=0$ $\quad a=-\frac{13}{4}$



$a^2+b^2 \le -4a-6b$

$a^2+4a+4+b^2+6b+9 \le 13$

$(a+2)^2+(b+3)^2 \le 13$

$a^2+b^2 \le 13$

Часть 2

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

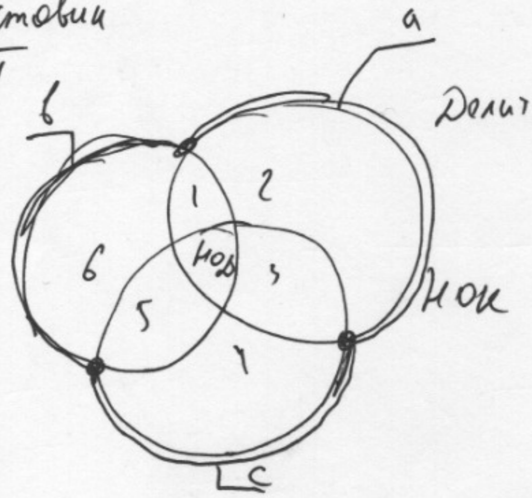
Шифр: **21100864**

ID профиля: **375550**

Вариант 20

Чистовик

№4



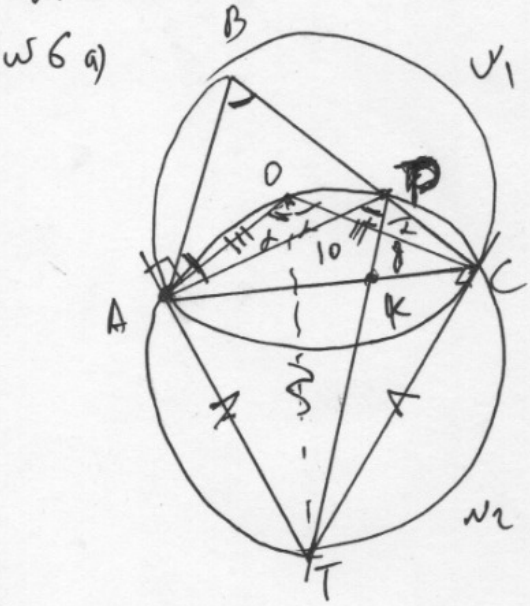
Заметим, что НОД и НОК заданы и в НОДе 2^1 и 5^1 (т.е. 1 двойка и 1 5-ка), а всего в схеме 17 двоек и 16 пятёрок.

Тогда т.к. a; b; c: упорядочены, то остались 16 двоек и 15 пятёрок надо разложить по 6 оставшимся частям кругов Эйлера. Это можно сделать $C^{6-1}_{16+6-1}\cdot C^{6-1}_{15+6-1}$ способами т.к. 1) Разложение 2-ек и 5-рок не влияют друг на друга; 2) Разложить X элементов в k коробок можно C^{k-1}_{x+k-1} способами: выложим ~~x~~ элементов в ряд, добавим к ним $k-1$ перегородку среди $x+k-1$ мест выберем $k-1$ перегородку $\Rightarrow$ $\Rightarrow$ разбили множество на k куч (возможно и нулевые) ■

Ответ: $C^5_{21}\cdot C^5_{20}$

Чистовик

№6 а)



Найти: $S_{\triangle ABC}$.

Решение: ∢ $AOCT$: $\angle OAT = \angle OCT = 90^\circ \Rightarrow$

$\Rightarrow T \in \omega_2 \Rightarrow \angle APC = \angle AOC =$

$= 2 \cdot \angle ABC \Rightarrow \angle PAB = \angle ABC \Rightarrow$

$\Rightarrow AP = BP$

∢ $\triangle ABC$: $\dfrac{S_{ABP}}{S_{APC}} = \dfrac{BP}{PC} = \dfrac{AP}{PC} = \dfrac{\frac{AP \cdot PK \sin\alpha}{2}}{\frac{PC \cdot PK \cdot \sin\alpha}{2}} =$

$=$ (т.к. $\angle TPC = \angle APT$, т.к. $\angle APT = \angle AOT = \angle TOC = \angle TPC$) $=$

$= \dfrac{S_{APK}}{S_{KPC}} = \dfrac{10}{8}$ $\quad S_{ABC} = S_{ABP} + S_{APC} = \left(\dfrac{10}{8} + \dfrac{8}{8}\right) S_{APC} =$

$= \dfrac{18 \cdot 18}{8} = \dfrac{9 \cdot 9}{2} = \dfrac{81}{2}$ $(40{,}5)$

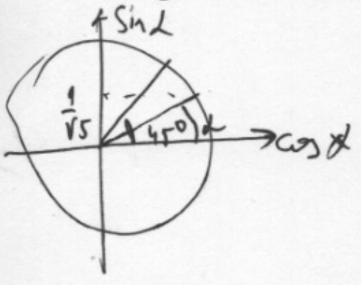
Ответ: 40,5

б) в $\triangle ABP$ $\angle ABP = \operatorname{arctg} \frac{1}{2} \Rightarrow \dfrac{\sin\alpha}{\cos\alpha} = \dfrac{1}{2}$ (из $\triangle APB$: APC - внешний $= 2\alpha \Rightarrow$ т.к. $BP = PA \Rightarrow \angle ABP = \alpha$, $\angle PAB = \alpha$) $\Rightarrow 2\sin\alpha = \cos\alpha \Rightarrow$

$\Rightarrow 4\sin^2\alpha = \cos^2\alpha \Rightarrow 5\sin^2\alpha = 1 \Rightarrow \sin\alpha = \dfrac{1}{\sqrt5}$ ($\sin\alpha > 0$ (острый)) ($\alpha < 45^\circ) \Rightarrow 2\alpha < 90^\circ$)

($\cos\alpha = \dfrac{2}{\sqrt5}$)

$\sin\angle APB = \sin(180 - 2\alpha) = \sin 2\alpha = 2 \cdot \dfrac{1}{\sqrt5} \cdot \dfrac{2}{\sqrt5} = \dfrac{4}{5} \Rightarrow$ (2α - острый) $\cos BPA = \dfrac{3}{5}$



$\cos APC = \cos(180 - \angle BPA) = -\cos BPA = -\dfrac{3}{5}$

$AP = x \Rightarrow$ из $\triangle ABP$: $\dfrac{x^2 \cdot \sin BPA}{2} = \dfrac{81}{2} - 18 = S_{ABP}$

$x^2 \cdot \dfrac{4}{5} = 81 - 36$

$x^2 = \dfrac{5 \cdot 45}{4} = \dfrac{9 \cdot 5^2}{2^2} \Rightarrow x = \boxed{\dfrac{15}{2}} \Rightarrow$ (равнобед.) $PC =$

$= \dfrac{15}{2} \cdot \dfrac{8}{10} = \dfrac{3 \cdot 2 \cdot 5 \cdot 4}{2 \cdot 2 \cdot 5} = 6$

Чистовик

№6 б) $AC = \sqrt{AP^2 + AC^2 - 2\,AP\cdot AC\cdot \cos\angle APC} = \sqrt{\left(\frac{15}{2}\right)^2 + 6^2 - \frac{15}{2}\cdot 2\cdot \cancel{6}\cdot\left(-\frac{3}{5}\right)}$

$= \sqrt{\frac{225}{4} + \frac{36\cdot 4}{4} + \frac{\cancel{15}^{3}\cdot \cancel{2}\cdot 6\cdot 3}{\cancel{2}\cdot \cancel{5}}} = \sqrt{\frac{225+144}{4} + \frac{54\cdot 4}{4}} = \sqrt{\frac{369+216}{4}} =$

$= \sqrt{\frac{585}{4}} = \frac{\sqrt{5\cdot 117}}{4} = \frac{3}{4}\sqrt{5\cdot 13} = \frac{3\sqrt{65}}{4}$

Ответ: $\frac{3}{4}\sqrt{65}$

$$\lg_{\sqrt{2x-8}}(x-4) = \lg_{(x-4)^2}(5x-26)$$

$$2\lg_{2x-8}(x-4) + \lg_{2x-8}(2x-8) = 2\lg_{5x-6}(2x-8)$$

$$\lg_{(2x-8)}(x-4)^2(2x-8) = \lg_{5x-6}(2x-8)^2$$

$$\cancel{\lg_{\sqrt{2x-8}}}$$

$$2\lg_{2x-8}(x-4);\ \frac{1}{1}\lg_{x-4}(5x-26);\ 2\lg_{5x-6}(2x-8)$$

$$2(\lg_{2x-8}(x-4) - \lg_{5x-6}(2x-8)) = 1$$

$$\lg_{2x-8}(x-4) - \frac{1}{\lg_{2x-8} 5x-6} = \frac{1}{2}$$

$2\log_{2x-8}(x-4) \geq \log_{x-4}(5x-26)$

чем больше

$(2x-8)^{2\log_{2x-8}} \quad x-4$

$= 2(x-4)$

$\log_{2x-8}(x-4) = \log_{5x-16}(2x-8)$

$(2x-8)^p = x-4 \qquad (5x-16)^p = (2x-8) = 2\cdot(x-4)^p$

$\left(\frac{5x-26}{x-8}\right)^p = 2.$

$5x-26 = 2\cdot(x-8)$ $\quad \frac{24}{12}$

$5x-26 = 4x-16$

$\boxed{x=10}$ до 10: $p>1$

после 10: $p<1$

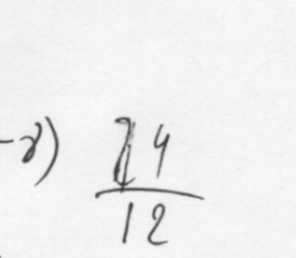
$\log_{x-4} 5x-16 \geq 2$

$x \sim 10100-130+32$

$(x-4)^2 = 5x-16$

$x^2-8x+16 = 5x-16$

$x^2-13x+32=0$



$65-16=49$

$2 \lg_{2x-8}(x-4)$

$\downarrow$

$x > 5,2$

$\Downarrow$

$2x-8 > x-4$

если $x > 5,2$

$2x-8 > x-4 > 1 \Rightarrow$

$\Rightarrow \lg = 2 \cdot y < 1$

$\frac{1}{2} \lg_{x-4}(5x-26)$

$x > 5,2$

$x-4 = 5x-16$

$0 = 4x-22$

$x = \frac{11}{2} = 5,5$

если $x > 5,5$, то

$\frac{1}{2} \lg_{x-4}(5x-26) =$

$= \frac{1}{2} \cdot y > 1$

если $x < 5,5$, то

$= \frac{1}{2} \cdot y < 1$

$2 \lg_{5x-26}(2x-8)$

$x > 5,2$

$5x-16 = 2x-8$

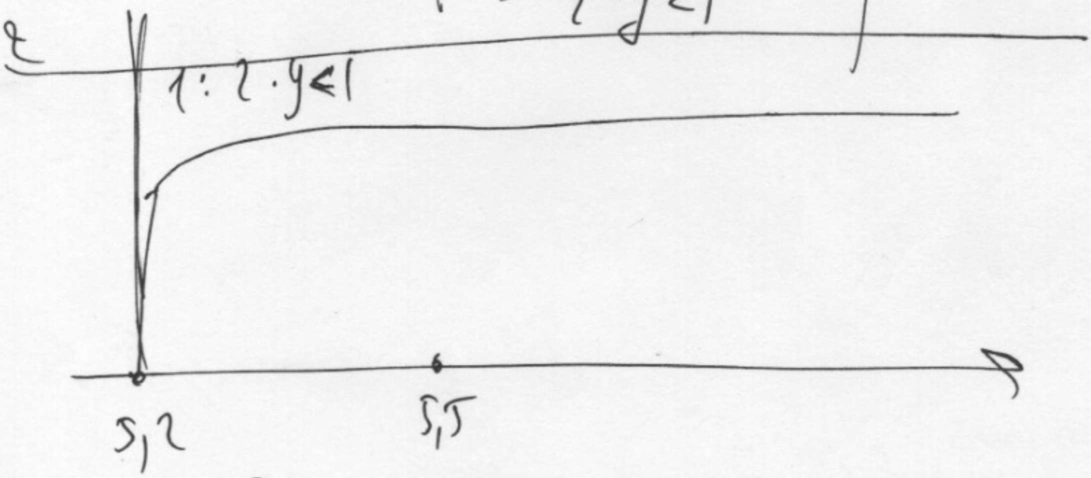
$3x = 18$

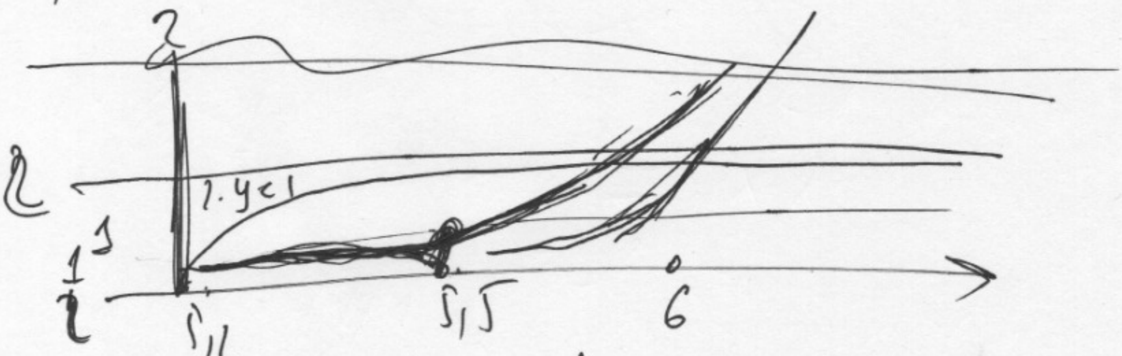
$x = 6$

$x > 6 \Rightarrow 5x-16 > 2x-8$

$2 \cdot y < 1$

$2 \cdot y > 1$ если $x < 6$





$\frac{1}{2} + 1 = 1,5$

$2\log_{2x-8}(x-4)$; $\frac{1}{2}\log_{x-4}(5x-16)$; $2\log_{5x-26}(2x-8)$

Зрафог.

1) $\log_{2x-8}(x-4) = \log_{5x-26}(2x-8)$

$\log_{2x-8}(x-4)$ $= (2x-8)$ $\frac{1}{\log_{2x-8} 5x-26}$

$(2x-8)$

$x-4$ $\underline{1}$

$x^{\frac{1}{7}} = \sqrt[7]{x}$

$2\log_{2x-8}(x-4) = 2\log_{5x-26}(2x-8)$

$\Downarrow$

$\log_{2x-8} x-4 = \log_{5x-26}(2x-8) = p$

$(x-4)^p = (2x-8)$ $(5x-26)^p = (2x-8)$

$x-4 \ne 2x-8$ $\cdot 2(x-4)$ т.к. $x-4>0$, то всегда

$2\log_{2x-8} x-4$ всегда $=$ ~~$x>0$~~ $x \cdot 4 \ne 2x-8$

$= 2\cdot$ ~~$\frac{1}{2}$~~ <1 $5x-26 \ne 2x-8$

$3x-18=0$

$2\log_{5x-26}(2x-8) = 2\cdot$ ~~$\log$~~ >1 $x=6$ если $x>6$, то

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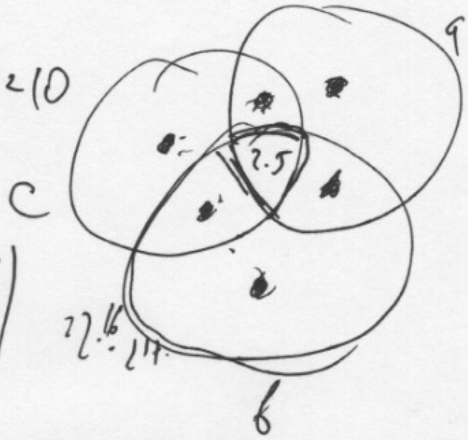
$2y<1 \cdot x<6$ $5x-16 > 2x-8$ $(x<6) \Rightarrow 5x$

№4

НОД (a,b,c) = 10

НОК (a,b,c)



Сумма 6-ти чисел равна 15 и всоотв

17 ; 18

ставим 6-1 / перегородку

на 3 кучи : +2

на 4 кучи

на 3 кучи

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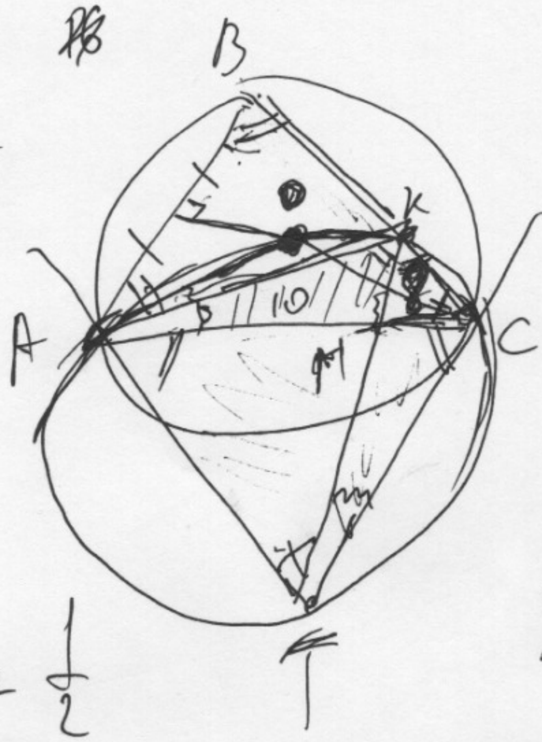
$81 - 3$
-31
$4\sqrt{5}$

$54 \times 4 = 216$



$$\frac{a^2 \cdot \sin\alpha}{2} = 40{,}5 - 18$$

$8S / O_2 \quad \frac{4}{5}$

$$a^2 \cdot \frac{4}{5} = 81$$

$$\frac{S}{S_1} = \frac{16}{25}$$

a

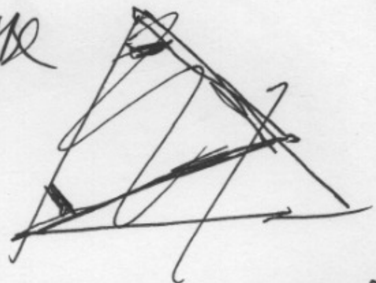
$285 + 144 = 369$
$+216$
585

$$\frac{\cos ABC}{\sin ABC} = \frac{1}{2}$$

$S_{CB'}$

$$\frac{S_{ABK}}{S_{AKC}} = \frac{BK}{KC} = \frac{AK}{KC} =$$

$2\cos ABC = \sin ABC$



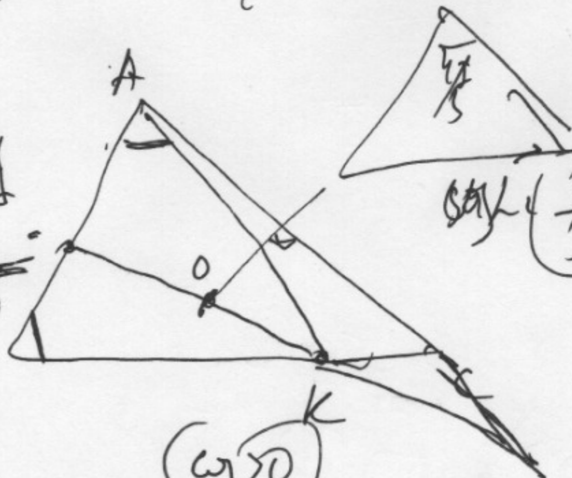
$\sin^2\alpha = 4\cos^2\alpha$

$$= \frac{\frac{AK \cdot KH \sin\alpha}{2}}{\frac{KC \cdot KH \cdot \sin\alpha}{2}} =$$

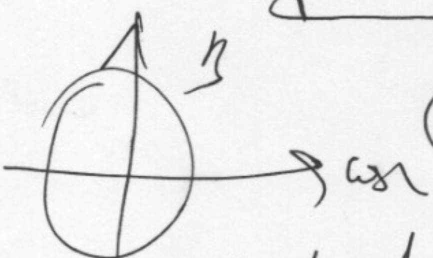
$S_{AKL} = \frac{3}{5}$

$5\cos^2\alpha = 1$

$\cos^2\alpha = \frac{1}{5}$



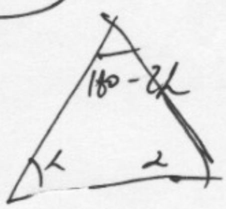
$$= \frac{S_{AKH}}{S_{AKC}} = \frac{10}{8}$$



$\cos > 0$

$\cos\alpha = \frac{1}{\sqrt{5}}$

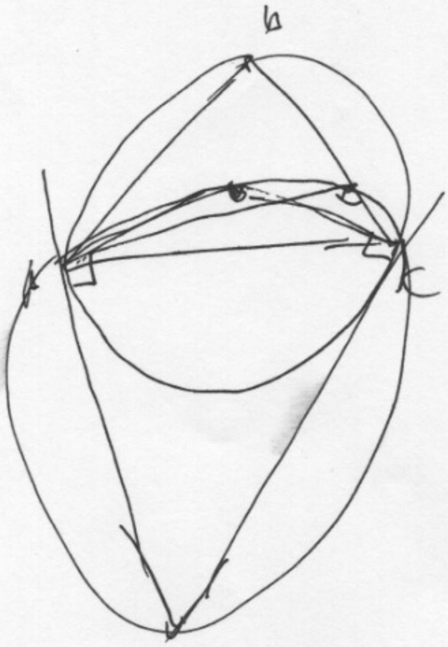
$\sin\alpha = \frac{2}{\sqrt{5}}$

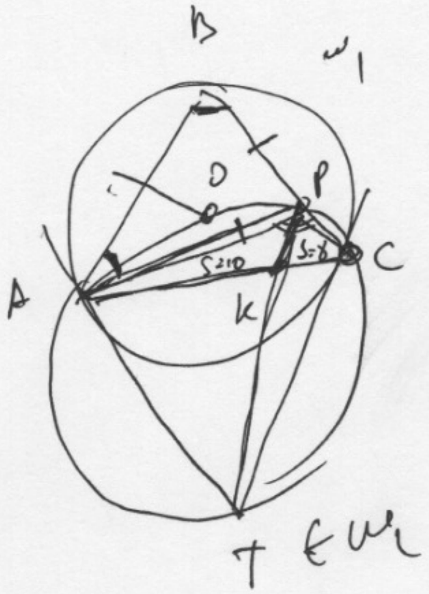


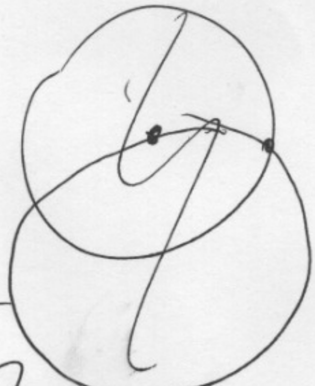
$$S_{obj} = \frac{10}{8} \cdot 18 + 18 = \frac{18 \cdot 18}{8} = \frac{9 \cdot 9}{2} =$$

$18 \cdot 3 = 54$

$$\sin(180 - 2\alpha) = \sin 2\alpha = 2 \cdot \frac{2}{\sqrt{5}} \cdot \frac{1}{\sqrt{5}} = \frac{4}{5} \quad \boxed{40{,}5}$$

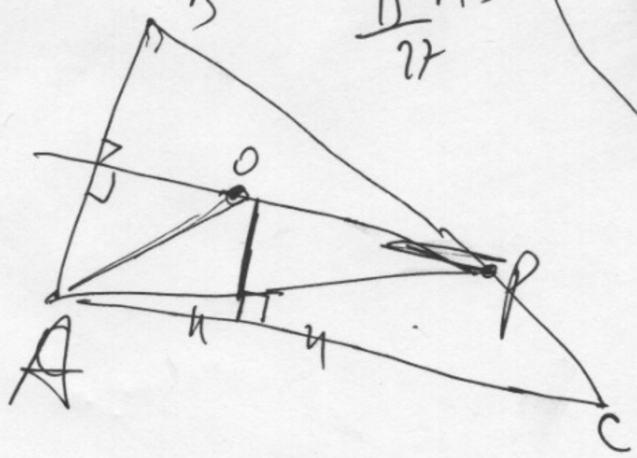


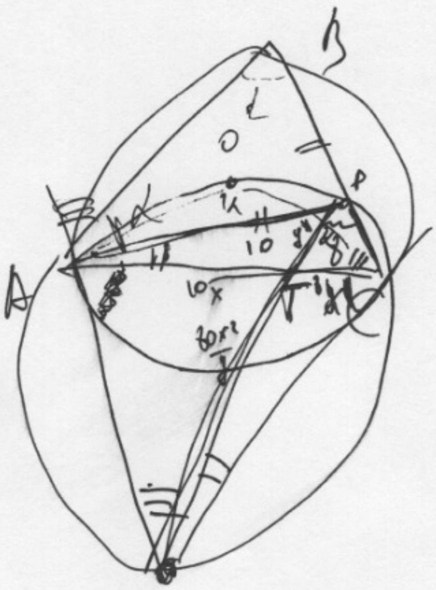




585 | 5
-5 | 117
8
-5
35

117 | 9
-9 | 13
27





$10x \cdot y \sin\angle(90-\alpha)/40$

$xy \sin\angle(90-\alpha)$

$\frac{x^3}{y}$

w4

$\text{НОД}(a;b;c)=10$

$\text{НОК}(a;b;c)=2^{17}\cdot 5^{16}$

кол-во $abc=1$

$2;5$

$$\begin{cases} a=2^{x_1}\cdot 5^{y_1} \\ b=2^{x_2}\cdot 5^{y_2} \\ c=2^{x_3}\cdot 5^{y_3} \end{cases}$$

$x_1;x_2;x_3\geq 0$

$y_1;y_2;y_3\geq 0$

$x_1+x_2+x_3=16$

$y_1+y_2+y_3=17$

≥ 0

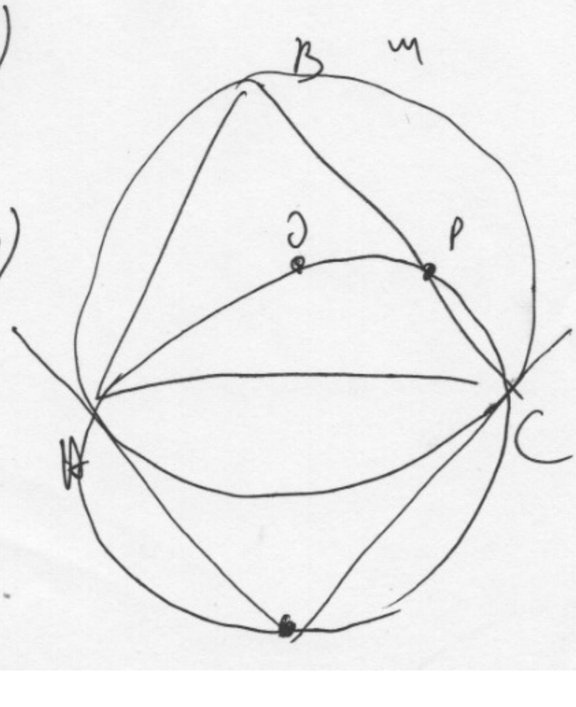
$l=y$. Sravn.

$2\log_{2x-8}(x-4)$

$\frac{1}{2}\log_{(x-4)}(5x-26)$

$\frac{5}{2}$

$2\log_{5x-26}(2x-8)$



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$$2\log_{2x-3} x-4 = \frac{1}{2}\log_{x-4} 5x-26$$

$$\cancel{4\frac{1}{\log_{x-4} 2+2} = \log_{x-4}(5x-26)}$$

$$\frac{4}{\log_{x-4}(5x-6)} = 2\log_{x-4} 2 + 2$$

$$\frac{2}{\log_{x-4}(5x+26)} = \log_{x-4} 2+1$$

$$2\log_{2a} a = \frac{2}{\log_a 2+1} =$$

$$\frac{1}{2}\log_a b = \frac{1}{2\log_b a}$$

$$2\log_b 2a = 2\log_b 2 + 2\log_b a$$

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$\cancel{2}\log_{2a} a = \frac{1}{2y+2}$

$\frac{1}{2}\log_a b = \frac{1}{2\log_b a} = \frac{1}{2x}$

$2\log_{b} 2a = 2\log_b 2 + 2\log_b a = 2z + 2x$

$x > 4$

$5x - 26 > 0$

$x > \frac{26}{5} = 5,2$

$x = 6$

$\frac{1}{2\log_a 2a} =$ $\log_{\sqrt{4}}$ $6 - 4 = 1$

$= \frac{1}{2\log_a 2 + 2\log_a a} =$ $\log_{2^2}(-30-26) = 1$

$= \frac{1}{2\log_a 2 + 2}$ $\log_{\sqrt{4}} (\cancel{\ldots}) = 2$

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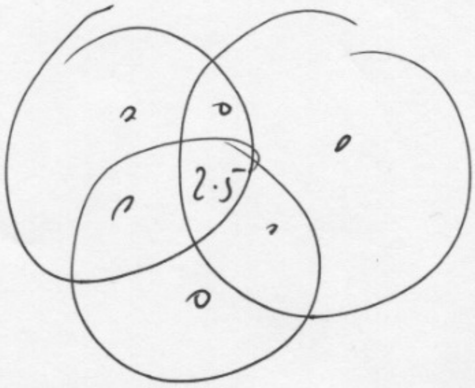
w^4

4



$\cancel{2^{16}} - 2^{16} \to 2^{15} \Rightarrow$ 15 ta ш 6 ау r =>

$$\Rightarrow C^{6}_{15+6} \cdot C^{6}_{16+6}$$

ш 2 ш 5

$2 \log_{2x-8} \cancel{2x-8}(x-4)$

$\frac{1}{2} : \log_{x-4} 5x-26$

$2 \log_{5x-26} (2x-8)$

$2x-8 \cdot \frac{5}{2} = \frac{10x}{2} - \frac{40}{2} = 5x-20$

$2 \log_a b = 2 \log_b a$

$5x-20$

$\frac{1}{2} \log_b c = \frac{1}{2} \log_b c$

$2 \log_c a = 2 \log_c a$

$2x-8 < (2x-8) \cdot \frac{5}{2} = 5x-20 > 5x-26$

$2x-8 > 0$

$5x-26 \leq \frac{5x-20}{5} - \frac{6}{5} = x-4-\frac{6}{5}$

$\leq x-4$

$\log_a b = \log_c a \Rightarrow \frac{1}{\log_1 c}$

$\Rightarrow \log_a b = \log_1 c$

$\frac{\log_a b \log_a c - 1}{\log_a b \log_a c}$

$\log_a b - \frac{1}{\log_a c} = 0$

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