Часть 1

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

Шифр: **21103398**

ID профиля: **218061**

Вариант 23

Чистовик Вариант 23

№1.

$a_n = a_1 + b(n-1)$, $b > 0$, $a_1, b \in \mathbb{Z}$

$S = a_1 + a_2 + \ldots + a_6 = 6a_1 + 15b$

$$\begin{cases} (a_1 + 9b)(a_1 + 15b) > 6a_1 + 15b + 39 \\ (a_1 + 10b)(a_1 + 14b) < 6a_1 + 15b + 55 \end{cases}$$

$$\begin{cases} a_1^2 + 24ba_1 + 135b^2 > 6a_1 + 15b + 39 \\ a_1^2 + 24ba_1 + 140b^2 < 6a_1 + 15b + 55 \end{cases}$$

$a_1^2 + 24ba_1 + 135b^2 + 6a_1 + 15b + 55 > 6a_1 + 15b + 39 + a_1^2 +$
$+ 24ba_1 + 140b^2$

$135b^2 + 55 > 140b^2 + 39$

$16 > 5b^2$

$b^2 < \frac{16}{5}$

$b < \frac{4}{\sqrt{5}}$

$2 > \frac{4}{\sqrt{5}} \Rightarrow b < 2 \Rightarrow \boxed{b = 1}$

$a_1^2 + 24a_1 + 135 > 6a_1 + 15 + 39$

$a_1^2 + 18a_1 + 81 > 0$

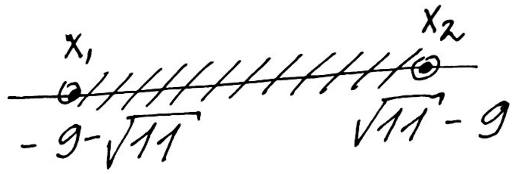
$(a_1 + 9)^2 > 0$ – верно при $\forall a_1$

$a_1^2 + 24a_1 + 140 < 6a_1 + 15 + 55$

$a_1^2 + 18a_1 + 70 < 0$

$a_1^2 + 18a_1 + 70 = 0$

$a_1 = -9 \pm \sqrt{81 - 70}$

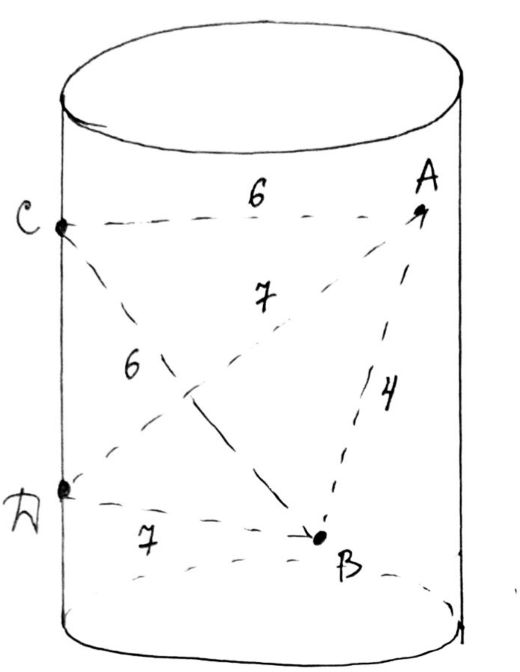


$$\begin{cases} -13 < x_1 < -12 \\ -6 < x_2 < -5 \end{cases} \Rightarrow a_1 \in \{-12; -11; -10; -9; -8; -7; -6\}$$

Ответ: $-12; -11; -10; -9; -8; -7; -6$.

Чистовик

№2.



Дано: АВСД - тетраэдр

$AB = 4$

$AC = BC = 6$

$AД = BД = 7$

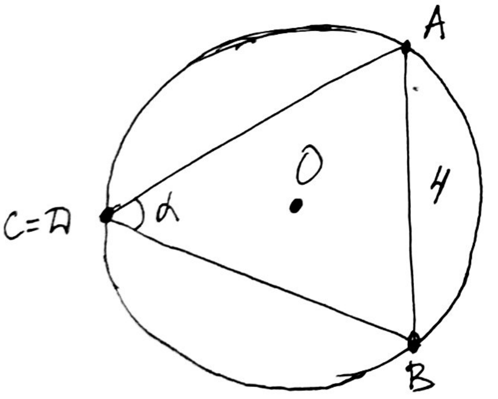
R_{min}

СД - ?

Решение:

1) $\triangle BCД = \triangle ACД$ (по 3 сторонам) $\Rightarrow$ точки A и B находятся на одинаковой высоте $\Rightarrow$ AB параллельна осн. цилиндра

2) проекция на осн. цилиндра:



по теор. синусов

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

$$R_{min} = \frac{AB}{2} = 2$$

3) пусть L - середина AB, $AL = LB = 2$

$\triangle ABC$ и $\triangle AДB$ равнобедр. $\Rightarrow CL \perp AB$, $ДL \perp AB \Rightarrow$ по теореме Пифагора:

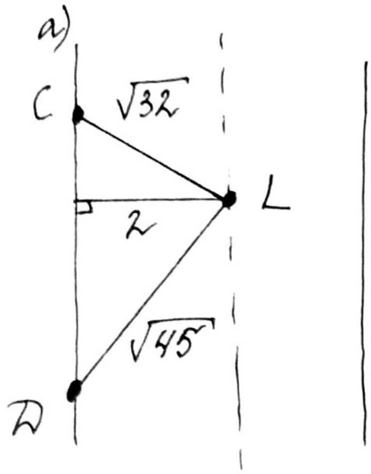
$$CL = \sqrt{CB^2 - BL^2} = \sqrt{36-4} = \sqrt{32}$$

$$ДL = \sqrt{ДB^2 - BL^2} = \sqrt{49-4} = \sqrt{45}$$

Чистовик

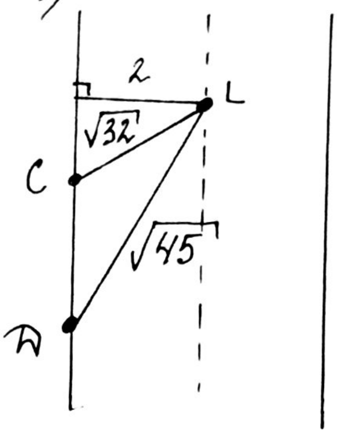
4) проекция на CDL

а)



или

б)



а) $CD = \sqrt{32-4} + \sqrt{45-4} = \sqrt{28} + \sqrt{41} = 2\sqrt{7} + \sqrt{41}$

б) $CD = \sqrt{45-4} - \sqrt{32-4} = \sqrt{41} - 2\sqrt{7}$

Ответ: $\sqrt{41} \pm 2\sqrt{7}$.

Чистовик

№3.

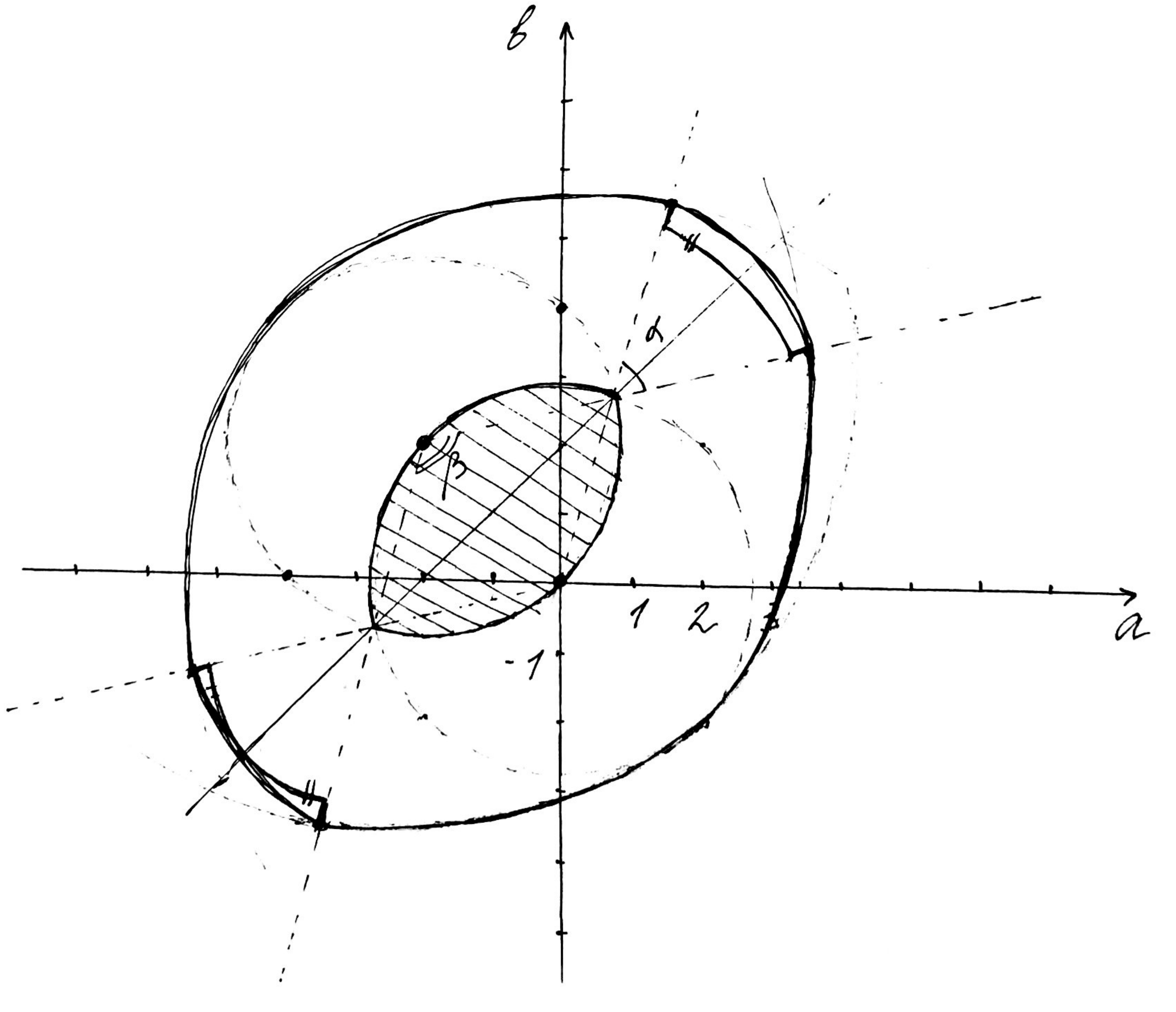
$$\begin{cases}(x-a)^2+(y-b)^2\le 8 & (1)\\ a^2+b^2\le \min(4b-4a,\ 8) & (2)\end{cases}$$

$$(2):\ \left[\begin{array}{l}\begin{cases}4b-4a<8\\ a^2+b^2\le 4b-4a\end{cases}\\ \begin{cases}4b-4a\ge 8\\ a^2+b^2\le 8\end{cases}\end{array}\right.$$

$$\left[\begin{array}{l}\begin{cases}b<a+2\\ (a+2)^2+(b-2)^2\le 8\end{cases}\\ \begin{cases}b\ge a+2\\ a^2+b^2\le 8\end{cases}\end{array}\right.$$

$(a+2)^2+(b-2)^2\le 8$ — ~~окр.~~ круг с ц. в т. $(-2;2)$ и $r=2\sqrt{2}$

$a^2+b^2\le 8$ — ~~окр.~~ круг с ц. в т. $(0;0)$ и $r=2\sqrt{2}$



Чистовик

в координатах Oab $(x-a)^2+(y-b)^2 \le 8$ - ур-ние круга с центром в точке $(x;y)$ и радиусом $2\sqrt{2}$ $\Rightarrow$ M - мн-во точек центров кругов с радиусом $2\sqrt{2}$, имеющих хотя бы 1 общ. точку с фигурой, заданной ~~[illegible]~~ нер-вом (2). Изобразим эту фигуру. M.

Фигура M состоит из двух пересекающихся секторов окружностей с радиусом $4\sqrt{2}$ и двух секторов окружностей с радиусом $2\sqrt{2}$, причём $\alpha=60^\circ$, $\beta=120^\circ$

$$S = 2\cdot\frac{\pi\cdot(2\sqrt{2})^2}{3} + 2\cdot\frac{2\pi\cdot(4\sqrt{2})^2}{3} - 2\cdot\frac{1}{2}\cdot(2\sqrt{2})^2\cdot\sin 60^\circ =$$

$$= \frac{16\pi}{3} + \frac{128\pi}{3} - 4\sqrt{3} = \frac{144\pi}{3} - 4\sqrt{3}$$

<u>Ответ</u>: $\frac{144\pi}{3} - 4\sqrt{3}$.

Черновик

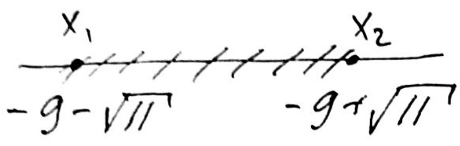
$a_1^2+6a_1\cdot 3+135-15-39=a_1^2+18a_1+81=(a_1+9)^2>0$

$a_1^2+18a_1+140-15-55=a_1^2+18a_1+70<0$

$a_1^2+18a_1+70=0$

$a_1=-9\pm\sqrt{81-70}$

$a_1=-9\pm\sqrt{11}$

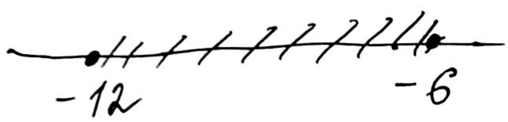


$3<\sqrt{11}<4$

$\Downarrow$

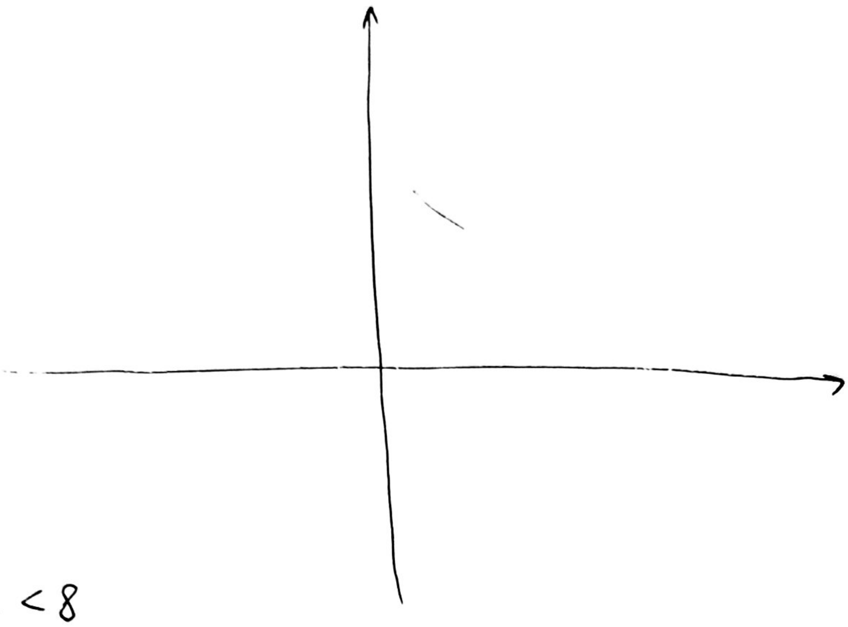
$-9-4<x_1<-9-3$ $\qquad$ $3-9<x_2<4-9$

$-13<x_1<-12$ $\qquad$ $-6<x_2<-5$



$\boxed{-12;-11;-10;-9;-8;-7;-6}$

Черновик



$$\begin{cases} 4b - 4a < 8 \\ a^2 + b^2 \le 4b - 4a \end{cases}$$

$b - a < 2 \Rightarrow b < 2 + a$

$a^2 + 4a + 4 + b^2 - 4b + 4 \le 8$

$(a+2)^2 + (b-2)^2 \le 8$

$4b - 4a \ge 8$

$a^2 + b^2 \le 8$

~~к+п~~ если $b - a = 2$

$a = b - 2$

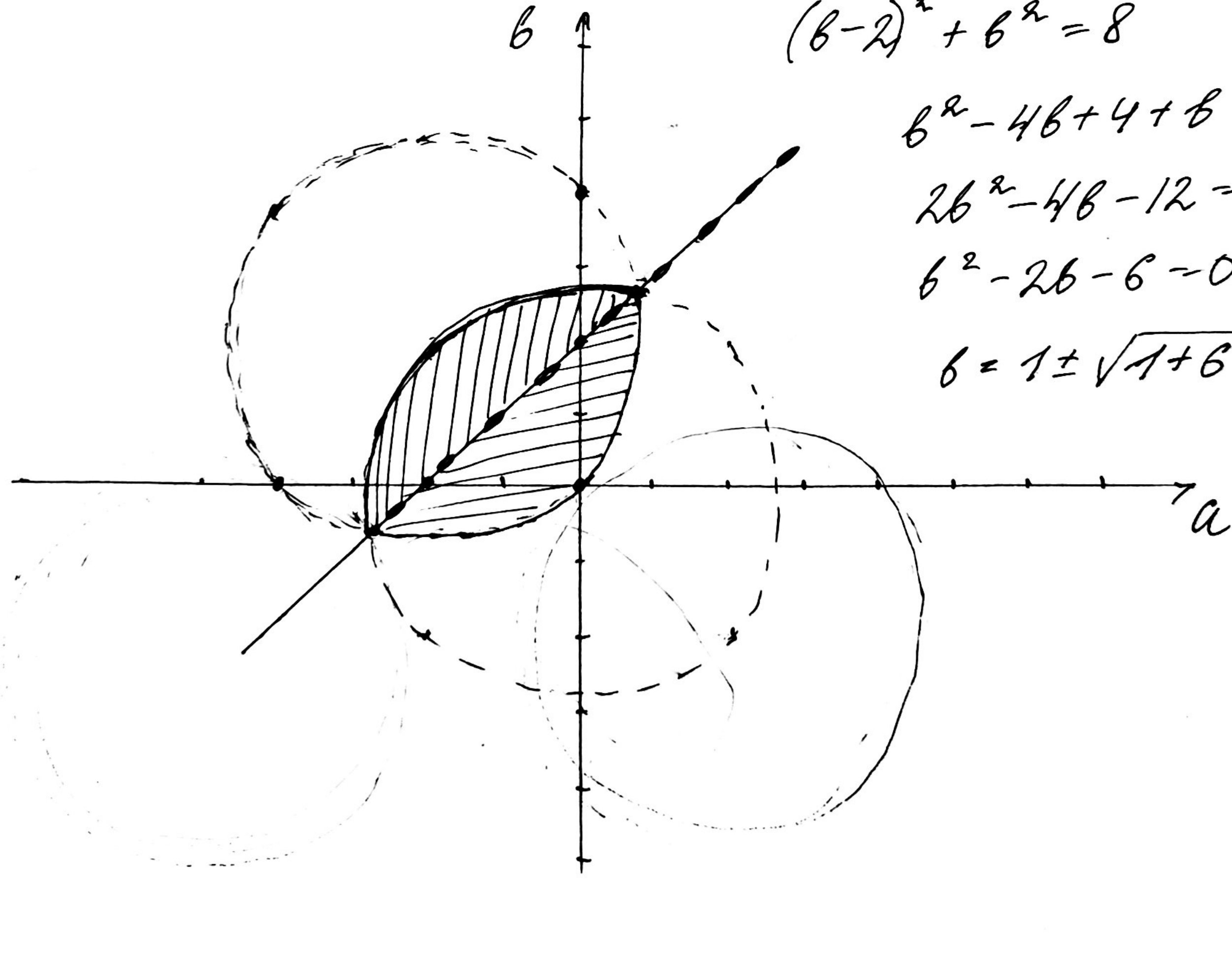
$(b-2)^2 + b^2 = 8$

$b^2 - 4b + 4 + b^2 = 8$

$2b^2 - 4b - 12 = 0$

$b^2 - 2b - 6 = 0$

$b = 1 \pm \sqrt{1+6}$



Черновик

$a_n = a_1 + b(n-1)$

~~$a_1 + b(n$~~ $S = a_1 + a_1 + b + a_1 + 2b + a_1 + 3b + a_1 + 4b + a_1 + 5b =$
$= 6a_1 + 15b$

$(a_1 + 9b)(a_1 + 15b) > 6a_1 + 15b + 39$

$a_1^2 + 9ba_1 + 15ba_1 + 135b^2 > 6a_1 + 15b + 39$

$\cancel{a_1^2 + a_1(9b - 15) + 15ba_1 + 135b^2 - 15b - 39 > 0}$

$a_1^2 + 24ba_1 - 6a_1 + 135b^2 - 15b - 39 > 0$

$\boxed{a_1^2 + 6a_1(4b-1) + 135b^2 - 15b - 39 > 0}$

$D = 9\cdot(16b^2 - 8b + 1) - 135b^2 + 15b + 39 = 144b^2 - 72b + 9 -$
$- 135b^2 + 15b + 39 = 9b^2 - 57b + 48$

$(a_1 + 10b)(a_1 + 14b) < 6a_1 + 15b + 55$

$a_1^2 + 24a_1b + 140b^2 < 6a_1 + 15b + 55$

$\boxed{a_1^2 + 6a_1(4b-1) + 140b^2 - 15b - 55 < 0}$

$-a_1^2 - 6a_1(4b-1) - 140b^2 + 15b + 55 > 0$

$135b^2 - 15b - 39 - 140b^2 + 15b + 55 > 0$

$-5b^2 + 16 > 0$

$5b^2 < 16$

$b^2 < \frac{16}{5}$

$|b| < \frac{4}{\sqrt{5}}$

$\frac{\cancel{400}^{\cancel{80}\ 16}}{\cancel{225}_{\cancel{45}\ 9}}$

$\sqrt{5} < 2{,}25$

$\Downarrow$

$b > \frac{4}{\sqrt{5}}$

$b = 2 \Rightarrow$

$2\sqrt{5} > 4$

$4\cdot 5 > 16$

$20 > 16$

$b = 1$

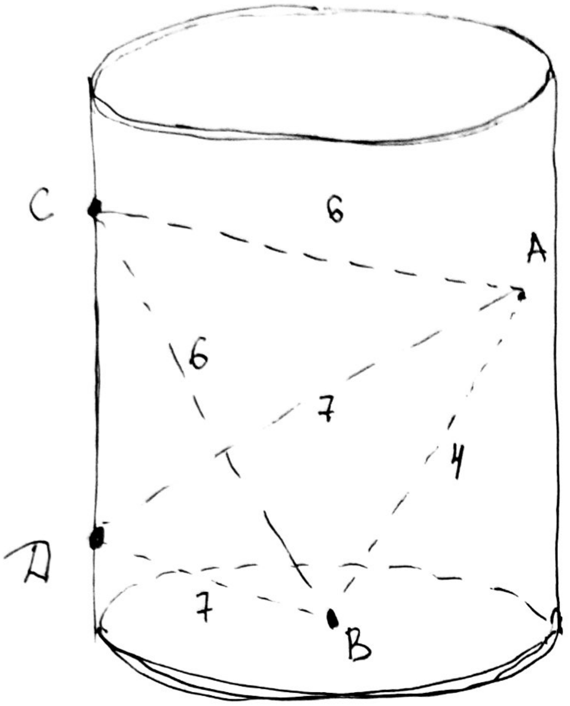
$55 - 39 = 16$

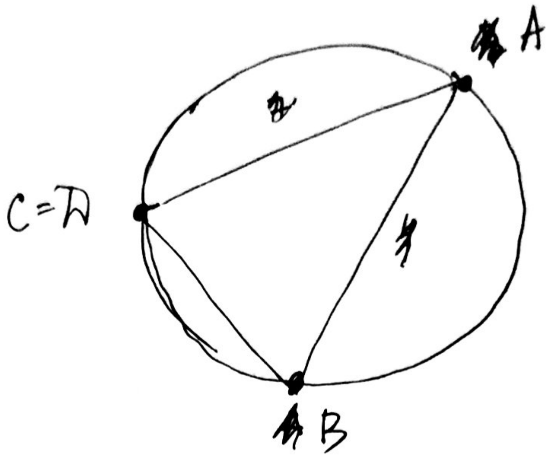
$2{,}2 \times 2{,}2$: 44, 44, $4{,}84$

$2{,}3 \times 2{,}3$: 69, 46, $5{,}29$

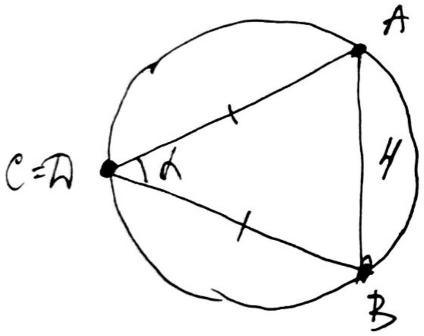
$2{,}25 \times 2{,}25$: 1125, 450, 450, $5{,}0625$

Черновик





AB || основанию



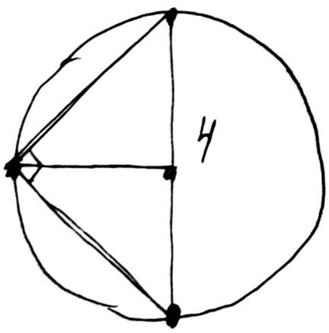
по теореме синусов:

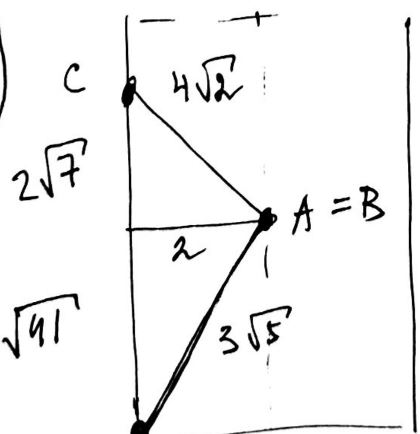
$4^2 \cdot 2$

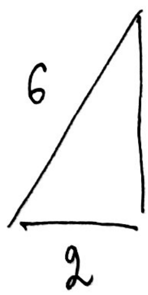
$$\frac{4}{\sin\alpha} = 2R$$

$$R = \frac{2}{\sin\alpha} \Rightarrow \sin\alpha = 1 \Rightarrow \alpha = 90^\circ$$

$$R = 2$$







$\sqrt{36-4} = \sqrt{32} = 4\sqrt{2}$

$49 - 4 = 45 = 9 \cdot 5$

$\sqrt{45} = 3\sqrt{5}$

$45 - 4 = 41$

$32 - 4 = 28$

Черновик

$(a-x)^2+(b-y)^2 \le 8$

$b-a=2$

$b=a+2$

$a^2+(a+2)^2=8$

$2a^2+4a+4=8$

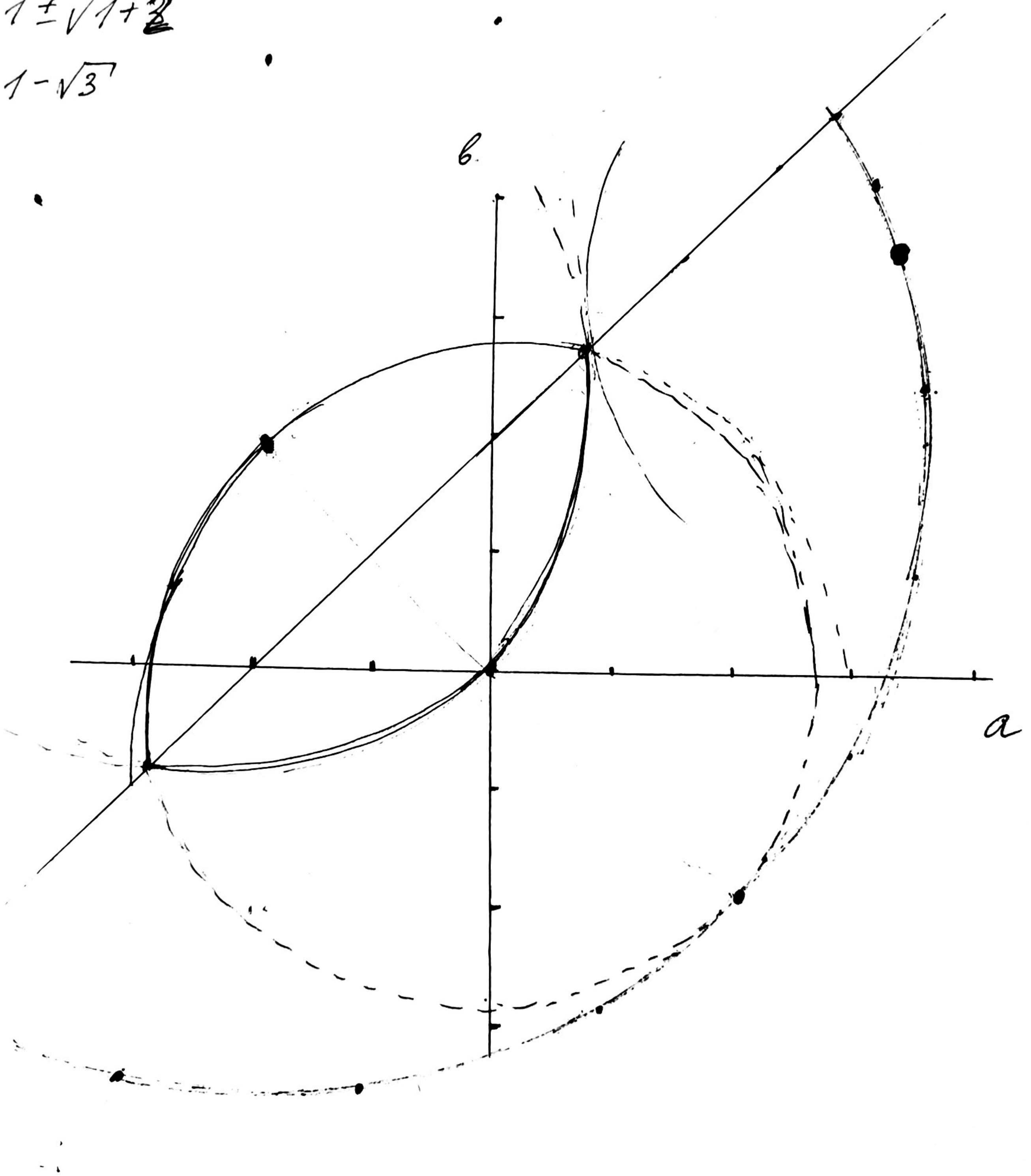
$2a^2+4a-4=0$

$a^2+2a-2=0$

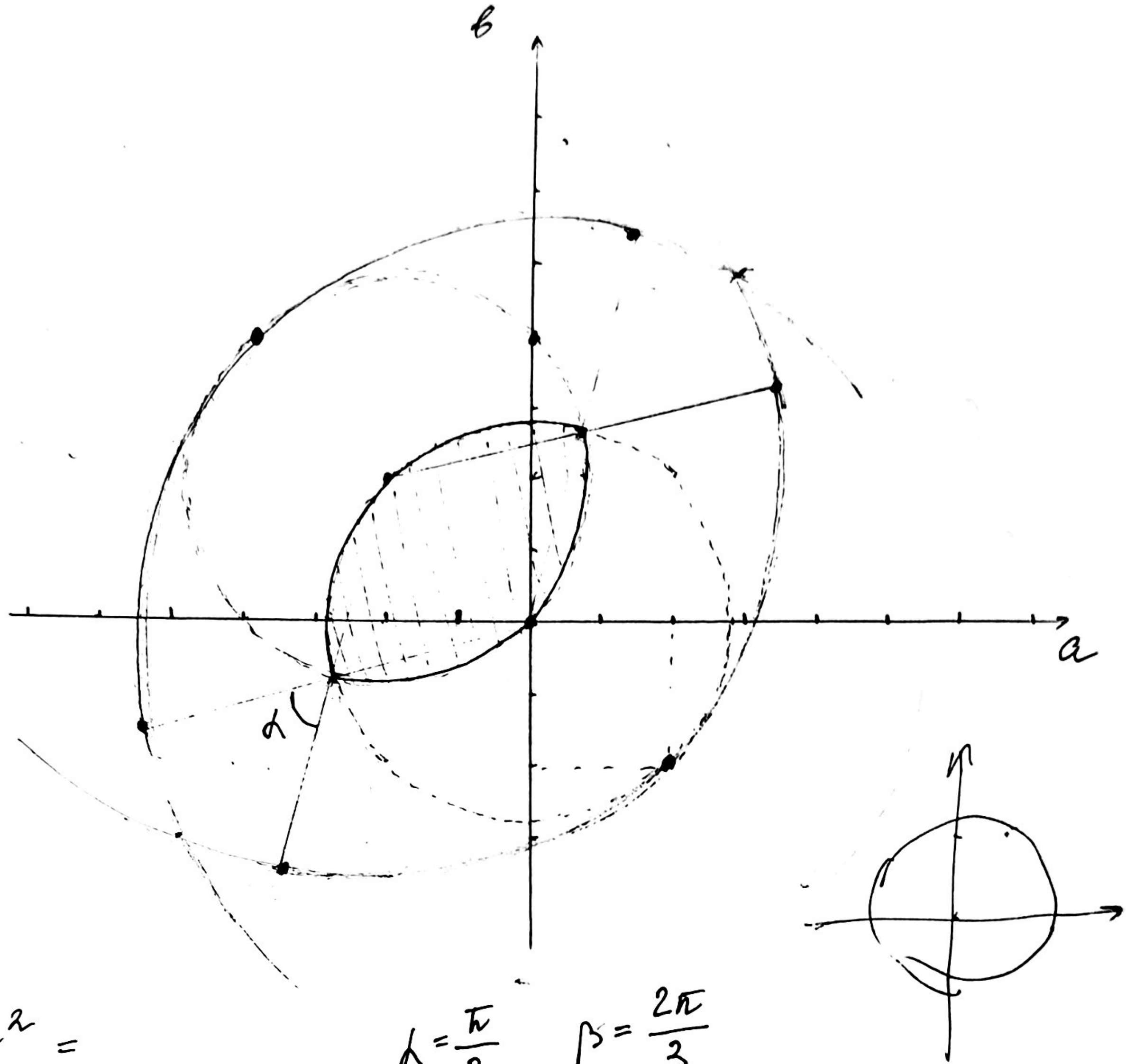
$a=-1\pm\sqrt{1+2}$

$a=-1-\sqrt{3}$

$b=$



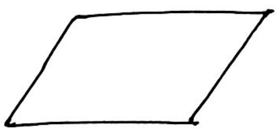
Черновик

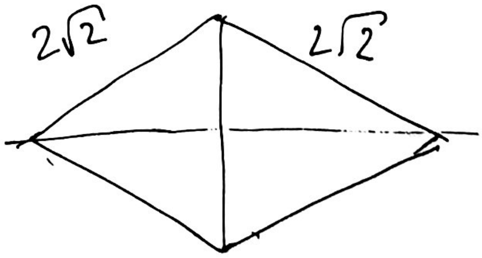


$\pi r^2 =$

$\alpha = \frac{\pi}{3}$ $\beta = \frac{2\pi}{3}$

$S_c = \frac{\alpha r^2}{2}$





$\frac{1}{2} \cdot (2\sqrt{2})^2 \cdot \sin 60^\circ \cdot 2 =$

$= 8 \cdot \frac{\sqrt{3}}{2} = 4\sqrt{3}$

$128 + 16 = 144$

Часть 2

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

Шифр: **21103398**

ID профиля: **218061**

Вариант 23

Чистовик Вариант 23

№4.

$$\begin{cases} a = 2^{\alpha} \cdot 11^{x} \\ b = 2^{\beta} \cdot 11^{y} \\ c = 2^{\gamma} \cdot 11^{z} \end{cases}$$

$\min(\alpha; \beta; \gamma) = 1$

$\min(x; y; z) = 1$

$\max(\alpha; \beta; \gamma) = 16$

$\max(x; y; z) = 19$

Среди α, β и γ есть 1, 16 и число между ними (от 1 до 16)

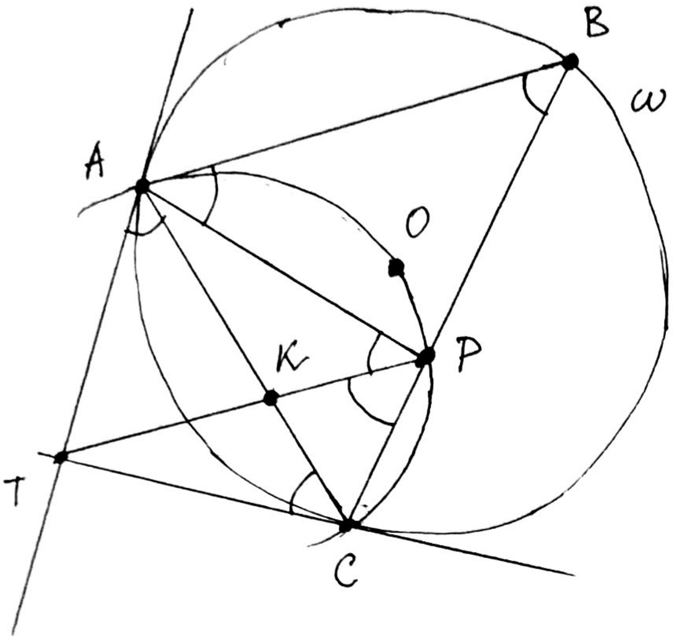
Среди x, y и z есть 1, 19 и число между ними (от 1 до 19)

$(6 \cdot 16 - 6)(6 \cdot 19 - 6) = 6 \cdot 15 \cdot 6 \cdot 18 = 9720$

Ответ: 9720.

Чистовик

№6.



Дано: $\triangle ABC$

ω - опис. окр.

$S_{APK} = 15$

$S_{CPK} = 13$

CT и AT - касательные

а) S_{ABC} - ?

б) AC, если $\angle ABC = \operatorname{arctg}\frac{4}{7}$

Решение:

1) пусть $\angle ABC = \alpha$, тогда $\angle TAC = \angle ACT = \alpha$ (углы между хордами и кас.)

2) $\angle AOC$ - центральный $\Rightarrow \angle AOC = 2\alpha \Rightarrow \angle APC = 2\alpha$

3) $\angle ATC = 180° - 2\alpha \Rightarrow \angle APC + \angle ATC = 180° \Rightarrow APCT$ - впис. $\Rightarrow$

$\Rightarrow \angle TPC = \angle APT = \alpha \Rightarrow TP \parallel AB \Rightarrow \angle BAP = \alpha$

4) $\triangle PKC \sim \triangle BAC$ (по 3 углам) $\Rightarrow S_{ABC} = k^2 \cdot S_{CKP}$

$$\frac{1}{k} = \frac{KC}{AC} = \frac{13}{13+15} = \frac{13}{28}$$

$$S_{ABC} = \frac{28^2}{13^2} \cdot 13 = \frac{28^2}{13} = \frac{784}{13}$$

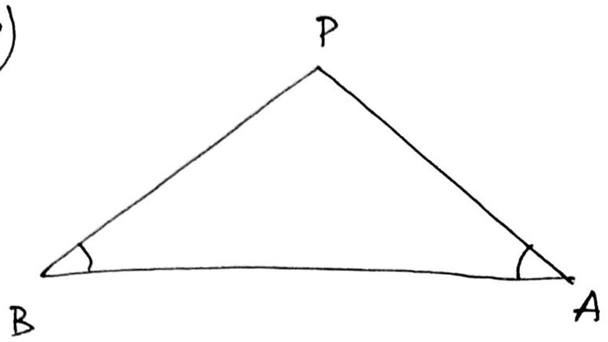
5) $S_{ABC} = \frac{1}{2} \cdot AB \cdot BC \cdot \sin\alpha \Rightarrow AB \cdot BC = \frac{2 \cdot S_{ABC}}{\sin\alpha}$

$$\frac{1}{\sin^2\alpha} = 1 + \operatorname{ctg}^2\alpha = 1 + \frac{49}{16} = \frac{65}{16} \Rightarrow \sin\alpha = \frac{4}{\sqrt{65}}$$

$$AB \cdot BC = \frac{2 \cdot 784\sqrt{65}}{13 \cdot 4 \cancel{\sqrt{65}}} = \frac{784\sqrt{5}}{2\sqrt{13}} = \frac{392\sqrt{5}}{\sqrt{13}}$$

Чистовик

б)



$BP = \frac{15}{28} BC$

$2BP \cdot \cos\alpha = AB$

$2 \cdot \frac{15BC}{28} \cdot \frac{7}{\sqrt{65}} = AB$

$\frac{\cancel{2} \cdot 15BC \cdot \cancel{7}}{\cancel{28}\sqrt{65}} = AB$ 2 14

$AB = \frac{15BC}{2\sqrt{65}}$

$\frac{15BC^2}{2\sqrt{65}} = \frac{392\sqrt{5}}{\sqrt{13}}$

$BC^2 = \frac{2 \cdot 392\sqrt{5} \cdot \sqrt{65}}{15 \cdot \sqrt{13}} = \frac{2 \cdot 392}{3}$

$BC = \frac{28}{\sqrt{3}}$

$AB = \frac{15 \cdot 14}{\sqrt{65} \cdot \sqrt{3}}$

$AC^2 = \frac{28^2}{3} + \frac{15^2 \cdot 14^2}{65 \cdot 3} - 2 \cdot \frac{28 \cdot 15 \cdot 14}{3\sqrt{65}} \cdot \frac{7}{\sqrt{65}} =$

$= \frac{28^2 \cdot 65 + 15^2 \cdot 14^2 - 28 \cdot 7 \cdot 15 \cdot 14 \cdot 2}{3 \cdot 65} = \frac{196}{3}$

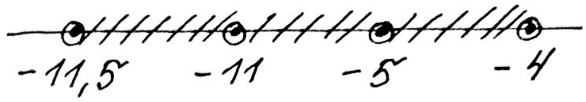
Ответ: а) $\frac{784}{13}$; $\frac{196}{3}$.

Чистовик

№5.

ОДЗ:

$$\begin{cases} x+34>0 \\ x+34\neq 1 \\ x+4<0 \\ x+4\neq -1 \\ 2x+23>0 \\ 2x+23\neq 1 \end{cases} \qquad \begin{cases} x>-34 \\ x\neq -33 \\ x<-4 \\ x\neq -5 \\ x>-11{,}5 \\ x\neq -11 \end{cases}$$



$a=\sqrt{x+34}$

$b=\sqrt{2x+23}$

$c=-x-4$

$\log_a b^2$

$\log_{c^2} a^2=\log_c a$

$\log_b c$

пусть $\log_b c=\log_c a=\log_a b^2-1$

$c^{\log_b c}=a$

$2\log_a b-1=\log_b c$

$2\log_{c^{\log_b c}} b-1=\log_b c$

$\frac{1}{\log_b c}\cdot 2\cdot \log_c b=\log_b c+1$

$\frac{2}{(\log_b c)^2}=\log_b c+1$

Чистовик

$(\log_b c)^3 + (\log_b c)^2 - 2 = 0$

$(\log_b c)^3 - (\log_b c)^2 + 2(\log_b c)^2 - 2\log_b c + 2\log_b c - 2 = 0$

$(\log_b c)^2(\log_b c - 1) + 2\log_b c(\log_b c - 1) + 2(\log_b c - 1) = 0$

$(\log_b c - 1)(\log_b c^2 + 2\log_b c + 2) = 0$

$\log_b c = 1$

$b = c$

$\sqrt{2x+23} = -(x+4)$

$2x + 23 = x^2 + 8x + 16$

$x^2 + 6x + 7 = 0$

$(x+7)(x-1) = 0$

$\left[\begin{array}{l} x = -7 \\ x = 1 \text{ - не подх. по ОДЗ} \end{array}\right.$

Проверка:

$\log_{\sqrt{27}} 9 = \frac{2}{3} \cdot 2 \cdot \log_3 3 = \frac{4}{3}$

$\log_9 27 = \frac{1}{2} \cdot 3 \cdot 1 = \frac{3}{2}$ $\Rightarrow x \neq -7$

$\log_3 3 = 1$

При $x = -9$:

$\log_5 5 = 1$

$\log_{25} 25 = 1$ $\Rightarrow x = -9$

$\log_{\sqrt{5}} 5 = 2$

Ответ: -9.

Черновик

$$\begin{cases} a = \sqrt{x+34} \\ b = \sqrt{2x+23} \\ c = -(x+4) \end{cases}$$

I. $\log_a b^2 = \log_c a = \log_b c - 1$

$\log_b c - 1 = \log_b c - \log_b b =$

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

$\log_a b^2$

$\log_{c^2} a^2 = \log_c a$

$\log_b c$

$\log_5 5 = 1$ $\quad \log_{\sqrt{5}} 5 = \cancel{1}\, 2$

$\log_{25} 25 = 1$ $\quad a = c^2 \quad b^2 = a^2$

$\log_a b^2 = \frac{1}{\log_a c}$

$\log_b c =$

$= \log_a \sqrt{a} = 2$

$\log_a (b^2) \cdot \log_a (c) = 1$

$\log_a b \cdot \log_a c = \frac{1}{2}$

$\log_b c - 1 = \log_b \frac{c}{b}$

$2\log_a b = \log_c a$

$\log$

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

$\log_{\sqrt{27}} 9 = \frac{2}{3} \cdot 2 = \frac{4}{3}$

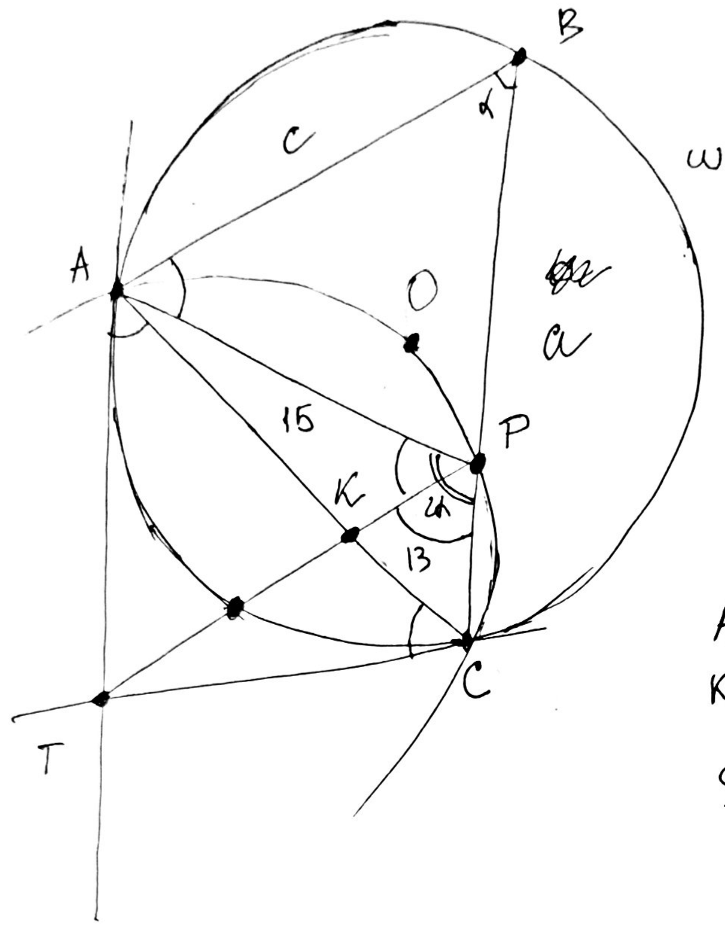
$\log_9 27 = \frac{1}{2} \cdot 3 = \frac{3}{2}$

$\sqrt{27} = 3^{\frac{3}{2}}$

$\log_3 3 = 1$

$\frac{2}{3} \cdot 2 = \frac{4}{3}$

Черновик



$S_{APK} = 15$

$S_{CPK} = 13$

APCT - вписанный

$\frac{CK}{AK} = \frac{13}{15}$

$c = \frac{15}{28} a$

$AC = 28x$

$KC = 13x$

$S_{ABC} = k^2 \cdot S_{CPK}$

$k = \frac{28}{13}$

$S_{ABC} = \frac{28^2}{13^2} \cdot 13 = \boxed{\frac{28^2}{13}}$

$$\begin{array}{r|l} 784 & 2 \\ 392 & 2 \\ 196 & 2 \\ 98 & 2 \\ 49 & 7 \\ 7 & 7 \end{array}$$

$tg\,\alpha = \frac{4}{7}$

$1 + \frac{16}{49} = \frac{1}{\cos^2\alpha}$

$\frac{49+16}{49} = \frac{75}{49}$

$\cos\alpha = \frac{7}{\sqrt{65}} = \frac{7}{\cancel{5\,13}}$

$$\begin{array}{r|l} 65 & 5 \\ 13 & 13 \\ 1 & \end{array}$$

$1 + \frac{49}{16} = \frac{1}{\sin^2\alpha}$

$\frac{65}{16} = \frac{1}{\sin^2\alpha} \Rightarrow \sin\alpha = \frac{4}{\sqrt{65}}$

$\frac{28^2 - 28\cdot 13}{13} = \frac{28\cdot 15}{13}$

$\frac{1}{2} a\cancel{b} \cdot \sin\alpha = S_{ABC}$

$a^2 + b^2$

$$\begin{array}{r} \times\ 28 \\ 28 \\ \hline 224 \\ 56\ \ \\ \hline 784 \end{array}$$

$\frac{1}{2} \cdot ac \cdot \sin\alpha = S_{ABC}$

$\frac{1}{2} \cdot a \cdot c \cdot \frac{15}{28} \cdot \sin\alpha = \frac{28\cdot 15}{13}$

$\sqrt{1 - \frac{16}{65}} = \sqrt{\frac{65-16}{65}} = \frac{7}{\sqrt{65}}$

черновик

$\begin{cases} 2\log_a b \\ \log_c a \\ \log_b c \end{cases}$

$\log_c a = \log_b c$

$c^{\log_b c} = a$

$\log_9 (34-7) = \log_{3^2} 3^3 = \frac{3}{2}$

$2\log_a b = \log_b c + 1$

$\log_3 3 = 1$

$2\log_c b \cdot \frac{1}{\log_b c} = \log_b c + 1$

$6 \cdot 16 - 8 = 6 \cdot 15$

$6 \cdot 14 + 6 = 6 \cdot 15$

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

$2x^3 = 1 + x$

$2x^3 - x - 1 = 0$

$x = 1:$

$2 - 1 - 1 = 0$

$\cancel{9 \cdot 16 - 2}$

$\cancel{9 \cdot 14 + 2}$

18×15: 90, 18, 270

$x^3 + x^2 - 2 =$

$= \cancel{x^3 - 2x^2 +}$

$x^3 - x^2 + 2x^2 -$

$-2x + 2x - 2 =$

$=$

$2x^3 - 2x^2 + 2x^2 - 2x + x - 1 = 0$

$2x^2(x-1) + 2x(x-1) + (x-1) = 0$

$(x-1)(2x^2 + 2x + 1) = 0$

270×36: 162, 81, 9720

1 19 19

19 1 19

19 19 1

$\log_c b = 1$

$c = b$

$(x+4)^2 = 2x + 23$

$x^2 + 8x + 16 = 2x + 23$

$x^2 + 6x - 7 = 0$

$x = -3 \pm \sqrt{16} = 3 \pm 4$

$x = -7$

$x = 1$ - нельзя

$\cancel{360 \times 27: 252, 78, 10320}$

270×36: 162, 81, 9720

360×27: 252, 72, 9720

если $x = 7$:

$\log_{\sqrt{34-7}} (23-14) = \log_{\sqrt{27}} 9 = \log_{3^{\frac{3}{2}}} 3^2 = \frac{2}{3} \cdot 2 \cdot 1 = \frac{4}{3}$

Черновик

$\left(\log_{\sqrt{x+34}}(2x+23)\right)'$

есть 3 числа

$(\log_a x)' = \dfrac{1}{x\cdot\ln a}$

$\log_a b^2 = 2\log_a b$

$\log_c a$

$\log_b c$

$2\log_a b = \log_c a$

$c^{2\log_a b} = a$

$784 = 28^2 = 14^2\cdot 4$

$196\cdot 15 = 14^2\cdot 15$

$\log_b c = \log_c a + 1$

$\dfrac{1}{2\log_a b}\cdot\log_b a = 2\log_a b + 1$

$\begin{array}{r} \times\ 196 \\ 55 \\ \hline \end{array}$

$\begin{array}{r} \times\ 196 \\ 3 \\ \hline 588 \end{array}$

$a^2+b^2-2ab\cdot\cos\alpha$

$\dfrac{1}{2\cdot\log_a b\cdot\log_a b} = 2\log_a b + 1$

$\begin{array}{r} 784 \\ -\ 588 \\ \hline 196 \end{array}$

$(2x+1)(2x^2)=1$

при $x=-1$

$-4+2-1 = -$

$x=1$

$4+2-1=+$

$x=0$

-1

$2x^2\cdot 2x+2x^2-1=0$

$4x^3+2x^2-1=0$

$$\frac{784}{3}+\frac{225\cdot 196}{3\cdot 65}-\frac{210\cdot 196}{3\cdot 65}=\frac{784}{3}+\frac{196\cdot 15}{3\cdot 65}=$$

$$=\frac{14^2\cdot 4\cdot 65+14^2\cdot 15}{3\cdot 65}=\frac{14^2(275)}{3\cdot 65}=\frac{14^2\cdot \cancel{275}^{\,55}}{3\cdot \cancel{65}_{\,13}}=$$

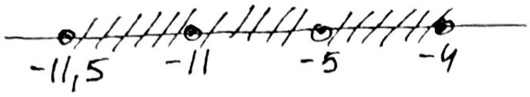
$$=\frac{196\cdot 55}{39}$$

$$\frac{784}{3}+\frac{15^2\cdot 14^2}{3\cdot 65}-\frac{14^2\cdot 210\cdot 2}{3\cdot 65}=\frac{784}{3}+\frac{14^2}{3\cdot 65}(225-420)=$$

$$=\frac{784}{3}-\frac{14^2\cdot \cancel{195}^{\,65}}{\cancel{3}\cdot \cancel{65}}=\frac{784}{3}-\frac{196\cdot 3}{3}=\frac{196}{3}$$

Черновик

$$\log_{\sqrt{x+34}}(2x+23) = \log_{(x+4)^2}(x+34)$$



$a = \sqrt{x+34}$

$b = -x-4$

$c = \sqrt{2x+23}$

пусть -6

$\log_{\sqrt{28}} 11$

$\log_4 28$

$\log_{\sqrt{4}} 2$

$\cancel{\log_a b^2}$

$\cancel{\log}$

$\log_a c^2$

$\log_{b^2} a^2 = \log_b a$

$\log_c b$

$$\log_a c^2 = \log_c b$$

$$\log_b a = \log_c b$$

$$c^{\log_b a} = b \ ; \ b^{\log_c b} = a$$

$$\log_a c^2 = \log_c b + 1 =$$

$$= \log_b a \cdot \log_c c + 1 = \log_b a + 1$$

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

$$= 2 \cdot (\log_b c)^2$$

$$\log_a c = \log_b c \cdot \log_b c$$

$$a^{\log_b c \cdot \log_b c} = c$$

Черновик

$НОД(a;b;c) = 22 = 2\cdot 11$

$НОК(a;b;c) = 2^{16}\cdot 11^{19}$

$a = 2^{\alpha}\cdot 11^{x}$

$b = 2^{\beta}\cdot 11^{y}$

$c = 2^{\gamma}\cdot 11^{z}$

$\max(x;y;z) = 19$ $\qquad$ $\min(\alpha;\beta;\gamma) = 1$

$\max(\alpha;\beta;\gamma) = 16$ $\qquad$ $\min(x;y;z) = 1$

$\log_{\sqrt{x+34}}(2x+23)$, $\log_{(x+4)^2}(x+34)$

$\log_{\sqrt{x+34}}(2x+23) = \log_{(x+4)^2}(x+34)$

ОДЗ:

~~x+34>~~

$$\begin{cases} x+34>0 & x>-34 \\ x+34\neq 1 & x\neq -33 \\ x+4<0 & x<-4 \\ x+4\neq -1 & x\neq -5 \\ 2x+23>0 & x>-\frac{23}{2}=-11{,}5 \\ 2x+23\neq 1 & x\neq -11 \end{cases}$$

$\Rightarrow x+34>1$

$$2\log_{x+34}(2x+23) = \frac{1}{2}\log_{x+4}(x+34)$$