Часть 1

Олимпиада: **Математика, 10 класс (1 часть)**

Шифр: **211005484**

ID профиля: **852805**

Вариант 12

Задание 2

$2a^2 - 2ax - 6ay + x^2 + 2xy + 5y^2 = 0$

$5y^2 + 2xy - 6ay = -2a^2 + 2ax - x^2$

~~$5y^2 + 2xy$~~

$5y^2 + y(2x - 6a) + 2a^2 - 2ax + x^2 = 0$

$D = (2x-6a)^2 - 20(2a^2 - 2ax + x^2) =$

$= 4x^2 - 24ax + 36a^2 - 40a^2 + 40ax - 20x^2 =$

$= -16x^2 + 16ax - 4a^2 = 4(-4x^2 + 4ax - a^2) =$

$= -4(4x^2 - 4ax + a^2) = -4(2x-a)^2$

$(2x-a)^2$

$4x^2 - 4ax + a^2$

$y = \sqrt{\ }$

$\frac{6a - 2x \pm 2(2x-a)}{10}$

$\frac{6a - 2x + 4x - 2a}{10}$

$\frac{4a + 2x}{10} = \frac{2a + x}{5}$

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

$16x^2 - 16ax + 4a^2$

$ax^2 + 4a^2x - ay + 4a^3 + 2 = 0$

$ay = ax^2 + 4a^2x + 4a^3 + 2$

$y = x^2 + 4ax + 4a^2 + \frac{2}{a}$

$x_B = \frac{-b}{2a} = \frac{-4a}{1} = -4a$

$y_B = 16a^2 - 16a^2 + 4a + \frac{2}{a} =$

$4a + \frac{2}{a} =$

$\frac{4a^2 + 2}{a}$

~~$ax^2 + 4a^2x$~~

$2a^2 - 2ax - 6ay + x^2 + 2xy + 5y^2 = 0$

$x^2 + 2xy - 2ax + 2a^2 - 6ay + 5y^2 = 0$

$x^2 + x(2y - 2a) + 2a^2 - 6ay + 5y^2 = 0$

$D = (2y - 2a)^2 - 4(2a^2 - 6ay + 5y^2) =$

$= 4y^2 - 8ay + 4a^2 - 8a^2 + 24ay - 20y^2 =$

$= -16y^2 + 16ay - 4a^2 = \sqrt{-4(2y-a)^2}$

$x = \frac{2y - 2a \pm \sqrt{-4(2y-a)^2}}{2}$

$\sqrt{2y-a} \cdot \sqrt{-4}$

$y = 3 - x$

$x + y = 3$

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$$8y^2-4yx-12y^2+x^2+2xy+5y^2=$$

$$=13y^2-2xy-12y^2+x^2=$$

$$=y^2-2xy+x^2=(x-y)^2=0$$

$$x=y$$

Чорновик

$2a^2-2ax-6ay+x^2+2xy+5y^2=0$

A(x;y)

$ax^2+4a^2x-ay+4a^3+2=0$

x вершина $\left(-\frac{b}{2a}\right)=-\frac{4a^2}{2a}=-2a$

$y=a\cdot 4a^2+-8a^3-ay+4\cdot 8a^3+2=$

$=4a^3-8a^3+4a^3=2-ay$

$y=2-ay$

$y+ay=2$

$y(a+1)=2$

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

$2-ay=0$

$ay=2$

$\begin{cases} y=\frac{2}{a} \\ x=-2a \end{cases}$

$x+y=\frac{2}{a}-2a=\frac{2-2a^2}{a}$

$5y^2+2y-1=0$

$D=4-$

$1+2y+3y^2=0$

$a=0$ $D=4-$

$x^2+2xy+5y^2=0$

$D=4y^2-20y^2$

x	0	-1
y	0	

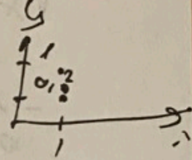
$a=1$ $2-2x-6y+x^2+2xy+5y^2=0$

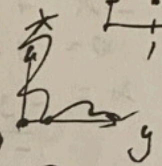
$x^2+2xy-2x-6y+5y^2+2=0$ $4y^2-4$

$1-2y+5y^2=0$

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

$D=4-$





$5y^2+6y+2=0$

$D=36\cdot 20$

$1+2y-2-6y+5y^2+2=$

$5y^2-6y+1=0$

$D=36-20$

$2a^2-2ax-6ay+x^2+2xy+5y^2=0$

$x+y=3$

$x=3-y$

$y=3-x$

$2a^2-2ax-6a(3-x)+x^2+2x(3-x)+5(3-x)^2$

$2a^2-2ax-18a+6ax+x^2+6x-2x^2+5(9-6x+x^2)=$

$\frac{2-2a^2}{a}$ $2\sqrt{6}$

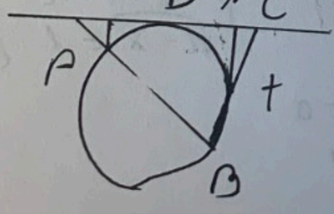
$=2a^2+4ax+18a+6x-2x^2+45-30x+5x^2$

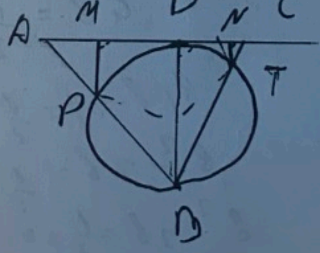
$2a^2+4ax+18a-24x+3x^2+45$

$6\cdot 6=36$

$y=\frac{6+4}{10}=1$

$y=\frac{6-4}{10}=0,2$

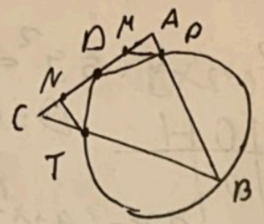




$x=2$

черновик

$a^2 - 2ab + b^2$



$\begin{cases} \sqrt{x+1} = a \geq 0 \\ \sqrt{4-x} = b \geq 0 \\ a - b + 3 = 2ab \end{cases}$

$x + 1 = a^2$

$4 - x = b^2$

$5 = a^2 + b^2$

$\sqrt{4} - \sqrt{1} + 3 = 2\sqrt{4+9-9}$

$2 - 1 + 3 = 2 \cdot 2$ ✓

$\sqrt{x+1} - \sqrt{4-x} + 3 = 2\sqrt{4+3x-x^2}$

$\begin{cases} a^2 + b^2 = 5 \\ a - b + 3 = 2ab \end{cases}$

замена $t = a - b$

$n = ab$

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

$D = 9 + 16 = 5^2$

$x = \frac{-3+5}{-2} = -1$

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

$(x-4)(x+1)$

$(4-x)(x+1)$

$-x^2 - x + 4x + 4$

$\sqrt{4-x} = \frac{2+\sqrt{6}}{2}$

$4 - x = \frac{4 + 4\sqrt{6} + 6}{2}$

$4 - x = 2 + 2\sqrt{6} + 3$

$-x = 2\sqrt{6} - 1$

$x = 1 - 2\sqrt{6}$

$\begin{cases} t^2 + 2n = 5 \\ t + 3 = 2n \end{cases}$

$t^2 + t + 3 = 5$

$t^2 + t - 2 = 0$

$t = 1 + 8 = 3^2$

$t = \frac{-1+3}{2} = 1$

$t = \frac{-1-3}{2} = -2$

$\begin{cases} a \geq 0 \\ b \geq 0 \\ a - b + 3 = -2ab \end{cases}$

$\sqrt{x+1} - \sqrt{4-x} + 3 = 2\sqrt{x-4}\sqrt{x+1}$

$a - b + 3 = 2ab$

$\begin{cases} t + 3 = 2n \\ \left[\begin{array}{l} t = 1 \\ t = -2 \end{array}\right. \end{cases}$

$4 = 2n \quad n = 2$

$1 = 2n \quad n = \frac{1}{2}$

$(\sqrt{x+1} - \sqrt{4-x} + 3)^2 = 4(4 + 3x - x^2)$

$(\sqrt{x+1} - \sqrt{4-x} + 3)(\sqrt{x+1} - \sqrt{4-x} + 3) =$

$= x + 1 - \sqrt{(x+1)(4-x)} + 3\sqrt{x+1} - \sqrt{4-x}\sqrt{x+1} + 4 + x - 3\sqrt{4-x} + 3\sqrt{x+1} - 3\sqrt{4-x} + 9 =$

$=$

$\left[\begin{array}{l} \begin{cases} t = 1 \\ n = 2 \end{cases} \\ \begin{cases} t = -2 \\ n = \frac{1}{2} \end{cases} \end{array}\right.$

$t = a - b = 1$

$n = ab = 2$

$\begin{cases} a = 2 \\ b = 1 \end{cases}$

$\begin{cases} a = \frac{\sqrt{6}-2}{2} \\ b = \frac{2+\sqrt{6}}{2} \end{cases}$

$a - b = -2$

$ab = \frac{1}{2}$

$a = b - 2$

$\begin{cases} \sqrt{x+1} = 2 \\ \sqrt{4-x} = 1 \end{cases}$

$\begin{cases} x + 1 = 4 \\ 4 - x = 1 \end{cases}$

$x = 3$

$\begin{cases} \sqrt{x+1} = \frac{\sqrt{6}-2}{2} \\ \sqrt{4-x} = \frac{2+\sqrt{6}}{2} \end{cases}$

$b(b-2) = \frac{1}{2}$

$2b^2 - 4b - 1 = 0$

$D = 16 + 8 = 24$

$b^2 - 2b = \frac{1}{2}$

$b^2 - 2b - \frac{1}{2} = 0$

$a = b - 2 = \frac{2+\sqrt{6}}{2} - 2 = \frac{2+\sqrt{6}-4}{2} = \frac{-2+\sqrt{6}}{2}$

$x + 1 = \frac{6 - 4\sqrt{6} + 4}{4}$

$D = 1 + 2 = 6$

$x + 1 = (3 - 2\sqrt{6} + 2)/2$

$b = \frac{2 \pm \sqrt{6}}{2}$

$b \geq 0 \quad \frac{2+\sqrt{6}}{2}$

$2x + 2 = 5 - 2\sqrt{6}$

$x = 4 - 2\sqrt{6}$

черновик

$\sqrt{x+1} = \frac{\sqrt{6}-2}{2}$

$x+1 = \frac{6-4\sqrt{6}+4}{4} = \frac{3-2\sqrt{6}+2}{2}$

$x = \frac{5-2\sqrt{6}}{2} - 1 = \frac{3-2\sqrt{6}}{2}$

$2 < \sqrt{6} < 3$

$4 < 2\sqrt{6} < 6$

$-6 < -2\sqrt{6} < -4$

$-3 < 3-2\sqrt{6} < -1$

$-1{,}5 < \frac{3-2\sqrt{6}}{2} < -0{,}5$

$\sqrt{\frac{3-2\sqrt{6}}{2}+1}$

$\sqrt{\frac{5-2\sqrt{6}}{2}} = \frac{\sqrt{6}-2}{2}$

$\frac{5-2\sqrt{6}}{2} = \frac{6-4\sqrt{6}+4}{4}$

$\frac{5-2\sqrt{6}}{2}$

$\sqrt{6} =$ 2,2 × 2,2 = 44 + 44 = 4,84; 24 × 24 = 96 + 48 = 576

2,4 4,8

$a = b+1$

$b(b+1) = 2$

$b^2 + b - 2 = 0$

$D = 1 + 8 = 3^2$

$b = \frac{-1+3}{2} = 1$

$b = \frac{-1-3}{2} = -2$

$\sqrt{4-x} = \frac{2+\sqrt{6}}{2}$

$4 - \frac{3-2\sqrt{6}}{2}$

$\sqrt{\frac{8-3+2\sqrt{6}}{2}} = \sqrt{\frac{5+2\sqrt{6}}{2}}$

$4-x = \frac{4+4\sqrt{6}+6}{4}$

$4-x = \frac{2+2\sqrt{6}+3}{2}$

$-x = \frac{5+2\sqrt{6}}{2} - 4 = \frac{5-2\sqrt{6}-8}{2} = \frac{-3-2\sqrt{6}}{2}$

$x = \frac{3+2\sqrt{6}}{2}$

$\frac{10+4\sqrt{6}}{4} = \frac{5+2\sqrt{6}}{2} - 1$

$\frac{5+2\sqrt{6}-2}{2} = \frac{3+2\sqrt{6}}{2}$

$4-$

$\frac{5-2\sqrt{6}}{2} = 4-x$

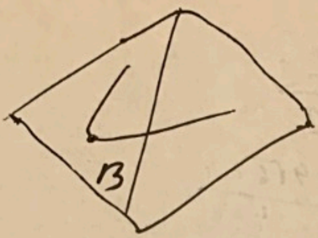
$\frac{5-2\sqrt{6}}{2} - 4 = \frac{-3-2\sqrt{6}}{2}$

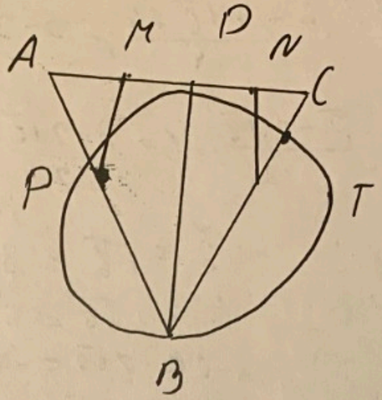
$3+2\sqrt{6}+1$

$\sqrt{\frac{5+2\sqrt{6}}{2}} - 4$

Черновик

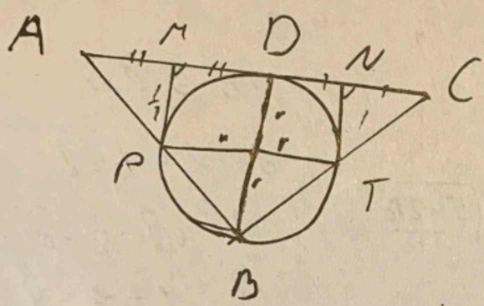
$x+y=3$

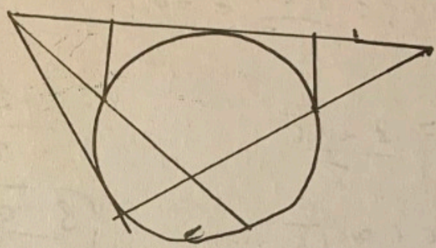


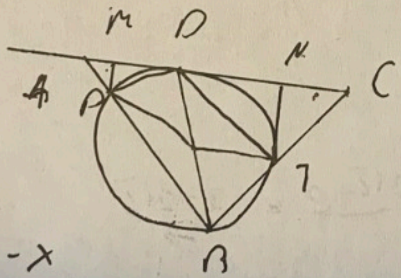


$ax^2+4a^2x-ay+4a^3+2=0$

$\frac{-8}{2a}$ $\quad \frac{-4a^2}{2a}=-2a$







$4-x$

$4-\frac{3+2\sqrt{6}}{2}=\frac{8-3-2\sqrt{6}}{2}=\frac{5-2\sqrt{6}}{2}$ $\quad 2,4\cdot 2$

2,5

6,25

$4+3\left(\frac{3+2\sqrt{6}}{2}\right)-\left(\frac{3+2\sqrt{6}}{2}\right)^2$

$\frac{8+9+6\sqrt{6}}{2}-\frac{9+12\sqrt{6}+24}{4}$

~~6~~ 17 $\frac{34+12\sqrt{6}}{4}$ $-33-12\sqrt{6}=$

чистовик Вариант 12 часть 1 (1)

№ 2

$\sqrt{x+1} - \sqrt{4-x} + 3 = 2\sqrt{4+3x-x^2}$

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

$D = 9+16 = 5^2$

$x = \frac{-3+5}{-2} = -1$

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

$-x^2+3x+4 = -(x+1)(x-4) = (4-x)(x+1)$

$\sqrt{x+1} - \sqrt{4-x} + 3 = 2\sqrt{(4-x)(x+1)}$

замена

$\begin{cases} \sqrt{x+1} = a \geq 0 \\ \sqrt{4-x} = b \geq 0 \\ a-b+3 = 2ab \end{cases}$

$\begin{cases} x+1 = a^2 \\ 4-x = b^2 \end{cases} \Big| +$

$\begin{cases} 5 = a^2+b^2 \\ a-b+3 = 2ab \end{cases}$

замена $ab = t$

$a-b = n$

$\begin{cases} 5 = n^2+2t \\ n+3 = 2t \end{cases}$

$\begin{cases} n^2+2t = 5 \\ n+3 = 2t \end{cases} \Big| +$

$n^2+n+3 = 5$

$n^2+n-2 = 0$

$D = 1+8 = 3^2$

$n = \frac{-1+3}{2} = 1$

$n = \frac{-1-3}{2} = -2$

$\begin{cases} n+3 = 2t \\ \left[\begin{array}{l} n = 1 \\ n = -2 \end{array}\right. \end{cases}$

$\left[\begin{array}{l} 4 = 2t \\ 1 = 2t \end{array}\right.$ $\left[\begin{array}{l} t = 2 \\ t = \frac{1}{2} \end{array}\right.$

$\left[\begin{array}{l} \begin{cases} n = 1 \\ t = 2 \end{cases} \\ \begin{cases} n = -2 \\ t = \frac{1}{2} \end{cases} \end{array}\right.$ $\left[\begin{array}{l} \begin{cases} a-b = 1 \\ ab = 2 \end{cases} \\ \begin{cases} a-b = -2 \\ ab = \frac{1}{2} \end{cases} \end{array}\right.$ $\left[\begin{array}{l} \begin{cases} a = 2 \\ b = 1 \end{cases} \\ \begin{cases} a = -1 \\ b = -2 \end{cases} \end{array}\right.$

$\begin{cases} a = b-2 \\ ab = \frac{1}{2} \end{cases}$

$b^2 - 2b = \frac{1}{2}$

$b^2 - 2b - \frac{1}{2} = 0$

$D = 4+2 = 6$

$b = \frac{2 \pm \sqrt{6}}{2}$

$\sqrt{6} > 2$

$2 - \sqrt{6} < 0$

$b \geq 0$

$\left[\begin{array}{l} \begin{cases} b = \frac{2+\sqrt{6}}{2} \\ a = \frac{\sqrt{6}-2}{2} \end{cases} \\ \begin{cases} a = 2 \\ b = 1 \end{cases} \end{array}\right.$

$\left[\begin{array}{l} \begin{cases} \sqrt{x+1} = 2 \\ \sqrt{4-x} = 1 \end{cases} \\ \begin{cases} \sqrt{x+1} = \frac{2+\sqrt{6}}{2} \\ \sqrt{4-x} = \frac{\sqrt{6}-2}{2} \end{cases} \end{array}\right.$

$\left[\begin{array}{l} \begin{cases} x+1 = 4 \\ 4-x = 1 \end{cases} \\ \begin{cases} x+1 = \frac{4+4\sqrt{6}+6}{4} \\ 4-x = \frac{6-4\sqrt{6}+4}{4} \end{cases} \end{array}\right.$

$a \geq 0$

$b \geq 0$

$x = 3$

$\begin{cases} x = \frac{3+2\sqrt{6}}{2} \\ x = \frac{3+2\sqrt{6}}{2} \end{cases}$

Ответ: 3; $\frac{3+2\sqrt{6}}{2}$

№ 3 Чистовик. (2)

$ax^2+4a^2x-ay+4a^3+2=0$

$ay=ax^2+4a^2x+4a^3+2 \qquad a\neq 0$

$y=x^2+4ax+4a^2+\frac{2}{a}$

$x_в=\frac{-4a}{2}=-2a$

$y_в=4a^2-8a^2+4a^2+\frac{2}{a}=\frac{2}{a}$

$B\left(-2a;\ \frac{2}{a}\right)$ $\qquad x+y=\frac{2}{a}-2a=\frac{2-2a^2}{a}$

$2a^2-2ax-6ay+x^2+2xy+5y^2=0$

$x^2+2xy-2ax+2a^2-6ay+5y^2=0$

$x^2+x(2y-2a)+2a^2-6ay+5y^2=0$

$D=(2y-2a)^2-4(2a^2-6ay+5y^2)=$

$=4y^2-8ay+4a^2-8a^2+24ay-20y^2=$

$=-16y^2+16ay-4a^2=-4(4y^2-4ay+a^2)=$

$=-4(2y-a)^2 \qquad D\geq 0 \qquad (2y-a)^2\geq 0$

$-4(2y-a)^2\leq 0$

$D=0 \qquad (2y-a)^2=0$

$2y=a$

$8y^2-4xy-12y^2+x^2+2xy+5y^2=$

$=13y^2-2xy-12y^2+x^2=y^2-2xy+x^2=(x-y)^2=0$

$x=y=\frac{a}{2}$

$A\left(\frac{a}{2};\ \frac{a}{2}\right) \qquad x+y=\frac{a}{2}+\frac{a}{2}=a$

чтобы точки лежали по одну сторону от прямой $x+y=3$

$\begin{cases}x_1+y_1\geq 0\\ x_2+y_2\geq 0\end{cases}$ либо $\begin{cases}x_1+y_1<0\\ x_2+y_2<0\end{cases}$; $a>3$, $\frac{2-2a^2}{a}<3$; $a<3$

Ответ:

Часть 2

Олимпиада: **Математика, 10 класс (2 часть)**

Шифр: **211005484**

ID профиля: **852805**

Вариант 12

чистовик Вар. 12 часть 2. (1)

№ 4

$$\begin{cases} \frac{1}{x^2+y^2} + x^2y^2 = \frac{5}{4} \\ 2x^4+2y^4+5x^2y^2 = \frac{9}{4} \end{cases}$$

замена: $x^2+y^2=a$, $x^2y^2=b$

$$\begin{cases} \frac{1}{a} + b = \frac{5}{4} \\ 2(a^2-2b)+5b = \frac{9}{4} \end{cases} \quad \begin{cases} \frac{1}{a} + b = \frac{5}{4} & (1) \\ 2a^2+b = \frac{9}{4} & (2) \end{cases}$$

(2)-(1) $2a^2 - \frac{1}{a} = 1$

$2a^2 - \frac{1}{a} = 1$ $\quad \frac{2a^3-a-1}{a} = 0 \quad a \neq 0$

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

Предположим, что уравнение имеет рациональные корни. a может равняться $\pm 1; \pm \frac{1}{2}$

$2 \cdot 1 - 1 - 1 = 0$

$a = 1$

$$\begin{array}{r|l} -\,2a^3-a-1 & a-1 \\ 2a^3-2a^2 & 2a^2+2a+1 \\ \hline -\,2a^2-a & \\ 2a^2-2a & \\ \hline -\,a-1 & \\ a-1 & \\ \hline 0 & \end{array}$$

$2a^2+2a+1=0$

$D = 4-8=-4<0$

$$\begin{cases} a = 1 \\ 2a^2+b = \frac{9}{4} \end{cases}$$

$\frac{8}{4} + b = \frac{9}{4}$

$b = \frac{1}{4}$

$$\begin{cases} x^2+y^2=1 \\ x^2y^2 = \frac{1}{4} \end{cases}$$

$x^2 = 1-y^2$

$-y^4+y^2-\frac{1}{4}=0$

$D = 1-1=0$

$y^2 = \frac{-1}{-2} = \frac{1}{2}$

$$\begin{cases} y^2 = \frac{1}{2} \\ x^2 = \frac{1}{2} \end{cases}$$

$y = \pm\frac{1}{\sqrt{2}}$

$x = \pm\frac{1}{\sqrt{2}}$

$$\left[\begin{array}{l} \begin{cases} x = \frac{1}{\sqrt{2}} \\ y = \frac{1}{\sqrt{2}} \end{cases} \\ \begin{cases} x = \frac{1}{\sqrt{2}} \\ y = -\frac{1}{\sqrt{2}} \end{cases} \\ \begin{cases} x = -\frac{1}{\sqrt{2}} \\ y = \frac{1}{\sqrt{2}} \end{cases} \\ \begin{cases} x = -\frac{1}{\sqrt{2}} \\ y = -\frac{1}{\sqrt{2}} \end{cases} \end{array}\right.$$

Ответ: $\left(\frac{1}{\sqrt{2}}; \frac{1}{\sqrt{2}}\right) \left(\frac{1}{\sqrt{2}}; -\frac{1}{\sqrt{2}}\right) \left(-\frac{1}{\sqrt{2}}; \frac{1}{\sqrt{2}}\right) \left(-\frac{1}{\sqrt{2}}; -\frac{1}{\sqrt{2}}\right)$.

чистовик

№ 5

(2)

прямые $y = x$; $y = 63 - x$ - это диагонали квадрата; так как не учитывается граница квадрата, получается квадрат из узлов сетки, 62 узла - сторона квадрата.

Один из 2 узлов ~~может~~ можно выбрать из $62 \cdot 2$ узлов диагоналей квадрата, второй узел может быть любым из 62^2 узлов квадрата, кроме $62+61$ узла, которые с первым узлом лежат на прямой, параллельной осям.

$62 \cdot 2 \cdot (62^2 - (62+61)) = 124(62^2 - 123)$

Однако здесь два раза посчитаны случаи, когда оба узла выбраны из узлов на диагоналях, таких случаев $\frac{124 \cdot \cancel{123}^{121}}{2} = 62 \cdot \cancel{123}^{121}$

количество способов $124(62^2 - 123) - 62 \cdot \cancel{123}^{121}$

Ответ: $124 \cdot (62^2 - 123) - 62 \cdot 121$.

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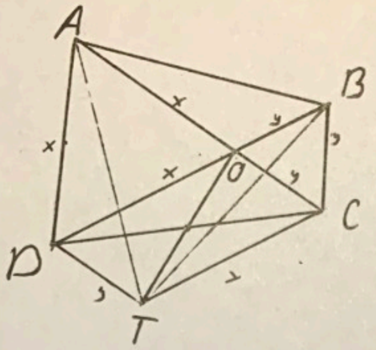
чистовик

③

№ 6



а) т.к. $\triangle ADO$ - правильный

$AD = AO = DO$

пусть $AD = x$

$\triangle BOC$ - правильный

$BO = BC = OC = y$

$AB = \sqrt{AO^2 + BO^2 - 2 AO BO \cos\angle AOB} =$

$= \sqrt{x^2 + y^2 - 2xy \cdot \cos\angle AOB}$

так как $\triangle AOD$ - правильный, то $\angle AOD = 60°$; $\angle AOB = 180° - 60 = 120°$

$AB = \sqrt{x^2 + y^2 - 2xy(-\frac{1}{2})} = \sqrt{x^2 + y^2 + xy}$

$AT = \sqrt{AD^2 + DT^2 - 2 AD DT \cos\angle ADT}$

OT, CD - диагонали $DOCT$ пересекаются и точкой пересечения делятся пополам => $OCTD$ - параллелограмм

$OC = DT = y$; $DO = CT = x$ $\angle ODT + \angle COD = 180°$ ($DT \parallel OC$)

$\angle ODT = 180° - 120° = 60°$

$\angle ADT = \angle ADO + \angle ODT = 60° + 60° = 120°$

$AT = \sqrt{x^2 + y^2 - 2xy \cdot \cos 120} = \sqrt{x^2 + y^2 + xy}$

$BT = \sqrt{BC^2 + CT^2 - 2 BC CT \cdot \cos TCB}$

$BT = \sqrt{x^2 + y^2 - 2xy \cdot (-\frac{1}{2})} = \sqrt{x^2 + y^2 + xy}$ $\angle TCB = \angle OCB + \angle TCO = 120°$

$AB = AT = TB$ => $\triangle ABT$ равносторонний, $\triangle ABT$ правильный.

б) $S_{ABT} = \frac{1}{2} AB \cdot AT \cdot \sin\angle BAT = \frac{1}{2} AB^2 \cdot \sin 60$; $AB = \sqrt{x^2 + y^2 + xy} =$

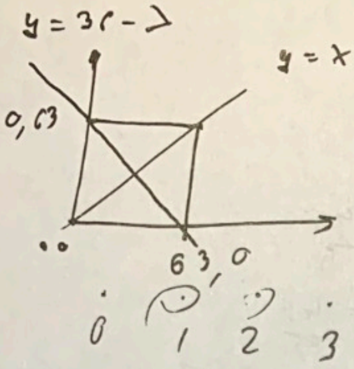
$= \sqrt{4^2 + 2^2 + 4 \cdot 2} = \sqrt{16 + 4 + 8} = \sqrt{28} = 2\sqrt{7}$ $S_{ABT} = \frac{1}{2} \cdot 28 \cdot \frac{\sqrt{3}}{2} = 7\sqrt{3}$

$S_{ABCD} = \frac{1}{2} AC \cdot BD \cdot \sin 60 = \frac{1}{2}(2+4)^2 \cdot \frac{\sqrt{3}}{2} = \frac{36\sqrt{3}}{4} = 9\sqrt{3}$

$\frac{S_{ABT}}{S_{ABCD}} = \frac{7\sqrt{3}}{9\sqrt{3}} = \frac{7}{9}$

Ответ: $\frac{7}{9}$.

~5 черновик



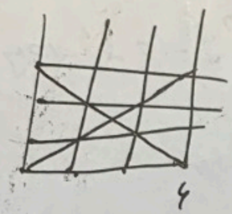
566
957
12 + 10 + 12 = 34

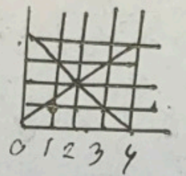
62^2

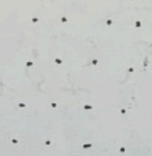
62 61

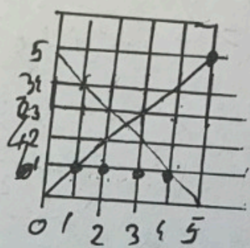
62 + 61

123









$4^2 - 4 - 3 = 4^2 - 7 = 16 - 7 = 9$

3 + 3

62 · 61

62 · 60

62(61 + 60)

62(121)

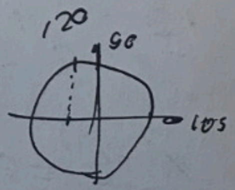
62
62
124

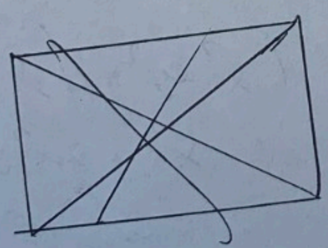
62

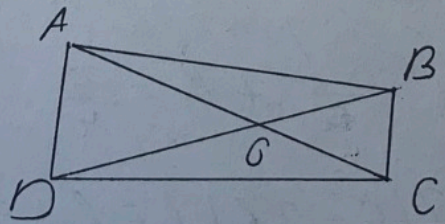
$62^2 - 62 - 61 = 62^2 - 123$

$62(62^2 - 123) + 62(62^2 - 123)$

$124(62^2 - 123) - 62(121)$



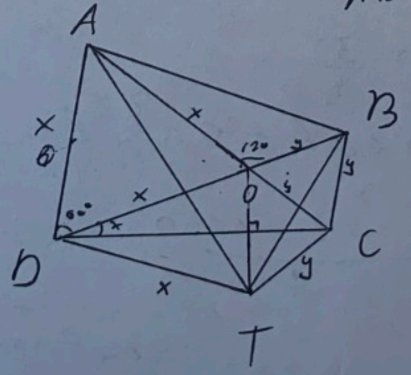




$AB = \sqrt{x^2 + y^2 - 2xy\cos 120}$

$\sqrt{x^2 + y^2 + xy}$

$\alpha =$



$BT = \sqrt{y^2 + y^2 - 2y^2\cos\alpha}$

чернвик

$$\begin{cases} \frac{1}{x^2+y^2} + x^2y^2 = \frac{5}{4} \\ 2x^4+2y^4+5x^2y^2 = \frac{9}{4} \end{cases}$$

$9 \quad x+y=a$

$xy = b$

5

$$\frac{1}{a^2-2b} + b^2 = \frac{5}{4}$$

$$\begin{cases} \frac{9}{x^2+y^2} + 9x^2y^2 = \frac{45}{4} \\ 10x^4+10y^4+25x^2y^2 = \frac{45}{4} \end{cases}$$

$$\frac{9}{x^2+y^2} + 9x^2y^2 - 10x^4 - 10y^4 - 25x^2y^2 = 0$$

$$\frac{9}{x^2+y^2} - 16x^2y^2 - 10x^4 - 10y^4 = 0$$

$(x+y)^4 = $ ~~xy~~ $(x^2+2xy+y^2)(x^2+2xy+y^2) =$

$= x^4 + 2x^3y + x^2y^2 + 2x^3y + 4x^2y^2 + 2xy^3 + x^2y^2 + 2xy^3 + y^4 =$

$= x^4 + y^4 + 4x^3y + 6x^2y^2 + 4xy^3$

$2(x^4+y^4)$

$a^4 + 4x^3y + 6x^2y^2 + 4xy^3 = x^2+y^2$

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

$= a^4 - 6b^2 - 4a^2b + 8b^2 = a^4 + 2b^2 - 4a^2b$

$x^2+y^2 = a$

$x^2y^2 = b$

$$\begin{cases} \frac{1}{a} + b = \frac{5}{4} \\ 2(a^2-2b) + 5b = \frac{9}{4} \end{cases}$$

$2a^2 + 2a + 1 = 0$

$D = 4 - 4 \cdot 2 < 0$

$(x^2+y^2)(x^2+y^2)$

$x^4 + 2x^2y^2 + y^4$

$a^2 - 2b$

$$\begin{cases} \frac{1}{a} + b = \frac{5}{4} \\ 2a^2 + b = \frac{9}{4} \end{cases}$$

$\frac{1}{a} + b = \frac{5}{4}$

$2a^2 - 4b + 5b = 2a^2 + b = \frac{9}{4}$

$2a^3 - a - 1 \;|\; a - 1$

$-\; 2a^3 - 2a^2 \quad\; 2a^2 + 2a + 1$

$-\; 2a^2 - a$

$-\; 2a^2 - 2a$

$a - 1$

$\frac{2a^3 - a - 1}{a} = 0$

$a = 1 \qquad a = 1$

$2a^2 - \frac{1}{a} = 1$

$\frac{2a^3 - 1 - a}{a} = 0$

$1 + b = \frac{5}{4} \quad b = \frac{1}{4}$

$a \neq 0$

$x^2y^2 = \frac{1}{4}$

$x^2 + y^2 = 1$

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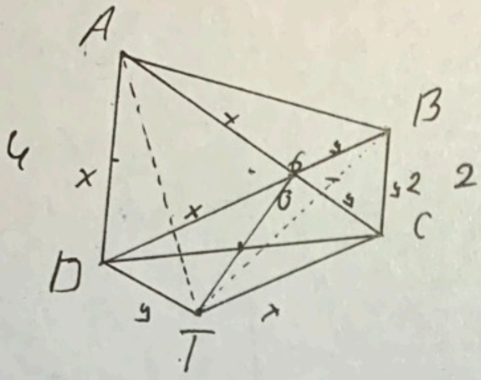
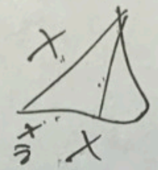


$AB = \sqrt{x^2+y^2+xy}$



$x^2 - \frac{x^2}{4} =$

$\frac{4x-x}{4} = \frac{\sqrt{3}x^2}{4}$

$\frac{\sqrt{3}}{2}x$

$TB = \sqrt{y^2+x^2-2xy\cos TCB}$

$\angle TCB = 60° + \angle OCT\ 60°$

$\angle TCB = 120°$ $\cos TCB = -\frac{1}{2}$

$\sqrt{y^2+x^2+xy}$

$S_{ABT} = \frac{AB \cdot TH}{2} = \frac{n}{2} \cdot$ $\sqrt{n^2-\left(\frac{n}{2}\right)^2} = n^2 - \frac{n^2}{4} =$

$\sqrt{\frac{3n^2}{4}} =$

$\frac{\sqrt{3}n}{2}$

$S_{ABT} = \frac{n}{2} \cdot \frac{\sqrt{3}n}{2} = \frac{\sqrt{3}n^2}{4}$

$n = \sqrt{x^2+y^2+xy} = \sqrt{16+4+8} = \sqrt{28} = 2\sqrt{7}$

$S_{ABT} = \frac{\sqrt{3} \cdot 4 \cdot 7}{4} = 7\sqrt{3}$

$\sqrt{28}^2 \cdot \frac{\sqrt{3}}{2} = 14\sqrt{3}$

$S_{ABCD} = \frac{1}{2} AC \cdot DD \cdot \sin DOA = 6 \cdot 6 \cdot \frac{\sqrt{3}}{4} = 9\sqrt{3}$

$\frac{BH \cdot AH}{2} =$

$AB = \sqrt{6^2+2^2-2 \cdot 6 \cdot 2 \cdot \frac{1}{2}} = \sqrt{36+4-12} = \sqrt{28}$

$BH = \sqrt{AB^2 - AH^2} = \sqrt{28-1} = 3\sqrt{3}$ $BH \cdot 3 = 9\sqrt{3}$

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