

Шифр 44

Внесите в таблицу номера правильных ответов. В заданиях, в которых отсутствуют варианты ответов, внесите правильный ответ.

1	2	3	4	5	6	7	8	9	10
2	5	5	2	4	2	1	3	3	3
+	+	+	+	-	+	+	+	+	+
11	12	13	14	15	16	17	18	19	20
2	3	4	2	1	4	4	1	2	3
+	+	-	-	-	+	-	-	+	-

Задача 2

$$(a-b)^3 = (a^2 - 2ab + b^2)(a-b) = a^3 - 2a^2b + ab^2 - a^2b + 2ab^2 - b^3 =$$

$$= a^3 - b^3 - 3a^2b + 3ab^2$$

$$(\sqrt{x})^3 - (2\sqrt{y})^3 - 3(\sqrt{x})^2 \cdot 2\sqrt{y} + 3 \cdot (\sqrt{x})^2 \cdot (2\sqrt{y})^2 = (\sqrt{x} - 2\sqrt{y})^3$$

$$\frac{2^2}{14}$$

$$\frac{(\sqrt{x} - 2\sqrt{y})^3}{(\sqrt{x} - 2\sqrt{y})} = (\sqrt{x} - 2\sqrt{y})^2 \pm (2\sqrt{y} - \sqrt{x})^2$$

$$\begin{matrix} x_1 + x_2 = 5 & x_1 = -3 \\ x_1 x_2 = -24 & x_2 = 8 \end{matrix}$$

$$3) \frac{2(x-5)}{\frac{2}{x-14} - \frac{1}{x-11}} = \frac{24}{\frac{2}{x-14} - \frac{1}{x-11}}$$

$$\begin{cases} x \neq 14 \\ x \neq 11 \\ \frac{2}{x-14} - \frac{1}{x-11} \neq 0 \Rightarrow x \neq 8 \end{cases}$$

$$\textcircled{1} \frac{2x-22 - x+14}{(x-14)(x-11)} = \frac{x-8}{(x-14)(x-11)}$$

$$\frac{2(x-5)}{\frac{2}{x-14} - \frac{1}{x-11}} - \frac{24}{\frac{2}{x-14} - \frac{1}{x-11}} = 0$$

$$\frac{x^2 - 5x - 24}{2(x-11) - x + 14} = 0$$

$$\frac{(x^2 - 5x - 24)(x-14)(x-11)}{2x-22 - x + 14} = 0$$

$$\frac{(x-8)(x+3)(x-14)(x-11)}{x-8} = 0$$

$$\begin{cases} x \neq 14 \\ x \neq 11 \\ x \neq 8 \end{cases} \Rightarrow x = -3$$

$$2) x^2 + |x| = 3$$



$$1) \text{ Если } x \geq 0$$

$$x^2 + x = 3$$

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

$$\begin{aligned} x_1 + x_2 &= -1 \\ x_1 x_2 &= -3 \end{aligned}$$

$$D = 1 + 4 \cdot 3 = 1 + 12 = 13$$

$$x_1 = \frac{-1 + \sqrt{13}}{2}$$

$$x_2 = \frac{-1 - \sqrt{13}}{2} \text{ — не ОК}$$

$$x_1 = \frac{-1 + \sqrt{13}}{2}$$

$$x_2 = \frac{1 - \sqrt{13}}{2}$$

$$\frac{-1 + \sqrt{13}}{2} - \frac{1 - \sqrt{13}}{2} = \frac{-1 + \sqrt{13} - 1 + \sqrt{13}}{2} = \frac{-2 + 2\sqrt{13}}{2} = -1 + \sqrt{13} = \sqrt{13} - 1$$

$$d) |3x - 4| + 6 \leq 8$$

$$|3x - 4| - 2 \leq 0$$

$$\begin{cases} 3x - 4 - 2 \leq 0 \\ x \geq \frac{4}{3} \end{cases} \quad (1)$$

$$\begin{cases} -3x + 4 - 2 \leq 0 \\ x < \frac{4}{3} \end{cases} \quad (2)$$

$$(2) \begin{cases} -3x + 2 \leq 0 \\ x < \frac{4}{3} \end{cases} \Rightarrow \begin{cases} 3x \geq 2 \\ x < \frac{4}{3} \end{cases}$$

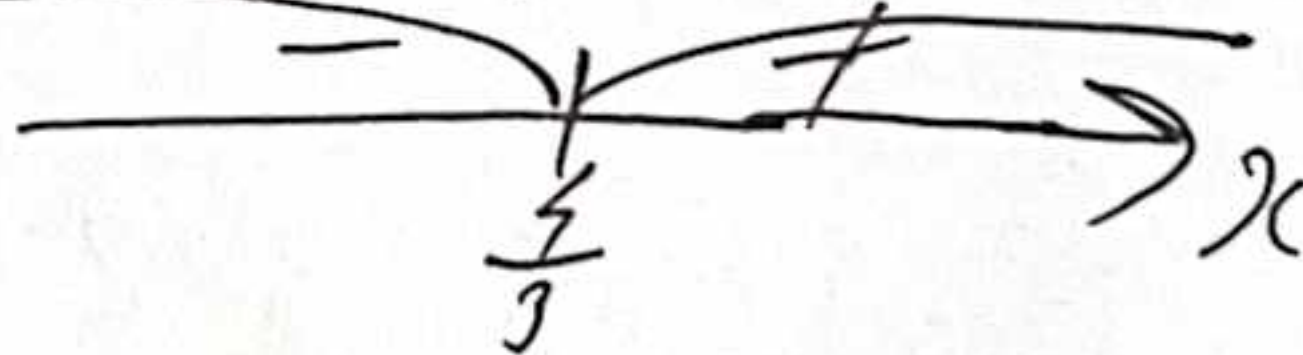
$$1 + 2 \quad (3)$$

$$\text{Или } 3x - 4 = 0$$

$$3x = 4$$

$$x = \frac{4}{3}$$

Значит, решение (решения)



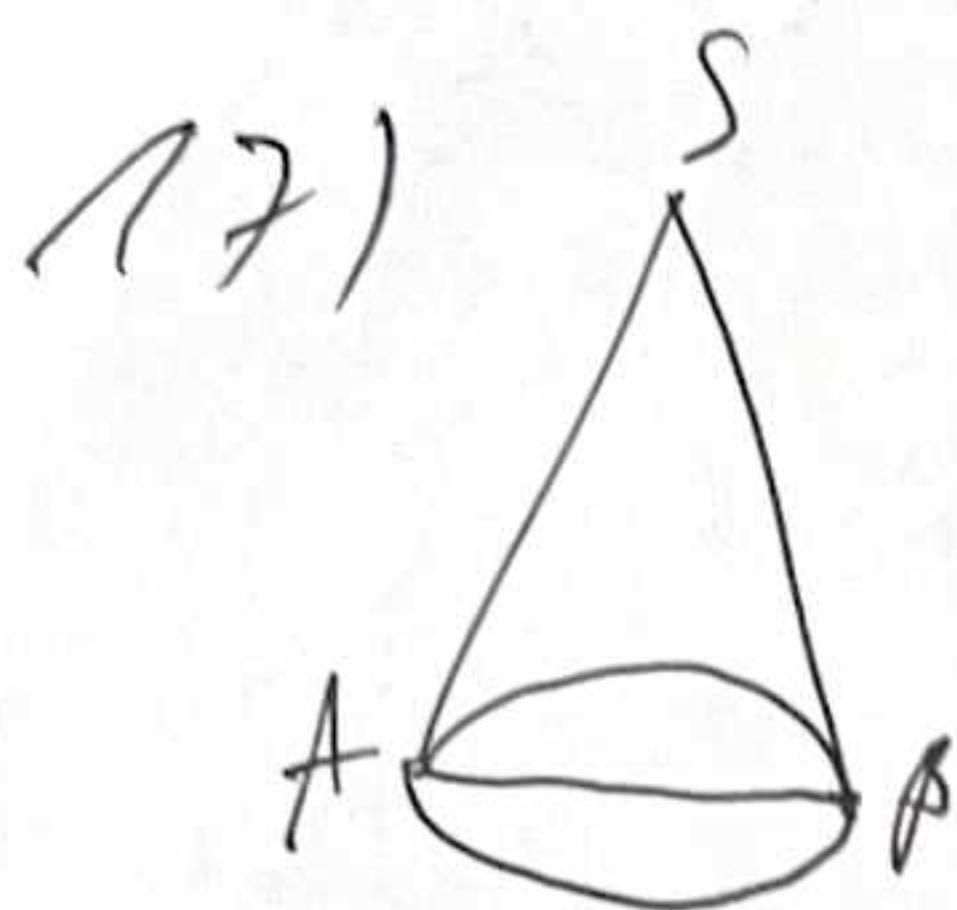
(1)

$$\begin{cases} 3x - 6 \leq 0 \\ x \geq \frac{4}{3} \end{cases}$$

$$\begin{cases} x - 2 \leq 0 & x \leq 2 \\ x \geq \frac{4}{3} & x \geq \frac{4}{3} \end{cases}$$

$$x \in \left[\frac{4}{3}; 2 \right] \cup \{2\}$$

$$x \in \left[\frac{2}{3}; \frac{4}{3} \right) \cup \{1\} \text{ — это решение}$$



$$AB = d = 12$$

15)

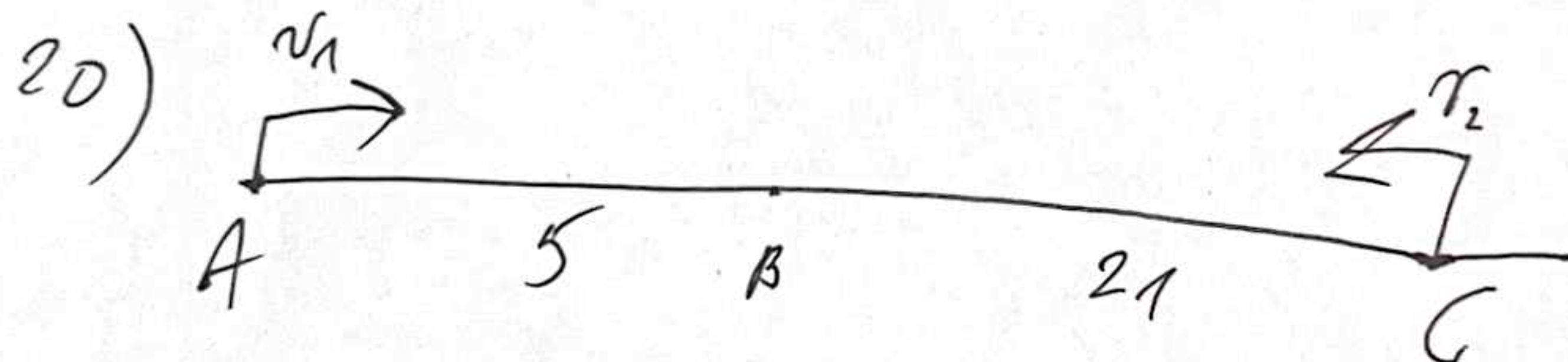
$$\boxed{50}^{60\%} + \boxed{x}^{100\%} = \boxed{50+x}^{90\%}$$

$$0,6 \cdot 50 + x = 0,9(50+x)$$

$$30 + x = 45 + 0,9x$$

$$0,1x = 15$$

$$x = 150$$



$$v_2 < v_1$$

18)

$$\begin{cases} 4ax + 9y = -27 \\ x + 4ay = 16a^2 \end{cases}$$

$$4ax = -27 - 9y \quad a = \frac{-27-9y}{4x}$$

$$x + 4ay = 16a^2 \quad x = 16a^2 - 4ay$$

$$4a(4a-y)$$

$$x = 4a(4a-y)$$

$$x = \frac{-27-9y}{4} \left(\frac{-27-9y}{4} - y \right)$$

$$x = \frac{-27-9y}{4} \left(\frac{-27-9y-4y}{4} \right)$$

$$x = \frac{-27-9y}{4} \left(\frac{-27-13y}{4} \right)$$

$$x =$$

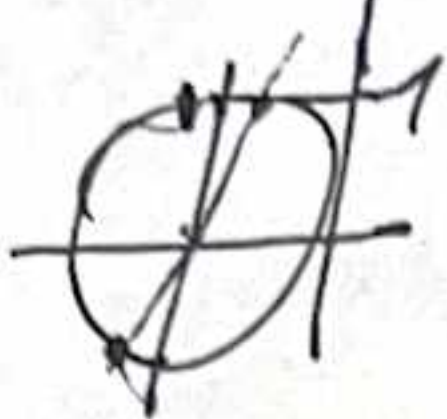
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$$14) \operatorname{tg}\left(2\arcsin \frac{\sqrt{2}}{2} + \operatorname{arctg} 3\right) = \operatorname{tg}\left(2 \cdot \frac{\pi}{4} + \operatorname{arctg} 3\right) =$$

$$\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$$

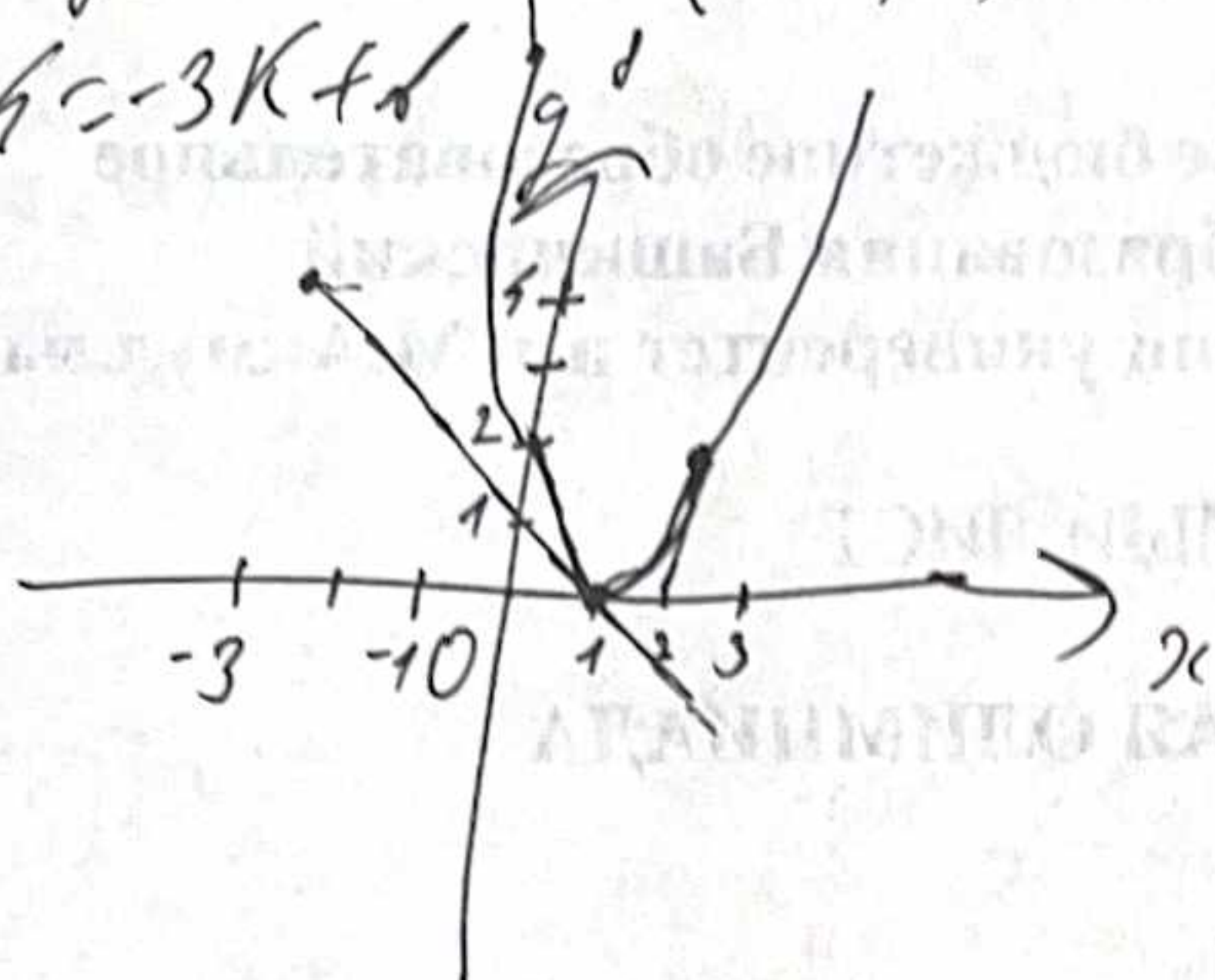
$$\cos \frac{\pi}{3} = \frac{1}{2}$$



$$= \operatorname{tg}\left(\frac{\pi}{2} + \operatorname{arctg} 3\right) = \operatorname{tg}(\operatorname{arctg} 3) = 3$$

$$15) y = kx + b \quad (-3; 4)$$

$$4 = -3k + b$$



$$f(x) = 2x^2 - 4x + 2$$

$$f'(x) = 4x - 4 = 0$$

$$x_f = 1$$

$$y_f =$$

$$y_f = 2 - 4 + 2 = 0$$

$$16) 2\sqrt{2}x^2 - 16x + 9 = 0$$

$$\begin{array}{r} 3 \\ 16 \\ 16 \\ \hline 96 \\ 16 \\ \hline 256 \end{array}$$

$$D_1 = 64 - 2\sqrt{2} \cdot 9 = 64 - 18\sqrt{2} = 2(32 - 9\sqrt{2})$$

$$256 - 4 \cdot 2\sqrt{2} \cdot 9 = 256$$

$$x_1 = \frac{8 + \sqrt{64 - 18\sqrt{2}}}{2 \cdot 2\sqrt{2}} = \frac{8 + \sqrt{64 - 18\sqrt{2}}}{4\sqrt{2}} = \frac{2}{\sqrt{2}} + \frac{\sqrt{64 - 18\sqrt{2}}}{4\sqrt{2}}$$

$$\sqrt{\frac{64 - 18\sqrt{2}}{16 \cdot 2}} = \sqrt{\frac{32 - 9\sqrt{2}}{16}} = \sqrt{2 - \frac{9\sqrt{2}}{16}}$$

$$x_2 = \frac{8 - \sqrt{64 - 18\sqrt{2}}}{4\sqrt{2}}$$

$$x_1 + x_2 = \frac{8 + \sqrt{64 - 18\sqrt{2}}}{4\sqrt{2}} + \frac{8 - \sqrt{64 - 18\sqrt{2}}}{4\sqrt{2}} = \frac{16}{4\sqrt{2}} = \frac{4}{\sqrt{2}} = \frac{2\sqrt{2}}{1} = 2\sqrt{2}$$

$$= \frac{4}{2\sqrt{2}} = \frac{2}{\sqrt{2}} = \sqrt{2} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} = \frac{1}{2} \cdot \sqrt{2} = \frac{\sqrt{2}}{2}$$

ЛИСТ ОТВЕТА

$$1) \sqrt{31 + 8\sqrt{15}} (20 - 5\sqrt{15})$$

$$20 = 4 \cdot 5 = 4\sqrt{25} = 5(4 - \sqrt{15})$$

$$\sqrt{31 + 8\sqrt{15}} (4 - \sqrt{15})$$

$$4\sqrt{31 + 8\sqrt{15}} - \sqrt{15}(31 + 8\sqrt{15})$$

$$15 \cdot 31 + 8 \cdot 15 \cdot \sqrt{15}$$

$$11 + 20 + 8\sqrt{15}$$

$$21 + 10 + 8\sqrt{15} = 31 + 2(5 + 4\sqrt{15})$$

$$-31 \cdot 3 + 31 \cdot 4 - 31 \cdot 8\sqrt{15} + 32 \cdot 8\sqrt{15}$$

$$32 \cdot 8\sqrt{15} - 31 \cdot 3 + 31(4 - 8\sqrt{15})$$

$$\frac{31}{15}$$

$$15 + 8\sqrt{15} + 16$$

$$(\sqrt{15})^2 + 2 \cdot 4\sqrt{15} + 4^2 = (\sqrt{15} + 4)^2$$

$$1) \sqrt{31 + 8\sqrt{15}} (20 - 5\sqrt{15}) = \sqrt{15 + 16 + 2 \cdot 4\sqrt{15}} \cdot 5(4 - \sqrt{15}) =$$

$$= \sqrt{(4 + \sqrt{15})^2} \cdot 5(4 - \sqrt{15}) = 5 \cdot (4 + \sqrt{15})(4 - \sqrt{15}) = 5 \cdot (16 - 15) =$$

$$= 5$$

$$2) \frac{x\sqrt{x} - 8y\sqrt{y} - 6\sqrt{x}y(\sqrt{x} - 2\sqrt{y})}{\sqrt{x} - 2\sqrt{y}}$$

$$x\sqrt{x} - 6x\sqrt{y} + 12y\sqrt{x} - 8y\sqrt{y}$$

$$x(\sqrt{x} - 6\sqrt{y}) + 4y(3\sqrt{x} - 2\sqrt{y})$$

$$+ \frac{25}{200}$$

$$31.5 = 31.5 \cdot 5$$

$$1.25 = \frac{2 \cdot 4 \cdot 5 \cdot 5}{2 \cdot 100}$$

$$5\sqrt{31 + 8\sqrt{15}} (4 - \sqrt{15})$$

$$20 = 5 + \sqrt{15} \cdot \sqrt{15} - 5\sqrt{15}$$

$$5 - 5\sqrt{15} = 5(1 - \sqrt{15}) + 15$$

$$5 - 1 - \sqrt{15} + 15$$

$$5 - 5\sqrt{15} + 15$$

$$\frac{31}{15}$$

$$3(5 \cdot 31 + 40\sqrt{15})$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a+b)^3 = (a^2 + 2ab + b^2)(a+b) =$$

$$= a^3 + 2a^2b + b^2a + a^2b + 2ab^2 + b^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$(\sqrt{x})^3 - (2\sqrt{y})^3 - 3 \cdot 2\sqrt{y}(\sqrt{x})^2 + 3 \cdot \sqrt{x}(2\sqrt{y})^2$$

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Задача 5

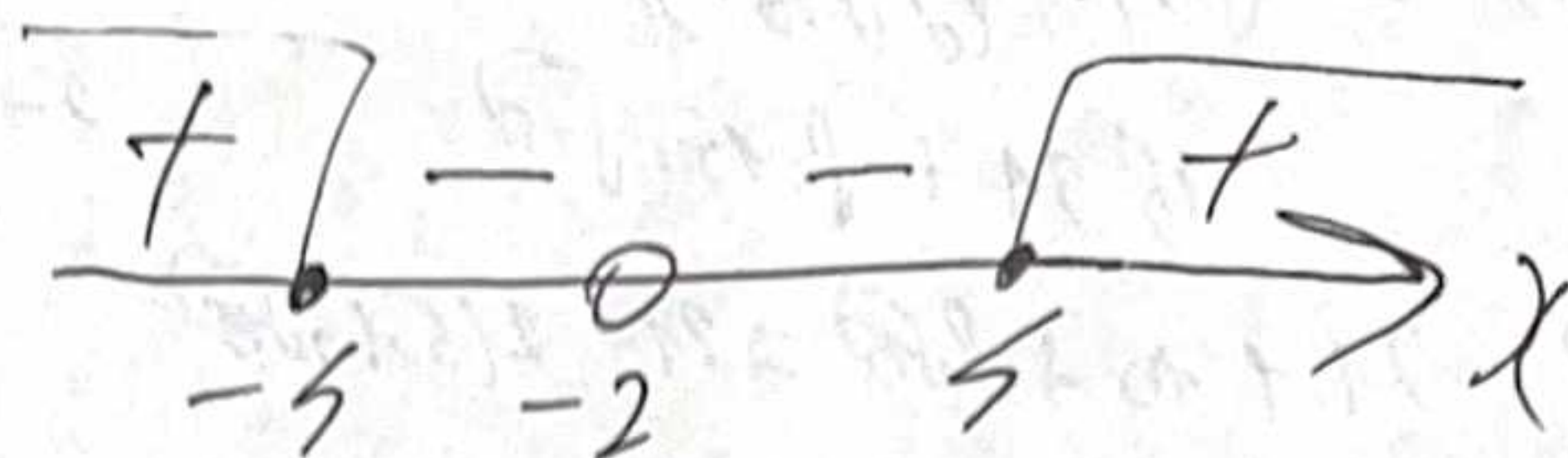
Условие: $(x+1)^2 - (1+2x+16)$

$2(x+1)$

$$(x+1)^2 - 1 - 2x - 16 = (x+1-1)(x+1+1) - 2(x+1) =$$

$$= x(x+2) - 2(x+1) = x^2 + 2x - 2x - 16 = x^2 - 16 = (x-4)(x+4)$$

$$\frac{(x-4)(x+4)}{(x+2)^2} \geq 0$$



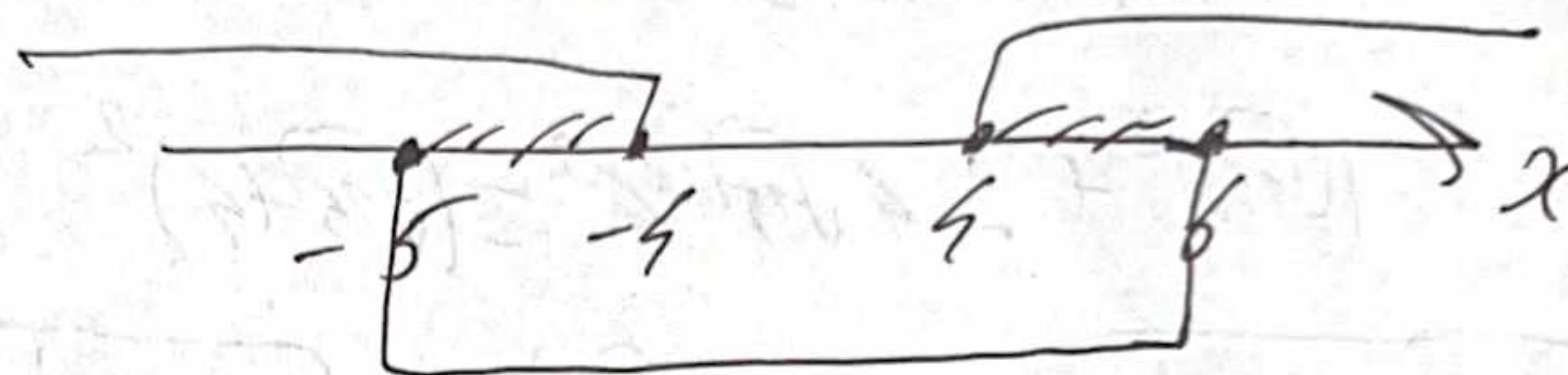
л. чис: $x = 4$ $x = -4$

л. зк: $x = -2$

$x \in [-4, -2] \cup [4, +\infty)$

на $[-5, 6]$

$-5, -4, 4, 5, 6$



Ответ: 4) 5

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

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

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

$(x-3)(x^3 - 3x^2 + 3x - 1 - (x^3 - 6x^2 + 12x - 8) - x) = 0$

$(x-3)(x^3 - 3x^2 + 3x - 1 - x^3 + 6x^2 - 12x + 8 - x) = 0$

$(x-3)(3x^2 - 9x) = 0$

$x(x-3)^2 = 0$

$(x-3) \cdot 3(x^2 - 3x) = 0$

$x = 0$ $x = 3$

$(x-3) \cdot x(x-3) = 0$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$(a-b)^3 = a^3 - b^3 - 3a^2b + 3ab^2$

$\frac{3+0}{3} = 1$

$\frac{3+3+0}{3} = 2$

$$9) \sqrt{x-1} \sqrt{3x+1} = x+3 \quad * \begin{cases} x \geq 1 \\ 3x+1 \geq 0 \Rightarrow 3x \geq -1 \Rightarrow x \geq -\frac{1}{3} \\ x+3 \geq 0 \Rightarrow x \geq -3 \end{cases}$$

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

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

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

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

$$3x^2-2x-1 = x^2+6x+9$$

$$2x^2-8x-10=0$$

$$x^2-4x-5=0$$

$$x_1+x_2=4 \quad x_1=5 \Rightarrow x_0=5$$

$$x_1 x_2 = -5 \quad x_2 = -1 - \text{negy van} *$$

$$\frac{2x_0(x_0-1)}{x_0^2+5} = \frac{2 \cdot 5(5-1)}{5^2+5} = \frac{10 \cdot 4}{25+5} = \frac{40}{30} = \left(\frac{4}{3}\right)$$

$$10) \log_6^2 9 + \frac{\log_6 325}{\log_4 6} = \log_6^2 9 + 2(\log_6 4) \cdot \log_6 5 + \log_6^2 4 =$$

$$\left(\frac{\log_6 325}{\log_6 4} = \frac{\log_6 325 \cdot \log_6 5}{\log_6 5} = \log \log(81 \cdot 4) \cdot \log_6 4 = \log_6 4 (\log_6 81 + \log_6 4) = \right.$$

$$\left. = \log_6 4 \cdot \log_6 81 + \log_6^2 4 = (\log_6 4) \cdot 2 \log_6 9 + \log_6^2 4 \right)$$

$$= (\log_6 9 + \log_6 4)^2 = (\log_6 36)^2 = 2^2 = \left(\frac{4}{1}\right)$$

$$11) (0,6)^{x^2} \cdot (1,5)^{-x^2} = (0,4)^{2x+1}$$

$$\left(\frac{0,6}{1,5}\right)^{x^2} = (0,4)^{2x+1}$$

$$\left(\frac{6}{15}\right)^{x^2} = \left(\frac{4}{10}\right)^{2x+1}$$

$$\left(\frac{2}{5}\right)^{x^2} = \left(\frac{2}{5}\right)^{2x+1}$$

$$x^2 = 2x+1$$

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

$$D = 4 + 4 = 8 \Rightarrow \sqrt{8} = 2\sqrt{2}$$

$$x_1 = \frac{2 + 2\sqrt{2}}{2} = 1 + \sqrt{2}$$

$$x_2 = 1 - \sqrt{2}$$

ЛИСТ ОТВЕТА

$$4) \begin{cases} xy(x+y) = 6 \\ xy(x-y) = 2 \end{cases} \Rightarrow \begin{matrix} (+) \\ (-) \end{matrix}$$

$$xy(x+y) - xy(x-y) = 4$$

$$xy(x+y-x+y) = 4$$

$$xy(2y) = 4$$

$$2xy^2 = 4$$

$$xy^2 = 2$$

$$2y \cdot y = \frac{6}{2y+y}$$

$$2y^2 = \frac{6}{3y}$$

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

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

$$y^2 = \frac{1}{y} = 0$$

$$\frac{y^3 - 1}{y} = 0$$

$$y = 1 \Rightarrow y_0 = 1$$

$$5) \frac{(x+1)^2 - 2x - 17}{(x+2)^2} \geq 0$$

$$xy(x+y) + xy(x-y) = 8$$

$$xy(x+y+x-y) = 8$$

$$xy \cdot (2x) = 8$$

$$2x^2y = 8$$

$$x^2y = 4$$

$$\frac{6}{x+y} = \frac{2}{x-y}$$

$$\frac{6}{x+y} - \frac{2}{x-y} = 0$$

$$\frac{6(x-y) - 2(x+y)}{(x+y)(x-y)} = 0$$

$$\frac{6x - 6y - 2x - 2y}{x^2 - y^2} = 0$$

$$\frac{4x - 8y}{x^2 - y^2} = 0$$

$$\frac{4(x - 2y)}{x^2 - y^2} = 0$$

$$\frac{x - 2y}{x^2 - y^2} = 0$$

$$x = 2y$$

$$x = 2 \Rightarrow x_0 = 2$$

$$\frac{(x+1)^2 - 2x - 17}{(x+2)^2} \geq 0$$

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