

Домашняя работа по алгебре за 9 класс

к учебнику «Алгебра. Учебник для 9 кл.
общеобразовательных учреждений» Ш.А. Алимов,
Ю.М. Колягин, Ю.В. Сидоров и др. — 6-е изд. — М.:
«Просвещение», 2001 г.

учебно-практическое
пособие

СОДЕРЖАНИЕ

Степень с рациональным показателем	4
ГЛАВА IV. Элементы тригонометрии	73
ГЛАВА V. Прогрессия	119

СТЕПЕНЬ С РАЦИОНАЛЬНЫМ ПОКАЗАТЕЛЕМ

62.

1) $2^3 + (-3)^3 - (-2)^2 + (-1)^5 = 8 + (-27) - (4) + (-1) = -24;$

2) $(-7)^2 - (-4)^3 - 3^4 = 49 - (-64) - 81 = 32;$

3) $13 \cdot 2^3 - 9 \cdot 2^3 + 2^3 = 2^3 \cdot (13 - 9 + 1) = 8 \cdot 5 = 40;$

4) $6 \cdot (-2)^3 - 5 \cdot (-2)^3 - (-2)^3 = -2^3 \cdot (6 - 5 - 1) = 0 \cdot (-2^3) = 0.$

63.

1) $\frac{7^2 \cdot 7^{15}}{7^{13}} = \frac{7^{15+2}}{7^{13}} = \frac{7^{17}}{7^{13}} = 7^4;$

2) $\frac{5^3 \cdot 5^{10} \cdot 5}{5^4 \cdot 5^{15}} = \frac{5^{10+3+1}}{5^{15+4}} = \frac{5^{14}}{5^{19}} = \frac{1}{5^5} = \left(\frac{1}{5}\right)^5;$

3) $\frac{a^2 \cdot a^8 \cdot b^3}{a^9 \cdot b^2} = \frac{a^{2+8} \cdot b^3}{a^9 \cdot b^2} = \frac{a^{10} b^3}{a^9 b^2} = ab;$

4) $\frac{c^3 d^5 c^9}{c^{10} d^7} = \frac{c^{12}}{c^{10} d^2} = \frac{c^2}{d^2} = \frac{c^2}{d^2}.$

64.

1) $1^{-5} = \frac{1}{1^5} = 1;$

2) $4^{-3} = \frac{1}{4^3} = \frac{1}{64};$

3) $(-10)^0 = 1;$

4) $(-5)^{-2} = \frac{1}{5^2} = \frac{1}{25};$

5) $\left(\frac{1}{2}\right)^4 = \frac{1}{2^4} = \frac{1}{16};$

6) $\left(\frac{3}{7}\right)^{-1} = \frac{7}{3} = 2\frac{1}{3}.$

65.

1) $\frac{1}{4^5} = \left(\frac{1}{4}\right)^5 = 4^{-5};$

2) $\frac{1}{21^3} = \left(\frac{1}{21}\right)^3 = 21^{-3};$

3) $\frac{1}{x^7} = \left(\frac{1}{x}\right)^7 = x^{-7};$

4) $\frac{1}{a^9} = \left(\frac{1}{a}\right)^9 = a^{-9}.$

66.

$$1) \left(\frac{10}{3}\right)^{-3} = \frac{3^3}{10^3} = \frac{27}{1000} = 0,027; \quad 2) \left(\frac{-9}{11}\right)^{-2} = \frac{11^2}{9^2} = \frac{121}{81} = 1\frac{40}{80};$$
$$3) (0,2)^{-4} = \left(\frac{1}{5}\right)^{-4} = (5)^4 = 625; \quad 4) (0,5)^{-5} = \left(\frac{1}{2}\right)^{-5} = 2^5 = 32;$$
$$5) -(-17)^{-1} = \frac{1}{17}; \quad 6) -(-13)^{-2} = -\frac{1}{13^2} = -\frac{1}{169}.$$

67.

$$1) 3^{-1} + (-2)^{-2} = \frac{1}{3} + \frac{1}{4} = \frac{3+4}{12} = \frac{7}{12};$$
$$2) \left(\frac{2}{3}\right)^{-3} - 4^{-2} = \frac{3^3}{2^3} - \frac{1}{4^2} = \frac{2 \cdot 27 - 1}{16} = \frac{53}{16} = 3\frac{5}{16};$$
$$3) (0,2)^{-2} + (0,5)^{-5} = 5^2 + 2^5 = 25 + 32 = 57;$$
$$4) (-0,1)^{-3} - (-0,2)^{-3} = -\left(\frac{1}{1000}\right)^{-1} + \left(\frac{1}{125}\right)^{-1} = -1000 + 125 = -875.$$

68.

$$1) 12^{-3} = \frac{1}{12^3} < 1; \quad 2) 21^0 = 1;$$
$$3) (0,6)^{-5} = \left(\frac{5}{3}\right)^5 > 1; \quad 4) \left(\frac{5}{19}\right)^{-4} = \left(\frac{19}{5}\right)^4 > 1.$$

69.

$$1) (x-y)^{-2} = \frac{1}{(x-y)^2}; \quad 2) (x+y)^{-3} = \frac{1}{(x+y)^3};$$
$$3) 3b^{-5}c^8 = \frac{3c^8}{b^5}; \quad 4) 9a^3b^{-4} = \frac{9a^3}{b^4};$$
$$5) a^{-1}b^2c^{-3} = \frac{b^2}{ac^3}; \quad 6) a^2b^{-1}c^{-4} = \frac{a^2}{bc^4}.$$

70.

$$1) \left(\frac{1}{7}\right)^{-3} \cdot \left(\frac{1}{7}\right) = \left(\frac{1}{7}\right)^{-2} = 7^2 = 49;$$
$$2) \left(-\frac{1}{5}\right) \cdot \left(-\frac{1}{5}\right)^{-4} = \left(-\frac{1}{5}\right)^{-3} = (-5)^3 = -125;$$

$$3) 0,3^7 \cdot 0,3^{-10} = 0,3^{-3} = \left(\frac{3}{10}\right)^{-3} = \left(\frac{10}{3}\right)^3 = \frac{1000}{27} = 37\frac{1}{27};$$

$$4) 17^{-5} \cdot 17^3 \cdot 17 = 17^{-1} = \frac{1}{17}.$$

71.

$$1) 9^7 : 9^{10} = 9^{-3} = \frac{1}{9^3} = \frac{1}{729};$$

$$2) (0,2)^2 : (0,2)^{-2} = (0,2)^4 = 0,0016;$$

$$3) \left(\frac{2}{13}\right)^{-12} : \left(\frac{2}{13}\right)^{-10} = \left(\frac{2}{13}\right)^{-2} = \frac{13^2}{2^2} = \frac{169}{4} = 42\frac{1}{4};$$

$$4) \left(\frac{2}{5}\right)^3 : \left(\frac{2}{5}\right)^{-1} = \frac{2^4}{5^4} = \frac{16}{625}.$$

72.

$$1) (a^3)^{-5} = a^{-15};$$

$$2) (b^{-2})^{-4} = b^8;$$

$$3) (a^3)^7 = a^{21};$$

$$4) (b^7)^{-4} = a^{-28}.$$

73.

$$1) (ab^{-2})^3 = a^3 b^{-6} = \frac{a^3}{b^6};$$

$$2) (a^2 b^{-1})^4 = a^8 b^{-4} = \frac{a^8}{b^4};$$

$$3) (2a^2)^{-6} = 2^{-6} a^{-12} = \frac{1}{64a^{12}};$$

$$4) (3a^3)^{-4} = 3^{-4} a^{-12} = \frac{1}{81a^{12}}.$$

74.

$$1) \left(\frac{a^8}{b^7}\right)^{-2} = \frac{a^{-16}}{b^{-14}} = \frac{b^{14}}{a^{16}};$$

$$2) \left(\frac{m^{-4}}{n^{-5}}\right)^{-3} = \frac{m^{12}}{n^{15}};$$

$$3) \left(\frac{2x^6}{3y^{-4}}\right)^2 = \frac{2^2 x^{12} y^8}{3^2} = \frac{4x^{12} y^8}{9};$$

$$4) \left(\frac{-4yx^{-5}}{z^3}\right)^3 = \frac{-64y^3 x^{-15}}{z^9} = -\frac{64y^3}{z^9 x^{15}};$$

75.

$$1) (x^2 y^{-2} - 4y^{-2}) \cdot \left(\frac{1}{y}\right)^{-2} = (x^2 - 4) \cdot y^{-2} \cdot y^2 = x^2 - 4,$$

если $x = 5$, то $x^2 = 25$ и $25 - 4 = 21$;

$$2) \left((a^2 b^{-1})^4 - a^0 b^4 \right) : \frac{a^4 - b^4}{b^2} = \left(\frac{a^8}{b^4} - b^4 \right) \cdot \frac{b^2}{a^4 - b^4} = \\ = \frac{(a^8 - b^8)}{b^4} \cdot \frac{b^2}{(a^4 - b^4)} = \frac{(a^4 - b^4)(a^4 + b^4)}{b^2 \cdot (a^4 - b^4)} = \frac{a^4 + b^4}{b^2};$$

если $a = 2$, $b = -3$, то $a^4 = 16$, $b^4 = 81$, $b^2 = 9$ и $\frac{16 + 81}{9} = \frac{97}{9} = 10\frac{7}{9}$.

76.

$$1) 200000^4 = (2 \cdot 10^5)^4 = 2^4 \cdot 10^{20} = 16 \cdot 10^{20} = 1,6 \cdot 10^{21};$$

$$2) 0,0003^3 = (3 \cdot 10^{-4})^3 = 3^3 \cdot 10^{-12} = 27 \cdot 10^{-12} = 2,7 \cdot 10^{-11};$$

$$3) 4000^{-2} = (4 \cdot 10^3)^{-2} = 0,0625 \cdot 10^{-6} = 6,25 \cdot 10^{-8};$$

$$4) 0,002^{-3} = (2 \cdot 10^{-3})^{-3} = 2^{-3} \cdot 10^9 = 0,125 \cdot 10^9 = 1,25 \cdot 10^8.$$

77.

$$1) 0,0000087 = 8,7 \cdot 10^{-6};$$

$$2) 0,00000005086 = 5,086 \cdot 10^{-8};$$

$$3) \frac{1}{125} = 0,008 = 8 \cdot 10^{-3};$$

$$4) \frac{1}{625} = 0,0016 = 1,6 \cdot 10^{-3}.$$

78, 79, 80.

$$3 \cdot 10^{-3} \text{мм} = \frac{3}{1000} \text{мм} = 0,003 \text{мм}; 0,00000000001 \text{с} = 10^{-11} \text{с};$$

$$10^{-4} \text{мм} = 0,0001 \text{мм}.$$

81.

$$1) \frac{a^8 a^{-7}}{a^{-2}} = a^{8-7+2} = a^3,$$

если $a = 0,8$, то $a^3 = 0,512$;

$$2) \frac{a^{15} a^3}{a^{13}} = a^{15+3-13} = a^5,$$

если $a = \frac{1}{2}$, то $a^5 = \left(\frac{1}{2}\right)^5 = \frac{1}{32}$.

82.

$$1) ((-20)^7)^{-7} : ((-20)^{-6})^8 + 2^{-2} = ((-20)^{-49} : (-20)^{-48}) + \frac{1}{4} = \\ = -\frac{1}{20} + \frac{1}{4} = \frac{-1+5}{20} = \frac{1}{5};$$

$$2) ((-17)^{-4})^{-6} : ((-17)^{-13})^{-2} - \left(\frac{1}{17}\right)^{-2} = (-17)^{24} : (-17)^{26} - \\ - \left(\frac{1}{17}\right)^2 = \left(-\frac{1}{17}\right)^2 - \left(\frac{1}{17}\right)^2 = \frac{1}{17^2} - \frac{1}{17^2} = 0.$$

83.

$$1) (1,3)^{-118} \cdot (1,3)^{127} = (1,3)^9 \approx 10,6;$$

$$2) (0,87)^{-74} : (0,87)^{-57} = (0,87)^{-74+57} = (0,87)^{-17} \approx 10,67;$$

$$3) \left(\frac{17}{19}\right)^{-47} : \left(\frac{17}{19}\right)^{-26} = \left(\frac{17}{19}\right)^{-21} = \left(\frac{19}{17}\right)^{21} \approx 10,34;$$

$$4) \left(\frac{23}{21}\right)^{56} \cdot \left(\frac{23}{21}\right)^{-25} = \left(\frac{23}{21}\right)^{31} \approx 16,78.$$

84.

$$1) (786^{-7})^4 = 786^{-28} = 5,8 \cdot 10^{-62};$$

$$2) (923^3)^{-6} = 923^{-18} = 4,23 \cdot 10^{-54};$$

$$3) (1,76)^{-8} \cdot (35,4)^{-8} = (62,3)^{-8} = 2,07 \cdot 10^{-14};$$

$$4) (0,47)^{-5} : (7,81)^{-5} = (0,47 : 7,81)^{-5} = 1,27 \cdot 10^6.$$

85.

$$1) V = (1,54 \cdot 10^{-4})^3 = 3,65 \cdot 10^{-12} \text{ мм}^3;$$

$$2) V = (3,18 \cdot 10^5)^3 = 3,21 \cdot 10^{15} \text{ км}^3.$$

86.

$$1) (a^{-3} + b^{-3}) \cdot (a^{-2} - b^{-2})^{-1} \cdot (a^{-2} - a^{-1}b^{-1} + b^{-2})^{-1} = \left(\frac{1}{a^3} + \frac{1}{b^3}\right) \times \\ \times \left(\frac{1}{a^2} - \frac{1}{b^2}\right)^{-1} \cdot \left(\frac{1}{a^2} - \frac{1}{ab} + \frac{1}{b^2}\right)^{-1} = \frac{b^3 + a^3}{a^3 b^3} \cdot \frac{a^2 b^2}{b^2 - a^2} \cdot \frac{a^2 b^2}{b^2 - ab + a^2} = \\ = \frac{(b^3 + a^3) \cdot a^4 b^4}{a^3 b^3 \cdot (b-a)(b+a)(b^2 - ab + a^2)} = \frac{ab(b^3 + a^3)}{(b-a)(a^3 + b^3)} = \frac{ab}{b-a};$$

$$\begin{aligned}
 & 2) (a^{-2}b - ab^{-2}) \cdot (a^{-2} + a^{-1}b^{-1} + b^{-2})^{-1} = \\
 & = \left(\frac{b}{a^2} - \frac{a}{b^2} \right) \cdot \left(\frac{1}{a^2} + \frac{1}{ab} + \frac{1}{b^2} \right)^{-1} = \\
 & = \frac{b^3 - a^3}{a^2b^2} \cdot \frac{a^2b^2}{b^2 + ab + a^2} = \frac{(b-a)(b^2 + ab + a^2)}{b^2 + ab + a^2} = b - a.
 \end{aligned}$$

87.

$$1) \sqrt[3]{1} = 1; \quad \sqrt[3]{0} = 0; \quad \sqrt[3]{16} = \sqrt[3]{4^2} = 4; \quad \sqrt[3]{169} = \sqrt[3]{13^2} = 13;$$

$$\sqrt{\frac{1}{289}} = \sqrt{\left(\frac{1}{17}\right)^2} = \frac{1}{17};$$

$$2) \sqrt[3]{1} = 1; \quad \sqrt[3]{0} = 0; \quad \sqrt[3]{125} = \sqrt[3]{5^3} = 5; \quad \sqrt[3]{\frac{1}{27}} = \sqrt[3]{\frac{1}{3^3}} = \frac{1}{3};$$

$$\sqrt[3]{0,027} = \sqrt[3]{(0,3)^3} = 0,3; \quad \sqrt[3]{0,064} = \sqrt[3]{(0,4)^3} = 0,4$$

$$3) \sqrt[4]{0} = 0; \quad \sqrt[4]{1} = 1; \quad \sqrt[4]{16} = \sqrt[4]{2^4} = 2; \quad \sqrt[4]{\frac{16}{81}} = \sqrt[4]{\left(\frac{2}{3}\right)^4} = \frac{2}{3};$$

$$\sqrt[4]{\frac{256}{625}} = \sqrt[4]{\left(\frac{4}{5}\right)^4} = \frac{4}{5}; \quad \sqrt[4]{0,0016} = \sqrt[4]{(0,2)^4} = 0,2.$$

88.

$$1) \sqrt[6]{36^3} = \sqrt[6]{(6^2)^3} = \sqrt[6]{6^6} = 6; \quad 2) \sqrt[12]{64^2} = \sqrt[12]{(2^6)^2} = \sqrt[12]{2^{12}} = 2;$$

$$3) \sqrt[4]{\left(\frac{1}{25}\right)^2} = \sqrt[4]{\left(\frac{1}{5}\right)^4} = \frac{1}{5}; \quad 4) \sqrt[8]{225^4} = \sqrt[8]{(15^2)^4} = \sqrt[8]{15^8} = 15.$$

89.

$$1) \sqrt[3]{10^6} = 10^2 = 100; \quad 2) \sqrt[3]{3^{12}} = 3^4 = 81;$$

$$3) \sqrt[4]{\left(\frac{1}{2}\right)^{12}} = \left(\frac{1}{2}\right)^3 = \frac{1}{2^3} = \frac{1}{8};$$

$$4) \sqrt[4]{\left(\frac{1}{3}\right)^{16}} = \left(\frac{1}{3}\right)^4 = \frac{1}{3^4} = \frac{1}{81}.$$

90.

- 1) $\sqrt[3]{-8} = -2$; 2) $\sqrt[15]{-1} = -1$;
3) $\sqrt[3]{-\frac{1}{27}} = -\frac{1}{\sqrt[3]{27}} = -\frac{1}{3}$; 4) $\sqrt[5]{-1024} = -\sqrt[5]{4^5} = -4$;
5) $\sqrt[3]{-34^3} = -34$; 6) $\sqrt[7]{-8^7} = -8$.

91.

- 1) $x^4 = 81$; $x = \pm \sqrt[4]{81} = \pm 3$; $x_1 = 3$; $x_2 = -3$;
2) $x^5 = -\frac{1}{32}$; $x = \sqrt[5]{-\frac{1}{32}} = \sqrt[5]{\left(-\frac{1}{2}\right)^5} = -\frac{1}{2}$;
3) $5x^5 = -160$; $x^5 = -32$; $x = \sqrt[5]{-32} = -2$.
4) $2x^6 = 128$; $x^6 = 64$; $x = \pm \sqrt[6]{64} = \pm 2$; $x_1 = 2$, $x_2 = -2$.

92.

1) $\sqrt[6]{2x-3}$ — имеет смысл, если

$$2x - 3 \geq 0, \text{ тогда } 2x \geq 3, x \geq \frac{3}{2},$$

$$x \geq 1,5.$$

Ответ: $x \in [1,5; +\infty)$.

2) $\sqrt[3]{x+3}$ — имеет смысл для любого x .

3) $\sqrt[3]{2x^2-x-1}$ — имеет смысл для любого x .

4) $\sqrt[4]{\frac{2-3x}{2x-4}}$ — имеет смысл, если: $\frac{2-3x}{2x-4} \geq 0$, т.е. $\begin{cases} 2-3x \geq 0 \\ 2x-4 > 0 \end{cases}$

$$\text{или } \begin{cases} 2-3x \leq 0 \\ 2x-4 < 0 \end{cases}; \begin{cases} x \leq \frac{2}{3} \\ x > 2 \end{cases} \text{ или } \begin{cases} x \geq \frac{2}{3} \\ x < 2 \end{cases}, \text{ поэтому } \begin{cases} x \geq \frac{2}{3} \\ x < 2 \end{cases}$$

Ответ: $x \in [\frac{2}{3}; 2)$.

93.

- 1) $\sqrt[3]{-125} + \frac{1}{8}\sqrt[6]{64} = \sqrt[3]{(-5)^3} + \frac{1}{8} \cdot \sqrt[6]{2^6} = -5 + \frac{1}{8} \cdot 2 = -5 + \frac{1}{4} = -4\frac{3}{4}$;
2) $\sqrt[5]{32} - 0,5 \cdot \sqrt[3]{-216} = \sqrt[5]{2^5} - \frac{1}{2} \sqrt[3]{(-6)^3} = 2 + \frac{6}{2} = 5$;

$$3) -\frac{1}{3}\sqrt[4]{81} + \sqrt[4]{625} = -\frac{1}{3}\sqrt[4]{3^4} + \sqrt[4]{5^4} = -\frac{1}{3} \cdot 3 + 5 = -1 + 5 = 4;$$

$$4) \sqrt[3]{-1000} - \frac{1}{4}\sqrt[4]{256} = \sqrt[3]{(-10)^3} - \frac{1}{4}\sqrt[4]{4^4} = -10 - 1 = -11;$$

$$5) \sqrt[4]{0,0001} - 2 \cdot \sqrt{0,25} + \sqrt[5]{-\frac{1}{32}} = \sqrt[4]{(0,1)^4} - 2\sqrt{0,5^2} + \sqrt[5]{\left(-\frac{1}{2}\right)^5} =$$

$$= 0,1 - 1 - \frac{1}{2} = -1,4;$$

$$6) \sqrt[5]{\frac{1}{243}} + \sqrt[3]{-0,001} - \sqrt[4]{0,0016} = \frac{1}{3} - 0,1 - 0,2 = \frac{1}{3} - 0,3 = \frac{1}{3} - \frac{3}{10} = \frac{10-9}{30} = \frac{1}{30}.$$

94.

$$1) \sqrt{9+\sqrt{17}} \cdot \sqrt{9-\sqrt{17}} = \sqrt{81-17} = \sqrt{64} = 8;$$

$$2) \left(\sqrt{3+\sqrt{5}} - \sqrt{3-\sqrt{5}} \right)^2 = 3 + \sqrt{5} - 2\sqrt{9-5} + 3 - \sqrt{5} = 6 - 4 = 2;$$

$$3) \left(\sqrt{5+\sqrt{21}} + \sqrt{5-\sqrt{21}} \right)^2 = 5 + \sqrt{21} + 2\sqrt{25-21} + 5 - \sqrt{21} =$$

$$= 10 + 4 = 14;$$

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

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

95.

$$1) \sqrt[3]{(x-2)^3} = x-2 \text{ — для любого } x.$$

$$2) \text{ т.к. } \sqrt{(3-x)^6} \geq 0, \text{ то при } x < 3 \sqrt{(3-x)^6} = (3-x)^3$$

$$\text{и при } x \geq 3 \sqrt{(3-x)^6} = -(3-x)^3 = (x-3)^3.$$

96.

$$1987 < \sqrt{n} < 1988; 1987^2 < n < 1988^2, \text{ отсюда}$$

$$3948169 < n < 3952144.$$

Найдем, сколько натуральных чисел между ними
 $3952144 - 3948169 = 3975$, а т.к. $n < 3952144$, то таких чисел 3974.

Ответ: 3974 числа.

97.

- 1) $\sqrt[3]{343 \cdot 0,125} = \sqrt[3]{7^3 \cdot (0,5)^3} = \sqrt[3]{(7 \cdot 0,5)^3} = \sqrt[3]{(3,5)^3} = 3,5;$
- 2) $\sqrt[3]{864 \cdot 216} = \sqrt[3]{3^3 \cdot 2^5 \cdot 2^3 \cdot 3^3} = 3^2 \cdot 2^2 \cdot \sqrt[3]{2^2} = 9 \cdot 4 \sqrt[3]{4} = 36 \cdot \sqrt[3]{4};$
- 3) $\sqrt[4]{256 \cdot 0,0081} = \sqrt[4]{2^8 \cdot (0,3)^4} = 2^2 \cdot 0,3 = 4 \cdot 0,3 = 1,2;$
- 4) $\sqrt[5]{32 \cdot 100000} = \sqrt[5]{2^5 \cdot 10^5} = 2 \cdot 10 = 20.$

98.

- 1) $\sqrt[3]{5^3 \cdot 7^3} = \sqrt[3]{(5 \cdot 7)^3} = \sqrt[3]{35^3} = 35;$
- 2) $\sqrt[4]{11^4 \cdot 3^4} = \sqrt[4]{(11 \cdot 3)^4} = \sqrt[4]{33^4} = 33;$
- 3) $\sqrt[5]{(0,2)^5 \cdot 8^5} = \sqrt[5]{(0,2 \cdot 8)^5} = \sqrt[5]{1,6^5} = 1,6;$
- 4) $\sqrt[7]{\left(\frac{1}{3}\right)^7 \cdot 21^7} = \sqrt[7]{\left(\frac{1}{3} \cdot 21\right)^7} = \sqrt[7]{7^7} = 7.$

99.

- 1) $\sqrt[3]{2} \cdot \sqrt[3]{500} = \sqrt[3]{1000} = \sqrt[3]{10^3} = 10;$
- 2) $\sqrt[3]{0,2} \cdot \sqrt[3]{0,04} = \sqrt[3]{0,008} = \sqrt[3]{0,2^3} = 0,2;$
- 3) $\sqrt[4]{324} \cdot \sqrt[4]{4} = \sqrt[4]{81 \cdot 16} = \sqrt[4]{3^4 \cdot 2^4} = \sqrt[4]{6^4} = 6;$
- 4) $\sqrt[3]{2} \cdot \sqrt[5]{16} = \sqrt[5]{32} = \sqrt[5]{2^5} = 2.$

100.

- 1) $\sqrt[5]{3^{10} \cdot 2^{15}} = 3^2 \cdot 2^3 = 9 \cdot 8 = 72;$
- 2) $\sqrt[3]{2^3 \cdot 5^6} = 2 \cdot 5^2 = 2 \cdot 25 = 50;$
- 3) $\sqrt[4]{3^{12} \cdot \left(\frac{1}{3}\right)^8} = 3^3 \cdot \left(\frac{1}{3}\right)^2 = \frac{27}{9} = 3;$
- 4) $\sqrt[10]{4^{30} \cdot \left(\frac{1}{2}\right)^{20}} = 4^3 \cdot \left(\frac{1}{2}\right)^2 = \frac{64}{4} = 16.$

(101 – 102)

- 1) $\sqrt[3]{64 \cdot x^3 \cdot z^6} = 4xz^2;$
- 2) $\sqrt[4]{a^8 \cdot b^{12}} = a^2b^3;$
- 3) $\sqrt[5]{32 \cdot x^{10} \cdot y^{20}} = 2x^2y^4;$
- 4) $\sqrt[6]{a^{12}b^{18}} = a^2b^3.$

102.

$$1) \sqrt[3]{2ab^2} \cdot \sqrt[3]{4a^2b} = \sqrt[3]{2^3 a^3 b^3} = 2ab; \quad 2) \sqrt[4]{3a^2b^3} \cdot \sqrt[4]{27a^2b} = \sqrt[4]{3^4 a^4 b^4} = 3ab;$$

$$3) \sqrt[4]{\frac{ab}{c}} \cdot \sqrt[4]{\frac{a^3c}{b}} = \sqrt[4]{\frac{a^4bc}{bc}} = a; \quad 4) \sqrt[3]{\frac{16a}{b^2}} \cdot \sqrt[3]{\frac{1}{2ba}} = \sqrt[3]{\frac{16a}{2ab^3}} = \frac{2}{b}.$$

103.

$$1) \sqrt[3]{\frac{64}{125}} = \sqrt[3]{\frac{4^3}{5^3}} = \sqrt[3]{\left(\frac{4}{5}\right)^3} = \frac{4}{5}; \quad 2) \sqrt[4]{\frac{16}{81}} = \sqrt[4]{\left(\frac{2}{3}\right)^4} = \frac{2}{3};$$

$$3) \sqrt[3]{3\frac{3}{8}} = \sqrt[3]{\frac{27}{8}} = \sqrt[3]{\left(\frac{3}{2}\right)^3} = \frac{3}{2}; \quad 4) \sqrt[5]{7\frac{19}{32}} = \sqrt[5]{\frac{243}{32}} = \sqrt[5]{\left(\frac{3}{2}\right)^5} = \frac{3}{2}.$$

104.

$$1) \sqrt[4]{324} : \sqrt[4]{4} = \sqrt[4]{\frac{324}{4}} = \sqrt[4]{81} = \sqrt[4]{3^4} = 3;$$

$$2) \sqrt[3]{128} : \sqrt[3]{2000} = \sqrt[3]{\frac{128}{2 \cdot 10^3}} = \sqrt[3]{\frac{64}{1000}} = \sqrt[3]{\left(\frac{4}{10}\right)^3} = \frac{4}{10} = \frac{2}{5};$$

$$3) \frac{\sqrt[3]{16}}{\sqrt[3]{2}} = \sqrt[3]{\frac{16}{2}} = \sqrt[3]{8} = \sqrt[3]{2^3} = 2; \quad 4) \frac{\sqrt[5]{256}}{\sqrt[5]{8}} = \sqrt[5]{\frac{256}{8}} = \sqrt[5]{32} = \sqrt[5]{2^5} = 2;$$

$$5) (\sqrt{20} - \sqrt{45}) : \sqrt{5} = \sqrt{\frac{20}{5}} - \sqrt{\frac{45}{5}} = \sqrt{4} - \sqrt{9} = 2 - 3 = -1;$$

$$6) (\sqrt[3]{625} - \sqrt[3]{5}) : \sqrt[3]{5} = \sqrt[3]{\frac{625}{5}} - \sqrt[3]{\frac{5}{5}} = \sqrt[3]{125} - 1 = \sqrt[3]{5^3} - 1 = 5 - 1 = 4.$$

105.

$$1) \sqrt[5]{a^6b^7} : \sqrt[5]{ab^2} = \sqrt[5]{\frac{a^6b^7}{ab^2}} = \sqrt[5]{a^5b^5} = ab;$$

$$2) \sqrt[3]{81x^4y} : \sqrt[3]{3xy} = \sqrt[3]{\frac{81x^4y}{3xy}} = \sqrt[3]{27x^3} = \sqrt[3]{3^3x^3} = 3x;$$

$$3) \sqrt[3]{\frac{3x}{y^2}} : \sqrt[3]{\frac{y}{9x^2}} = \sqrt[3]{\frac{27x^3}{y^3}} = \frac{3x}{y};$$

$$4) \sqrt[4]{\frac{2b}{a^3}} : \sqrt[4]{\frac{a}{8b^3}} = \sqrt[4]{\frac{16b^4}{a^4}} = \frac{2b}{a}.$$

106.

$$1) \left(\sqrt[6]{7^3}\right)^2 = \sqrt[6]{7^6} = 7; \quad 2) \left(\sqrt[6]{9}\right)^{-3} = 9^{-\frac{3}{6}} = 9^{-\frac{1}{2}} = \frac{1}{9^{\frac{1}{2}}} = \frac{1}{3};$$

$$3) \left(\sqrt[10]{32}\right)^2 = 32^{\frac{2}{10}} = 32^{\frac{1}{5}} = \sqrt[5]{32} = \sqrt[5]{2^5} = 2;$$

$$4) \left(\sqrt[8]{16}\right)^4 = 16^{\frac{4}{8}} = 16^{\frac{1}{2}} = \frac{1}{16^{\frac{1}{2}}} = \frac{1}{4}.$$

107.

$$1) \sqrt[3]{\sqrt[3]{729}} = \sqrt[6]{3^6} = 3; \quad 2) \sqrt{\sqrt[4]{1024}} = \sqrt[8]{2^{10}} = 2^{\frac{5}{4}} = 4\sqrt{2};$$

$$3) \sqrt[3]{\sqrt[9]{9}} \cdot \sqrt[9]{3^7} = \sqrt[3]{3^2 \cdot 3^7} = \sqrt[3]{3^9} = 3;$$

$$4) \sqrt[4]{\sqrt[3]{25}} \cdot \sqrt[6]{5^5} = \sqrt[12]{25} \cdot \sqrt[12]{5^{10}} = \sqrt[12]{5^2 \cdot 5^{10}} = \sqrt[12]{5^{12}} = 5.$$

108.

$$1) \left(\sqrt[3]{x}\right)^6 = x^{\frac{6}{3}} = x^2; \quad 2) \left(\sqrt[3]{y^2}\right)^3 = \sqrt[3]{y^6} = y^{\frac{6}{3}} = y^2;$$

$$3) \left(\sqrt{a} \cdot \sqrt[3]{b}\right)^6 = a^{\frac{6}{2}} \cdot b^{\frac{6}{3}} = a^3 b^2;$$

$$4) \left(\sqrt[3]{a^2} \cdot \sqrt[4]{b^3}\right)^{12} = a^{\frac{24}{3}} \cdot b^{\frac{36}{4}} = a^8 b^9;$$

$$5) \left(\sqrt[3]{\sqrt{a^2 b}}\right)^6 = \left(a^{\frac{2}{6}} \cdot b^{\frac{1}{6}}\right)^6 = a^2 b;$$

$$6) \left(\sqrt[3]{\sqrt[4]{27a^3}}\right)^4 = \left(27^{\frac{1}{12}} \cdot a^{\frac{3}{12}}\right)^4 = \sqrt[3]{27a^3} = \sqrt[3]{(3a)^3} = 3a.$$

109.

$$1) \sqrt[3]{\frac{3}{2}} \cdot \sqrt[3]{2\frac{1}{4}} = \sqrt[3]{\frac{3}{2} \cdot \frac{9}{4}} = \sqrt[3]{\left(\frac{3}{2}\right)^3} = \frac{3}{2};$$

$$2) \sqrt[4]{\frac{3}{4}} \cdot \sqrt[4]{6\frac{3}{4}} = \sqrt[4]{\frac{3}{4} \cdot \frac{27}{4}} = \sqrt[4]{\left(\frac{3}{2}\right)^4} = \frac{3}{2};$$

$$3) \sqrt[4]{15 \frac{5}{8}} : \sqrt[4]{\frac{2}{5}} = \sqrt[4]{\frac{125}{8} \cdot \frac{5}{2}} = \sqrt[4]{\left(\frac{5}{2}\right)^4} = \frac{5}{2};$$

$$4) \sqrt[3]{11 \frac{1}{4}} : \sqrt[3]{3 \frac{1}{3}} = \sqrt[3]{\frac{45}{4} \cdot \frac{3}{10}} = \sqrt[3]{\frac{27}{8}} = \sqrt[3]{\left(\frac{3}{2}\right)^3} = \frac{3}{2};$$

$$5) \left(\sqrt[3]{\sqrt{27}}\right)^2 = \sqrt[6]{3^6} = 3; 6) \left(\sqrt{\sqrt[3]{16}}\right)^3 = \sqrt[6]{2^{12}} = 2^2 = 4.$$

110.

$$1) \sqrt[3]{\frac{ab^2}{c}} \cdot \sqrt[3]{\frac{a^5b}{c^2}} = \sqrt[3]{\frac{a^6b^3}{c^3}} = \frac{a^2b}{c};$$

$$2) \sqrt[5]{\frac{8a^3}{b^2}} \cdot \sqrt[5]{\frac{4a^7}{b^3}} = \sqrt[5]{\frac{2^5 a^{10}}{b^5}} = \frac{2a^2}{b};$$

$$3) \frac{\sqrt[4]{a^2b^2c} \cdot \sqrt[4]{a^3b^3c^2}}{\sqrt[4]{abc^3}} = \sqrt[4]{\frac{a^2b^2c \cdot a^3b^3c^2}{abc^3}} = \sqrt[4]{a^4b^4} = ab;$$

$$4) \frac{\sqrt[3]{2a^4b} \cdot \sqrt[3]{4ab}}{2b\sqrt[3]{a^2b^2}} = \frac{1}{2b} \sqrt[3]{\frac{2^3 a^5b^2}{a^2b^2}} = \frac{\sqrt[3]{8a^3}}{2b} = \frac{2a}{2b} = \frac{a}{b};$$

$$5) \left(\sqrt[5]{a^3}\right)^5 \cdot \left(\sqrt[3]{b^2}\right)^3 = a^3b^2;$$

$$6) \left(\sqrt[4]{a^3b^3}\right)^4 : \left(\sqrt[3]{ab^2}\right)^3 = \frac{a^3b^3}{ab^2} = a^2b.$$

111.

$$1) \frac{\sqrt[3]{49} \cdot \sqrt[3]{112}}{\sqrt[3]{250}} = \sqrt[3]{\frac{49 \cdot 56}{125}} = \sqrt[3]{\frac{7^2 \cdot 7 \cdot 8}{5^3}} =$$

$$= \sqrt[3]{\frac{7^3 \cdot 2^3}{5^3}} = \sqrt[3]{\left(\frac{14}{5}\right)^3} = 2 \frac{4}{5};$$

$$2) \frac{\sqrt[4]{54} \cdot \sqrt[4]{120}}{\sqrt[4]{5}} = \sqrt[4]{54 \cdot 24} = \sqrt[4]{27 \cdot 2 \cdot 8 \cdot 3} = \sqrt[4]{2^4 \cdot 3^4} = 2 \cdot 3 = 6;$$

$$3) \frac{\sqrt[4]{32}}{\sqrt[4]{2}} + \sqrt[6]{27^2} - \sqrt{\sqrt[3]{64}} = \sqrt[4]{\frac{32}{2}} + 3 - \sqrt[6]{2^6} = \sqrt[4]{16} + 3 - 2 = 2 + 1 = 3;$$

$$4) \sqrt[3]{3\frac{3}{8}} + \sqrt[4]{18} \cdot \sqrt[4]{4\frac{1}{2}} - \sqrt{\sqrt{256}} = \sqrt[3]{\frac{27}{8}} + \sqrt[4]{\frac{2 \cdot 3^2 \cdot 3^2}{2}} - \sqrt[4]{4^4} =$$

$$= \frac{3}{2} + 3 - 4 = \frac{1}{2};$$

$$5) \sqrt[3]{11 - \sqrt{57}} \cdot \sqrt[3]{11 + \sqrt{57}} = \sqrt[3]{11^2 - 57} = \sqrt[3]{121 - 57} = \sqrt[3]{64} = 4;$$

$$6) \sqrt[4]{17 - \sqrt{33}} \cdot \sqrt[4]{17 + \sqrt{33}} = \sqrt[4]{17^2 - 33} = \sqrt[4]{256} = \sqrt[4]{4^4} = 4.$$

112.

$$1) \sqrt[3]{2ab} \cdot \sqrt[3]{4a^2b} \cdot \sqrt[3]{27b} = \sqrt[3]{2^3 \cdot a^3 b^3 \cdot 3^3} = 2 \cdot 3 \cdot ba = 6ab;$$

$$2) \sqrt[4]{abc} \cdot \sqrt[4]{a^3b^2c} \cdot \sqrt[4]{b^5c^2} = \sqrt[4]{a^4b^8c^4} = ab^2c;$$

$$3) \frac{\sqrt[5]{a^3b^2} \cdot \sqrt[5]{3a^2b^3}}{\sqrt[5]{3ab}} = \frac{\sqrt[5]{a^5b^5 \cdot 3}}{\sqrt[5]{3ab}} = \sqrt[5]{a^4b^4};$$

$$4) \frac{\sqrt[4]{8x^2y^5} \cdot \sqrt[4]{4x^3y}}{\sqrt[4]{2xy^2}} = \sqrt[4]{\frac{16 \cdot x^5y^6}{xy^2}} = \sqrt[4]{16x^4y^4} = 2xy.$$

113.

$$1) \sqrt[3]{\sqrt[3]{a^{18}}} + \left(\sqrt[3]{\sqrt[3]{a^4}} \right)^3 = a^{\frac{18}{9}} + a^{\frac{12}{6}} = a^2 + a^2 = 2a^2;$$

$$2) \left(\sqrt[3]{\sqrt[3]{x^2}} \right)^3 + 2 \left(\sqrt[4]{\sqrt{x}} \right)^8 = x^{\frac{6}{6}} + 2x^{\frac{8}{8}} = x + 2x = 3x;$$

$$3) 2\sqrt{\sqrt{a^4b^8}} - \left(\sqrt[3]{\sqrt{a^3b^6}} \right)^2 = 2a^{\frac{4}{4}b^{\frac{8}{4}}} - a^{\frac{6}{6}b^{\frac{12}{6}}} = 2ab^2 - ab^2 = ab^2;$$

$$4) \sqrt[3]{\sqrt{x^6y^{12}}} - \left(\sqrt[5]{xy^2} \right)^5 = \sqrt[6]{x^6y^{12}} - xy^2 = xy^2 - xy^2 = 0;$$

$$5) \left(\sqrt[4]{\sqrt{x^8y^2}} \right)^4 - \left(\sqrt[4]{x^2y^8} \right)^2 = \sqrt[8]{x^{32}y^8} - \sqrt[4]{x^4y^{16}} = \sqrt[8]{(x^4y)^8} - xy^4 =$$

$$= x^4y - xy^4;$$

$$6) \left(\left(\sqrt[5]{\sqrt{a^5a}} \right)^5 - \sqrt[5]{a} \right) : \sqrt[10]{a^2} = \left(a\sqrt[5]{a} - \sqrt[5]{a} \right) : \sqrt[5]{a} = \frac{(a-1)\sqrt[5]{a}}{\sqrt[5]{a}} = a-1.$$

114.

$$1) \sqrt{7} \cdot \sqrt{14} : \sqrt{3} = \sqrt{\frac{98}{3}} \approx 5,72;$$

$$2) \sqrt{6,7} \cdot \sqrt{23} \cdot \sqrt{0,37} = \sqrt{6,7 \cdot 23 \cdot 0,37} = \sqrt{57,017} \approx 7,55;$$

$$3) \sqrt{(1,34)^{-7}} \cdot \sqrt{(0,43)^{-7}} = \sqrt{(1,34 \cdot 0,43)^{-7}} \approx 6,88;$$

$$4) \sqrt{(3,44)^{-9}} : \sqrt{(4,57)^{-9}} = \sqrt{(3,44 \cdot 4,57)^{-9}} \approx 3,59.$$

115.

$$1) \frac{\sqrt{3} \cdot \sqrt[3]{9}}{\sqrt[6]{3}} = \sqrt[6]{\frac{3^3 \cdot 3^4}{3}} = \sqrt[6]{3^6} = 3; 2) \frac{\sqrt[3]{7} \cdot \sqrt[4]{343}}{\sqrt[12]{7}} = \frac{7^{\frac{1}{3}} \cdot 7^{\frac{3}{4}}}{7^{\frac{1}{12}}} = 7^{\frac{13}{12} - \frac{1}{12}} = 7;$$

$$3) (\sqrt[3]{4} - \sqrt[3]{10} + \sqrt[3]{25})(\sqrt[3]{2} + \sqrt[3]{5}) = (\sqrt[3]{2})^3 + (\sqrt[3]{5})^3 = 2 + 5 = 7;$$

$$4) (\sqrt[3]{9} + \sqrt[3]{6} + \sqrt[3]{4})(\sqrt[3]{3} - \sqrt[3]{2}) = (\sqrt[3]{3})^3 - (\sqrt[3]{2})^3 = 3 - 2 = 1.$$

116.

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

$$\sqrt[2]{(4+2\sqrt{3})(4-2\sqrt{3})} = 2;$$

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

$$\left(\sqrt{4+2\sqrt{3}} - \sqrt{4-2\sqrt{3}}\right)^2 = 2^2. \text{ Тогда } \sqrt{4+2\sqrt{3}} - \sqrt{4-2\sqrt{3}} = 2.$$

117.

$$1) \frac{\sqrt{a} - \sqrt{b}}{\sqrt[4]{a} - \sqrt[4]{b}} - \frac{\sqrt{a} + \sqrt[4]{ab}}{\sqrt[4]{a} + \sqrt[4]{b}} = \frac{(\sqrt[4]{a} - \sqrt[4]{b})(\sqrt[4]{a} + \sqrt[4]{b})}{\sqrt[4]{a} - \sqrt[4]{b}} - \frac{\sqrt[4]{a}(\sqrt[4]{a} + \sqrt[4]{b})}{\sqrt[4]{a} + \sqrt[4]{b}} = \\ = \sqrt[4]{a} + \sqrt[4]{b} - \sqrt[4]{a} = \sqrt[4]{b};$$

$$2) \frac{a-b}{\sqrt[3]{a} - \sqrt[3]{b}} + \frac{a+b}{\sqrt[3]{a} + \sqrt[3]{b}} = \frac{(\sqrt[3]{a} - \sqrt[3]{b})(\sqrt[3]{a^2} + \sqrt[3]{ab} + \sqrt[3]{b^2})}{\sqrt[3]{a} - \sqrt[3]{b}} + \\ + \frac{(\sqrt[3]{a} + \sqrt[3]{b})(\sqrt[3]{a^2} - \sqrt[3]{ab} + \sqrt[3]{a^2})}{\sqrt[3]{a} + \sqrt[3]{b}} = \sqrt[3]{a^2} + \sqrt[3]{ab} + \sqrt[3]{b^2} + \\ + \sqrt[3]{a^2} - \sqrt[3]{ab} + \sqrt[3]{a^2} = 2\sqrt[3]{a^2} + 2\sqrt[3]{b^2} = 2(\sqrt[3]{a^2} + \sqrt[3]{b^2});$$

$$3) \frac{1}{\sqrt[4]{a}-\sqrt[4]{b}} - \frac{1}{\sqrt[4]{a}+\sqrt[4]{b}} \cdot (\sqrt{a}-\sqrt{b}) = \left(\frac{\sqrt[4]{a}+\sqrt[4]{b}}{\sqrt{a}-\sqrt{b}} - \frac{\sqrt[4]{a}-\sqrt[4]{b}}{\sqrt{a}-\sqrt{b}} \right) (\sqrt{a}-\sqrt{b}) =$$

$$= \left(\frac{\sqrt[4]{a}+\sqrt[4]{b}}{\sqrt{a}-\sqrt{b}} - \frac{\sqrt[4]{a}-\sqrt[4]{b}}{\sqrt{a}-\sqrt{b}} \right) (\sqrt{a}-\sqrt{b}) = \sqrt[4]{a} - \sqrt[4]{a} + 2\sqrt[4]{b} = 2\sqrt[4]{b};$$

$$4) \left(\frac{a+b}{\sqrt[3]{a}+\sqrt[3]{b}} - \sqrt[3]{ab} \right) : (\sqrt[3]{a}-\sqrt[3]{b})^2 =$$

$$= \frac{(\sqrt[3]{a}+\sqrt[3]{b}) \left(\sqrt[3]{a^2} - \sqrt[3]{ab} + \sqrt[3]{b^2} \right) - \sqrt[3]{ab} (\sqrt[3]{a}+\sqrt[3]{b})}{\sqrt[3]{a}+\sqrt[3]{b}} : (\sqrt[3]{a}-\sqrt[3]{b})^2 =$$

$$= \left(\sqrt[3]{a^2} - \sqrt[3]{ab} + \sqrt[3]{b^2} - \sqrt[3]{ab} \right) : (\sqrt[3]{a}-\sqrt[3]{b})^2 = (\sqrt[3]{a}-\sqrt[3]{b})^2 : (\sqrt[3]{a}-\sqrt[3]{b})^2 =$$

118.

$$1) \sqrt{x^3} = x^{\frac{3}{2}};$$

$$2) \sqrt[3]{a^4} = a^{\frac{4}{3}};$$

$$3) \sqrt[4]{b^3} = b^{\frac{3}{4}};$$

$$4) \sqrt[5]{x^{-1}} = x^{-\frac{1}{5}};$$

$$5) \sqrt[6]{a} = a^{\frac{1}{6}};$$

$$6) \sqrt[7]{b^{-3}} = b^{-\frac{3}{7}}.$$

119.

$$1) x^{\frac{1}{4}} = \sqrt[4]{x};$$

$$2) y^{\frac{2}{5}} = \sqrt[5]{y^2};$$

$$3) a^{-\frac{5}{6}} = \sqrt[6]{a^{-5}};$$

$$4) b^{-\frac{1}{3}} = \sqrt[3]{b^{-1}};$$

$$5) (2x)^{\frac{1}{2}} = \sqrt{2x};$$

$$6) (3b)^{-\frac{2}{3}} = \sqrt[3]{(3b)^{-2}}.$$

120.

$$1) 64^{\frac{1}{2}} = \sqrt{64} = 8;$$

$$2) 27^{\frac{1}{3}} = \sqrt[3]{27} = 3;$$

$$3) 8^{\frac{2}{3}} = \sqrt[3]{64} = 4;$$

$$4) 81^{\frac{3}{4}} = \sqrt[4]{81^3} = 3^3 = 27;$$

$$5) 16^{-\frac{3}{4}} = \sqrt[4]{16^{-3}} = \frac{1}{2^3} = \frac{1}{8};$$

$$6) 9^{-\frac{3}{2}} = \sqrt{9^{-3}} = \frac{1}{3^3} = \frac{1}{27}.$$

121.

$$1) 2^{\frac{4}{5}} \cdot 2^{\frac{11}{5}} = 2^{\frac{15}{5}} = 2^3 = 8;$$

$$2) 5^{\frac{2}{7}} \cdot 5^{\frac{5}{7}} = 5;$$

$$3) 9^{\frac{2}{3}} \cdot 9^{\frac{1}{6}} = 9^{\frac{3}{6}} = 9^{\frac{1}{2}} = 3;$$

$$4) 4^{\frac{1}{3}} \cdot 4^{\frac{5}{6}} = \frac{1}{2};$$

$$5) (7^{-3})^{\frac{2}{3}} = 7^2 = 49;$$

$$6) \left(8^{\frac{1}{12}}\right)^{-4} = 8^{-\frac{1}{3}} = \frac{1}{2}.$$

122.

$$1) 9^{\frac{2}{5}} \cdot 27^{\frac{2}{5}} = 3^{\frac{4}{5}} \cdot 3^{\frac{6}{5}} = 3^{\frac{10}{5}} = 3^2 = 9;$$

$$2) 7^{\frac{2}{3}} \cdot 49^{\frac{2}{3}} = 7^{\frac{2}{3}} \cdot 7^{\frac{4}{3}} = 7^{\frac{6}{3}} = 7^2 = 49;$$

$$3) 144^{\frac{3}{4}} : 9^{\frac{3}{4}} = \left(\frac{144}{9}\right)^{\frac{3}{4}} = 16^{\frac{3}{4}} = 2^3 = 8;$$

$$4) 150^{\frac{3}{2}} : 6^{\frac{3}{2}} = \left(\frac{150}{6}\right)^{\frac{3}{2}} = 25^{\frac{3}{2}} = 5^3 = 125.$$

123.

$$1) \left(\frac{1}{16}\right)^{\frac{3}{4}} + \left(\frac{1}{8}\right)^{\frac{4}{3}} = 2^3 + 2^4 = 8 + 16 = 24;$$

$$2) (0,04)^{\frac{3}{2}} - (0,125)^{\frac{2}{3}} = \left(\frac{1}{25}\right)^{\frac{3}{2}} - \left(\frac{1}{8}\right)^{\frac{2}{3}} = 25^{\frac{3}{2}} - 8^{\frac{2}{3}} = 5^3 - 2^2 = \\ = 125 - 4 = 121;$$

$$3) 8^{\frac{9}{7}} : 8^{\frac{2}{7}} - 3^{\frac{6}{5}} \cdot 3^{\frac{4}{5}} = 8 - 3^2 = 8 - 9 = -1;$$

$$4) (5^{-\frac{2}{5}})^{-5} + ((0,2)_4^3)^{-4} = 5^2 + \left(\frac{1}{5}\right)^{-3} = 25 + 125 = 150.$$

124.

$$1) \sqrt[3]{a} \cdot \sqrt[6]{a} = \sqrt[6]{a^2} \cdot \sqrt[6]{a} = \sqrt[6]{a^3} = \sqrt{a}, \text{ при } a=0,09, \sqrt{a} = \sqrt{0,09} = 0,3;$$

$$2) \sqrt{b} : \sqrt[6]{b} = \sqrt[6]{b^3} : \sqrt[6]{b} = \sqrt[6]{b^2} = \sqrt[3]{b}, \text{ при } b = 27, \sqrt{b} = \sqrt[3]{27} = 3;$$

$$3) \frac{\sqrt{b} \cdot \sqrt[3]{b^2}}{\sqrt[6]{b}} = \frac{\sqrt[6]{b^3} \cdot \sqrt[6]{b^4}}{\sqrt[6]{b}} = \sqrt[6]{b^6} = b = 1,3;$$

$$4) \sqrt[3]{a} \cdot \sqrt[4]{a} \cdot \sqrt[12]{a^5} = \sqrt[12]{a^4} \cdot \sqrt[12]{a^3} \cdot \sqrt[12]{a^5} = \sqrt[12]{a^{12}} = a = 2,7.$$

125.

$$1) a^{\frac{1}{3}} \cdot \sqrt{a} = a^{\frac{1}{3} + \frac{1}{2}} = a^{\frac{5}{6}};$$

$$2) b^{\frac{1}{2}} \cdot b^{\frac{1}{3}} \cdot \sqrt[6]{b} = b^{\frac{5}{6} + \frac{1}{6}} = b^{\frac{6}{6}} = b;$$

$$3) \sqrt[3]{b} : b^{\frac{1}{6}} = b^{\frac{1}{3} - \frac{1}{6}} = b^{\frac{2}{6} - \frac{1}{6}} = b^{\frac{1}{6}};$$

$$4) a^{\frac{4}{3}} : \sqrt[3]{a} = a^{\frac{4}{3} - \frac{1}{3}} = a;$$

$$5) x^{1,7} \cdot x^{2,8} : \sqrt{x^5} = x^{4,5} : x^{2,5} = x^{4,5-2,5} = x^2;$$

$$6) y^{-3,8} : y^{-2,3} \cdot \sqrt{y^3} = y^{-3,8+2,3+\frac{3}{2}} = y^0 = 1.$$

126.

$$1) 2^{2-3\sqrt{5}} \cdot 8^{\sqrt{5}} = 2^{2-3\sqrt{5}+3\sqrt{5}} = 2^2 = 4;$$

$$2) 3^{1+2\sqrt[3]{2}} : 9^{\sqrt[3]{2}} = 3^{1+2\sqrt[3]{2}-2\sqrt[3]{2}} = 3;$$

$$3) 6^{1+2\sqrt{3}} : \left(4^{\sqrt{3}} \cdot 9^{\sqrt{3}}\right) = 6^{1+2\sqrt{3}} : 6^{2\sqrt{3}} = 6^{1+2\sqrt{3}-2\sqrt{3}} = 6;$$

$$4) \left(5^{1+\sqrt{2}}\right)^{1-\sqrt{2}} = 5^{1-2} = 5^{-1} = \frac{1}{5}.$$

127.

$$1) (a^4)^{\frac{3}{4}} \cdot (b^{\frac{2}{3}})^{-6} = a^{-3} \cdot b^4;$$

$$2) \left(\left(\frac{a^6}{b^{-3}} \right)^4 \right)^{\frac{1}{12}} = (a^{24} b^{12})^{\frac{1}{12}} = a^2 b;$$

$$3) \left(\sqrt{x^{0,4} \cdot y^{1,2}} \right)^{10} = (x^{0,2} \cdot y^{0,6})^{10} = x^2 \cdot y^6;$$

$$4) x^{-2\sqrt{2}} \cdot \left(\frac{1}{x^{-\sqrt{2}-1}} \right)^{\sqrt{2}+1} = x^{-2\sqrt{2}} \cdot x^{2+2\sqrt{2}+1} = x^{-2\sqrt{2}+3+2\sqrt{2}} = x^3.$$

128.

$$1) \frac{a^{\frac{4}{3}} \left(a^{-\frac{1}{3}} + a^{\frac{2}{3}} \right)}{a^{\frac{1}{4}} \left(a^{\frac{3}{4}} + a^{-\frac{1}{4}} \right)} = \frac{a^{\frac{4}{3} - \frac{1}{3}} + a^{\frac{4}{3} + \frac{2}{3}}}{a^{\frac{1}{4} + \frac{3}{4}} + a^{\frac{1}{4} - \frac{1}{4}}} = \frac{a + a^2}{a + 1} = \frac{a(a+1)}{a+1} = a;$$

$$2) \frac{b^{\frac{1}{5}} \cdot \left(\sqrt[5]{b^4} - \sqrt[5]{b^{-1}} \right)}{b^{\frac{2}{3}} \left(\sqrt[3]{b} - \sqrt[3]{b^{-2}} \right)} = \frac{b^{\frac{1}{5} + \frac{4}{5}} - b^{\frac{1}{5} - \frac{1}{5}}}{b^{\frac{2}{3} + \frac{1}{3}} - b^{\frac{2}{3} - \frac{2}{3}}} = \frac{b - 1}{b - 1} = 1;$$

$$3) \frac{a^{\frac{5}{3}} \cdot b^{-1} - ab^{-\frac{1}{3}}}{\sqrt[3]{a^2} - \sqrt[3]{b^2}} = \frac{ab^{-1} \left(a^{\frac{2}{3}} - b^{\frac{2}{3}} \right)}{a^{\frac{2}{3}} - b^{\frac{2}{3}}} = \frac{a}{b};$$

$$4) \frac{a^{\frac{1}{3}} \sqrt[6]{b} + b^{\frac{1}{3}} \sqrt[6]{a}}{\sqrt[6]{a} + \sqrt[6]{b}} = \frac{a^{\frac{1}{3}} b^{\frac{1}{6}} \left(b^{\frac{1}{6} - \frac{1}{3}} + a^{\frac{1}{6} - \frac{1}{3}} \right)}{a^{\frac{1}{6}} + b^{\frac{1}{6}}} = \frac{a^{\frac{1}{3}} b^{\frac{1}{6}} \left(b^{-\frac{1}{6}} + a^{-\frac{1}{6}} \right)}{a^{\frac{1}{6}} + b^{\frac{1}{6}}} = a^{\frac{1}{3}} b^{\frac{1}{6}}.$$

129.

$$1) \left(2^{\frac{5}{3}} \cdot 3^{-\frac{1}{3}} - 3^{\frac{5}{3}} \cdot 2^{-\frac{1}{3}} \right) \cdot \sqrt[3]{6} = 2^{\frac{1}{3}} \cdot 3^{-\frac{1}{3}} (2^2 - 3^2) \cdot \sqrt[3]{2} \cdot \sqrt[3]{3} = \\ = \frac{4-9}{\sqrt[3]{2} \cdot \sqrt[3]{3}} \cdot \sqrt[3]{2} \cdot \sqrt[3]{3} = -5;$$

$$2) \left(5^{\frac{1}{4}} \cdot 2^{\frac{3}{4}} - 2^{\frac{1}{4}} \cdot 5^{\frac{3}{4}} \right) \cdot \sqrt[4]{1000} = \left(\frac{5^4}{2^4} - \frac{2^4}{5^4} \right) \cdot \sqrt[4]{10^3} = \frac{5-2}{10^4} \cdot 10^{\frac{3}{4}} = 3;$$

$$3) \left(2^{\sqrt{2}} \right)^{\sqrt{2}} + \left(3^{\sqrt{3}+1} \right)^{\left(\sqrt{3}-1 \right)} = 2^2 + 3^{3-1} = 2^2 + 3^2 = 4 + 9 = 13;$$

$$4) \left((0,5)^{\frac{3}{5}} \right)^{-5} - (4^{-0,3})^{\frac{5}{3}} = \left(\frac{1}{2} \right)^{-3} - 4^{\frac{1}{2}} = 8 - 2 = 6.$$

130.

$$1) a^{\frac{1}{9}} \cdot \sqrt[6]{a^3 \sqrt{a}} = a^{\frac{1}{9}} \left(a a^{\frac{1}{3}} \right)^{\frac{1}{6}} = a^{\frac{1}{9}} \left(a^{\frac{4}{3}} \right)^{\frac{1}{6}} = a^{\frac{1}{9} + \frac{2}{9}} = a^{\frac{1}{3}};$$

$$2) \left(\sqrt[3]{ab^{-2}} + (ab)^{-\frac{1}{6}} \right) \cdot \sqrt[6]{ab^4} = \left(a^{\frac{1}{3}b^{-\frac{2}{3}} + a^{-\frac{1}{6}b^{-\frac{1}{6}}} \right) a^{\frac{1}{6}} \cdot b^{\frac{2}{3}} = \\ = a^{\frac{1}{2}} + b^{\frac{1}{2}} = \sqrt{a} + \sqrt{b};$$

$$3) b^{\frac{1}{12}} \cdot \sqrt[3]{b^4 \sqrt{b}} = b^{\frac{1}{12}} \left(b b^{\frac{1}{4}} \right)^{\frac{1}{3}} = b^{\frac{1}{12}} \left(b^{\frac{5}{4}} \right)^{\frac{1}{3}} = b^{\frac{1}{12}} \cdot b^{\frac{5}{12}} = b^{\frac{1}{2}} = \sqrt{b};$$

$$4) \left(\sqrt[3]{a} + \sqrt[3]{b} \right) \left(a^{\frac{2}{3}} + b^{\frac{2}{3}} - \sqrt[3]{ab} \right) = \left(\sqrt[3]{a} + \sqrt[3]{b} \right) \left((\sqrt[3]{a})^2 + (\sqrt[3]{b})^2 - \sqrt[3]{a} \sqrt[3]{b} \right) = \\ = (\sqrt[3]{a})^3 + (\sqrt[3]{b})^3 = a + b.$$

131.

$$1) \frac{x-y}{x^{\frac{1}{2}} + y^{\frac{1}{2}}} = \frac{\left(x^{\frac{1}{2}} + y^{\frac{1}{2}} \right) \left(x^{\frac{1}{2}} - y^{\frac{1}{2}} \right)}{x^{\frac{1}{2}} + y^{\frac{1}{2}}} = x^{\frac{1}{2}} - y^{\frac{1}{2}};$$

$$2) \frac{\sqrt{a} - \sqrt{b}}{a^{\frac{1}{4}} - b^{\frac{1}{4}}} = \frac{\left(a^{\frac{1}{4}} - b^{\frac{1}{4}} \right) \left(a^{\frac{1}{4}} + b^{\frac{1}{4}} \right)}{a^{\frac{1}{4}} - b^{\frac{1}{4}}} = a^{\frac{1}{4}} + b^{\frac{1}{4}};$$

$$3) \frac{m^{\frac{1}{2}} + n^{\frac{1}{2}}}{m + 2\sqrt{mn} + n} = \frac{m^{\frac{1}{2}} + n^{\frac{1}{2}}}{\left(m^{\frac{1}{2}} + n^{\frac{1}{2}} \right)^2} = \frac{1}{m^{\frac{1}{2}} + n^{\frac{1}{2}}};$$

$$4) \frac{c - 2c^{\frac{1}{2}} + 1}{\sqrt{c} - 1} = \frac{\left(c^{\frac{1}{2}} - 1 \right)^2}{c^{\frac{1}{2}} - 1} = c^{\frac{1}{2}} - 1.$$

132.

$$1) \left(1 - 2\sqrt{\frac{b}{a}} + \frac{b}{a}\right) : \left(a^{\frac{1}{2}} - b^{\frac{1}{2}}\right)^2 = \left(1 - \sqrt{\frac{b}{a}}\right)^2 \cdot \frac{1}{(\sqrt{a} - \sqrt{b})^2} =$$

$$= \frac{(\sqrt{a} - \sqrt{b})^2}{a \cdot (\sqrt{a} - \sqrt{b})^2} = \frac{1}{a};$$

$$2) \left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right) : \left(2 + \sqrt[3]{\frac{a}{b}} + \sqrt[3]{\frac{b}{a}}\right) = (\sqrt[3]{a} + \sqrt[3]{b}) : \frac{\sqrt[3]{a^2} + 2\sqrt[3]{ab} + \sqrt[3]{b^2}}{\sqrt[3]{ab}} =$$

$$= \frac{\sqrt[3]{ab}(\sqrt[3]{a} + \sqrt[3]{b})}{(\sqrt[3]{a} + \sqrt[3]{b})^2} = \frac{\sqrt[3]{ab}}{\sqrt[3]{a} + \sqrt[3]{b}};$$

$$3) \frac{a^{\frac{1}{4}} - a^{\frac{9}{4}}}{a^4 - a^4} - \frac{b^{\frac{1}{2}} - b^{\frac{3}{2}}}{b^2 + b^{\frac{1}{2}}} = \frac{(1 - a^2)a^{\frac{1}{4}}}{(1 - a)a^4} - \frac{(1 - b^2)b^{\frac{1}{2}}}{(1 + b)b^{\frac{1}{2}}} =$$

$$= 1 + a - (1 - b) = a + b;$$

$$4) \frac{\sqrt{a} - a^{-\frac{1}{2}}b}{1 - \sqrt{a^{-1}}b} - \frac{\sqrt[3]{a^2} - a^{-\frac{1}{3}}b}{\sqrt[6]{a} + a^{-\frac{1}{3}}\sqrt{b}} = \frac{(a - b)a^{-\frac{1}{2}}}{\sqrt{a} - \sqrt{b}} - \frac{(a - b)a^{-\frac{1}{3}}}{\sqrt{a} + \sqrt{b}}$$

$$= \frac{a - b}{\sqrt{a} - \sqrt{b}} - \frac{a - b}{\sqrt{a} + \sqrt{b}} = \frac{(a - b)(\sqrt{a} + \sqrt{b})}{a - b} - \frac{(\sqrt{a} - \sqrt{b})(a - b)}{a - b} =$$

$$= \sqrt{a} + \sqrt{b} - \sqrt{a} + \sqrt{b} = 2\sqrt{b}.$$

133.

$$1) \frac{a^{\frac{3}{2}}}{\sqrt{a} + \sqrt{b}} - \frac{ab^{\frac{1}{2}}}{\sqrt{b} - \sqrt{a}} - \frac{2a^2 - 4ab}{a - b} = \frac{a^{\frac{3}{2}}}{\sqrt{a} + \sqrt{b}} + \frac{b^{\frac{1}{2}}a}{\sqrt{a} - \sqrt{b}} -$$

$$- \frac{2a^2 - 4ab}{(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})} = \frac{a^{\frac{3}{2}}(\sqrt{a} - \sqrt{b}) + ab^{\frac{1}{2}}(\sqrt{a} + \sqrt{b}) - 2a^2 + 4ab}{(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})} =$$

$$= \frac{a^2 - a^{\frac{3}{2}}b^{\frac{1}{2}} + a^{\frac{3}{2}}\sqrt{b} + ab - 2a^2 + 4ab}{a - b} = \frac{5ab - a^2}{a - b};$$

$$\begin{aligned}
2) \quad & \frac{3xy - y^2}{x - y} - \frac{y\sqrt{y}}{\sqrt{x} - \sqrt{y}} - \frac{y\sqrt{x}}{\sqrt{x} + \sqrt{y}} = \\
& = \frac{3xy - y^2}{(\sqrt{x} - \sqrt{y})(\sqrt{x} + \sqrt{y})} - \frac{y\sqrt{y}}{\sqrt{x} - \sqrt{y}} - \\
& - \frac{y\sqrt{x}}{\sqrt{x} + \sqrt{y}} = \frac{3xy - y^2 - y\sqrt{y}(\sqrt{x} + \sqrt{y}) - y\sqrt{x}(\sqrt{x} - \sqrt{y})}{x - y} = \\
& = \frac{3xy - y^2 - y^{\frac{3}{2}}\sqrt{x} - y^2 - yx + y^{\frac{3}{2}}\sqrt{x}}{x - y} = \frac{2xy - 2y^2}{x - y} = \frac{2y(x - y)}{x - y} = 2y; \\
3) \quad & \frac{1}{\sqrt[3]{a} + \sqrt[3]{b}} - \frac{\sqrt[3]{a} + \sqrt[3]{b}}{a^{\frac{2}{3}} - \sqrt[3]{ab} + b^{\frac{2}{3}}} = \frac{a^{\frac{2}{3}} - \sqrt[3]{ab} + b^{\frac{2}{3}} - (\sqrt[3]{a} + \sqrt[3]{b})(\sqrt[3]{a} + \sqrt[3]{b})}{a + b} = \\
& = \frac{\sqrt[3]{a^2} - \sqrt[3]{ab} + \sqrt[3]{b^2} - \sqrt[3]{a^2} - 2\sqrt[3]{ab} - \sqrt[3]{b^2}}{a + b} = \frac{-3\sqrt[3]{ab}}{a + b}; \\
4) \quad & \frac{\sqrt[3]{a^2} - \sqrt[3]{b^2}}{\sqrt[3]{a} - \sqrt[3]{b}} - \frac{a - b}{a^{\frac{2}{3}} + \sqrt[3]{ab} + b^{\frac{2}{3}}} = \frac{(\sqrt[3]{a} - \sqrt[3]{b})(\sqrt[3]{a} - \sqrt[3]{b})}{\sqrt[3]{a} - \sqrt[3]{b}} - \\
& - \frac{(\sqrt[3]{a} - \sqrt[3]{b}) \cdot (\sqrt[3]{a} + \sqrt[3]{ab} + \sqrt[3]{b^2})}{\sqrt[3]{a} + \sqrt[3]{ab} + \sqrt[3]{b^2}} = \sqrt[3]{a} + \sqrt[3]{b} - \sqrt[3]{a} + \sqrt[3]{b} = 2\sqrt[3]{b}.
\end{aligned}$$

134.

$$\begin{aligned}
1) \quad & \frac{(a - b)}{\sqrt[3]{a} - \sqrt[3]{b}} - \frac{a + b}{a^{\frac{1}{3}} + b^{\frac{1}{3}}} = \frac{(\sqrt[3]{a^2} + \sqrt[3]{ab} + \sqrt[3]{b^2})(\sqrt[3]{a} - \sqrt[3]{b})}{\sqrt[3]{a} - \sqrt[3]{b}} - \\
& - \frac{(\sqrt[3]{a^2} - \sqrt[3]{ab} + \sqrt[3]{b^2})(\sqrt[3]{a} + \sqrt[3]{b})}{\sqrt[3]{a} + \sqrt[3]{b}} = \\
& = \sqrt[3]{a^2} + \sqrt[3]{ab} + \sqrt[3]{b^2} - \sqrt[3]{a^2} + \sqrt[3]{ab} - \sqrt[3]{b^2} = 2\sqrt[3]{ab};
\end{aligned}$$

$$2) \frac{a+b}{a^{\frac{2}{3}} - a^{\frac{1}{3}}b^{\frac{1}{3}} + b^{\frac{2}{3}}} - \frac{a-b}{a^{\frac{2}{3}} + a^{\frac{1}{3}}b^{\frac{1}{3}} + b^{\frac{2}{3}}} = \frac{\left(a^{\frac{2}{3}} - a^{\frac{1}{3}}b^{\frac{1}{3}} + b^{\frac{2}{3}} \right) \left(a^{\frac{1}{3}} + b^{\frac{1}{3}} \right)}{a^{\frac{2}{3}} - a^{\frac{1}{3}}b^{\frac{1}{3}} + b^{\frac{2}{3}}} - \frac{\left(a^{\frac{2}{3}} + a^{\frac{1}{3}}b^{\frac{1}{3}} + b^{\frac{2}{3}} \right) \left(a^{\frac{1}{3}} - b^{\frac{1}{3}} \right)}{a^{\frac{2}{3}} + a^{\frac{1}{3}}b^{\frac{1}{3}} + b^{\frac{2}{3}}} = a^{\frac{1}{3}} + b^{\frac{1}{3}} - \left(a^{\frac{1}{3}} - b^{\frac{1}{3}} \right) = 2b^{\frac{1}{3}};$$

$$3) \frac{a^{\frac{2}{3}} + b^{\frac{2}{3}}}{a-b} - \frac{1}{a^{\frac{1}{3}} - b^{\frac{1}{3}}} = \frac{a^{\frac{2}{3}} + b^{\frac{2}{3}} - \left(a^{\frac{2}{3}} + a^{\frac{1}{3}}b^{\frac{1}{3}} + b^{\frac{2}{3}} \right)}{a-b} = \frac{\sqrt[3]{ab}}{b-a};$$

$$4) \frac{a^{\frac{1}{3}} - b^{\frac{1}{3}}}{a+b} + \frac{1}{a^{\frac{2}{3}} - a^{\frac{1}{3}}b^{\frac{1}{3}} + b^{\frac{2}{3}}} = \frac{a^{\frac{1}{3}} - b^{\frac{1}{3}} + a^{\frac{1}{3}} + b^{\frac{1}{3}}}{a+b} = \frac{2\sqrt[3]{a}}{a+b}.$$

135.

$$1) \sqrt[3]{3} + \sqrt[3]{4} \approx 3,02; \quad 2) \sqrt[3]{7} + \sqrt[3]{10} \approx 2,04; \quad 3) 5^{\sqrt{3}} \approx 16,24;$$

$$4) (\sqrt[3]{2})^{\sqrt{3}} \approx 1,49; \quad 5) \pi^{\pi} \approx 36,46.$$

136.

$$1) 2^{\frac{1}{3}} < 3^{\frac{1}{3}}; \quad 2) 5^{-\frac{4}{5}} < 3^{-\frac{4}{5}}, \quad \text{т.к. } \frac{1}{\sqrt[5]{5^4}} < \frac{1}{\sqrt[5]{3^4}};$$

$$3) 5^{\sqrt{3}} < 7^{\sqrt{3}}; \quad 4) 21^{-\sqrt{2}} > 31^{-\sqrt{2}}, \quad \text{т.к. } \frac{1}{21^{\sqrt{2}}} > \frac{1}{31^{\sqrt{2}}}.$$

137.

$$1) (0,88)^{\frac{1}{6}} > \left(\frac{6}{11} \right)^{\frac{1}{6}}, \quad \text{т.к. } \frac{88}{100} > \frac{6}{11}, \text{ и } \left(\frac{88}{100} \right)^{\frac{1}{6}} > \left(\frac{6}{11} \right)^{\frac{1}{6}};$$

$$2) \left(\frac{5}{12} \right)^{\frac{1}{4}} < (0,41)^{\frac{1}{4}}, \quad \text{т.к. } \frac{12}{5} < \frac{100}{41} \text{ и } \left(\frac{12}{5} \right)^{\frac{1}{4}} < \left(\frac{100}{41} \right)^{\frac{1}{4}};$$

$$3) (4,09)^{\sqrt[3]{2}} < \left(4\frac{3}{25}\right)^{\sqrt[3]{2}}, \text{ т.к. } \left(4,09 < 4\frac{3}{25}\right);$$

$$4) \left(\frac{11}{12}\right)^{-\sqrt{5}} > \left(\frac{12}{13}\right)^{-\sqrt{5}}, \text{ т.к. } \frac{12}{11} > \frac{13}{12} \text{ и } \left(\frac{12}{11}\right)^{\sqrt{5}} > \left(\frac{13}{12}\right)^{\sqrt{5}}.$$

138.

$$1) 6^{2x} = 6^{\frac{1}{5}}.$$

$$2) 3^x = 27;$$

$$\text{Тогда } 2x = \frac{1}{5}.$$

$$3^x = 3^3;$$

$$\text{Отсюда } x = \frac{1}{10}.$$

$$x = 3.$$

$$3) 7^{1-3x} = 7^{10}.$$

$$4) 2^{2x+1} = 32,$$

$$\text{Поэтому } 1 - 3x = 10,$$

$$2^{2x+1} = 2^5.$$

$$x = -3.$$

$$\text{Тогда } 2x + 1 = 5, x = 2.$$

$$5) 4^{2+x} = 1;$$

$$6) \left(\frac{1}{5}\right)^{4x-3} = 5,$$

$$4^{2+x} = 4^0.$$

$$5^{3-4x} = 5,$$

$$\text{Поэтому } 2 + x = 0,$$

$$3 - 4x = 1,$$

$$x = -2.$$

$$x = \frac{1}{2}.$$

139.

$$1) \sqrt[7]{\left(\frac{1}{2} - \frac{1}{3}\right)^2} = \sqrt[7]{\left(\frac{3-2}{6}\right)^2} = \left(\frac{1}{6}\right)^{\frac{2}{7}};$$

$$\sqrt[7]{\left(\frac{1}{3} - \frac{1}{4}\right)^2} = \sqrt[7]{\left(\frac{4-3}{12}\right)^2} = \left(\frac{1}{12}\right)^{\frac{2}{7}}$$

$$\text{т.к. } \frac{1}{6} > \frac{1}{12}, \text{ а } \frac{2}{7} > 0,$$

$$\text{то } \sqrt[7]{\left(\frac{1}{2} - \frac{1}{3}\right)^2} > \sqrt[7]{\left(\frac{1}{3} - \frac{1}{4}\right)^2}.$$

$$2) \sqrt[5]{\left(1\frac{1}{4}-1\frac{1}{5}\right)^3} \quad \text{и} \quad \sqrt[5]{\left(1\frac{1}{6}-1\frac{1}{7}\right)^3};$$

$$\sqrt[5]{\left(1\frac{1}{4}-1\frac{1}{5}\right)^3} = \sqrt[5]{\left(\frac{25-24}{20}\right)^3} = \left(\frac{1}{20}\right)^{\frac{3}{5}};$$

$$\sqrt[5]{\left(1\frac{1}{6}-1\frac{1}{7}\right)^3} = \sqrt[5]{\left(\frac{49-48}{42}\right)^3} = \left(\frac{1}{42}\right)^{\frac{3}{5}};$$

т.к. $\frac{1}{20} > \frac{1}{42}$, а $\frac{3}{5} > 0$,

то $\sqrt[5]{\left(1\frac{1}{4}-1\frac{1}{5}\right)^3} > \sqrt[5]{\left(1\frac{1}{6}-1\frac{1}{7}\right)^3}$.

140.

1) $3^{2-y} = 27$, $3^{2-y} = 3^3$. Тогда $2 - y = 3$ и $y = -1$.

2) $3^{5-2x} = 1$; $3^{5-2x} = 3^0$. Поэтому $5 - 2x = 0$ и $x = 2,5$.

3) $9^{\frac{1}{2}x-1} - 3 = 0$; $9^{\frac{1}{2}x-1} = 3$; $3^{2\left(\frac{1}{2}x-1\right)} = 3$. Тогда $x - 2 = 1$ и $x = 3$.

4) $27^{3-\frac{1}{3}y} - 81 = 0$; $3^{3\left(3-\frac{1}{3}y\right)} = 3^4$. Тогда $9 - y = 4$ и $y = 5$.

141.

1) $\left(\frac{1}{9}\right)^{2x-5} = 3^{5x-8}$; $\left(3^{-2}\right)^{2x-5} = 3^{5x-8}$;

$$3^{-4x+10} = 3^{5x-8}$$

Тогда $10 - 4x = 5x - 8$,

$9x = 18$ и $x = 2$.

2) $2^{4x-9} = \left(\frac{1}{2}\right)^{x-4}$; $2^{4x-9} = 2^{-x+4}$.

Поэтому $4x - 9 = -x + 4$,

$5x = 13$ и $x = 2,6$.

3) $8^x \cdot 4^{x+13} = \frac{1}{16}$;

$$2^{3x} \cdot 2^{2x+26} = 2^{-4}$$

Тогда $3x + 2x + 26 = -4$, $5x = -30$; $x = -6$.

$$4) \frac{25^{x-2}}{\sqrt{5}} = \left(\frac{1}{5}\right)^{x-7,5};$$

$$5^{2x-4-\frac{1}{2}} = 5^{-x+7,5}.$$

Тогда $2x - 4,5 = -x + 7,5$,

$3x = 12$ и $x = 4$.

142.

$$1) \left(\frac{1}{\sqrt{3}}\right)^{2x+1} = (3\sqrt{3})^x,$$

$$\left(3^{\frac{1}{2}}\right)^{2x+1} = 3^{\frac{3}{2}x},$$

$$3^{-x-\frac{1}{2}} = 3^{\frac{3x}{2}}.$$

Тогда $-x - \frac{1}{2} = \frac{3}{2}x$,

$$-2,5x = 0,5$$

и $x = -\frac{1}{5}$.

$$3) 9^{3x+4} \cdot \sqrt{3} = \frac{27^{x-1}}{\sqrt{3}},$$

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

$$3^{6x+8+1} = 3^{3x-3}.$$

Тогда $6x + 9 = 3x - 3$,

$3x = -12$ и $x = -4$.

143.

$$1) \log_7 49 = \log_7 7^2 = 2;$$

$$3) \log_{\frac{1}{2}} 4 = \log_{\frac{1}{2}} \left(\frac{1}{2}\right)^{-2} = -2;$$

$$2) (\sqrt[3]{2})^{x-1} = \left(\frac{2}{\sqrt[3]{2}}\right)^{2x},$$

$$2^{\frac{x-1}{3}} = 2^{\frac{4x}{3}}.$$

Поэтому $\frac{x-1}{3} = \frac{4}{3}x$,

$$x - 1 = 4x,$$

$$3x = -1$$

и $x = -\frac{1}{3}$.

$$4) \frac{8}{(\sqrt{2})^x} = 4^{3x-2} \sqrt{2},$$

$$\frac{2^3}{2^{\frac{1}{2}x}} = 2^{2(3x-2)} \cdot 2^{\frac{1}{2}}.$$

Тогда $3 - \frac{1}{2}x = 2(3x-2) + \frac{1}{2}$,

$$6\frac{1}{2}x = 6\frac{1}{2}$$

и $x = 1$.

$$2) \log_2 64 = \log_2 2^6 = 6;$$

$$4) \log_3 \frac{1}{27} = \log_3 3^{-3} = -3.$$

144.

1) $\lg 23 \approx 1,4$; 2) $\lg 131 \approx 2,1$; 3) $40 \lg 2 \approx 12$; 4) $57 \lg 3 \approx 27,2$.

146.

$$1) 10^{2x-1} = 7, 2x-1 = \lg 7, x = \frac{1+\lg 7}{2}, x \approx 0,92;$$

$$2) 10^{1-3x} = 6, 1-3x = \lg 6,$$

$$x = \frac{1+\lg 6}{3}, x \approx 0,07.$$

146.

$$1) (0,175)^0 + (0,36)^{-2} - 1^{\frac{4}{3}} = 1 + \left(\frac{100}{36}\right)^2 - 1 = \left(\frac{25}{9}\right)^2 = \frac{625}{81};$$

$$2) 1^{-0,43} - (0,008)^{\frac{1}{3}} + (15,1)^0 = 1 - \left(\frac{1000}{8}\right)^{\frac{1}{3}} + 1 =$$
$$= 2 - \sqrt[3]{\frac{10^3}{2^3}} = 2 - \frac{10}{2} = -3;$$

$$3) \left(\frac{4}{5}\right)^{-2} - \left(\frac{1}{27}\right)^{\frac{1}{3}} + 4 \cdot 379^0 = \left(\frac{5}{4}\right)^2 - \sqrt[3]{\frac{1}{27}} + 4 = \frac{25}{16} - \frac{1}{3} + 4 =$$
$$= \frac{25}{16} + \frac{11}{3} = \frac{251}{48} = 5\frac{11}{48};$$

$$4) (0,125)^{-\frac{1}{3}} + \left(\frac{3}{4}\right)^2 - (1,85)^0 = \frac{1}{\sqrt[3]{0,125}} + \frac{9}{16} - 1 = \frac{1}{0,5} + \frac{9}{16} - 1 =$$
$$= \frac{9}{16} + 2 - 1 = 1\frac{9}{16}.$$

147.

$$1) 9,3 \cdot 10^{-6} : (3,1 \cdot 10^{-5}) = \frac{9,3 \cdot 10^{-6}}{3,1 \cdot 10^{-5}} = 3 \cdot 10^{-1} = 0,3;$$

$$2) 1,7 \cdot 10^{-6} \cdot 3 \cdot 10^7 = 5,1 \cdot 10 = 51;$$

$$3) 8,1 \cdot 10^{16} \cdot 2 \cdot 10^{-14} = 16,2 \cdot 10^2 = 1620;$$

$$4) 6,4 \cdot 10^5 : (1,6 \cdot 10^7) = \frac{6,4 \cdot 10^5}{1,6 \cdot 10^7} = \frac{4}{10^2} = 0,04;$$

$$5) 2 \cdot 10^{-1} + \left(6^0 - \frac{1}{6}\right)^{-1} \cdot \left(\frac{1}{3}\right)^{-2} \cdot \left(\frac{1}{3}\right)^3 \cdot \left(-\frac{1}{4}\right)^{-1} = \frac{1}{5} + \frac{6}{5} \cdot \frac{3^2}{3^3} \cdot (-4) = \\ = \frac{1}{5} + \frac{2 \cdot (-4) \cdot 3}{5 \cdot 3} = \frac{1}{5} - \frac{8}{5} = -\frac{7}{5} = -1,4;$$

$$6) 3 \cdot 10^{-1} - \left(8^0 - \frac{1}{8}\right)^{-1} \cdot \left(\frac{1}{4}\right)^{-3} \cdot \left(\frac{1}{4}\right)^4 \cdot \left(\frac{5}{7}\right)^{-1} = \frac{3}{10} - \frac{8}{7} \cdot \frac{1}{4} \cdot \frac{7}{5} = \\ = \frac{3}{10} - \frac{2}{5} = \frac{3-4}{10} = -0,1.$$

148.

$$1) \left(\frac{x^{\frac{1}{3}} \cdot x^{\frac{5}{6}}}{x^{\frac{1}{6}}}\right)^{-2} = \left(\frac{x^{\frac{2}{6}} \cdot x^{\frac{5}{6}}}{x^{\frac{1}{6}}}\right)^{-2} = \left(\frac{x^{\frac{7}{6}}}{x^{\frac{1}{6}}}\right)^{-2} = x^{-2} = \frac{1}{x^2},$$

$$\text{при } x = \frac{7}{9} \cdot \frac{1}{x^2} = \frac{81}{49} = 1\frac{32}{49};$$

$$2) \left(\frac{a^{\frac{2}{3}} \cdot a^{\frac{1}{9}}}{a^{\frac{-2}{9}}}\right)^{-3} = \left(\frac{a^{\frac{6}{9}} \cdot a^{\frac{1}{9}}}{a^{\frac{-2}{9}}}\right)^{-3} = \left(a^{\frac{7}{9}} \cdot a^{\frac{2}{9}}\right)^{-3} = (a)^{-3} = \frac{1}{a^3},$$

$$\text{при } a = 0,1, a^3 = 0,001, \frac{1}{a^3} = 1000.$$

149.

$$1) \left(\sqrt[3]{125x} - \sqrt[3]{8x}\right) - \left(\sqrt[3]{27x} - \sqrt[3]{64x}\right) = \left(5\sqrt[3]{x} - 2\sqrt[3]{x}\right) - \left(3\sqrt[3]{x} - 4\sqrt[3]{x}\right) = 4\sqrt[3]{x};$$

$$2) \left(\sqrt[4]{x} + \sqrt[4]{16x}\right) + \left(\sqrt[4]{81x} - \sqrt[4]{625x}\right) = \\ = \sqrt[4]{x} + 2\sqrt[4]{x} + 3\sqrt[4]{x} - 5\sqrt[4]{x} = \sqrt[4]{x};$$

$$3) \left(\frac{3}{\sqrt{1+a}} + \sqrt{1-a}\right) : \frac{3 + \sqrt{1-a^2}}{\sqrt{1+a}} = \frac{(3 + \sqrt{1-a^2})\sqrt{1+a}}{\sqrt{1+a}(3 + \sqrt{1-a^2})} = 1;$$

$$4) \left(1 - \frac{x}{\sqrt{x^2 - y^2}}\right) : \left(\sqrt{x^2 - y^2} - x\right) = \frac{\sqrt{x^2 - y^2} - x}{\sqrt{x^2 - y^2}(\sqrt{x^2 - y^2} - x)} = \frac{1}{\sqrt{x^2 - y^2}}.$$

150.

1) $7^{5x-1} = 49$; $7^{5x-1} = 7^2$.

Тогда $5x - 1 = 2$; $5x = 3$ и $x = \frac{3}{5}$.

2) $(0,2)^{1-x} = 0,04$; $(0,2)^{1-x} = (0,2)^2$.

Поэтому $1 - x = 2$ и $x = -1$.

3) $\left(\frac{1}{7}\right)^{3x+3} = 7^{2x}$; $7^{-3x-3} = 7^{2x}$.

Значит, $-3x - 3 = 2x$; $-5x = 3$ и $x = -\frac{3}{5}$.

4) $3^{5x-7} = \left(\frac{1}{3}\right)^{2x}$; $3^{5x-7} = 3^{-2x}$.

Отсюда, $5x - 7 = -2x$; $7x = 7$ и $x = 1$.

Проверь себя

1.

1) $3^{-5} : 3^{-7} - 2^{-2} \cdot 2^4 + \left(\left(\frac{2}{3}\right)^{-1}\right)^3 = 3^2 - 2^2 + \frac{27}{8} = 9 - 4 + 3\frac{3}{8} = 8\frac{3}{8}$;

2) $\sqrt[5]{3^{10} \cdot 32} - \frac{\sqrt[3]{48}}{\sqrt[3]{2} \cdot \sqrt[3]{3}} = 3^2 \cdot 2 - \sqrt[3]{8} = 18 - 2 = 16$;

3) $25^{\frac{3}{2}} \cdot 25^{-1} + \left(5^3\right)^{\frac{2}{3}} : 5^3 - 48^{\frac{2}{3}} : 6^{\frac{2}{3}} = \sqrt{25} + 5^{-1} - 8^{\frac{2}{3}} =$
 $= 5 + \frac{1}{5} - 4 = 1,2$.

2.

$8600 = 8,6 \cdot 10^3$;

$0,0078 = 7,8 \cdot 10^{-3}$;

1) $8,6 \cdot 10^3 \cdot 7,8 \cdot 10^{-3} = 67,08$; 2) $8,6 \cdot 10^3 : 7,8 \cdot 10^{-3} = \frac{43}{39} \cdot 10^6$.

3.

1) $\frac{3x^{-9} \cdot 2x^5}{x^{-4}} = 6$; 2) $(x^{-1} + y^{-1}) \cdot \left(\frac{1}{xy}\right)^{-2} = \frac{y+x}{xy} \cdot (xy)^2 = (x+y)xy$.

4.

$$\frac{a^{\frac{5}{3}}}{\sqrt[3]{a^2 \cdot a^4}} = a^{\frac{5}{3}} \cdot a^{-\frac{2}{3}} \cdot a^{-\frac{3}{4}} = a \cdot a^{-\frac{3}{4}} = a^{1-\frac{3}{4}} = a^{\frac{1}{4}}, \text{ при } a = 81, \text{ то } a^{\frac{1}{4}} = 3.$$

5.

а) $(0,78)^{\frac{2}{3}} > (0,67)^{\frac{2}{3}}$, т.к. $0,78 > 0,67$, и показатель степени $\frac{2}{3} > 0$;

б) $(3,09)^{-\frac{1}{3}} < (3,08)^{-\frac{1}{3}}$, т.к. $3,09 > 3,08$, и показатель $-\frac{1}{3} < 0$.

151.

$$1) \left(\frac{1}{16}\right)^{-\frac{3}{4}} + 10000^{\frac{1}{4}} - \left(7\frac{19}{32}\right)^{\frac{1}{5}} = (16)^{\frac{3}{4}} + 10 - \left(\frac{243}{32}\right)^{\frac{1}{5}} = 2^3 + 10 - \frac{3}{2} = \\ = 8 + 10 - \frac{3}{2} = 16,5;$$

$$2) (0,001)^{-\frac{1}{3}} - 2^{-2} \cdot 64^{\frac{2}{3}} - 8^{-\frac{1}{3}} = 1000^{\frac{1}{3}} - \frac{1}{4} \cdot \sqrt[3]{64^2} - \left(\frac{1}{8}\right)^{\frac{4}{3}} = \\ = 10 - \frac{16}{4} - 3\sqrt{\left(\frac{1}{8}\right)^4} = 10 - 4 - \frac{1}{16} = 5\frac{15}{16};$$

$$3) 27^{\frac{2}{3}} - (-2)^{-2} + \left(3\frac{3}{8}\right)^{\frac{1}{3}} = \sqrt[3]{27^2} - \frac{1}{4} + \sqrt[3]{\frac{8}{27}} = 9 - \frac{1}{4} + \frac{2}{3} = 9\frac{5}{12};$$

$$4) (-0,5)^{-4} - 625 - \left(2\frac{1}{4}\right)^{-\frac{1}{2}} = 16 - 625 - \sqrt{\left(\frac{4}{9}\right)^3} = \\ = 16 - 625 - \frac{8}{27} = -609\frac{8}{27}.$$

152.

1) $\sqrt[4]{x^2 - 4}$ — имеет смысл, если выполнено $x^2 - 4 \geq 0$,
т.е. $(x-2)(x+2) \geq 0$.



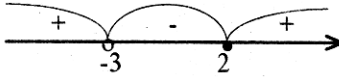
Ответ: $x \in (-\infty; -2] \cup [2; +\infty)$.

2) $\sqrt[3]{x^2 - 5x + 6}$ – имеет смысл для любого x .

Ответ: $x \in (-\infty; +\infty)$.

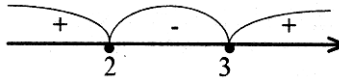
3) $\sqrt[6]{\frac{x-2}{x+3}}$ – имеет смысл, если $\frac{x-2}{x+3} \geq 0$, при этом $x+3 \neq 0$

т.е. $x \neq -3$.



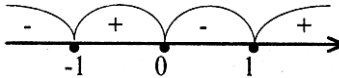
Ответ: $x \in (-\infty; -3) \cup [2; +\infty)$.

4) $\sqrt[4]{x^2 - 5x + 6}$ – имеет смысл, если $x^2 - 5x + 6 \geq 0$, тогда $(x-3)(x-2) \geq 0$.



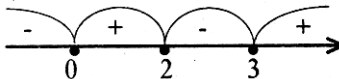
Ответ: $x \in (-\infty; +2] \cup [3; +\infty)$.

5) $\sqrt[8]{x^3 - x}$ – имеет смысл, если $x^3 - x \geq 0$, поэтому $x(x-1)(x+1) \geq 0$.



Ответ: $x \in [-1; 0] \cup [1; +\infty)$

6) $\sqrt[6]{x^3 - 5x^2 + 6x}$ – имеет смысл, если $x^3 - 5x^2 + 6x \geq 0$, тогда $x \cdot (x-3)(x-2) \geq 0$.



Ответ: $x \in [0; 2] \cup [3; +\infty)$.

153.

$$1) \frac{a^{\frac{1}{4}} - a^{-\frac{7}{4}}}{a^{\frac{1}{4}} - a^{-\frac{3}{4}}} = \frac{a^{-\frac{7}{4}}(a^2 - 1)}{a^{-\frac{3}{4}}(a-1)} = \frac{a^{-1}(a+1)(a-1)}{(a-1)} = \frac{a+1}{a} = 1 + \frac{1}{a};$$

$$2) \frac{a^{\frac{4}{3}} - a^{-\frac{2}{3}}}{a^{\frac{1}{3}} - a^{-\frac{2}{3}}} = \frac{a^{-\frac{2}{3}}(a^2 - 1)}{a^{\frac{1}{3}}(a-1)} = \frac{(a+1)(a-1)}{(a-1)} = a+1;$$

$$3) \frac{b^{\frac{5}{4}} + 2b^{\frac{1}{4}} + b^{-\frac{3}{4}}}{b^{\frac{3}{4}} + b^{-\frac{1}{4}}} = \frac{b^{-\frac{3}{4}}(b^2 + 2b + 1)}{b^{-\frac{1}{4}}(b+1)} = \frac{(b+1)^2}{\sqrt{b}(b+1)} = \frac{b+1}{\sqrt{b}};$$

$$4) \frac{a^{-\frac{4}{3}}b^{-2} - a^{-2}b^{-\frac{4}{3}}}{a^{-\frac{5}{3}}b^{-2} - a^{-2}b^{-\frac{5}{3}}} = \frac{a^{-2}b^{-2}(a^{\frac{2}{3}} - b^{\frac{2}{3}})}{a^{-2}b^{-2}(a^{\frac{1}{3}} - b^{\frac{1}{3}})} = \frac{(a^{\frac{1}{3}} + b^{\frac{1}{3}})(a^{\frac{1}{3}} - b^{\frac{1}{3}})}{a^{\frac{1}{3}} - b^{\frac{1}{3}}} =$$

$$= a^{\frac{1}{3}} + b^{\frac{1}{3}} = \sqrt[3]{a} + \sqrt[3]{b};$$

$$5) \frac{\sqrt{a^3b^{-1}} - \sqrt{a^{-1}b^3}}{\sqrt{ab^{-1}} - \sqrt{a^{-1}b}} = \frac{\frac{\sqrt{a^3}}{\sqrt{b}} - \frac{\sqrt{b^3}}{\sqrt{a}}}{\frac{\sqrt{a}}{\sqrt{b}} - \frac{\sqrt{b}}{\sqrt{a}}} =$$

$$= \frac{\frac{\sqrt{a^4} - \sqrt{b^4}}{\sqrt{ab}}}{\frac{\sqrt{a^2} - \sqrt{b^2}}{\sqrt{ab}}} = \frac{\sqrt{a^4} - \sqrt{b^4}}{\sqrt{a^2} - \sqrt{b^2}} =$$

$$= \frac{a^2 - b^2}{a - b} = \frac{(a+b)(a-b)}{a-b} = a + b;$$

$$6) \frac{a^{\frac{3}{4}}b^{\frac{1}{4}} - a^{-\frac{1}{4}}b^{\frac{3}{4}}}{a^{\frac{1}{4}}b^{\frac{1}{4}} + a^{-\frac{1}{4}}b^{\frac{1}{4}}} = \frac{a^{-\frac{1}{4}}b^{-\frac{1}{4}}(a-b)}{a^{-\frac{1}{4}}b^{-\frac{1}{4}}\left(a^{\frac{1}{2}} + b^{\frac{1}{2}}\right)} = \frac{(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})}{\sqrt{a} + \sqrt{b}} =$$

$$= \sqrt{a} - \sqrt{b};$$

$$7) \left(\frac{1 + \sqrt{ab}}{\sqrt[4]{ab}} + \frac{\sqrt[4]{a^3b} - \sqrt[4]{ab^3}}{\sqrt{b} - \sqrt{a}} \right)^{-2} \cdot \left(1 + \frac{b}{a} + 2\sqrt{\frac{b}{a}} \right)^{\frac{1}{2}} =$$

$$= \left(\frac{(1 + \sqrt{ab})(\sqrt{b} - \sqrt{a}) + \sqrt[4]{ab}(\sqrt[4]{a^3b} - \sqrt[4]{ab^3})}{\sqrt[4]{ab} \cdot (\sqrt{b} - \sqrt{a})} \right)^{-2} \cdot \left(\left(1 + \sqrt{\frac{b}{a}} \right)^2 \right)^{\frac{1}{2}} =$$

$$= \sqrt{ab} \cdot \frac{\sqrt{a} + \sqrt{b}}{\sqrt{a}} = (\sqrt{a} + \sqrt{b}) \cdot \sqrt{b};$$

$$\begin{aligned}
& 8) \left(\frac{a+b}{\sqrt[3]{a^2} - \sqrt[3]{b^2}} + \frac{\sqrt[3]{ab^2} - \sqrt[3]{a^2b}}{\sqrt[3]{a^2} - 2\sqrt[3]{ab} + \sqrt[3]{b^2}} \right) : (\sqrt[6]{a} - \sqrt[6]{b}) = \\
& = \left(\frac{(\sqrt[3]{a} + \sqrt[3]{b})(\sqrt[3]{a^2} - \sqrt[3]{ab} + \sqrt[3]{b^2})}{(\sqrt[3]{a} - \sqrt[3]{b})(\sqrt[3]{a} + \sqrt[3]{b})} + \frac{\sqrt[3]{ab}(\sqrt[3]{b} - \sqrt[3]{a})}{(\sqrt[3]{a} - \sqrt[3]{b})^2} \right) : (\sqrt[6]{a} - \sqrt[6]{b}) = \\
& = \left(\frac{\sqrt[3]{a^2} - \sqrt[3]{ab} + \sqrt[3]{b^2}}{\sqrt[3]{a} - \sqrt[3]{b}} - \frac{\sqrt[3]{ab}}{\sqrt[3]{a} - \sqrt[3]{b}} \right) : (\sqrt[6]{a} - \sqrt[6]{b}) = \\
& = \frac{\sqrt[3]{a^2} - 2\sqrt[3]{ab} + \sqrt[3]{b^2}}{\sqrt[3]{a} - \sqrt[3]{b}} : (\sqrt[6]{a} - \sqrt[6]{b}) = \frac{(\sqrt[3]{a} - \sqrt[3]{b})^2}{(\sqrt[3]{a} - \sqrt[3]{b})(\sqrt[6]{a} - \sqrt[6]{b})} = \\
& = \frac{\sqrt[3]{a} - \sqrt[3]{b}}{\sqrt[6]{a} - \sqrt[6]{b}} = \frac{(\sqrt[6]{a} + \sqrt[6]{b})(\sqrt[6]{a} - \sqrt[6]{b})}{\sqrt[6]{a} - \sqrt[6]{b}} = \sqrt[6]{a} + \sqrt[6]{b}.
\end{aligned}$$