Домашняя работа по алгебре за 9 класс

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пособие

СОДЕРЖАНИЕ

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

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

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

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

64.

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

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

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

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

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

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

65.

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

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

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

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

66.

1) $\left(\frac{10}{3}\right)^{-3} = \frac{3^3}{10^3} = \frac{27}{1000} = 0{,}027$; 2) $\left(\frac{-9}{11}\right)^{-2} = \frac{11^2}{9^2} = \frac{121}{81} = 1\frac{40}{80}$;

3) $(0{,}2)^{-4} = \left(\frac{1}{5}\right)^{-4} = (5)^4 = 625$; 4) $(0{,}5)^{-5} = \left(\frac{1}{2}\right)^{-5} = 2^5 = 32$;

5) $-(-17)^{-1} = \frac{1}{17}$; 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) $12^{-3} = \frac{1}{12^3} < 1$; 2) $21^0 = 1$;

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

69.

1) $(x-y)^{-2} = \frac{1}{(x-y)^2}$; 2) $(x+y)^{-3} = \frac{1}{(x+y)^3}$;

3) $3b^{-5}c^8 = \frac{3c^8}{b^5}$; 4) $9a^3 b^{-4} = \frac{9a^3}{b^4}$;

5) $a^{-1}b^2c^{-3} = \frac{b^2}{ac^3}$; 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) $\left(a^3\right)^{-5} = a^{-15}$;

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

3) $\left(a^3\right)^7 = a^{-21}$;

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

73.

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

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

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

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

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

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

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

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

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) $200000^4=(2\cdot10^5)^4=2^4\cdot10^{20}=16\cdot10^{20}=1{,}6\cdot10^{21}$;
2) $0{,}0003^3=(3\cdot10^{-4})^3=3^3\cdot10^{-12}=27\cdot10^{-12}=2{,}7\cdot10^{-11}$;
3) $4000^{-2}=(4\cdot10^3)^{-2}=0{,}0625\cdot10^{-6}=6.25\cdot10^{-8}$;
4) $0{,}002^{-3}=(2\cdot10^{-3})^{-3}=2^{-3}\cdot10^9=0{,}125\cdot10^9=1{,}25\cdot10^8$.

77.

1) $0{,}0000087=8{,}7\cdot10^{-6}$;
2) $0{,}00000005086=5{,}086\cdot10^{-8}$;
3) $\frac{1}{125}=0{,}008=8\cdot10^{-3}$;
4) $\frac{1}{625}=0{,}0016=1.6\cdot10^{-3}$.

78, 79, 80.

$3\cdot10^{-3}$мм $=\frac{3}{1000}$ мм $=0{,}003$мм; $0{,}00000000001$с $=10^{-11}$с; 10^{-4}мм $=0{,}0001$мм.

81.

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

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

$= -\frac{1}{20} + \frac{1}{4} = \frac{-1+5}{20} = \frac{1}{5};$

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

$-\left(\frac{1}{17}\right)^2 = \left(-\frac{1}{17}\right)^2 - \left(\frac{1}{17}\right)^2 = \frac{1}{17^2} - \frac{1}{17^2} = 0.$

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

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

86.

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

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

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

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

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

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

87.

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

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

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

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

89.

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

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

$x\ge 1{,}5$.

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: $\frac{2-3x}{2x-4}\ge 0$, т.е. $\begin{cases}2-3x\ge 0\\2x-4>0\end{cases}$

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

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

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

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

96.

$1987<\sqrt{n}<1988$; $1987^2<n<1988^2$, 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) $\sqrt[5]{2} \cdot \sqrt[5]{16} = \sqrt[5]{32} = \sqrt[5]{2^5} = 2.$

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) $\sqrt[4]{a^8 \cdot b^{12}} = a^2 b^3;$

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

102.

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

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

103.

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

3) $\sqrt[3]{3\frac{3}{8}}=\sqrt[3]{\frac{27}{8}}=\sqrt[3]{\left(\frac{3}{2}\right)^3}=\frac{3}{2}$; 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) $\sqrt[3]{128}:\sqrt[3]{2000}=\sqrt[3]{\frac{128}{2\cdot10^3}}=\sqrt[3]{\frac{64}{1000}}=\sqrt[3]{\left(\frac{4}{10}\right)^3}=\frac{4}{10}=\frac{2}{5}$;

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

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

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

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

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

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

107.

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

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

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

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

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

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

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

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) $\frac{\sqrt[3]{49}\cdot\sqrt[3]{112}}{\sqrt[3]{250}}=\sqrt[3]{\frac{49\cdot56}{125}}=\sqrt[3]{\frac{7^2\cdot7\cdot8}{5^3}}=$

$=\sqrt[3]{\frac{7^3\cdot2^3}{5^3}}=\sqrt[3]{\left(\frac{14}{5}\right)^3}=2\frac{4}{5}$;

2) $\frac{\sqrt[4]{54}\cdot\sqrt[4]{120}}{\sqrt[4]{5}}=\sqrt[4]{54\cdot24}=\sqrt[4]{27\cdot2\cdot8\cdot3}=\sqrt[4]{2^4\cdot3^4}=2\cdot3=6$;

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

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

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

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

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

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

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

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

116.

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

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

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

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

117.

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

$=\sqrt[4]{a}+\sqrt[4]{b}-\sqrt[4]{a}=\sqrt[4]{b}$;

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

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

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

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

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

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) $16^{-\frac{3}{4}}=\sqrt[4]{16^{-3}}=\dfrac{1}{2^3}=\dfrac{1}{8}$;
6) $9^{-\frac{3}{2}}=\sqrt{9^{-3}}=\dfrac{1}{3^3}=\dfrac{1}{27}$.

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

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

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

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

124.

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

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

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

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

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

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

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

127.

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

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

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

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

128.

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

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

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

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

129.

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

$=\dfrac{4-9}{\sqrt[3]{2}\cdot\sqrt[3]{3}}\cdot\sqrt[3]{2}\cdot\sqrt[3]{3}=-5;$

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

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

130.

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

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

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

$= \left(\sqrt[3]{a}\right)^3 + \left(\sqrt[3]{b}\right)^3 = a + b.$

131.

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

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

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

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

132.

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

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

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

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

3) $\frac{a^{\frac{1}{4}}-a^{\frac{9}{4}}}{a^{\frac{1}{4}}-a^{\frac{5}{4}}}-\frac{b^{-\frac{1}{2}}-b^{\frac{3}{2}}}{b^{\frac{1}{2}}+b^{-\frac{1}{2}}}=\frac{\left(1-a^2\right)a^{\frac{1}{4}}}{(1-a)a^{\frac{1}{4}}}-\frac{\left(1-b^2\right)b^{-\frac{1}{2}}}{(1+b)b^{-\frac{1}{2}}}=$

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

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

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

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

133.

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

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

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

2) $\dfrac{3xy-y^2}{x-y}-\dfrac{y\sqrt{y}}{\sqrt{x}-\sqrt{y}}-\dfrac{y\sqrt{x}}{\sqrt{x}+\sqrt{y}}=$

$=\dfrac{3xy-y^2}{\left(\sqrt{x}-\sqrt{y}\right)\left(\sqrt{x}+\sqrt{y}\right)}-\dfrac{y\sqrt{y}}{\sqrt{x}-\sqrt{y}}-$

$-\dfrac{y\sqrt{x}}{\sqrt{x}+\sqrt{y}}=\dfrac{3xy-y^2-y\sqrt{y}\left(\sqrt{x}+\sqrt{y}\right)-y\sqrt{x}\left(\sqrt{x}-\sqrt{y}\right)}{x-y}=$

$=\dfrac{3xy-y^2-y^{\frac{3}{2}}\sqrt{x}-y^2-yx+y^{\frac{3}{2}}\sqrt{x}}{x-y}=\dfrac{2xy-2y^2}{x-y}=\dfrac{2y(x-y)}{x-y}=2y;$

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

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

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

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

134.

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

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

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

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

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

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

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

135.

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

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

136.

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

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

137.

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

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

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

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

138.

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

Тогда $2x = \frac{1}{5}$.

Отсюда $x = \frac{1}{10}$.

2) $3^x = 27$;

$3^x = 3^3$;

$x = 3$.

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

Поэтому $1 - 3x = 10$,
$x = -3$.

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

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

Тогда $2x + 1 = 5$, $x = 2$.

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

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

Поэтому $2 + x = 0$,

$x = -2$.

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

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

$3 - 4x = 1$,

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

139.

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

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

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

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

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

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

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

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

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

Тогда $2x - 4,5 = -x + 7,5$,
$3x = 12$ и $x = 4$.

142.

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

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

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

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

$-2,5x = 0,5$

и $x = -\dfrac{1}{5}$.

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

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

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

$x - 1 = 4x$,

$3x = -1$

и $x = -\dfrac{1}{3}$.

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

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

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

Тогда $6x + 9 = 3x - 3$,

$3x = -12$ и $x = -4$.

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

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

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

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

и $x = 1$.

143.

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

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

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

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

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

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

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

146.

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

2) $1^{-0{,}43} - (0{,}008)^{\frac{1}{3}} + (15{,}1)^0 = 1 - \left(\dfrac{1000}{8}\right)^{\frac{1}{3}} + 1 =$

$= 2 - \sqrt[3]{\dfrac{10^3}{2^3}} = 2 - \dfrac{10}{2} = -3$;

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

$= \dfrac{25}{16} + \dfrac{11}{3} = \dfrac{251}{48} = 5\dfrac{11}{48}$;

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

$= \dfrac{9}{16} + 2 - 1 = 1\dfrac{9}{16}$.

147.

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

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

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

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

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

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

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

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

4.

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

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

$= 10 - \frac{16}{4} - \sqrt[3]{\left(\frac{1}{8}\right)^4} = 10 - 4 - \frac{1}{16} = 5\frac{15}{16};$

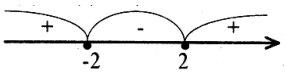
3) $27^{\frac{2}{3}} - (-2)^{-2} + \left(3\frac{3}{8}\right)^{-\frac{1}{3}} = \sqrt[3]{27^2} - \frac{1}{4} + \sqrt[3]{\frac{8}{27}} = 9 - \frac{1}{4} + \frac{2}{3} = 9\frac{5}{12};$

4) $(-0.5)^{-4} - 625 - \left(2\frac{1}{4}\right)^{-1\frac{1}{2}} = 16 - 625 - \sqrt{\left(\frac{4}{9}\right)^3} =$

$= 16 - 625 - \frac{8}{27} = -609\frac{8}{27}.$

152.

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



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

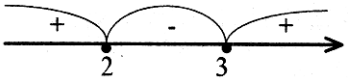
2) $\sqrt[3]{x^2-5x+6}$ – имеет смысл для любого x.

Ответ: $x\in(-\infty;+\infty)$.

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

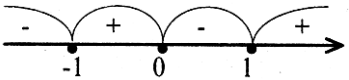
Ответ: $x\in(-\infty;-3)\cup[2;+\infty)$.

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



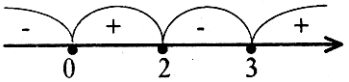
Ответ: $x\in(-\infty;+2]\cup[3;+\infty)$.

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

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

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

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

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

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

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

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

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

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

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

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

$=\sqrt{ab}\cdot\dfrac{\sqrt{a}+\sqrt{b}}{\sqrt{a}}=\left(\sqrt{a}+\sqrt{b}\right)\cdot\sqrt{b}$;

8) $\left(\dfrac{a+b}{\sqrt[3]{a^2}-\sqrt[3]{b^2}}+\dfrac{\sqrt[3]{ab^2}-\sqrt[3]{a^2b}}{\sqrt[3]{a^2}-2\sqrt[3]{ab}+\sqrt[3]{b^2}}\right):\left(\sqrt[6]{a}-\sqrt[6]{b}\right)=$

$=\left(\dfrac{\left(\sqrt[3]{a}+\sqrt[3]{b}\right)\left(\sqrt[3]{a^2}-\sqrt[3]{ab}+\sqrt[3]{b^2}\right)}{\left(\sqrt[3]{a}-\sqrt[3]{b}\right)\left(\sqrt[3]{a}+\sqrt[3]{b}\right)}+\dfrac{\sqrt[3]{ab}\left(\sqrt[3]{b}-\sqrt[3]{a}\right)}{\left(\sqrt[3]{a}-\sqrt[3]{b}\right)^2}\right):\left(\sqrt[6]{a}-\sqrt[6]{b}\right)=$

$=\left(\dfrac{\sqrt[3]{a^2}-\sqrt[3]{ab}+\sqrt[3]{b^2}}{\sqrt[3]{a}-\sqrt[3]{b}}-\dfrac{\sqrt[3]{ab}}{\sqrt[3]{a}-\sqrt[3]{b}}\right):\left(\sqrt[6]{a}-\sqrt[6]{b}\right)=$

$=\dfrac{\sqrt[3]{a^2}-2\sqrt[3]{ab}+\sqrt[3]{b^2}}{\sqrt[3]{a}-\sqrt[3]{b}}:\left(\sqrt[6]{a}-\sqrt[6]{b}\right)=\dfrac{\left(\sqrt[3]{a}-\sqrt[3]{b}\right)^2}{\left(\sqrt[3]{a}-\sqrt[3]{b}\right)\left(\sqrt[6]{a}-\sqrt[6]{b}\right)}=$

$=\dfrac{\sqrt[3]{a}-\sqrt[3]{b}}{\sqrt[6]{a}-\sqrt[6]{b}}=\dfrac{\left(\sqrt[6]{a}+\sqrt[6]{b}\right)\left(\sqrt[6]{a}-\sqrt[6]{b}\right)}{\sqrt[6]{a}-\sqrt[6]{b}}=\sqrt[6]{a}+\sqrt[6]{b}\ .$