

פישוט שורשים:

1. $\sqrt{81} = 9$
2. $\sqrt{2^4} = 2^{\frac{4}{2}} = 2^2 = 4$
3. $4^{\frac{1}{2}} = \sqrt{4} = 2$
4. $\sqrt{16^{\frac{1}{2}}} = \sqrt{\sqrt{16}} = {}^{2 \cdot 2}\sqrt{16} = {}^4\sqrt{16} = 2$
5. $\sqrt[3]{8^4} = 8^{\frac{4}{3}} = (2^3)^{\frac{4}{3}} = 2^{\frac{3 \cdot 4}{3}} = 2^4 = 16$ $\sqrt[3]{8^4} = 8^{\frac{4}{3}} = (2^3)^{\frac{4}{3}} = 2^{\frac{3 \cdot 4}{3}} = 2^4 = 16$
6. $\sqrt{a^2} = a^{\frac{2}{2}} = a$
7. $\sqrt[3]{a^3} = a^{\frac{3}{3}} = a$
8. $(\sqrt[3]{x})^6 = \left(x^{\frac{1}{3}}\right)^6 = x^{6 \cdot \frac{1}{3}} = x^{\frac{6}{3}} = x^2$
9. $(\sqrt[3]{64})^a = (4)^a = 4^a$
10. $\sqrt[3]{216} = 6$

כפל שורשים:

1. $\sqrt{8} \cdot \sqrt{2} = \sqrt{8 \cdot 2} = \sqrt{16} = 4$

ניתן גם להגיע לאותו הפתרון בדרך מעט שונה:

$$\sqrt{8} \cdot \sqrt{2} = \sqrt{8 \cdot 2} = \sqrt{2^3 \cdot 2^1} = \sqrt{2^{3+1}} = 2^{\frac{4}{2}} = 2^2 = 4$$

2. $\sqrt{2} \cdot \sqrt{3} \cdot \sqrt{6} = \sqrt{2 \cdot 3 \cdot 6} = \sqrt{36} = 6$
3. $\sqrt{3} \cdot \sqrt{3} = 3$
4. $\sqrt{3y} \cdot \sqrt{3y} = 3y$
5. $\sqrt{y^2} \cdot \sqrt{y} \cdot \sqrt{y} = y^{\frac{2}{2}} \cdot y = y \cdot y = y^2$
6. $\sqrt{25x^2} = \sqrt{25} \cdot \sqrt{x^2} = 5 \cdot x^{\frac{2}{2}} = 5x$
7. $\sqrt{32} = \sqrt{8 \cdot 4} = \sqrt{8} \cdot \sqrt{4} = \sqrt{4 \cdot 2} \cdot \sqrt{4} = \sqrt{4} \cdot \sqrt{2} \cdot \sqrt{4} = 4\sqrt{2}$
8. $\sqrt{24} = \sqrt{6 \cdot 4} = \sqrt{6} \cdot \sqrt{4} = \sqrt{3 \cdot 2} \cdot 2 = \sqrt{3} \cdot \sqrt{2} \cdot 2$
9. $\sqrt{4a^2x^2} = \sqrt{4} \cdot \sqrt{a^2} \cdot \sqrt{x^2} = 2 \cdot a^{\frac{2}{2}} \cdot x^{\frac{2}{2}} = 2ax$
10. $\sqrt{20} = \sqrt{4 \cdot 5} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}$

$$1. \sqrt{\frac{4}{36}} = \frac{\sqrt{4}}{\sqrt{36}} = \frac{2}{6} = \frac{1}{3}$$

$$2. \frac{2}{\sqrt{2}} = \sqrt{2}$$

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

$$4. \frac{\sqrt[3]{24}}{\sqrt[3]{3}} = \frac{\sqrt[3]{8 \cdot 3}}{\sqrt[3]{3}} = \frac{\sqrt[3]{8} \cdot \sqrt[3]{3}}{\sqrt[3]{3}} = \sqrt[3]{8} = 2$$

$$5. \frac{3}{\sqrt{3}} = \sqrt{3}$$

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

מאחר וידוע ש $\sqrt{x} \cdot \sqrt{x} = x$, ניתן לפתור שאלה זו גם על ידי צמצום ב- \sqrt{x} , בצורה הבאה:

$$\frac{x^2}{\sqrt{x}} = \frac{\cancel{x} \cdot x}{\sqrt{\cancel{x}}} = x\sqrt{x} = x^1 x^{\frac{1}{2}} = x^{1 + \frac{1}{2}} = x^{\frac{3}{2}}$$

$$7. \frac{x^{\frac{1}{3}}}{\sqrt[6]{x}} = \frac{x^{\frac{1}{3}}}{x^{\frac{1}{6}}} = x^{\frac{1}{3} - \frac{1}{6}} = x^{\frac{1}{6}}$$

$$8. \frac{10}{\sqrt{5}} = \frac{2 \cdot \cancel{5}}{\sqrt{\cancel{5}}} = 2\sqrt{5}$$

$$9. \frac{12}{\sqrt{2}} = \frac{\cancel{2} \cdot 6}{\sqrt{\cancel{2}}} = 6\sqrt{2}$$

$$10. \frac{2x}{\sqrt{x}} = \frac{2\cancel{x}}{\sqrt{\cancel{x}}} = 2\sqrt{x}$$

שורש של שורש:

1. $\sqrt{\sqrt{16}} = {}^{2 \cdot 2}\sqrt{16} = {}^4\sqrt{16} = 2$
2. $\sqrt[3]{\sqrt{64}} = {}^{3 \cdot 2}\sqrt{64} = {}^6\sqrt{64} = 2$
3. $\sqrt{25 \cdot \sqrt{16}} = \sqrt{25} \cdot \sqrt{\sqrt{16}} = 5 \cdot {}^{2 \cdot 2}\sqrt{16} = 5 \cdot {}^4\sqrt{16} = 5 \cdot 2 = 10$
4. $\sqrt[4]{\sqrt{x^{\frac{1}{a}}}} = \sqrt[4]{\sqrt[2]{x^{\frac{1}{a}}}} = \sqrt[2 \cdot 4]{x^{\frac{1}{a}}} = {}^{2 \cdot a}\sqrt{x} = {}^{2a}\sqrt{x}$
5. $\sqrt{x^4 \sqrt{x^4}} = \sqrt{x^4 \cdot x^2} = \sqrt{x^4 \cdot x^2} = \sqrt{x^{4+2}} = \sqrt{x^6} = x^{\frac{6}{2}} = x^3$
6. $\sqrt[4]{(\sqrt{a^4})^2} = \sqrt[4]{\left(a^2\right)^2} = \sqrt[4]{(a^2)^2} = \sqrt[4]{a^{2 \cdot 2}} = \sqrt[4]{a^4} = a^{\frac{4}{4}} = a^1$
7. $\sqrt{\sqrt{162}} = \sqrt{\sqrt{81 \cdot 2}} = \sqrt{\sqrt{81} \cdot \sqrt{2}} = \sqrt{9 \cdot \sqrt{2}} = \sqrt{9} \cdot \sqrt{\sqrt{2}} = 3 \cdot {}^4\sqrt{2}$

תרגילים מסכמים:

1. $\frac{\sqrt{6} \cdot \sqrt{12}}{2^3} = \frac{\sqrt{2 \cdot 3} \cdot \sqrt{3 \cdot 4}}{2^3} = \frac{\sqrt{2} \cdot \sqrt{3} \cdot \sqrt{3} \cdot \sqrt{4}}{2^3} = \frac{\sqrt{2} \cdot 3 \cdot \cancel{2}}{2^3} = \frac{\sqrt{2} \cdot 3}{2^2} = \frac{3}{2\sqrt{2}}$
2. $\left(\frac{\sqrt{400}}{2^3 + 2}\right)^2 = \left(\frac{20}{2^3 + 2}\right)^2 = \left(\frac{20}{8 + 2}\right)^2 = \left(\frac{20}{10}\right)^2 = (2)^2 = 4$
3. $\frac{\sqrt[6]{x^3 \cdot x^{\frac{1}{4}}}}{x} = \frac{\sqrt[6]{x^{3 + \frac{1}{4}}}}{x} = \frac{{}^{6 \cdot 2}\sqrt{x^{3 \cdot \frac{1}{4}}}}{x} = \frac{x^{\frac{3 \cdot \frac{1}{4}}{12}}}{x} = \frac{x^{\frac{3}{4}}}{x} = \frac{x^{\frac{3}{4}}}{x^1} = \frac{x^{\frac{3}{4}}}{x^{\frac{4}{4}}} = \frac{x^{\frac{3}{4}}}{x^{\frac{4}{4}}} = x^{\frac{3}{4} - 1} = x^{-\frac{1}{4}} = \left(\frac{1}{x}\right)^{\frac{1}{4}}$
4. $\sqrt[3]{8\left(\frac{1}{2}\right)^{-6}} - 2^3 = \sqrt[3]{2^3 \cdot 2^6} - 2^3 = \sqrt[3]{2^{3+6}} - 2^3 = 2^{\frac{9}{3}} - 2^3 = 2^3 - 2^3 = 0$
5. $\left(\frac{\sqrt{\sqrt{36} + \sqrt{100}}}{2^3}\right)^{-2} - 4 = \left(\frac{2^3}{\sqrt{\sqrt{36} + \sqrt{100}}}\right)^2 - 4 = \left(\frac{2^3}{\sqrt{6+10}}\right)^2 - 4 = \left(\frac{2^3}{\sqrt{16}}\right)^2 - 4 = \left(\frac{8}{4}\right)^2 - 4 = 2^2 - 4 = 0$