

Mocniny s racionálním mocnitelem a druhá a třetí odmocnina:

PRAVIDLA PRO POČÍTÁNÍ S ODMOCNINAMI:

$$n \cdot p \sqrt[n]{a^{m \cdot p}} = \sqrt[n]{a^m}$$

$$\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{a \cdot b}$$

$$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$$

$$\sqrt[r]{\sqrt[s]{a}} = \sqrt[r \cdot s]{a}$$

$$\sqrt[n]{a^m} = a^{\frac{m}{n}}$$

15. Vypočtete:

a) $1000^{\frac{1}{3}} =$

b) $0,0001^{-\frac{3}{4}} =$

c) $32^{\frac{3}{5}} =$

d) $256^{0,75} =$

16. Upravte pro přípustné hodnoty neznámých:

a) $\sqrt[3]{x^{r-1}} \cdot \sqrt[3]{x^{4-r}} \cdot \sqrt[3]{x^{3(r-1)}} =$

b) $\sqrt[3]{\frac{2m}{n}} \cdot \sqrt[3]{\frac{n}{3m}} \cdot \sqrt[3]{\frac{4m^2}{n}} \cdot \sqrt[3]{\frac{n^3}{9m}} =$

c) $\sqrt[4]{3a^7} \cdot \sqrt[4]{9a^3} \cdot \sqrt[4]{27a} =$

d) $\sqrt{3xy} \cdot \sqrt[3]{9x^2y^4} \cdot \sqrt[4]{27x^3y^5} \cdot \sqrt[6]{x^5y^7} \cdot \sqrt[12]{3x^3y^9} =$

e) $\sqrt{\frac{27a^{11}}{5b^8}} \cdot \sqrt{\frac{b^6}{15b^9}} =$

f) $\sqrt{\frac{1}{5}xy^2} \cdot \sqrt{2xy} \cdot \sqrt{\frac{1}{5}y} =$

17. Vypočtete a výsledek запиште pomocí odmocnin:

a) $\left(\sqrt[4]{a^2}\right)^3 =$

b) $\sqrt[3]{(25x^4y^5)^2} =$

c) $\left(\sqrt{2xy^3} \cdot \sqrt{3x^2y^5}\right)^2 =$

d) $\left(\sqrt{3x^3} \cdot \sqrt[3]{4x^4} \cdot \sqrt{5x^5}\right)^6 =$

e) $\left(\sqrt{20m}\right)^3 =$

f) $\sqrt[3]{(54a^3b^4c^5)^7} =$

g) $\left(3x^2y^3\sqrt[3]{3xy^2}\right)^8 =$

h) $\sqrt[5]{\frac{160a^7}{c^3}} \cdot \sqrt[5]{\frac{c^{11}}{5a^2}} =$

18. Proveďte:

a) $\sqrt{2a} : \sqrt{3a^2} =$

b) $\sqrt[4]{x^3} \cdot \sqrt[6]{x^5} : \sqrt[12]{x^{13}} =$

c) $\sqrt[3]{1,4} \cdot \sqrt[3]{10000} \cdot \sqrt[3]{0,196} =$

d) $\sqrt[6]{x^9y^5} : \sqrt[4]{x^2y^3} =$

e) $\sqrt[3]{0,1} \cdot \sqrt[3]{100} \cdot \sqrt[3]{0,0001} =$

f) $\sqrt[3]{2} \cdot \sqrt[6]{2} \cdot \sqrt[4]{2} \cdot \sqrt[12]{2} =$

g) $\sqrt{2} \cdot \sqrt[3]{4} \cdot \sqrt[4]{8} \cdot \sqrt[6]{16} \cdot \sqrt[12]{32} =$

h) $2\sqrt{6} \cdot 5\sqrt[3]{2} \cdot \sqrt[6]{54} =$

i) $\sqrt[n]{x^{1-2n}} \cdot \sqrt[n+1]{x} \cdot \sqrt[n]{x^{n-1}} \cdot \sqrt[n+1]{x^{1+2n}} =$

j) $\sqrt[9]{x^{8n}} : \sqrt[6]{x^{5n}} =$

k) $\sqrt[15]{x^{4n+5}} \cdot \sqrt[12]{x^{2n+3}} =$

l) $\sqrt{\sqrt{5}} =$

19. Vypočtete:

a) $\sqrt[3]{\sqrt{125}} =$

b) $\sqrt[3]{\sqrt[4]{128}} =$

c) $\sqrt{3\sqrt{3}} =$

d) $\sqrt[4]{3\sqrt{3}} =$

e) $\sqrt[4]{8\sqrt[3]{16}} =$

f) $\sqrt[4]{\sqrt[3]{32}} =$

g) $\sqrt{\sqrt[3]{512}} =$

h) $\sqrt{3^3\sqrt[3]{32^2}} =$

i) $6 \cdot \sqrt[6]{432} =$

j) $\sqrt[5]{5\sqrt[5]{5\sqrt[5]{5}}} =$

k) $\sqrt{\frac{2}{3}} \sqrt{\frac{4}{9}} =$

l) $\sqrt[4]{\frac{4}{5}} \sqrt[3]{\frac{125}{256}} =$

m) $\sqrt[3]{9x\sqrt{\frac{x^2}{16}}\sqrt{81x^4}} =$

20. Vypočtete:

a) $\sqrt{\frac{125}{a}} \sqrt{\frac{5}{a^3}} =$

b) $\sqrt{\frac{x}{y}} \sqrt[3]{\frac{x^2}{y^2}} \sqrt[4]{\frac{x^3}{y^3}} =$

c) $\sqrt[3]{\frac{x^7y^{10}}{x^6y^3}} =$

d) $\sqrt{\frac{a^5}{a^6}} =$

e) $4x \cdot \sqrt[3]{\frac{1}{\sqrt[4]{x}}} \cdot 3x^2 \cdot \sqrt[3]{\frac{1}{\sqrt{x}}} =$

f) $\sqrt[18]{x^{4r+3}} : \sqrt[15]{x^{8r+5}} =$

g) $\sqrt[6]{\frac{5\sqrt[3]{3}}{6}} : \sqrt[3]{\frac{6\sqrt{5}}{3\sqrt{3}}} =$

h) $\sqrt{\frac{3\sqrt{2}}{4\sqrt{3}}} : \sqrt[3]{\frac{5\sqrt{6}}{6\sqrt{8}}} =$

i) $\frac{p}{q} \sqrt[r]{\frac{q^{r-1}}{p^{r-1}}} : \sqrt[r]{\left(\frac{p}{q}\right)^2} =$

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

21. Upravte:

a) $\sqrt[3]{\frac{24x^7y^2}{z^3}} : \sqrt[3]{\frac{3x^2y^7}{z^6}} =$

b) $\sqrt{\frac{243a^{11}b^7}{5c^8}} : \sqrt{\frac{15a^9b^5}{c^6}} =$

c) $\sqrt[3]{\frac{64x^2y^5z^6}{54a^3b^6c^7}} \cdot \sqrt[3]{\frac{32a^5b^8c^{11}}{72x^3y^5z^{12}}} =$

d) $\sqrt{\frac{2x^3}{3y^2}} : \left(\sqrt[3]{\frac{3x^4}{4y^5}} \cdot \sqrt[6]{\frac{6x}{y^5}}\right) =$

e) $\sqrt[3]{\frac{a^2x^4}{b^2y^6}} : \left(\sqrt[4]{\frac{b^2x^5}{a^2y^6}} \cdot \sqrt[12]{\frac{a^5b^5x^5}{y^7}}\right) =$

f) $\left(\sqrt{\frac{mx}{n}} \cdot \sqrt[4]{\frac{ny^3}{mx^5}}\right) : \sqrt[4]{\frac{m+n}{m-n}} \cdot \sqrt[3]{\frac{m-n}{m+n}} =$

22. Vypočítejte:

$$\begin{aligned} \text{a) } 3\sqrt{2} - 5\sqrt{18} + \sqrt{32} - \sqrt{50} = & \quad \text{b) } 4\sqrt[3]{5} - 6\sqrt[3]{40} + 3\sqrt[3]{135} - 6\sqrt[3]{320} + 3\sqrt[3]{625} = & \quad \text{c) } x\sqrt{a} - y\sqrt{a^3} + z\sqrt{a^5} = \\ \text{d) } \frac{2}{5}x\sqrt{25x} + 8x\sqrt{x} + 4\sqrt{x^3} - 5x^2\sqrt{\frac{1}{x^2}} \cdot \sqrt{x^7} = & \quad \text{e) } 9x\sqrt{\frac{27}{4}y} - \frac{1}{2}\sqrt{3x^2y} + 8x\sqrt{\frac{3}{4}y} - \frac{13}{2}\sqrt{12x^2y} = \\ \text{f) } \sqrt[3]{16a^2b} + \sqrt{4a^2y} - \sqrt{a^2b} - \sqrt[3]{54a^2b} + \frac{2}{3}\sqrt[3]{\frac{27}{4}a^3b} = & \quad \text{g) } \frac{2x}{yz}\sqrt[3]{xy^7z^7} + \frac{3y}{xz}\sqrt[3]{x^7yz^7} - \frac{2z}{xy}\sqrt[3]{x^7y^7z} = \\ \text{h) } 5\sqrt[3]{x^2y^5} + 2y^2\sqrt[3]{\frac{x^2}{y}} + \frac{4y}{x^2}\sqrt[3]{x^8y^2} - 6xy\sqrt[3]{\frac{y^2}{x}} - \frac{3}{2}xy^2\sqrt[3]{\frac{8}{xy}} = & \quad \text{i) } \frac{1}{a^2}\sqrt{a^7} - 5a^2\sqrt{\frac{1}{a}} + 3\sqrt{a^3} + 6a\sqrt{a} + \frac{2}{3}a\sqrt{9a} = \end{aligned}$$

23. Vypočítejte:

$$\begin{aligned} \text{a) } 5\sqrt{2} + 3\sqrt{8} - (2\sqrt{18} + 4\sqrt{32}) + \sqrt{24} = & \quad \text{b) } 3\sqrt[3]{54} - 2\sqrt[3]{16} - \sqrt[3]{2} + 2\sqrt[3]{128} = \\ \text{c) } 2\sqrt{\frac{1}{12}} - \sqrt{27} - \sqrt{3} + 4\sqrt{\frac{3}{4}} + 5\sqrt{1\frac{1}{3}} + 4\sqrt{12} = & \quad \text{d) } 9\sqrt[3]{162} + 4\sqrt[3]{81} - 6\sqrt[3]{192} - 5\sqrt[3]{375} = \\ \text{e) } 8a\sqrt{\frac{3}{4}b} - \frac{13}{2}\sqrt{12a^2b} + 9a\sqrt{\frac{27}{4}b} - \frac{1}{2}\sqrt{3a^2b} = & \quad \text{f) } \frac{7}{2}\sqrt[4]{a^3b^{x+4}} - \frac{3b}{2a}\sqrt[4]{\frac{a^7b^{2x}}{b^x}} + 8a\sqrt[4]{\frac{b^x}{a}} - 4\sqrt[4]{16a^3b^x} = \end{aligned}$$

24. Vypočítejte:

$$\begin{aligned} \text{a) } \frac{8}{a^3}\sqrt[4]{a^3} = & \quad \text{b) } x^{\frac{1}{3}} \cdot x^{\frac{1}{9}} \cdot x^{\frac{1}{12}} = & \quad \text{c) } m^{-\frac{1}{2}}m^{-1}m^{-0,5} = & \quad \text{d) } a^{-\frac{1}{5}} : a^{-\frac{5}{3}} = & \quad \text{e) } b^{-0,3} : b^{-0,5} = \\ \text{f) } \left(u^{-\frac{2}{3}}\right)^{-\frac{3}{2}} = & \quad \text{g) } \sqrt[4]{a^8} : a^{-4} = & \quad \text{h) } \left(x^{\frac{5}{8}} \cdot x^{-\frac{3}{4}}\right)^{-\frac{3}{4}} = & \quad \text{i) } \frac{1}{a^2} \cdot a^{-\frac{5}{4}} \cdot \sqrt[6]{a^5} = & \quad \text{j) } \left(2m^{-3}m^{\frac{1}{2}}\right)^4 = \\ \text{k) } \left(3x^{-\frac{1}{2}} \cdot \sqrt[3]{x^2}\right)^{-\frac{1}{3}} = & \quad \text{l) } \left(z^{\frac{3}{4}}z^{\frac{5}{6}}\right) : z^{\frac{12}{13}} = & \quad \text{m) } \left(\frac{3}{4}\right)^{\frac{1}{4}} \cdot \left(\frac{1}{2}\right)^{\frac{3}{8}} \cdot \left(\frac{2}{3}\right)^{\frac{1}{2}} \cdot 18^{\frac{1}{8}} = & \quad \text{n) } x^{\frac{1}{3}}x^{\frac{1}{4}}\sqrt[6]{x} = \end{aligned}$$

25. Vypočítejte:

$$\begin{aligned} \text{a) } \frac{1}{2^{\frac{1}{4}}} \cdot \sqrt[3]{4} \cdot \frac{1}{8^{\frac{1}{4}}} \cdot \sqrt[6]{16} \cdot \frac{1}{32^{\frac{1}{12}}} = & \quad \text{b) } \sqrt[4]{a^3} : \left(a^{\frac{1}{3}} \cdot \sqrt[6]{a}\right) = & \quad \text{c) } \frac{\left(a^{\frac{3}{4}}b^{-\frac{2}{3}}\right)^{-\frac{1}{2}}}{\left(a^{\frac{1}{2}}b^{-\frac{2}{3}}\right)^{-\frac{3}{4}}} = & \quad \text{d) } \left[\left(a^2 - b^2\right)^2\right]^{-\frac{2}{3}} = \\ \text{e) } \frac{4y(3x)^{\frac{1}{2}}(4x)^{\frac{1}{3}}}{(6y)^{\frac{1}{6}}} + 21(2xy)^{\frac{1}{2}}(3xy)^{\frac{1}{3}} - \frac{24xy^{\frac{1}{2}}(12y)^{\frac{1}{3}}}{(2x)^{\frac{1}{6}}} = & \quad \text{f) } \sqrt{y} \cdot \sqrt[3]{y^2} \cdot \sqrt[4]{y^3} = \end{aligned}$$

26. Vypočítejte:

$$\begin{aligned} \text{a) } \frac{1}{3^{\frac{1}{2}}} \cdot 9^{-0,4} \cdot 27 \cdot 3^{0,8} = & \quad \text{b) } \frac{x^3y^{\frac{3}{4}}y^{-1}}{x^{-\frac{4}{3}}y^{\frac{1}{3}}y^{\frac{2}{3}}} = & \quad \text{c) } \left(\frac{2 \cdot 2^{\frac{1}{4}}}{2^{\frac{1}{3}}}\right)^{\frac{1}{2}} = & \quad \text{d) } \left\{\left[\frac{m^{\frac{1}{2}}m^{-2}}{m^{\frac{1}{3}}}\right]^{-2}\right\}^{\frac{1}{5}} = \end{aligned}$$

$$\begin{aligned}
 \text{e)} & \left[\frac{\left(x^{\frac{1}{3}} y^{-1} \right)^{-2}}{z^{-3} u^{\frac{1}{2}}} \right]^{-3} \cdot \left[\frac{x^{\frac{3}{4}} y^{\frac{2}{5}} u^{\frac{1}{4}}}{\left(z^{\frac{3}{2}} \right)^4} \right]^{-1} = \text{f)} 3^{\frac{3}{4}} \cdot \left[\left(9x^{-3} y^{-2} \right)^{\frac{5}{3}} \right]^{-\frac{1}{3}} \cdot \left[(3xy)^{\frac{4}{3}} \right]^{-\frac{4}{5}} = \text{g)} \left[x^{-\frac{4}{3}} y (xy^{-3})^{-\frac{2}{3}} \cdot (x^{-2})^{-\frac{3}{4}} \right]^4 = \\
 \text{h)} & \left(\frac{15^{\frac{1}{3}} \cdot 27^{-\frac{1}{2}}}{25^{\frac{1}{4}} \cdot 9^{\frac{1}{8}}} \right)^{-3} : \frac{\sqrt[3]{9}}{\sqrt[3]{3427}} = \text{i)} \frac{x \cdot x^{\frac{1}{2}}}{x^{\frac{4}{5}} \left(x^{\frac{2}{3}} \right)^{\frac{1}{5}}} : \frac{x^{\frac{1}{2}} \cdot x^{-1}}{x^{\frac{1}{3}}} = \text{j)} \sqrt[4]{a^4 b^{-3}} : \sqrt[5]{b^3 a^3} + \sqrt{b} : b^2 =
 \end{aligned}$$

27. Vypočtete:

$$\begin{aligned}
 \text{a)} & \left[\left(m^{\frac{3}{4}} n^{\frac{2}{3}} \right)^{\frac{3}{2}} : \left(mn^{\frac{1}{3}} \right)^{\frac{1}{2}} \right] \cdot \left[\left(m^{\frac{3}{2}} n^{\frac{4}{3}} \right)^{\frac{2}{3}} : \left(m^{\frac{2}{3}} n^{-1} \right)^{\frac{1}{3}} \right] = \text{b)} \sqrt{\frac{a^3 b}{a^3 b}} = \text{c)} \frac{\left(x^{\frac{2}{3}} y^{-1} z \right)^{-\frac{1}{3}}}{\left(x^{-1} y^{-\frac{3}{2}} z^{\frac{1}{2}} \right)^{\frac{2}{3}}} =
 \end{aligned}$$

28. Vypočtete:

$$\begin{aligned}
 \text{a)} & \left(5^{\sqrt{3}} \right)^{\sqrt{3}} = \text{b)} \left(a^{\sqrt{5}-2} \right)^{\sqrt{5}+2} = \text{c)} x^{\sqrt{3}-1} \cdot x^{\sqrt{3}+1} = \text{d)} \left(m^{\sqrt{7}-\sqrt{5}} \right)^{\sqrt{7}+\sqrt{5}} =
 \end{aligned}$$

29. Vypočtete:

$$\begin{aligned}
 \text{a)} & \sqrt{3}(\sqrt{5} + \sqrt{6}) + \sqrt{5}(\sqrt{3} + \sqrt{6}) - \sqrt{6}(\sqrt{3} + \sqrt{5}) = \text{b)} \sqrt{x}(\sqrt{x} + \sqrt{y}) - \sqrt{y}(\sqrt{x} - \sqrt{y}) = \\
 \text{c)} & \left(\frac{a}{b} \sqrt{\frac{a}{b}} + \sqrt{a^3} - b\sqrt{b} \right) \cdot \left(a\sqrt{\frac{a}{b^3}} - a\sqrt{a} + \sqrt{b^3} \right) = \text{d)} (2\sqrt{3} - 3\sqrt{2}) \cdot (3\sqrt{3} - 2\sqrt{2}) = \\
 \text{e)} & (\sqrt{2} + \sqrt{3} + \sqrt{6}) \cdot (2\sqrt{2} + 5\sqrt{3} - 2\sqrt{6}) = \text{f)} (5\sqrt{21} - 6\sqrt{14} - 2\sqrt{7}) \cdot (5\sqrt{21} + 6\sqrt{14} + 2\sqrt{7}) = \\
 \text{g)} & (3\sqrt{18} - 5\sqrt{3} - 4\sqrt{8})(3\sqrt{2} - 5\sqrt{6} + 4\sqrt{12}) = \text{h)} \left(m\sqrt[6]{\frac{n^2}{m}} + n\sqrt[6]{\frac{m^2}{n}} \right) \cdot \sqrt[6]{mn} =
 \end{aligned}$$

30. Usměrněte zlomky, pokud je odmocnina ve jmenovateli:

$$\begin{aligned}
 \text{a)} & \frac{6}{\sqrt{2}} = \text{b)} \frac{12}{\sqrt{6}} = \text{c)} \frac{6 - \sqrt{12}}{\sqrt{3}} = \text{d)} \frac{\sqrt{2} - \sqrt{3}}{\sqrt{6}} = \text{e)} \frac{3 + \sqrt{3}}{\sqrt{5}} = \\
 \text{f)} & \frac{\sqrt{10}}{3 - \sqrt{10}} = \text{g)} \frac{\sqrt{3}}{\sqrt{5} + 2} = \text{h)} \frac{6}{\sqrt{13} - \sqrt{11}} = \text{i)} \frac{2\sqrt{2}}{3\sqrt{3} + \sqrt{5}} = \text{j)} \frac{a}{\sqrt{a}} = \text{k)} \frac{x}{\sqrt{x^3}} =
 \end{aligned}$$

31. Usměrněte zlomky, pokud je odmocnina ve jmenovateli:

$$\begin{aligned}
 \text{a)} & \frac{1-a}{1-\sqrt{a}} = \text{b)} \frac{2+\sqrt{3}}{\sqrt{2}-\sqrt{3}} = \text{c)} \frac{5}{\sqrt{5}-2\sqrt{2}} = \text{d)} \frac{1}{\sqrt{2}+\sqrt{3}+\sqrt{5}} = \text{e)} \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}} + \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} =
 \end{aligned}$$

32. Vypočtete:

$$\begin{aligned}
 \text{a)} & \left(\sqrt{3+\sqrt{8}} + \sqrt{3-\sqrt{8}} \right)^2 = \text{b)} \left(\sqrt{9+4\sqrt{2}} + \sqrt{9-4\sqrt{2}} \right)^2 = \text{c)} \left(\sqrt{6+\sqrt{11}} - \sqrt{6-\sqrt{11}} \right)^2 =
 \end{aligned}$$

33. Usměrněte zlomky:

$$\begin{aligned}
 \text{a)} & \frac{1}{\sqrt{3}} = \text{b)} \frac{\sqrt{7}-1}{\sqrt{7}+1} = \text{c)} \frac{26}{\sqrt{3}-4} = \text{d)} \frac{3}{2+\sqrt{7}} = \text{e)} \frac{2\sqrt{3}}{\sqrt{7}+\sqrt{3}} = \text{f)} \frac{\sqrt{6}-\sqrt{3}}{\sqrt{6}+\sqrt{3}} = \text{g)} \frac{3\sqrt{14}-5\sqrt{3}}{3\sqrt{14}+5\sqrt{3}} =
 \end{aligned}$$

34. Usměrněte zlomky:

$$\text{a) } \sqrt{\frac{3}{5}} = \quad \text{b) } \frac{\sqrt{5} + \sqrt{2}}{\sqrt{5}} = \quad \text{c) } \frac{6 + \sqrt{12}}{\sqrt{3}} = \quad \text{d) } \frac{19\sqrt{6}}{5\sqrt{3} + 3\sqrt{2}} = \quad \text{e) } \frac{1}{2 + \sqrt{3}} = \quad \text{f) } \frac{4}{3 - \sqrt{2}} =$$

35. Usměrněte:

$$\text{a) } \frac{\sqrt{6}}{2\sqrt{2} - \sqrt{5}} = \quad \text{b) } \frac{7}{\sqrt[3]{5} + \sqrt[3]{2}} = \quad \text{c) } \frac{1 - \sqrt{x}}{1 + \sqrt{x}} + \frac{3\sqrt{x}}{1 - \sqrt{x}} - \frac{3 + \sqrt{x}}{1 - x} = \quad \text{d) } \frac{\sqrt{2} - 1}{2} - \frac{2}{\sqrt{2} + 1} =$$

36. Zjednodušte:

$$\begin{aligned} \text{a) } \sqrt{x \cdot \sqrt[3]{x^6} \cdot \sqrt[4]{x^3}} : \sqrt[5]{x^4 \cdot \sqrt[4]{x} \cdot \sqrt[6]{x^7}} &= \quad \text{b) } \frac{\left(10^{\frac{1}{3}} \cdot 8^{-\frac{1}{2}}\right)^{-3}}{\left(25^{\frac{1}{4}} \cdot 4^{\frac{1}{8}}\right)^{-2}} : \frac{\sqrt{2\sqrt[3]{4}}}{\sqrt[3]{2 \cdot \sqrt[4]{8}}} = \quad \text{c) } \left(x^{\frac{4}{3}} y^{\frac{2}{3}}\right)^{\frac{3}{2}} : \left(x^{\frac{3}{2}} y^{\frac{4}{3}}\right)^{\frac{2}{3}} = \\ \text{d) } \sqrt{a^3 \sqrt[3]{b^{-1}}} : \sqrt[3]{b^2 \sqrt{a^3}} + \sqrt[6]{b} : b &= \quad \text{e) } \frac{a^{\frac{1}{2}} \cdot a^{-\frac{1}{3}} \cdot a^{\frac{1}{4}}}{\left(b^{-\frac{1}{3}}\right)^2} : \left[b^{\frac{2}{3}} \cdot b^2\right] = \quad \text{f) } \left(\frac{a}{b} \sqrt[3]{\frac{b^4}{a^2}}\right) : \left(\frac{a^2}{b} \sqrt[3]{\frac{a^7}{b^2}} \cdot \frac{b^2}{a^4} \sqrt[3]{\frac{a^{10}}{b^5}}\right) = \end{aligned}$$

37. Zjednodušte:

$$\begin{aligned} \text{a) } \frac{\left(10^{\frac{1}{3}} \cdot 8^{-\frac{1}{2}}\right)^{-3}}{\left(5^{\frac{1}{4}} \cdot 4^{\frac{1}{8}}\right)^2} : \frac{\sqrt{2\sqrt[3]{4}}}{\sqrt[3]{2\sqrt[4]{4}}} &= \quad \text{b) } \frac{\sqrt{6} \cdot 12^{-\frac{1}{3}}}{\sqrt[2]{4} \cdot 3^{\frac{1}{2}} \cdot \sqrt[3]{4^{-1}}} \cdot \frac{3^{\frac{3}{4}} \cdot \sqrt{4}}{\sqrt[3]{8} \cdot \sqrt{3}} : \sqrt[3]{3^{-1}} = \end{aligned}$$

38. S použitím částečného odmocňování vypočtete:

$$\text{a) } \sqrt[3]{375c^5 d^{12}} = \quad \text{b) } \sqrt{\frac{147s^{41}}{4k^8}} = \quad \text{c) } \sqrt{40a^9 b^5} = \quad \text{d) } \sqrt[4]{81p^{17} a^{23} b^{15}} = \quad \text{e) } 10 \sqrt{\frac{2048d^{12} m^{23}}{y^{10}}} =$$

39. S použitím částečného odmocňování vypočtete:

$$\begin{aligned} \text{a) } 8\sqrt{44} - 6\sqrt{99} &= \quad \text{b) } -\sqrt[3]{128} - 4\sqrt[3]{686} = \quad \text{c) } -4\sqrt{216} - 12\sqrt{150} = \quad \text{d) } 11 \cdot \sqrt[3]{48} - \sqrt[3]{750} = \\ \text{e) } (3 + \sqrt{5})^2 &= \quad \text{f) } (\sqrt{3} - \sqrt{7})^2 = \quad \text{g) } (-8\sqrt{2} - \sqrt{5})^2 = \quad \text{h) } (-1 + \sqrt{15}) \cdot (-1 - \sqrt{15}) = \\ \text{i) } (\sqrt{5} - 2) \cdot (\sqrt{5} + 2) &= \quad \text{j) } (8 - x\sqrt{y}) \cdot (8 + x\sqrt{y}) = \quad \text{k) } (\sqrt{5} + 3) \cdot (7 - \sqrt{5}) = \quad \text{l) } (3 + \sqrt{2})^3 = \end{aligned}$$

40. Vypočtete:

$$\begin{aligned} \text{a) } (5 - 3\sqrt{3})^2 - (-1 + 3\sqrt{3}) \cdot \sqrt{27} &= \quad \text{b) } (\sqrt{5} + 2\sqrt{3})^2 - 2\sqrt{60} - 17 = \quad \text{c) } \sqrt[4]{x} \cdot \sqrt[4]{x} \cdot \sqrt{x} : \sqrt{x\sqrt[4]{x}} = \\ \text{d) } \left(12^{\frac{1}{3}} \cdot 8^{-\frac{1}{2}}\right)^{-3} \cdot \left(3^{\frac{1}{4}} \cdot 4^{\frac{1}{8}}\right)^{-2} &= \quad \text{e) } x^2 \cdot \sqrt[3]{(\sqrt{x} \cdot x^{-2})^2} : \sqrt{x^{\frac{1}{3}} \cdot x} = \quad \text{f) } (2 - 2\sqrt{5})^2 - (3\sqrt{5} - 1) \cdot \sqrt{125} = \end{aligned}$$

ŘEŠENÍ:

15. a) 10 b) 1000 c) 8 d) 64 16. a) x^r , $x > 0$ b) $\frac{2}{3} \cdot \sqrt[3]{mn^2}$, $m > 0$, $n > 0$ c) $3a^2 \cdot \sqrt[4]{9a^3}$, $a \geq 0$ d)

$9x^3 y^5$, $x \geq 0$, $y \geq 0$ e) $\frac{3a^5}{5b^5} \cdot \sqrt{\frac{a}{b}}$, $a \geq 0$, $b > 0$ f) $\frac{1}{5} xy^2 \sqrt{2}$, $x \geq 0$, $y \geq 0$ 17. a) $a\sqrt{a}$, $a \geq 0$ b) $5x^2 y^3 \cdot \sqrt[3]{5x^2 y}$ c)

$6x^3y^8$, $x \geq 0$, $y \geq 0$ d) $54000x^{32}$, $x \geq 0$ e) $40m\sqrt{5m}$, $m \geq 0$ f) $8748a^7b^9c^{11} \cdot \sqrt[3]{2bc^2}$ g) $3^{10}x^{18}y^{29} \cdot \sqrt[3]{9x^2y}$ h) $2 \cdot a \cdot c \cdot \sqrt[5]{c^3}$, $a \neq 0$, $c \neq 0$ **18.** a) $\frac{\sqrt{2}}{\sqrt{3a}}$, $a > 0$ b) $\sqrt{x}$, $x > 0$ c) 14 d) $x \cdot \sqrt[12]{y}$, $x > 0$, $y > 0$ e) 0,1 f) $\sqrt[6]{2^5}$

g) 8 h) 60 i) x , $x \geq 0$ j) $\sqrt[18]{x^n}$, $x \geq 0$ k) $\sqrt[60]{x^{26n+35}}$, $x \geq 0$ l) $\sqrt[4]{5}$ **19.** a) $\sqrt{5}$ b) $\sqrt[12]{2^7}$ c) $\sqrt[3]{9}$ d) $\sqrt[3]{3}$ e) $2 \cdot \sqrt[12]{2}$

f) $\sqrt[12]{2^5}$ g) $\sqrt[8]{8}$ h) $6 \cdot \sqrt[8]{432}$ i) $6 \cdot \sqrt{3} \cdot \sqrt[3]{2^2}$ j) $\sqrt[125]{5^{31}}$ k) $\frac{2}{3}$ l) $\frac{1}{\sqrt[6]{2}}$ m) $\frac{3x}{\sqrt[3]{4}}$

20. a) $\frac{5}{a^2} \cdot \sqrt[4]{125a^3}$ b) $24 \left(\frac{x}{y} \right)^{23}$ c) $y^2 \cdot \sqrt[3]{xy}$ d) $\frac{1}{\sqrt{a}}$ e) $12x^2 \cdot \sqrt[4]{x^3}$ f) $\frac{1}{90 \sqrt{x^{28r+15}}}$ g) $\sqrt[18]{\frac{3}{512}}$ h) $\sqrt[12]{\frac{3^5}{2 \cdot 5^4}}$ i) $\sqrt[4]{\frac{q}{p}}$ j) $\sqrt[36]{3^7}$

21. a) $\frac{2xz}{y} \cdot \sqrt[3]{\left(\frac{x}{y} \right)^2}$ b) $\frac{9ab}{5c}$ c) $\frac{4c}{3z^2} \cdot \sqrt[3]{\frac{2a^2b^2c}{9x}}$ d) $\frac{2}{3}y\sqrt{y}$ e) $\frac{1}{b} \cdot \sqrt[12]{\frac{a^9y}{b^7x^4}}$ f) $\sqrt[4]{\frac{m \cdot y^3}{n \cdot x^3}} \cdot \sqrt[6]{\frac{m-n}{m+n}}$ **22.** a) $-13\sqrt{2}$ b) $-8\sqrt[3]{5}$

c) $\sqrt{a} \cdot (x - ya + za^2)$ d) $x\sqrt{x}(14 - 5x^3)$ e) $4x\sqrt{3y}$ f) $a(2\sqrt{y} - \sqrt{b}) + a \cdot \sqrt[3]{2b} - \sqrt[3]{2a^2b}$ g) $3xyz \cdot \sqrt[3]{xyz}$ h) $2y \cdot \sqrt[3]{x^2y^2}$

i) $7a\sqrt{a}$ **23.** a) $\sqrt{2}(2\sqrt{3} - 11)$ b) $12\sqrt[3]{2}$ c) $\frac{29}{3}\sqrt{3}$ d) $27\sqrt[3]{6} - 37\sqrt[3]{3}$ e) $4a\sqrt{3b}$ f) $2b\sqrt[4]{a^3b^x}$ **24.** a) $a^3 \cdot \sqrt[12]{a^5}$ b) $\sqrt[36]{x^{19}}$

c) m^{-2} d) $a \cdot \sqrt[15]{a^7}$ e) $\sqrt[5]{b}$ f) u g) a^3 h) $\sqrt[32]{x^3}$ i) $\sqrt[12]{a}$ j) $16m^{-10}$ k) $\frac{1}{3^3 \cdot x^{18}}$ l) $\sqrt[156]{z^{103}}$ m) $\sqrt[4]{2^{-1}}$ n) $\sqrt[4]{x^3}$ **25.** a) $4 \cdot \sqrt[4]{8}$

b) $\sqrt[4]{a}$ c) $b^{-\frac{1}{6}}$ d) $(a^2 - b^2)^{-\frac{4}{3}}$ e) $\sqrt[6]{72x^5y^5}$ f) $y^{\frac{23}{12}}$ **26.** a) $27\sqrt{3}$ b) $\frac{x^4 \cdot \sqrt[3]{x}}{y \cdot \sqrt[4]{y}}$ c) $\sqrt[24]{2^{11}}$ d) $m^{\frac{11}{15}}$ e) $\frac{x \cdot u \cdot \sqrt[4]{xu}}{y^6 \cdot z^3 \cdot \sqrt[5]{y^2}}$

f) $3^{-\frac{257}{180}} \cdot x^{\frac{3}{5}} \cdot y^{\frac{2}{45}}$ g) $\frac{y^{12}}{x^2}$ h) $3^{\frac{17}{4}}$ i) $x^{\frac{7}{5}}$ j) $a^{\frac{1}{5}}b^{-\frac{39}{40}} + b^{-\frac{3}{2}}$ **27.** a) $\frac{101}{m^{\frac{72}{72}}} \frac{37}{n^{\frac{18}{18}}}$ b) $\frac{1}{a^3}b^{\frac{1}{12}}$ c) $\frac{x^{\frac{4}{9}} \cdot y^{\frac{4}{3}}}{z^{\frac{3}{2}}}$ **28.** a) 125 b) a

c) $x^{2\sqrt{3}}$ d) m^2 **29.** a) $2\sqrt{15}$ b) $x + y$ c) $\frac{1}{b^3}(a^3 - a^3b^3 - b^6) + 2ab\sqrt{ab}$ d) $30 - 13\sqrt{6}$ e) $7 + 7\sqrt{6} + 9\sqrt{2}$ f) $-7 - 168\sqrt{2}$

g) $-114 - 10\sqrt{3} + 75\sqrt{2} - 7\sqrt{6}$ h) $m\sqrt{n} + n\sqrt{m} = \sqrt{nm}(\sqrt{m} + \sqrt{n})$ **30.** a) $3\sqrt{2}$ b) $2\sqrt{6}$ c) $2(\sqrt{3} - 1)$ d) $\frac{\sqrt{3}}{3} - \frac{\sqrt{2}}{2}$

e) $\frac{3\sqrt{5} + \sqrt{15}}{5}$ f) $-3\sqrt{10} - 10$ g) $\sqrt{3}(\sqrt{5} - 2)$ h) $3\sqrt{13} + 3\sqrt{11}$ i) $\frac{3\sqrt{6} - \sqrt{10}}{11}$ j) $\sqrt{a}$ k) $\frac{\sqrt{x}}{x}$ **31.** a) $1 + \sqrt{a}$ b) $(2 + \sqrt{3})\sqrt{2 + \sqrt{3}}$

c) $\frac{5}{17} \left(\sqrt{17(5 + 2\sqrt{2})} \right)$ d) $\frac{2\sqrt{3} + 3\sqrt{2} - \sqrt{30}}{12}$ e) 8 **32.** a) 8 b) 32 c) 2 **33.** a) $\frac{\sqrt{3}}{3}$ b) $\frac{4 - \sqrt{7}}{3}$ c) $-2\sqrt{3} - 8$ d) $-2 + \sqrt{7}$

e) $\frac{\sqrt{21} - 3}{2}$ f) $3 - 2\sqrt{2}$ g) $\frac{201 - 30\sqrt{42}}{51}$ **34.** a) $\frac{\sqrt{15}}{5}$ b) $1 + \frac{\sqrt{10}}{5}$ c) $2\sqrt{3} + 2$ d) $5\sqrt{2} - 2\sqrt{3}$ e) $2 - \sqrt{3}$ f) $\frac{12}{7} + \frac{4\sqrt{2}}{7}$

35. a) $\frac{4\sqrt{3} + \sqrt{30}}{3}$ b) $\sqrt[3]{25} - \sqrt[3]{10} + \sqrt[3]{4}$ c) $\frac{2(2x - 1)}{1 - x}$ d) $\frac{3}{2} \cdot (1 - \sqrt{2})$ **36.** a) $\sqrt[24]{x^{13}}$ b) $8\sqrt[4]{8}$ c) $x \cdot \sqrt[9]{y}$ d) $\frac{a+1}{\sqrt[6]{b^5}}$ e) $\frac{\sqrt[12]{a^5}}{b^2}$

f) $\frac{13}{a^3b \cdot \sqrt[3]{a}}$ **37.** a) $\frac{2^2 \cdot \sqrt[6]{2}}{5 \cdot \sqrt[2]{5}}$ b) $\frac{1}{3^4} \cdot 2^{-\frac{1}{2}}$ **38.** a) $5cd^4 \cdot \sqrt[3]{3c^2}$ b) $\frac{7}{2} \cdot s^{20}k^{-4} \cdot \sqrt{3s}$ c) $2a^4b^2 \cdot \sqrt{10ab}$ d) $3p^4a^5b^3 \cdot \sqrt{pa^3b^3}$

e) $\frac{2dm^2 \cdot \sqrt[10]{2d^2m^3}}{y}$ **39.** a) $-2\sqrt{11}$ b) $-30\sqrt[3]{2}$ c) $-84\sqrt{6}$ d) $17\sqrt[3]{6}$ e) $14 + 6\sqrt{5}$ f) $2(5 - \sqrt{21})$ g) $133 + 16\sqrt{10}$ h) -14

i) 1 j) $64 - x^2y$ k) $4(4 + \sqrt{5})$ l) $11(3 + \sqrt{2})$ **40.** a) $25 - 27\sqrt{3}$ b) 0 c) 1 d) $\frac{4}{3\sqrt{3}}$ e) $\sqrt[3]{x}$ f) $-3(17 + \sqrt{5})$