

A: Operace s odmocninami čísel

1) Odmocněte:

a) $\sqrt{25}$

b) $\sqrt{0,81}$

c) $\sqrt{144}$

d) $\sqrt{16}$

e) $\sqrt{25}$

f) $\sqrt{900}$

g) $\sqrt{\frac{1}{64}}$

h) $\sqrt{\frac{25}{225}}$

i) $\sqrt{\frac{36}{49}}$

j) $\sqrt{\frac{0,0025}{0,0001}}$

k) $\sqrt{\frac{12100}{625}}$

l) $\sqrt{\frac{-0,0169}{-0,0196}}$

m) $\sqrt[3]{8}$

n) $\sqrt[3]{27}$

o) $\sqrt[3]{0,125}$

p) $\sqrt[3]{0,064}$

q) $\sqrt[3]{216000}$

r) $\sqrt[3]{343000}$

s) $\sqrt[3]{\frac{8}{64}}$

t) $\sqrt[3]{\frac{125}{64000}}$

u) $\sqrt[3]{\frac{0,001}{0,125}}$

v) $\sqrt[3]{\frac{27}{216}}$

w) $\sqrt[3]{\frac{0,000008}{0,001}}$

x) $\sqrt[3]{\frac{-64}{216}}$

2) Částečně odmocněte a upravte následující výrazy:

a) $\sqrt{4} + \sqrt{50} - \sqrt{32}$

b) $\sqrt{45} - \sqrt{125} + \sqrt{20}$

c) $\sqrt{75} + \sqrt{48} - \sqrt{12}$

d) $3\sqrt{28} + \sqrt{28} - \sqrt{112}$

e) $2\sqrt{18} + 2\sqrt{32} - \sqrt{32}$

g) $\sqrt{125} + \sqrt{72} - \sqrt{80} - \sqrt{32}$

h) $\sqrt{45} + \sqrt{63} - \sqrt{75} - \sqrt{28}$

i) $3\sqrt{50} + 3\sqrt{20} - 2\sqrt{45} - \sqrt{98}$

j) $2\sqrt{32} + 2\sqrt{8} - 2\sqrt{63} + 2\sqrt{28}$

k) $2\sqrt{45} - 3\sqrt{20} + 2\sqrt{72} - 4\sqrt{18}$

3) Upravte následující výrazy pomocí vzorců $(a + b)^2$, $(a - b)^2$.

a) $(2 + \sqrt{2})^2$

b) $(2 + 3\sqrt{2})^2$

c) $(3 - \sqrt{5})^2$

d) $(5 - 2\sqrt{3})^2$

e) $(\sqrt{2} + \sqrt{5})^2$

g) $(\sqrt{3} - \sqrt{6})^2$

h) $(1 + \sqrt{2})^2 + (1 - \sqrt{2})^2$

i) $(\sqrt{2} + \sqrt{5})^2 - (\sqrt{2} - \sqrt{5})^2$

j) $(\sqrt{3} - \sqrt{7})^2 - (\sqrt{3} + \sqrt{7})^2$

k) $(-\sqrt{3} + \sqrt{5})^2 + (-\sqrt{3} - \sqrt{5})^2$

4) Upravte následující výrazy pomocí vzorce $(a + b)(a - b) = a^2 - b^2$.

a) $(2 - \sqrt{2})(2 + \sqrt{2})$

b) $(2 + 3\sqrt{2})(2 - 3\sqrt{2})$

c) $(3 - \sqrt{5})(3 + \sqrt{5})$

d) $(5 + 2\sqrt{3})(5 - 2\sqrt{3})$

e) $(\sqrt{2} - \sqrt{5})(\sqrt{2} + \sqrt{5})$

g) $(2\sqrt{3} + 3\sqrt{6})(2\sqrt{3} - 3\sqrt{6})$

h) $(2\sqrt{7} + 2\sqrt{6})(2\sqrt{7} - 2\sqrt{6})$

i) $(\frac{1}{2}\sqrt{10} + \frac{2}{3}\sqrt{6})(\frac{1}{2}\sqrt{10} - \frac{2}{3}\sqrt{6})$

j) $(\frac{4}{3}\sqrt{3} + \frac{4}{5}\sqrt{5})(\frac{4}{3}\sqrt{3} - \frac{4}{5}\sqrt{5})$

k) $(\frac{5}{3}\sqrt{12} + \frac{3}{4}\sqrt{8})(\frac{5}{3}\sqrt{12} - \frac{3}{4}\sqrt{8})$

5) Vynásobte:

a) $(3 - \sqrt{2})(2 + \sqrt{2})$

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

b) $(4 - 3\sqrt{2})(-1 + 3\sqrt{2})$

h) $(\sqrt{7} - 2\sqrt{6})(2\sqrt{7} - 3\sqrt{6})$

c) $(7 - \sqrt{5})(-2 + 3\sqrt{5})$

i) $(\frac{1}{2}\sqrt{10} + \frac{1}{3}\sqrt{6})(2\sqrt{10} - \frac{3}{4}\sqrt{6})$

d) $(-3 - 2\sqrt{3})(-4 - 5\sqrt{3})$

j) $(-\frac{1}{5}\sqrt{3} + \frac{2}{5}\sqrt{5})(5\sqrt{3} - 15\sqrt{5})$

e) $(3 - 3\sqrt{5})(-3 + 2\sqrt{5})$

k) $(\sqrt{12} - \frac{3}{4}\sqrt{8})(-12\sqrt{12} - 24\sqrt{8})$

6) Upravte výrazy:

a) $(3 - 4\sqrt{5})(4 + 2\sqrt{5}) - (2 - 3\sqrt{5})^2 - (\sqrt{5} + 4)^2 + 100$

b) $2(2 - 2\sqrt{7})^2 - 3(3 + \sqrt{7})^2 - (-\sqrt{7} + 4)(\sqrt{7} - 5) - 43$

c) $(\sqrt{3} - \sqrt{5})(\sqrt{3} + \sqrt{5}) - 3(\sqrt{3} + \sqrt{5})^2 - (\sqrt{3} - \sqrt{5})^2 + 34$

d) $(\sqrt{12} - 3\sqrt{27})(2\sqrt{27} - 4) - 2(2\sqrt{12} - 3\sqrt{27})^2 + 426$

B: Shrnutí – odmocniny čísel

Zadání A

1) $\sqrt{90000} =$

2) $\sqrt{0,0064} =$

3) $\sqrt[3]{\frac{27}{8}} =$

4) $\sqrt[3]{\frac{64}{0,001}} =$

5) $4\sqrt{32} + 3\sqrt{8} - 2\sqrt{64} + 16 =$

6) $(\sqrt{3} - \sqrt{7})^2 =$

7) $(\sqrt{3} + 2\sqrt{6})(\sqrt{3} - 2\sqrt{6}) =$

8) $(3 - 4\sqrt{2})(-2\sqrt{2} + 5) =$

Zadání B

1) $\sqrt{160000} =$

2) $\sqrt{0,0081} =$

3) $\sqrt[3]{\frac{64}{125}} =$

4) $\sqrt[3]{\frac{27}{0,001}} =$

5) $3\sqrt{32} + 2\sqrt{8} - 4\sqrt{64} + 32 =$

6) $(\sqrt{7} - \sqrt{3})^2 =$

7) $(\sqrt{5} + 2\sqrt{3})(\sqrt{5} - 2\sqrt{3}) =$

8) $(4 - 3\sqrt{2})(-5\sqrt{2} + 2) =$

Řešení

A: Operace s odmocninami čísel

1) Odmocněte:

a) 5

g) $\frac{1}{8}$

m) 2

s) $\frac{1}{2}$

b) 0,9

h) $\frac{1}{5}$

n) 3

t) $\frac{1}{8}$

c) 12

i) $\frac{6}{7}$

o) 0,5

u) $\frac{1}{5}$

d) 4

j) 5

p) 0,4

v) $\frac{1}{2}$

e) 5

k) $\frac{22}{5}$

q) 60

w) 0,2

f) 30

l) $\frac{13}{14}$

r) 70

x) $\frac{2}{3}$

2) Částečně odmocněte a upravte následující výrazy:

a) $\sqrt{4} + \sqrt{50} - \sqrt{32} = 2 + \sqrt{2}$

g) $\sqrt{125} + \sqrt{72} - \sqrt{80} - \sqrt{32} = \sqrt{5} - 2\sqrt{2}$

b) $\sqrt{45} - \sqrt{125} + \sqrt{20} = 0$

h) $\sqrt{45} + \sqrt{63} - \sqrt{75} - \sqrt{28} = 3\sqrt{5} - 5\sqrt{3} + \sqrt{7}$

c) $\sqrt{75} + \sqrt{48} - \sqrt{12} = 7\sqrt{3}$

i) $3\sqrt{50} + 3\sqrt{20} - 2\sqrt{45} - \sqrt{98} = 8\sqrt{2}$

d) $3\sqrt{28} + \sqrt{28} - \sqrt{112} = 4\sqrt{7}$

j) $2\sqrt{32} + 2\sqrt{8} - 2\sqrt{63} + 2\sqrt{28} = 12\sqrt{2} - 2\sqrt{7}$

e) $2\sqrt{18} + 2\sqrt{32} - \sqrt{32} = \sqrt{2}$

k) $2\sqrt{45} - 3\sqrt{20} + 2\sqrt{72} - 4\sqrt{18} = 0$

3) Upravte následující výrazy pomocí vzorců $(a + b)^2$, $(a - b)^2$.

a) $(2 + \sqrt{2})^2 = 6 + 4\sqrt{2}$

g) $(\sqrt{3} - \sqrt{6})^2 = 9 - 6\sqrt{2}$

b) $(2 + 3\sqrt{2})^2 = 22 + 12\sqrt{2}$

h) $(1 + \sqrt{2})^2 + (1 - \sqrt{2})^2 = 6$

c) $(3 - \sqrt{5})^2 = 14 - 6\sqrt{5}$

i) $(\sqrt{2} + \sqrt{5})^2 - (\sqrt{2} - \sqrt{5})^2 = 4\sqrt{10}$

d) $(5 - 2\sqrt{3})^2 = 37 - 20\sqrt{3}$

j) $(\sqrt{3} - \sqrt{7})^2 - (\sqrt{3} + \sqrt{7})^2 = 0$

e) $(\sqrt{2} + \sqrt{5})^2 = 7 + 2\sqrt{10}$

k) $(-\sqrt{3} + \sqrt{5})^2 + (-\sqrt{3} - \sqrt{5})^2 = 16$

4) Upravte následující výrazy pomocí vzorce $(a + b)(a - b) = a^2 - b^2$.

a) $(2 - \sqrt{2})(2 + \sqrt{2}) = 2$

g) $(2\sqrt{3} + 3\sqrt{6})(2\sqrt{3} - 3\sqrt{6}) = -42$

b) $(2 + 3\sqrt{2})(2 - 3\sqrt{2}) = -14$

h) $(2\sqrt{7} + 2\sqrt{6})(2\sqrt{7} - 2\sqrt{6}) = 4$

c) $(3 - \sqrt{5})(3 + \sqrt{5}) = 4$

i) $(\frac{1}{2}\sqrt{10} + \frac{2}{3}\sqrt{6})(\frac{1}{2}\sqrt{10} - \frac{2}{3}\sqrt{6}) = \frac{1}{6}$

d) $(5 + 2\sqrt{3})(5 - 2\sqrt{3}) = 13$

j) $(\frac{4}{3}\sqrt{3} + \frac{4}{5}\sqrt{5})(\frac{4}{3}\sqrt{3} - \frac{4}{5}\sqrt{5}) = \frac{32}{15}$

e) $(\sqrt{2} - \sqrt{5})(\sqrt{2} + \sqrt{5}) = -3$

k) $(\frac{5}{3}\sqrt{12} + \frac{3}{4}\sqrt{8})(\frac{5}{3}\sqrt{12} - \frac{3}{4}\sqrt{8}) = \frac{173}{6}$

5) Vynásobte:

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

$$g) (2\sqrt{3} + 4\sqrt{6})(\sqrt{3} - 3\sqrt{6}) = -66 - 6\sqrt{2}$$

$$b) (4 - 3\sqrt{2})(-1 + 3\sqrt{2}) = -22 + 15\sqrt{2}$$

$$h) (\sqrt{7} - 2\sqrt{6})(2\sqrt{7} - 3\sqrt{6}) = 50 - 7\sqrt{42}$$

$$c) (7 - \sqrt{5})(-2 + 3\sqrt{5}) = -29 + 23\sqrt{5}$$

$$i) \left(\frac{1}{2}\sqrt{10} + \frac{1}{3}\sqrt{6}\right)\left(2\sqrt{10} - \frac{3}{4}\sqrt{6}\right) = \frac{17}{2} + \frac{7}{12}\sqrt{15}$$

$$d) (-3 - 2\sqrt{3})(-4 - 5\sqrt{3}) = 42 + 23\sqrt{3}$$

$$j) \left(-\frac{1}{5}\sqrt{3} + \frac{2}{5}\sqrt{5}\right)(5\sqrt{3} - 15\sqrt{5}) = -33 + 5\sqrt{15}$$

$$e) (3 - 3\sqrt{5})(-3 + 2\sqrt{5}) = -39 + 15\sqrt{5}$$

$$k) \left(\sqrt{12} - \frac{3}{4}\sqrt{8}\right)(-12\sqrt{12} - 24\sqrt{8}) = -60\sqrt{6}$$

6) Upravte výrazy:

$$a) (3 - 4\sqrt{5})(4 + 2\sqrt{5}) - (2 - 3\sqrt{5})^2 - (\sqrt{5} + 4)^2 + 100 = 2 - 6\sqrt{6}$$

$$b) 2(2 - 2\sqrt{7})^2 - 3(3 + \sqrt{7})^2 - (-\sqrt{7} + 4)(\sqrt{7} - 5) - 43 = -43\sqrt{7}$$

$$c) (\sqrt{3} - \sqrt{5})(\sqrt{3} + \sqrt{5}) - 3(\sqrt{3} + \sqrt{5})^2 - (\sqrt{3} - \sqrt{5})^2 + 34 = -4\sqrt{15}$$

$$d) (\sqrt{12} - 3\sqrt{27})(2\sqrt{27} - 4) - 2(2\sqrt{12} - 3\sqrt{27})^2 + 426 = 28\sqrt{3}$$

B: Shrnutí – odmocniny čísel

Zadání A

$$1) \sqrt{90000} = 300$$

$$2) \sqrt{0,0064} = 0,08$$

$$3) \sqrt[3]{\frac{27}{8}} = \frac{3}{2}$$

$$4) \sqrt[3]{\frac{64}{0,001}} = 40$$

$$5) 4\sqrt{32} + 3\sqrt{8} - 2\sqrt{64} + 16 = 22\sqrt{2}$$

$$6) (\sqrt{3} - \sqrt{7})^2 = 10 - 2\sqrt{21}$$

$$7) (\sqrt{3} + 2\sqrt{6})(\sqrt{3} - 2\sqrt{6}) = -21$$

$$8) (3 - 4\sqrt{2})(-2\sqrt{2} + 5) = 31 - 26\sqrt{2}$$

Zadání B

1) $\sqrt{160000} = 400$

2) $\sqrt{0,0081} = 0,09$

3) $\sqrt[3]{\frac{64}{125}} = \frac{4}{5}$

4) $\sqrt[3]{\frac{27}{0,001}} = 0,3$

5) $3\sqrt{32} + 2\sqrt{8} - 4\sqrt{64} + 32 = 16\sqrt{2}$

6) $(\sqrt{7} - \sqrt{3})^2 = 10 - 2\sqrt{21}$

7) $(\sqrt{5} + 2\sqrt{3})(\sqrt{5} - 2\sqrt{3}) = -7$

8) $(4 - 3\sqrt{2})(-5\sqrt{2} + 2) = 38 - 26\sqrt{2}$