1. Základné mocniny

1. Urči druhé mocniny čísel:
   a) 120
   b) 9000
   c) 95000
   d) 18
   e) 150

   Riešenie:

   a) $120^2 = 120 \cdot 120 = 14400$
   b) $9000^2 = 9000 \cdot 9000 = 81000000$
   c) $95000^2 = 95000 \cdot 95000 = 9025000000$
   d) $18^2 = 18 \cdot 18 = 324$
   e) $150^2 = 150 \cdot 150 = 22500$

2. Urči druhé mocniny čísel:
   a) 1,1
   b) 0,07
   c) 0,15
   d) 0,13
   e) 0,65
   f) 0,00035
   g) 1,9

   Riešenie:

   a) $1,1^2 = 1,1 \cdot 1,1 = 1,21$
   b) $0,07^2 = 0,07 \cdot 0,07 = 0,0049$
   c) $0,15^2 = 0,15 \cdot 0,15 = 0,0225$
   d) $0,13^2 = 0,13 \cdot 0,13 = 0,0169$
   e) $0,65^2 = 0,65 \cdot 0,65 = 0,4225$
   f) $0,00035^2 = 0,00035 \cdot 0,00035 = 0,0000001225$
   g) $1,9^2 = 1,9 \cdot 1,9 = 3,61$

3. Vypočítajte:

a) $-1,6^2$

b) $-0,14^2$

c) -50^2

d) -170^2

e) -450^2

f) -20^2

g) -16002

Riešenie:

a) $-1,6^2 = -1,6 \cdot 1,6 = -2,56$

b) $-0,14^2 = -(0,14 \cdot 0,14) = -0,0196$

c) $-50^2 = -50 \cdot 50 = -2500$

d). $-170^2 = -170 \cdot 170 = -28900$

e). $-450^2 = -450 \cdot 450 = -202500$

f) $-20^2 = -20 \cdot 20 = -400$

g) $-1600^2 = -1600 \cdot 1600 = -2560000$

4. Vypočítajte:

a) $(-110)^2$

b) $(-0,006)^2$

c) $(-2,5)^2$

d) $(-0,11)^2$

e) $(-0,018)^2$

f) $(-0,7)^2$

Riešenie:

a) $(-110)^2 = (-110) \cdot (-110) = +12100$

b) $(-0,006)^2 = (-0,006) \cdot (-0,006) = +0,000036$

c) $(-2,5)^2 = (-2,5) \cdot (-2,5) = +6,25$

d) $(-0,11)^2 = (-0,11) \cdot (-0,11) = +0,0121$

e) $(-0,018)^2 = (-0,018) \cdot (-0,018) = +0,000324$

f) $(-0,7)^2 = (-0,7) \cdot (-0,7) = +0,49$

5. Vypočítajte:

a) $-(-0,9)^2$

b) $-(-190)^2$

c) $-\left[-(-13)\right]^2$

d) $-\left[+(-8)\right]^2$

e) $-\left[-(+6)\right]^2$

Riešenie:

a) $-(-0,9)^2 = -(-0,9)\cdot(-0,9) = -0,81$

b) $-(-190)^2 = -(-190)\cdot(-190) = -36100$

c) $-\left[-(-13)\right]^2 = -\left[+13\right]^2 = -(+13)\cdot(+13) = -169$

d) $-\left[+(-8)\right]^2 = -(-8)^2 = -(-8)\cdot(-8) = -64$

e) $-\left[-(+6)\right]^2 = -(-6)^2 = -(-6)\cdot(-6) = -36$

6. Vypočítajte:

a) $\left[-(-3)^2 + 5^2 - 4^2 + 3^2\right]^2 =$

b) $\left(2^2 - 4^2\right)^2 =$

c) $\left[-6^2 + (-2)^2 - (-4)\right]\cdot 7 =$

d) $(-4)^2 + 3^2 - (+6)^2 =$

e) $\left(3 + 2^2\right)^2 \cdot 5 - (-8)^2 =$

f) $(-7)\cdot\left[-3^2 + 4^2 - (-8)^2\right] - 15 =$

g) $\left(\frac{2}{3} - \frac{4}{5}\right)^2 =$

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

i) $\left[\frac{-1}{2^2} - \left(\frac{-2^2}{3}\right)^2 - \frac{8}{(-3)^2}\right] - \frac{1}{2} =$

Riešenie:

a) $\left[-(-3)^2 + 5^2 - 4^2 + 3^2\right]^2 = \left[-9 + 25 - 16 + 9\right]^2 = 9^2 = 81$

b) $\left(2^2 - 4^2\right)^2 = (4 - 16)^2 = (-12)^2 = 144$

c) $\left[-6^2 + (-2)^2 - (-4)\right]\cdot 7 = \left[-36 + 4 + 4\right]\cdot 7 = -28\cdot 7 = -196$

d) $(-4)^2 + 3^2 - (+6)^2 = 16 + 9 - 36 = -11$

e) $\left(3 + 2^2\right)^2 \cdot 5 - (-8)^2 = (3 + 4)^2 \cdot 5 - 64 = 49\cdot 5 - 64 = 245 - 64 = 181$

f) $(-7)\cdot\left[-3^2+4^2-(-8)^2\right]-15=-7\cdot\left[-9+16-64\right]-15=-7\cdot(-57)-15=399-15=384$

g) $\left(\frac{2}{3}-\frac{4}{5}\right)^2=\left(\frac{2\cdot5-4\cdot3}{15}\right)^2=\frac{(-2)^2}{225}=\frac{4}{225}$

h) $\left(\frac{1}{5}\right)^2-\frac{-5^2}{3^2}+\frac{4^2}{-5}=\frac{1}{25}+\frac{25}{9}-\frac{16}{5}=\frac{9+25^2-16\cdot5\cdot9}{25\cdot9}=\frac{9+625-720}{225}=\frac{-86}{225}$

i) $\left[\frac{-1}{2^2}-\left(\frac{-2^2}{3}\right)^2-\frac{8}{(-3)^2}\right]-\frac{1}{2}=\frac{-1}{4}-\left(\frac{-4}{3}\right)^2-\frac{8}{9}=$

$=\frac{-9-16\cdot12-8\cdot4}{9\cdot4}=\frac{-9-192-32}{36}=\frac{-233}{36}$

V ďalších príkladoch je potrebné krátiť!!!

7. Vypočítajte:

a) $\frac{1{,}1^2}{12^2}\cdot\frac{-4^2}{11^2}\cdot\frac{(3.2)^2}{4^2}=$

b) $\frac{1{,}5^2}{250^2}\cdot\frac{-100^2}{1{,}2^2}\cdot\frac{1{,}3^2}{-140^2}=$

c) $\frac{35^2}{0{,}25^2}\cdot\frac{7{,}5^2}{450^2}\cdot\frac{10^2}{550^2}=$

d) $\frac{-0{,}2^2}{0{,}1^2}\cdot\frac{12^2}{130^2}\cdot\frac{(-0{,}15)^2}{-120^2}=$

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

Riešenie:

a) $\frac{1{,}1^2}{12^2}\cdot\frac{-4^2}{11^2}\cdot\frac{(3.2)^2}{4^2}=\frac{1{,}21}{144}\cdot\frac{-16}{121}\cdot\frac{9\cdot4}{16}=\frac{1}{4}\cdot\frac{-1}{100}\cdot\frac{1}{1}=-\frac{1}{400}$

b) $\frac{1{,}5^2}{250^2}\cdot\frac{-100^2}{1{,}2^2}\cdot\frac{1{,}3^2}{-140^2}=\frac{2{,}25}{62500}\cdot\frac{-10000}{1{,}44}\cdot\frac{1{,}69}{-19600}=\frac{225\cdot100\cdot169}{625\cdot144\cdot1960000}=$

$=\frac{9\cdot169}{25\cdot144\cdot19600}=\frac{169}{25\cdot16\cdot19600}=\frac{169}{7840000}$

c) $\frac{35^2}{0{,}25^2}\cdot\frac{7{,}5^2}{450^2}\cdot\frac{10^2}{550^2}=\frac{1225\cdot56{,}25\cdot100}{0{,}0625\cdot202500\cdot302500}=$

$=\frac{49}{6{,}25\cdot9\cdot484}=\frac{49}{27225}$

d) $$\frac{-0,2^2}{0,1^2}\cdot\frac{12^2}{130^2}\cdot\frac{(-0,15)^2}{-120^2}=\frac{-0,04\cdot144\cdot0,0225}{0,01\cdot16900\cdot(-14400)}=\frac{0,09}{1690000}$$

e) $$\left[\frac{2^2}{-3^2}-\frac{-4^2}{(-5)^2}-(-6)^2\right]\cdot\frac{1}{2}-\frac{2}{3}=\left[\frac{4}{-9}-\frac{-16}{25}-36\right]\cdot\frac{1}{2}-\frac{2}{3}=$$

$$\left[\frac{-100+16\cdot9-36\cdot9\cdot25}{9\cdot25}\right]\cdot\frac{1}{2}-\frac{2}{3}=\frac{-100+144-8100}{225}\cdot\frac{1}{2}-\frac{2}{3}=$$

$$=\frac{-8056}{225}\cdot\frac{1}{2}-\frac{2}{3}=\frac{-4028}{225}-\frac{2}{3}=\frac{-4028-150}{225}=\frac{-4178}{225}$$

2. Odmocnina

1. Urči druhé odmocniny čísel:

a) $\sqrt{121}$

b) $\sqrt{225}$

c) $\sqrt{81}$

d) $\sqrt{324}$

e) $\sqrt{361}$

Riešenie:

a) $\sqrt{121}=11$, protože $11^2=121$

b) $\sqrt{225}=15$, protože $15^2=225$

c) $\sqrt{81}=9$, protože $9^2=81$

d) $\sqrt{324}=18$, protože $18^2=324$

e) $\sqrt{361}=19$, protože $19^2=361$

2. Urči druhé odmocniny desatinných čísel:

a) $\sqrt{1,69}$

b) $\sqrt{0,0144}$

c) $\sqrt{0,64}$

d) $\sqrt{0,0049}$

e) $\sqrt{0,0196}$

f) $\sqrt{6,25}$

g) $\sqrt{1,21}$

h) $\sqrt{0,16}$

Riešenie:

a) $\sqrt{1,69}=1,3$, protože $1,3^2=1,69$

b) $\sqrt{0,0144}=0,12$, protože $0,12^2=0,0144$

c) $\sqrt{0,64}=0,8$, protože $0,8^2=0,64$

d) $\sqrt{0,0049}=0,07$, protože $0,07^2=0,0049$

e) $\sqrt{0,0196}=0,14$, protože $0,14^2=0,0196$

f) $\sqrt{6,25}=2,5$, protože $2,5^2=6,25$

g) $\sqrt{1,21}=1,1$, protože $1,1^2=1,21$

h) $\sqrt{0,16}=0,4$, protože $0,4^2=0,16$

3. Urči druhé odmocniny veľkých čísel:

a) $\sqrt{12100}$

b) $\sqrt{640000}$

c) $\sqrt{2500}$

d) $\sqrt{144000000}$

f) $\sqrt{6250000}$

g) $\sqrt{360000}$

h) $\sqrt{8100}$

i) $\sqrt{1960000}$

e) $\sqrt{16900}$ j) $\sqrt{49000000}$

Riešenie:

a) $\sqrt{12100} = 110$, protože $110^2 = 12100$

b) $\sqrt{640000} = 800$, protože $800^2 = 640000$

c) $\sqrt{2500} = 50$, protože $50^2 = 2500$

d) $\sqrt{144000000} = 12000$, protože $12000^2 = 144000000$

e) $\sqrt{16900} = 130$, protože $130^2 = 16900$

f) $\sqrt{6250000} = 2500$, protože $2500^2 = 6250000$

g) $\sqrt{360000} = 600$, protože $600^2 = 360000$

h) $\sqrt{8100} = 90$, protože $90^2 = 8100$

i) $\sqrt{1960000} = 1400$, protože $1400^2 = 1960000$

j) $\sqrt{49000000} = 7000$, protože $7000^2 = 49000000$

4. Urči druhé odmocniny zlomkov:

a) $\sqrt{\frac{144}{169}}$ e) $\sqrt{\frac{0,36}{12100}}$

b) $\sqrt{\frac{12100}{1960000}}$ f) $\sqrt{\frac{0,0025}{225}}$

c) $\sqrt{\frac{0,000144}{0,0625}}$ g) $\sqrt{\frac{0,36}{256}}$

d) $\sqrt{\frac{0,0064}{0,0324}}$

Riešenie:

a) $\sqrt{\frac{144}{169}} = \frac{12}{13}$

b) $\sqrt{\frac{12100}{1960000}} = \sqrt{\frac{121}{19600}} = \frac{11}{130}$ nebo $\sqrt{\frac{12100}{1960000}} = \frac{110}{1400} = \frac{11}{140}$

c) $\sqrt{\frac{0,000144}{0,0625}} = \sqrt{\frac{144}{62500}} = \frac{12}{250} = \frac{6}{125}$ nebo $\sqrt{\frac{0,000144}{0,0625}} = \frac{0,012}{0,25} = \frac{12}{250} = \frac{6}{125}$

d) $\sqrt{\frac{0,0064}{0,0324}} = \frac{0,08}{0,18} = \frac{8}{18} = \frac{4}{9}$ nebo $\sqrt{\frac{0,0064}{0,0324}} = \sqrt{\frac{64}{324}} = \frac{8}{18} = \frac{4}{9}$

e) $\sqrt{\frac{0,36}{12100}} = \sqrt{\frac{36}{1210000}} = \frac{6}{1100} = \frac{3}{550}$

f) $\sqrt{\frac{0,0025}{225}} = \sqrt{\frac{25}{2250000}} = \frac{5}{1500} = \frac{1}{300}$

g) $\sqrt{\frac{0,36}{256}} = \sqrt{\frac{36}{25600}} = \frac{6}{160} = \frac{3}{80}$

3. Tretia mocnina

1. Vypočítaj: $0,7^3,\ 0,04^3,\ 1,1^3,\ 60^3,\ 200^3$

Riešenie:

$0,7^3 = 0,7 \cdot 0,7 \cdot 0,7 = 0,343$ nebo $0,7^3 = (7 \cdot 0,1)^3 = 343 \cdot 0,001 = 0,343$

$0,04^3 = 0,04 \cdot 0,04 \cdot 0,04 = 0,000064$

$1,1^3 = 1,1 \cdot 1,1 \cdot 1,1 = 1,331$

$60^3 = 60 \cdot 60 \cdot 60 = 216000$ nebo $60^3 = 6^3 \cdot 10^3 = 216 \cdot 1000 = 216000$

$200^3 = 200 \cdot 200 \cdot 200 = 8000000$

2. Řešte příklady: $-0,6^3,\ -1,2^3,\ -0,05^3,\ -40^3,\ -900^3$

Riešenie:

$-0,6^3 = -0,6 \cdot 0,6 \cdot 0,6 = -0,216$

$-1,2^3 = -1,2 \cdot 1,2 \cdot 1,2 = -1,728$

$-0,05^3 = -0,05 \cdot 0,05 \cdot 0,05 = -0,000125$

$-40^3 = -40 \cdot 40 \cdot 40 = -64000$

$-900^3 = -900 \cdot 900 \cdot 900 = -729000000$

3. Řešte příklady: $(-0,2)^3,\ \left(-\frac{2}{3}\right)^3,\ \left(\frac{-5}{6}\right)^3,\ (-300)^3,\ (-120)^3$

Riešenie:

$(-0,2)^3 = (-0,2) \cdot (-0,2) \cdot (-0,2) = -0,008$

$\left(-\frac{2}{3}\right)^3 = \left(-\frac{2}{3}\right) \cdot \left(-\frac{2}{3}\right) \cdot \left(-\frac{2}{3}\right) = -\frac{8}{27}$

$\left(\frac{-5}{6}\right)^3 = \left(\frac{-5}{6}\right) \cdot \left(\frac{-5}{6}\right) \cdot \left(\frac{-5}{6}\right) = \frac{-125}{216}$

$(-300)^3 = (-300) \cdot (-300) \cdot (-300) = -27000000$

$(-120)^3 = -120 \cdot 120 \cdot 120 = -1728000$

4. Řešte příklady:

$(2\cdot 3\cdot 4)^3,\ (0,2\cdot 0,1\cdot 30)^3,\ \left(\frac{2}{3}\cdot\frac{6}{0,2}\cdot\frac{-0,4}{4}\right)^3,\ -(-0,2\cdot 0,3)^3,\ -\left[-(-0,02)\right]^3$

Riešenie:

$(2\cdot 3\cdot 4)^3 = 2^3\cdot 3^3\cdot 4^3 = 8\cdot 27\cdot 64 = 13824$ nebo $(2\cdot 3\cdot 4)^3 = 24^3 = 13824$

$(0,2\cdot 0,1\cdot 30)^3 = 0,2^3\cdot 0,1^3\cdot 30^3 = 0,008\cdot 0,001\cdot 27000 = 0,216$

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

$-(-0,2\cdot 0,3)^3 = -(-0,06)^3 = -(-0,000216) = +0,000216$

$-\left[-(-0,02)\right]^3 = -[+0,02]^3 = -0,000008$

5. Vypočítajte hodnotu výrazů:

a) $-4-\left(\frac{1}{3}\right)^3$

b) $5+(-0,4)^3$

c) $4\cdot 2-2\cdot(-3)^3$

d) $-3-(-2)^3\cdot 4$

e) $-\frac{2}{3}+\left(\frac{1}{2}\right)^3$

f) $\left(\frac{-2}{3}\right)^3-\left(-\frac{1}{3}\right)^3$

g) $\frac{-3}{4}+\left(\frac{3}{-2}\right)^3$

h) $5\cdot\frac{2}{3}-2\cdot\left(\frac{1}{6}\right)^3$

i) $\frac{3}{4}\cdot\frac{-1}{2}+\frac{3}{2}\cdot\left(\frac{1}{2}\right)^3$

j) $\left(\frac{3}{5}\right)^3\cdot\frac{25}{9}-\frac{6^3}{15}$

k) $\frac{-2}{3^2}+\frac{2^3}{-3^2}$

l) $\left(-\frac{2}{5}\right)^2-\left(-\frac{3}{5}\right)^3$

m) $\frac{6}{4^3}\cdot\frac{-8}{3^2}+(-2)\cdot\frac{3^2}{2^3}$

n) $\frac{3}{-2^2}-(-2)^3$

o) $\frac{-5}{-3^3}-\left(-\frac{-2}{3}\right)^2$

p) $\left(\frac{1}{3}\right)^2+\left(\frac{-1}{3}\right)^3$

q) $\left(\frac{1}{2^2}\right)^3-\left(\frac{1^2}{2^3}\right)^2$

r) $(-6)-\left(-\frac{2}{3}\right)^3$

s) $\left(\frac{-3}{4^2}\right)^2+(-3)^3$

t) $-\left[-\frac{(-2)^3}{3}\right]^2+\left[-\left(-\frac{1}{2}\right)^3\right]$

Riešenie:

a) $-4-\left(\frac{1}{3}\right)^3=-4-\frac{1}{27}=\frac{-4\cdot 27-1}{27}=\frac{-108-1}{27}=\frac{-109}{27}=-4\frac{1}{27}$

b) $5+\left(-0,4\right)^3=5+\left(-0,064\right)=5-0,064=4,936$

c) $4\cdot 2-2\cdot\left(-3\right)^3=8-2\cdot\left(-27\right)=8+54=62$

d) $-3-\left(-2\right)^3\cdot 4=-3-\left(-8\right)\cdot 4=-3+32=29$

e) $-\frac{2}{3}+\left(\frac{1}{2}\right)^3=-\frac{2}{3}+\frac{1}{8}=\frac{-2\cdot 8+1\cdot 3}{24}=\frac{-16+3}{24}=\frac{-13}{24}$

f) $\left(\frac{-2}{3}\right)^3-\left(-\frac{1}{3}\right)^3=\frac{-8}{27}-\left(-\frac{1}{27}\right)=\frac{-8+1}{27}=\frac{-7}{27}$

g) $\frac{-3}{4}+\left(\frac{3}{-2}\right)^3=\frac{-3}{4}+\frac{27}{-8}=\frac{-3}{4}+\frac{-27}{8}=\frac{-6-27}{8}=\frac{-33}{8}=-4\frac{1}{8}$

h) $5\cdot\frac{2}{3}-2\cdot\left(\frac{1}{6}\right)^3=\frac{10}{3}-2\cdot\frac{1}{216}=\frac{2160-6}{648}=\frac{2154}{648}=\frac{359}{108}=3\frac{35}{108}$

i) $\frac{3}{4}\cdot\frac{-1}{2}+\frac{3}{2}\cdot\left(\frac{1}{2}\right)^3=\frac{-3}{8}+\frac{3}{2}\cdot\frac{1}{8}=\frac{-3}{8}+\frac{3}{16}=\frac{-6+3}{16}=\frac{-3}{16}$

j) $\left(\frac{3}{5}\right)^3\cdot\frac{25}{9}-\frac{6^3}{15}=\frac{27}{125}\cdot\frac{25}{9}-\frac{216}{15}=\frac{3}{5}-\frac{216}{15}=\frac{9-216}{15}=-\frac{207}{15}=-\frac{69}{5}=-13\frac{4}{5}$

k) $\frac{-2}{3^2}+\frac{2^3}{-3^2}=\frac{-2}{9}+\frac{8}{-9}=\frac{-2-8}{9}=-\frac{10}{9}=-1\frac{1}{9}$

l) $\left(-\frac{2}{5}\right)^2-\left(-\frac{3}{5}\right)^3=\frac{4}{25}-\left(-\frac{27}{125}\right)=\frac{20+27}{125}=\frac{47}{125}$

m) $\frac{6}{4^3}\cdot\frac{-8}{3^2}+\left(-2\right)\cdot\frac{3^2}{2^3}=\frac{6}{64}\cdot\frac{-8}{9}-\frac{2\cdot 9}{8}=\frac{-2}{24}-\frac{9}{4}=\frac{-2-54}{24}=\frac{-56}{24}=\frac{-7}{3}=-2\frac{1}{3}$

n) $\frac{3}{-2^2}-\left(-2\right)^3=\frac{3}{-4}-\left(-8\right)=\frac{-3+32}{4}=\frac{29}{4}=7\frac{1}{4}$

o) $\frac{-5}{-3^3}-\left(-\frac{-2}{3}\right)^2=\frac{5}{27}-\frac{4}{9}=\frac{5-12}{27}=-\frac{7}{27}$

p) $\left(\frac{1}{3}\right)^2+\left(\frac{-1}{3}\right)^3=\frac{1}{9}+\frac{-1}{27}=\frac{3-1}{27}=\frac{2}{27}$

q) $\left(\frac{1}{2^2}\right)^3-\left(\frac{1^2}{2^3}\right)^2=\left(\frac{1}{4}\right)^3-\left(\frac{1}{8}\right)^2=\frac{1}{64}-\frac{1}{64}=0$

r) $$(-6)-\left(-\frac{2}{3}\right)^3=-6-\frac{-8}{27}=\frac{-162+8}{27}=\frac{-154}{27}=-5\frac{19}{27}$$

s) $$\left(\frac{-3}{4^2}\right)^2+(-3)^3=\frac{9}{256}-27=\frac{9-6912}{256}=-\frac{6903}{256}=-26\frac{247}{256}$$

t) $$-\left[-\frac{(-2)^3}{3}\right]^2+\left[-\left(-\frac{1}{2}\right)^3\right]=-\left[-\frac{-8}{3}\right]^2+\left[-\frac{-1}{8}\right]=-\frac{64}{9}+\frac{1}{8}=\frac{-512+9}{72}=\frac{-503}{72}=-6\frac{71}{72}$$

4. Tretia odmocnina

1. Vypočítaj: $\sqrt[3]{64},\ \sqrt[3]{216},\ \sqrt[3]{0,008},\ \sqrt[3]{27000},\ \sqrt[3]{0,000343}$

Riešenie:

$\sqrt[3]{64}=4$

$\sqrt[3]{216}=6$

$\sqrt[3]{0,008}=0,2$

$\sqrt[3]{27000}=30$

$\sqrt[3]{0,000343}=0,07$

2.Vypočítaj: $\sqrt[3]{\frac{64}{216}},\ \sqrt[3]{\frac{343}{512}},\ \sqrt[3]{\frac{0,729}{343}},\ \sqrt[3]{\frac{0,000512}{0,729}},\ \sqrt[3]{\frac{64000}{343000000}}$

Riešenie:

$\sqrt[3]{\frac{64}{216}}=\frac{4}{6}=\frac{2}{3}$

$\sqrt[3]{\frac{343}{512}}=\frac{7}{8}$

$\sqrt[3]{\frac{0,729}{343}}=\frac{0,9}{7}=\frac{9}{70}$

$\sqrt[3]{\frac{0,000512}{0,729}}=\frac{0,08}{0,9}=\frac{8}{90}=\frac{4}{45}$

$\sqrt[3]{\frac{64000}{343000000}}=\frac{40}{700}=\frac{2}{35}$

3. Vypočítaj: $\sqrt[3]{64\cdot 125},\sqrt[3]{0,008\cdot 125},\ \sqrt[3]{27\cdot 0,064},\ \sqrt[3]{343\cdot 0,216},\ \sqrt[3]{0,027\cdot 0,008}$

Riešenie::

$\sqrt[3]{64\cdot 125}=4\cdot 5=20$ nebo $\sqrt[3]{64\cdot 125}=\sqrt[3]{8000}=20$

$\sqrt[3]{0,008\cdot 125}=0,2\cdot 5=1$ nebo $\sqrt[3]{0,008\cdot 125}=\sqrt[3]{1}=1$

$\sqrt[3]{27\cdot 0,064}=3\cdot 0,4=1,2$

$\sqrt[3]{343\cdot 0,216}=7\cdot 0,6=4,2$

$\sqrt[3]{0,027\cdot 0,008}=0,3\cdot 0,2=0,06$

4. Vypočítaj:

$\sqrt[3]{0,001\cdot 0,512},\ \sqrt[3]{1000\cdot 0,343},\ \sqrt[3]{729\cdot 1000000},\ \sqrt[3]{343000\cdot 0,001},\ \sqrt[3]{0,000512\cdot 1000}$

Riešenie:

$\sqrt[3]{0,001 \cdot 0,512} = 0,1 \cdot 0,8 = 0,08$

$\sqrt[3]{1000 \cdot 0,343} = \sqrt[3]{343} = 7$

$\sqrt[3]{729 \cdot 1000000} = 900$

$\sqrt[3]{343000 \cdot 0,001} = 70 \cdot 0,1 = 7$

$\sqrt[3]{0,000512 \cdot 1000} = \sqrt[3]{0,512} = 0,8$

5. **Umocňovanie súčinu a podielu použitím vzorcov:**

$$(a \cdot b)^2 = a^2 \cdot b^2, \left(\frac{a}{b}\right)^2 = \frac{a^2}{b^2}$$

1. Urči druhé mocniny čísel:

a) 22^2

b) 48^2

c) $0,048^2$

d) $0,33^2$

Riešenie:

a) $22^2 = 11^2 \cdot 2^2 = 121 \cdot 4 = 484$

b) $48^2 = 4^2 \cdot 12^2 = 16 \cdot 144 = 2304$

c) $0,048^2 = (0,001 \cdot 4 \cdot 12)^2 = 0,001^2 \cdot 4^2 \cdot 12^2 = 0,000001 \cdot 16 \cdot 144 = 0,002304$

d) $0,33^2 = (0,01 \cdot 3 \cdot 11)^2 = 0,0001 \cdot 9 \cdot 121 = 0,1089$

2. Urči druhé mocniny čísel:

a) $(0,1 \cdot 8 \cdot 3)^2$

b) $(7 \cdot 15 \cdot 0,2)^2$

c) $(2 \cdot 3 \cdot 6)^2$

Riešenie:

a) $(0,1 \cdot 8 \cdot 3)^2 = 0,1^2 \cdot 8^2 \cdot 3^2 = 0,01 \cdot 64 \cdot 9 = 5,76$

b) $(7 \cdot 15 \cdot 0,2)^2 = 7^2 \cdot 15^2 \cdot 0,2^2 = 49 \cdot 225 \cdot 0,04 = 441$

c) $(2 \cdot 3 \cdot 6)^2 = 36^2 = 1296$

3.Urči druhé mocniny čísel:

a) $\frac{5^2}{4}$

b) $\left(\frac{2}{7}\right)^2$

c) $\left(\frac{2\cdot 3}{5}\right)^2$

d) $\left(-\frac{3}{5}\right)^2$

e) $-\left(-\frac{6}{11}\right)^2$

f) $\left(\frac{-2\cdot 7}{3\cdot 8}\right)^2$

Riešenie:

a) $\frac{5^2}{4}=\frac{5\cdot 5}{4}=\frac{25}{4}=6\frac{1}{4}$

b) $\left(\frac{2}{7}\right)^2=\left(\frac{2}{7}\right)\cdot\left(\frac{2}{7}\right)=\frac{2\cdot 2}{7\cdot 7}=\frac{4}{49}$

c) $\left(\frac{2\cdot 3}{5}\right)^2=\frac{2^2\cdot 3^2}{5^2}=\frac{4\cdot 9}{25}=\frac{36}{25}=1\frac{11}{25}$

d) $\left(-\frac{3}{5}\right)^2=\frac{(-1)^2\cdot 3^2}{5^2}=\frac{1\cdot 9}{25}=\frac{9}{25}$

e) $-\left(-\frac{6}{11}\right)^2=-\frac{(-1)^2\cdot 6^2}{11^2}=-\frac{36}{121}$

f) $\left(\frac{-2\cdot 7}{3\cdot 8}\right)^2=\left(\frac{-14}{24}\right)^2=\left(\frac{-7}{12}\right)^2=\frac{49}{144}$

4. Urči druhé mocniny čísel:

a) $\left(\frac{0,12}{0,013}\right)^2$

b) $\left(\frac{0,008}{0,07}\right)^2$

c) $\left(\frac{2\cdot 0,03}{0,8}\right)^2$

Riešenie:

a) $\left(\frac{0,12}{0,013}\right)^2 = \frac{0,0144}{0,000169} = \frac{14400}{169} = 85\frac{35}{169}$

b) $\left(\frac{0,008}{0,07}\right)^2 = \left(\frac{8}{70}\right)^2 = \left(\frac{4}{35}\right)^2 = \frac{16}{1225}$

c) $\left(\frac{2\cdot 0,03}{0,8}\right)^2 = \left(\frac{0,06}{0,8}\right)^2 = \left(\frac{6}{80}\right)^2 = \left(\frac{3}{40}\right)^2 = \frac{9}{1600}$

5. Urči druhé mocniny čísel:

a) $\left[\frac{5\cdot(-2)}{7}\right]^2$

b) $\left[\frac{6\cdot(-3)}{17}\right]^2$

c) $\left[-\frac{(-3)\cdot 5}{(-8)}\right]^2$

d) $-\left[\frac{(-2)\cdot(-1)}{3}\right]^2$

Riešenie:

a) $\left[\frac{5\cdot(-2)}{7}\right]^2 = \left(\frac{-10}{7}\right)^2 = \frac{100}{49} = 2\frac{2}{49}$

b) $\left[\frac{6\cdot(-3)}{17}\right]^2 = \left(\frac{-18}{17}\right)^2 = \frac{324}{289}$

c) $\left[-\frac{(-3)\cdot 5}{(-8)}\right]^2 = \left[-\frac{-15}{-8}\right]^2 = \left(-\frac{15}{8}\right)^2 = \frac{225}{64} = 3\frac{33}{64}$

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

6. Odmocňovanie súčinu použitím vzorca $\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$

1.Urči odmocniny čísel:

a) $\sqrt{16 \cdot 4}$

b) $\sqrt{25 \cdot 16}$

c) $\sqrt{64 \cdot 9}$

d) $\sqrt{81 \cdot 25}$

e) $\sqrt{25 \cdot 64}$

f) $\sqrt{81 \cdot 49}$

g) $\sqrt{9 \cdot 121}$

h) $\sqrt{144 \cdot 25}$

i) $\sqrt{121 \cdot 64}$

j) $\sqrt{361 \cdot 81}$

Riešenie:

a) $\sqrt{16 \cdot 4} = 4 \cdot 2 = 8$ nebo $\sqrt{16 \cdot 4} = \sqrt{64} = 8$

b) $\sqrt{25 \cdot 16} = 5 \cdot 4 = 20$ nebo $\sqrt{25 \cdot 16} = \sqrt{400} = 20$

c) $\sqrt{64 \cdot 9} = 8 \cdot 3 = 24$

d) $\sqrt{81 \cdot 25} = 9 \cdot 5 = 45$

e) $\sqrt{25 \cdot 64} = 5 \cdot 8 = 40$

f) $\sqrt{81 \cdot 49} = 9 \cdot 7 = 63$ nebo $\sqrt{81 \cdot 49} = \sqrt{3969} = 63$

g) $\sqrt{9 \cdot 121} = 3 \cdot 11 = 33$

h) $\sqrt{144 \cdot 25} = 12 \cdot 5 = 60$

i) $\sqrt{121 \cdot 64} = 11 \cdot 8 = 88$

j) $\sqrt{361 \cdot 81} = 19 \cdot 9 = 171$ nebo $\sqrt{361 \cdot 81} = \sqrt{29241} = 171$

2. Urči odmocniny čísel:

a) $\sqrt{16 \cdot 400}$

b) $\sqrt{2500 \cdot 1600}$

c) $\sqrt{640000 \cdot 9}$

d) $\sqrt{81 \cdot 250000}$

e) $\sqrt{250.64000}$

Riešenie:

a) $\sqrt{16 \cdot 400} = 4 \cdot 20 = 80$

b) $\sqrt{2500 \cdot 1600} = 50 \cdot 40 = 2000$

c) $\sqrt{640000 \cdot 9} = 800 \cdot 3 = 2400$

d) $\sqrt{81 \cdot 250000} = 9 \cdot 500 = 4500$

e) $\sqrt{250.64000} = \sqrt{25 \cdot 10 \cdot 64 \cdot 1000} = \sqrt{25 \cdot 64 \cdot 10000} = 5 \cdot 8 \cdot 100 = 4000$

3.Urči odmocniny čísel:

a) $\sqrt{0,81 \cdot 49}$

b) $\sqrt{9 \cdot 0,000121}$

c) $\sqrt{1,44 \cdot 0,25}$

d) $\sqrt{0,0121 \cdot 0,64}$

e) $\sqrt{36,1 \cdot 8,1}$

Riešenie:

a) $\sqrt{0,81 \cdot 49} = 0,9 \cdot 7 = 6,3$

b) $\sqrt{9 \cdot 0,000121} = 3 \cdot 0,011 = 0,033$

c) $\sqrt{1,44 \cdot 0,25} = 1,2 \cdot 0,5 = 0,6$

d) $\sqrt{0,0121 \cdot 0,64} = 0,11 \cdot 0,8 = 0,088$

e) $\sqrt{36,1 \cdot 8,1} = \sqrt{361 \cdot 0,1 \cdot 81 \cdot 0,1} = \sqrt{361 \cdot 81 \cdot 0,01} = 19 \cdot 9 \cdot 0,1 = 17,1$

7. Mocnina súčinu

1. Zjednoduš číselné výrazy: $(2\cdot 5)^2, (2\cdot 4)^3, (4\cdot 10)^2, (-3\cdot 7)^2, (-1\cdot 2\cdot 3)^3$

Riešenie:

$(2\cdot 5)^2 = 4\cdot 25 = 100$

$(2\cdot 4)^3 = 8\cdot 64 = 512$

$(4\cdot 10)^2 = 16\cdot 100 = 1600$

$(-3\cdot 7)^2 = 9\cdot 49 = 441$

$(-1\cdot 2\cdot 3)^3 = -1\cdot 8\cdot 27 = -216$

2. Zjednoduš číselné výrazy: $(3\cdot 4)^3, (2\cdot 5)^5, (-3\cdot 5)^3, (-4\cdot 5)^2, (5\cdot 6)^4$

Riešenie:

$(3\cdot 4)^3 = 27\cdot 64 = 1728$

$(2\cdot 5)^5 = 32\cdot 3125 = 100000$

$(-3\cdot 5)^3 = -27\cdot 125 = -3375$

$(-4\cdot 5)^2 = 16\cdot 25 = 400$

$(5\cdot 6)^4 = 625\cdot 1296 = 810000$

3. Zjednoduš číselné výrazy: $[(-2)\cdot 4]^2, [(-3)\cdot(-4)]^3, [3\cdot(-5)]^2, [-1\cdot(-7)]^3, [2\cdot(-5)]^5$

Riešenie:

$[(-2)\cdot 4]^2 = 4\cdot 16 = 64$

$[(-3)\cdot(-4)]^3 = -27\cdot(-64) = 1728$

$[3\cdot(-5)]^2 = 9\cdot 25 = 225$

$[-1\cdot(-7)]^3 = -1\cdot(-343) = 343$

$[2\cdot(-5)]^5 = 32\cdot(-3125) = -100000$

4. Zjednoduš číselné výrazy:
$[-2\cdot 3\cdot(-4)]^3, [(-1)\cdot(-2)\cdot(-5)]^4, [2\cdot 4\cdot(-5)]^2, [5\cdot(-3)\cdot 6]^2, [(-2)\cdot 3\cdot(-1)]^3$

Riešenie:

$[-2\cdot 3\cdot(-4)]^3 = -8\cdot 27\cdot(-64) = 13824$

$\left[(-1)\cdot(-2)\cdot(-5)\right]^4 = 1\cdot 16\cdot 625 = 10000$

$\left[2\cdot 4\cdot(-5)\right]^2 = 4\cdot 16\cdot 25 = 1600$

$\left[5\cdot(-3)\cdot 6\right]^2 = 25\cdot 9\cdot 36 = 8100$

$\left[(-2)\cdot 3\cdot(-1)\right]^3 = -8\cdot 27\cdot(-1) = 216$

5. Zjednoduš číselné výrazy: $(0,5\cdot 0,2)^2, (-0,3\cdot 0,04)^3, (20\cdot 0,6)^2, (10\cdot 0,4)^3, (-300\cdot 0,5)^2$
Riešenie:

$(0,5\cdot 0,2)^2 = 0,25\cdot 0,04 = 0,01$

$(-0,3\cdot 0,04)^3 = -0,027\cdot 0,000064 = -0,000001728$

$(20\cdot 0,6)^2 = 400\cdot 0,36 = 144$

$(10\cdot 0,4)^3 = 1000\cdot 0,064 = 64$

$(-300\cdot 0,5)^2 = 90000\cdot 0,25 = 22500$

6. Zjednoduš výrazy: $(4a)^3, (6xy)^2, (2b\cdot 3d)^2, (-1p\cdot 2q)^3, (4k\cdot 3l)^2$
Riešenie:

$(4a)^3 = 64a^3$

$(6xy)^2 = 36x^2y^2$

$(2b\cdot 3d)^2 = 36b^2d^2$

$(-1p\cdot 2q)^3 = -8p^3q^3$

$(4k\cdot 3l)^2 = 144k^2l^2$

8. Mocnina podielu

1. Zjednoduš číselné výrazy: $\left(\frac{2}{3}\right)^2, \left(\frac{2}{5}\right)^3, \left(\frac{3}{4}\right)^2, \left(\frac{1}{2}\right)^4, \left(\frac{5}{3}\right)^3$

Riešenie:

$$\left(\frac{2}{3}\right)^2 = \frac{2^2}{3^2} = \frac{4}{9}$$

$$\left(\frac{2}{5}\right)^3 = \frac{2^3}{5^3} = \frac{8}{125}$$

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

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

$$\left(\frac{5}{3}\right)^3 = \frac{5^3}{3^3} = \frac{125}{27} = 4\frac{17}{27}$$

2. Zjednoduš číselné výrazy: $\left(-\frac{4}{5}\right)^3, \left(\frac{-2}{3}\right)^4, \left(-\frac{-11}{-12}\right)^2, \left(-\frac{5}{18}\right)^2, -\left(\frac{16}{-17}\right)^2$

Riešenie:

$$\left(-\frac{4}{5}\right)^3 = -\frac{64}{125}$$

$$\left(\frac{-2}{3}\right)^4 = \frac{(-2)^4}{3^4} = \frac{16}{81}$$

$$\left(-\frac{-11}{-12}\right)^2 = \frac{(-11)^2}{12^2} = \frac{121}{144}$$

$$\left(-\frac{5}{18}\right)^2 = \frac{25}{324}$$

$$-\left(\frac{16}{-17}\right)^2 = -\frac{16^2}{(-17)^2} = -\frac{256}{289}$$

3. Zjednoduš číselné výrazy: $\left(\frac{2\cdot 3}{4}\right)^4, \left(\frac{-3\cdot 5}{7}\right)^3, \left(\frac{9}{3\cdot 7}\right)^2, \left(\frac{-2\cdot 6}{3\cdot 5}\right)^3, \left(-\frac{5\cdot 6}{-4\cdot 5}\right)^2$

Riešenie:

$$\left(\frac{2\cdot 3}{4}\right)^4 = \frac{2^4\cdot 3^4}{4^4} = \frac{16\cdot 81}{256} = \frac{81}{16} \text{ nebo } \left(\frac{2\cdot 3}{4}\right)^4 = \frac{6^4}{4^4} = \frac{1296}{256} = \frac{81}{16} \text{ nebo } \left(\frac{2\cdot 3}{4}\right)^4 = \frac{3^4}{2^4} = \frac{81}{16}$$

$$\left(\frac{-3\cdot 5}{7}\right)^3 = \frac{-15^3}{7^3} = \frac{-3375}{343}$$

$$\left(\frac{9}{3\cdot 7}\right)^2 = \frac{3^2}{7^2} = \frac{9}{49}$$

$$\left(\frac{-2\cdot 6}{3\cdot 5}\right)^3 = \frac{-4^3}{5^3} = \frac{-64}{125}$$

$$\left(-\frac{5\cdot 6}{-4\cdot 5}\right)^2 = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$$

4. Zjednoduš číselné výrazy:

$$\left[-\frac{(-6)\cdot(-5)}{10\cdot(-3)}\right]^4, \left[\frac{5\cdot(-2)}{7}\right]^3, \left[\frac{8\cdot(-2)\cdot(-3)}{(-9)\cdot 16}\right]^3, \left[\frac{5\cdot(-11)}{25}\right]^2, \left[-\frac{15\cdot(-12)}{(-16)\cdot(-45)}\right]^5$$

Riešenie:

$$\left[-\frac{(-6)\cdot(-5)}{10\cdot(-3)}\right]^4 = 1^4 = 1$$

$$\left[\frac{5\cdot(-2)}{7}\right]^3 = \frac{(-10)^3}{7^3} = \frac{-1000}{343}$$

$$\left[\frac{8\cdot(-2)\cdot(-3)}{(-9)\cdot 16}\right]^3 = \left[\frac{-1}{3}\right]^3 = \frac{-1}{27}$$

$$\left[\frac{5\cdot(-11)}{25}\right]^2 = \left[\frac{-11}{5}\right]^2 = \frac{121}{25}$$

$$\left[-\frac{15\cdot(-12)}{(-16)\cdot(-45)}\right]^5 = \left[\frac{1}{4}\right]^5 = \frac{1}{1024}$$

5. Zjednoduš výrazy: $\left(\frac{2a}{b}\right)^3, \left(\frac{-10ab}{15b}\right)^4, \left(\frac{x}{3y}\right)^2, \left(\frac{-4p}{10q}\right)^3, \left(\frac{5pq}{-10qr}\right)^2$

Riešenie:

$$\left(\frac{2a}{b}\right)^3 = \frac{8a^3}{b^3}, \text{ kde } b \neq 0$$

$$\left(\frac{-10ab}{15b}\right)^4 = \left(\frac{-2a}{3}\right)^4 = \frac{16a^4}{81}, \text{ kde } b \neq 0$$

$$\left(\frac{x}{3y}\right)^2 = \frac{x^2}{9y^2}, \text{ kde } y \neq 0$$

$$\left(\frac{-4p}{10q}\right)^3 = \left(\frac{-2p}{5q}\right)^3 = -\frac{8p^3}{125q^3}, \text{ kde } q \neq 0$$

$$\left(\frac{5pq}{-10qr}\right)^2 = \left(\frac{p}{-2r}\right)^2 = \frac{p^2}{4r^2}, \text{ kde } qr \neq 0$$

9. Cvičenie I

1. Riešte príklady:
   a) $4+5^2$
   b) 7^2-4^2
   c) $8^2-1^2+2^2$
   d) 6^2+4^2
   e) 3^2-5+4^2-2

   Riešenie:

   a) $4+5^2=4+25=29$

   b) $7^2-4^2=49-16=33$

   c) $8^2-1^2+2^2=64-1+4=67$

   d) $6^2+4^2=36+16=52$

   e) $3^2-5+4^2-2=9-5+16-2=18$

2. Riešte príklady:
   a) $8-(-5)^2$
   b) $4+(-2)^2$
   c) $4-\left[-(-2)^2\right]$
   d) $4-\left[-(-2)\right]^2$
   e) $(-6)^2-5^2$

   Riešenie:

   a) $8-(-5)^2=8-(+25)=8-25=-17$

   b) $4+(-2)^2=4+4=8$

   c) $4-\left[-(-2)^2\right]=4-[-4]=4+4=8$

   d) $4-\left[-(-2)\right]^2=4-[+2]^2=4-4=0$

   e) $(-6)^2-5^2=36-25=11$

3. Riešte príklady:

a) $4 \cdot 3^2$

b) $-5 \cdot 2^2$

c) $-3 \cdot (-2)^2$

d) $(-2)^2 \cdot (-6)^2$

e) $5 \cdot (-3) \cdot (-1)^2$

Riešenie:

a) $4 \cdot 3^2 = 4 \cdot 9 = 36$

b) $-5 \cdot 2^2 = -5 \cdot 4 = -20$

c) $-3 \cdot (-2)^2 = -3 \cdot 4 = -12$

d) $(-2)^2 \cdot (-6)^2 = 4 \cdot 36 = 144$

e) $5 \cdot (-3) \cdot (-1)^2 = -15 \cdot 1 = -15$

4. Riešte príklady:

a) $4^2 \cdot 5 + 2 \cdot (6^2 - 2 \cdot 5)$

b) $(4^2 - 2 \cdot 3^2)^2 - 6^2$

c) $-(9 - 4^2) + 11^2 \cdot (-1)$

d) $5 \cdot (-2)^2 + (-3) \cdot (-4)^2$

e) $-\left[-(6 + 2 \cdot 3^2)\right]^2$

Riešenie:

a) $4^2 \cdot 5 + 2 \cdot (6^2 - 2 \cdot 5) = 16 \cdot 5 + 2 \cdot (36 - 10) = 80 + 2 \cdot 26 = 80 + 52 = 132$

b) $(4^2 - 2 \cdot 3^2)^2 - 6^2 = (16 - 2 \cdot 9)^2 - 36 = (16 - 18)^2 - 36 = (-2)^2 - 36 = 4 - 36 = -32$

c) $-(9 - 4^2) + 11^2 \cdot (-1) = -(9 - 16) + 121 \cdot (-1) = -(-7) - 121 = 7 - 121 = -114$

d) $5 \cdot (-2)^2 + (-3) \cdot (-4)^2 = 5 \cdot 4 - 3 \cdot 16 = 20 - 48 = -28$

e) $-\left[-(6 + 2 \cdot 3^2)\right]^2 = -\left[-(6 + 2 \cdot 9)\right]^2 = -\left[-24\right]^2 = -576$

5. Riešte príklady

a) $\sqrt{16}\cdot 2+4\cdot\sqrt{6+10}$

b) $\sqrt{25\cdot 4}-3\cdot\sqrt{12^2}$

c) $\sqrt{121}\cdot(-1)+\sqrt{4}\cdot\sqrt{9}$

d) $\sqrt{8+4^2+1}-5\cdot\sqrt{9}$

e) $15:\sqrt{25}-6\cdot\sqrt{121}$

Riešenie:

a) $\sqrt{16}\cdot 2+4\cdot\sqrt{6+10}=4\cdot 2+4\cdot\sqrt{16}=8+4\cdot 4=8+16=24$

b) $\sqrt{25\cdot 4}-3\cdot\sqrt{12^2}=5\cdot 2-3\cdot 12=10-36=-26$

c) $\sqrt{121}\cdot(-1)+\sqrt{4}\cdot\sqrt{9}=11\cdot(-1)+2\cdot 3=-11+6=-5$

d) $\sqrt{8+4^2+1}-5\cdot\sqrt{9}=\sqrt{9+16}-5\cdot 3=\sqrt{25}-15=5-15=-10$

e) $15\div\sqrt{25}-6\cdot\sqrt{121}=15\div 5-6\cdot 11=3-66=-63$

6. Riešte príklady:

a) $\left(6-3^2\right)^2+4\cdot\sqrt{9}$

b) $\sqrt{22+14}-\sqrt{16}\cdot 2$

c) $\sqrt{5^2+6^2+3}-(-1)\cdot\sqrt{9}$

d) $\sqrt{\left(12-4^2+5^2\right)^2}$

e) $\sqrt{6\cdot 12+9}-6\cdot\sqrt{12+2^2}$

Riešenie:

a) $\left(6-3^2\right)^2+4\cdot\sqrt{9}=(6-9)^2+4\cdot 3=(-3)^2+12=9+12=21$

b) $\sqrt{22+14}-\sqrt{16}\cdot 2=\sqrt{36}-4\cdot 2=6-8=-2$

c) $\sqrt{5^2+6^2+3}-(-1)\cdot\sqrt{9}=\sqrt{25+36+3}+1\cdot 3=\sqrt{64}+3=8+3=11$

d) $\sqrt{\left(12-4^2+5^2\right)^2}=12-16+25=21$

e) $\sqrt{6\cdot 12+9}-6\cdot\sqrt{12+2^2}=\sqrt{72+9}-6\cdot\sqrt{12+4}=\sqrt{81}-6\cdot\sqrt{16}=9-6\cdot 4=9-24=-15$

10. Cvičenie II

2. Vypočítaj:

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

b) $\sqrt[3]{50} \cdot \sqrt[3]{20} =$

c) $\sqrt[3]{0,001} \cdot \sqrt[3]{1000} =$

d) $\sqrt[3]{0,512} \cdot \sqrt[3]{512} =$

e) $\sqrt[3]{27 \cdot 27 \cdot 27 \cdot 27} =$

f) $\sqrt[3]{3,3^3} =$

g) $\sqrt[3]{5^2 + 5^2 + 5^2 + 5^2 + 5^2} =$

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

i) $\sqrt[3]{2^6} =$

j) $\sqrt[3]{\frac{125}{1000}} =$

Riešenie:

a) $\sqrt[3]{8.27} = \sqrt[3]{2^3 \cdot 3^3} = 2 \cdot 3 = 6$

b) $\sqrt[3]{50} \cdot \sqrt[3]{20} = \sqrt[3]{1000} = 10$

c) $\sqrt[3]{0,001} \cdot \sqrt[3]{1000} = \sqrt[3]{1} = 1$

d) $\sqrt[3]{0,512}.\sqrt[3]{512} = 0,8 \cdot 8 = 6,4$

e) $\sqrt[3]{27.27.27.27} = \sqrt[3]{\left(3^3\right)^4} = 3^4 = 81$

f) $\sqrt[3]{3,3^3} = 3,3$

g) $\sqrt[3]{5^2 + 5^2 + 5^2 + 5^2 + 5^2} = \sqrt[3]{5 \cdot 25} = \sqrt[3]{125} = 5$

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

i) $\sqrt[3]{2^6} = 2^{\frac{6}{3}} = 2^2 = 4$

j) $\sqrt[3]{\frac{125}{1000}} = \frac{5}{10} = \frac{1}{2}$

3. Vypočítaj:

a) $5 \cdot 3^4 \cdot 2^1 =$

b) $5^0 \cdot 3^4 : 3^3 =$

c) $11 \cdot 7^2 - 4^3 + 5 \cdot 2^7 =$

d) $8 \cdot 10^8 + 5 \cdot 10^8 - 2 \cdot 10^8 - 6 \cdot 10^8 =$

e) $5^4 : 5^2 =$

f) $\frac{2^6 \cdot 3^4 \cdot 8}{48 \cdot 9} =$

g) $\frac{4^9 \cdot 6^5 \cdot 3^4}{16^2 \cdot 3^7} =$

h) $\frac{15^4.6^2.12^2}{125.9^2.16} =$

Riešenie:

a) $5 \cdot 3^4 \cdot 2^1 = 10 \cdot 81 = 810$

b) $5^0 \cdot 3^4 : 3^3 = 1 \cdot 3 = 3$

c) $11 \cdot 7^2 - 4^3 + 5 \cdot 2^7 = 11 \cdot 49 - 64 + 5 \cdot 128 = 539 - 64 + 640 = 1115$

d) $8 \cdot 10^8 + 5 \cdot 10^8 - 2 \cdot 10^8 - 6 \cdot 10^8 = (8 + 5 - 2 - 6) \cdot 10^8 = 5 \cdot 10^8$

e) $5^4 : 5^2 = 5^2 = 25$

f) $\dfrac{2^6 \cdot 3^4 \cdot 8}{48 \cdot 9} = \dfrac{2^{6+3} \cdot 3^4}{2^4 \cdot 3 \cdot 3^2} = 2^5 \cdot 3$

g) $\dfrac{4^9 \cdot 6^5 \cdot 3^4}{16^2 \cdot 3^7} = \dfrac{2^{18+5} \cdot 3^{5+4}}{2^{4 \cdot 2} \cdot 3^7} = 2^{15} \cdot 3^2$

h) $\dfrac{15^4 \cdot 6^2 \cdot 12^2}{125 \cdot 9^2 \cdot 16} = \dfrac{5^4 \cdot 3^4 \cdot 2^2 \cdot 3^2 \cdot 3^2 \cdot 2^{2 \cdot 2}}{5^3 \cdot 3^{2 \cdot 2} \cdot 2^4} = 5 \cdot 3^4 \cdot 2^2$

4. Vypočítaj:

a) $\dfrac{12^6 \cdot 3^3 \cdot 7}{14 \cdot 9 \cdot 2^3} =$

b) $\dfrac{3^6 \cdot 3^4 \cdot 8}{3 \cdot 9} =$

c) $\dfrac{2^5 . 2^3}{2^{10}} =$

d) $\dfrac{(-3)^3 \cdot (-3)^6}{(-3)^5 \cdot 3^2} =$

e) $\dfrac{(2^4 \cdot 3^2)^4}{(2 \cdot 3)^5} =$

f) $\left(\dfrac{2^2}{5}\right)^6 \cdot \left(-\dfrac{5^2}{2^4}\right)^3 =$

Riešenie:

a) $\dfrac{12^6 . 3^3 . 7}{14 . 9 . 2^3} = \dfrac{2^{2 \cdot 6} \cdot 3^6 \cdot 3^3 \cdot 7}{2 \cdot 7 \cdot 3^2 \cdot 2^3} = 2^8 \cdot 3^7$

b) $\dfrac{3^6 . 3^4 . 8}{3 . 9} = \dfrac{3^{10} \cdot 2^3}{3^3} = 3^7 \cdot 2^3$

c) $\dfrac{2^5 . 2^3}{2^{10}} = 2^{-2}$

d) $\dfrac{(-3)^3 . (-3)^6}{(-3)^5 . 3^2} = \dfrac{-3^3 \cdot 3^6}{-3^5 \cdot 3^2} = 3^2 = 9$

e) $\dfrac{(2^4 . 3^2)^4}{(2 . 3)^5} = \dfrac{2^{16} \cdot 3^8}{2^5 \cdot 3^5} = 2^{11} \cdot 3^3$

f) $\left(\dfrac{2^2}{5}\right)^6 \cdot \left(-\dfrac{5^2}{2^4}\right)^3 = \dfrac{-2^{12} \cdot 5^6}{5^6 \cdot 2^{12}} = -1$

5. Vypočítajte:

a) $3 + 4^2 =$
b) $(3 + 4)^2 =$
c) $(7 - 5)^2 =$
f) $(3^2 + 4^2) =$
g) $7^2 - 5^2 =$
h) $7^2 - 5 =$

d) $2+9^2=$ i) $(2+9)^2=$

e) $(2^2+9^2)=$ j) $6^2-2^3=$

Riešenie:

a) $3+4^2=3+16=19$

b) $\left(3^2+4^2\right)=9+16=25$

c) $\left(3+4\right)^2=7^2=49$

d) $7^2-5^2=49-25=24$

e) $\left(7-5\right)^2=2^2=4$

f) $7^2-5=49-5=44$

g) $2+9^2=2+81=83$

h) $\left(2+9\right)^2=11^2=121$

i) $\left(2^2+9^2\right)=4+81=85$

j) $6^2-2^3=36-8=28$

6. Vypočítaj:

a) $\sqrt{25}+\sqrt{9}=$ f) $\sqrt{7^2}=$

b) $\sqrt{100}-\sqrt{36}=$ g) $\sqrt{5^6}=$

c) $\sqrt{64}+\sqrt{4}=$ h) $2\sqrt{100}=$

d) $\sqrt{1}-\sqrt{0{,}16}=$ i) $3\sqrt{6^2}=$

e) $\sqrt{3^4}=$ j) $10\sqrt{0{,}09}=$

Riešenie:

a) $\sqrt{25}+\sqrt{9}=5+3=8$

b) $\sqrt{100}-\sqrt{36}=10-6=4$

c) $\sqrt{64}+\sqrt{4}=8+2=10$

d) $\sqrt{1}-\sqrt{0{,}16}=1-0{,}4=0{,}6$

e) $\sqrt{3^4}=3^2=9$

f) $\sqrt{7^2}=7$

g) $\sqrt{5^6}=5^3=125$

h) $2\sqrt{100}=2\cdot 10=20$

i) $3\sqrt{6^2} = 3 \cdot 6 = 18$

j) $10\sqrt{0,09} = 10 \cdot 0,3 = 3$

7. Vypočítajte:

a) $\sqrt{4} + \sqrt{9} + \sqrt{16} + \sqrt{25} =$

b) $100 - \sqrt{100} =$

c) $\sqrt{3^2} + \sqrt{4^2} =$

d) $\sqrt{3^2 + 4^2} =$

e) $100 - \sqrt{8^2 + 6^2} =$

f) $\sqrt{4^2 + 6^2 + 7^2 - 1^2} =$

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

h) $\sqrt{15^2 - 10^2 - 5^2} =$

i) $5\sqrt{9} - 2\sqrt{4} + \sqrt{1} =$

j) $9 + \sqrt{121} - 3\sqrt{8^2} =$

Riešenie:

a) $\sqrt{4} + \sqrt{9} + \sqrt{16} + \sqrt{25} = 2 + 3 + 4 + 5 = 14$

b) $100 - \sqrt{100} = 100 - 10 = 90$

c) $\sqrt{3^2} + \sqrt{4^2} = 3 + 4 = 7$

d) $\sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5$

e) $100 - \sqrt{8^2 + 6^2} = 100 - \sqrt{64 + 36} = 100 - \sqrt{100} = 100 - 10 = 90$

f) $\sqrt{4^2 + 6^2 + 7^2 - 1^2} = \sqrt{16 + 36 + 49 - 1} = \sqrt{100} = 10$

g) $\sqrt{2^2 + 3^2 + 5^2 - 7^2} = \sqrt{4 + 9 + 25 - 49} = \sqrt{-11}$ nelze v oboru reálných čísel

h) $\sqrt{15^2 - 10^2 - 5^2} = \sqrt{225 - 100 - 25} = \sqrt{100} = 10$

i) $5\sqrt{9} - 2\sqrt{4} + \sqrt{1} = 5 \cdot 3 - 2 \cdot 2 + 1 = 12$

j) $9 + \sqrt{121} - 3\sqrt{8^2} = 9 + 11 - 3 \cdot 8 = -4$

8. Vypočítajte:

a) $3\sqrt{4} + 2\sqrt{16} - \sqrt{36} =$

b) $-4\sqrt{64} + 7\sqrt{25} - \sqrt{3^2} =$

c) $\frac{1}{2}\sqrt{16} + \frac{1}{3}\sqrt{81} - \frac{4}{7}\sqrt{49} =$

d) $100\sqrt{0,09} + 0,5\sqrt{400} =$

e) $-\frac{1}{3}\sqrt{36} + 0,2\sqrt{100} + \sqrt{0,01} =$

f) $\frac{3}{4}\sqrt{16} - 16 + 10\sqrt{1,44} =$

g) $\sqrt{0,04 \cdot 64 \cdot 100} =$

h) $\sqrt{2} \cdot \sqrt{2} \cdot \sqrt{2} \cdot \sqrt{2} =$

Riešenie:

a) $3\sqrt{4} + 2\sqrt{16} - \sqrt{36} = 3 \cdot 2 + 2 \cdot 4 - 6 = 8$

b) $-4\sqrt{64} + 7\sqrt{25} - \sqrt{3^2} = -4 \cdot 8 + 7 \cdot 5 - 3 = -32 + 35 - 3 = 0$

c) $\frac{1}{2}\sqrt{16}+\frac{1}{3}\sqrt{81}-\frac{4}{7}\sqrt{49}=\frac{1}{2}\cdot 4+\frac{1}{3}\cdot 9-\frac{4}{7}\cdot 7=2+3-4=1$

d) $100\sqrt{0,09}+0,5\sqrt{400}=100\cdot 0,3+0,5\cdot 20=30+10=40$

e) $-\frac{1}{3}\sqrt{36}+0,2\sqrt{100}+\sqrt{0,01}=-\frac{1}{3}\cdot 6+0,2\cdot 10+0,1=-2+2+0,1=0,1$

f) $\frac{3}{4}\sqrt{16}-16+10\sqrt{1,44}=\frac{3}{4}\cdot 4-16+10\cdot 1,2=3-16+12=-1$

g) $\sqrt{0,04\cdot 64(100}=\sqrt{4\cdot 64}=2\cdot 8=16$

h) $\sqrt{2}\cdot\sqrt{2}\cdot\sqrt{2}\cdot\sqrt{2}=\sqrt{4}\cdot\sqrt{4}=2\cdot 2=4$

9. Upravte

a) $\frac{1}{1+\sqrt{1}}=$

b) $\frac{9+\sqrt{9}}{\sqrt{4}-1}=$

c) $\frac{2\sqrt{49}}{\sqrt{4\cdot 81}}=$

d) $\frac{5+\sqrt{1}}{3}=$

e) $\frac{\sqrt{16}}{\sqrt{2}\cdot\sqrt{8}}=$

f) $\frac{4z}{\sqrt{4z^2}}=$

g) $\frac{x^4}{\sqrt{x^6}}=$

h) $\frac{a+\sqrt{a^2}}{4a^3}=$

i) $\frac{\sqrt{64}-\sqrt{9}}{36-\sqrt{36}}=$

j) $\frac{\sqrt{6^2}+\sqrt{144}}{\sqrt{10^2-4^2-2^2+1^2}}=$

Riešenie:

a) $\frac{1}{1+\sqrt{1}}=\frac{1}{1+1}=\frac{1}{2}$

b) $\frac{9+\sqrt{9}}{\sqrt{4}-1}=\frac{9+3}{2-1}=12$

c) $\frac{2\sqrt{49}}{\sqrt{4\cdot 81}}=\frac{2\cdot 7}{2\cdot 9}=\frac{7}{9}$

d) $\frac{5+\sqrt{1}}{3}=\frac{5+1}{3}=\frac{6}{3}=2$

e) $\frac{\sqrt{16}}{\sqrt{2}\cdot\sqrt{8}}=\frac{4}{\sqrt{16}}=1$

f) $\frac{4z}{\sqrt{4z^2}}=\frac{4z}{2z}=2$

g) $\frac{x^4}{\sqrt{x^6}}=\frac{x^4}{x^3}=x$, kde $x\neq 0$

h) $\frac{a+\sqrt{a^2}}{4a^3}=\frac{a+a}{4a^3}=\frac{2a}{4a^3}=\frac{1}{2a^2}$, kde $a\neq 0$

i) $\dfrac{\sqrt{64}-\sqrt{9}}{36-\sqrt{36}}=\dfrac{8-3}{36-6}=\dfrac{5}{30}=\dfrac{1}{6}$

j) $\dfrac{\sqrt{6^2}+\sqrt{144}}{\sqrt{10^2-4^2-2^2+1^2}}=\dfrac{6+12}{\sqrt{100-16-4+1}}=\dfrac{18}{\sqrt{81}}=\dfrac{18}{9}=2$

10. Upravte na základný tvar

a) $\dfrac{\sqrt{16}+\sqrt{4}}{\sqrt{10^2-6^2}}=$

b) $\dfrac{2\sqrt{9}+5\sqrt{1}}{\dfrac{1}{2}\cdot\sqrt{64}+\sqrt{49}}=$

c) $\dfrac{\sqrt{1}\cdot\sqrt{25}}{\sqrt{2^2\cdot3^4\cdot5^2}}=$

d) $\dfrac{\sqrt{9\cdot16}}{\sqrt{2}\cdot\sqrt{5}\cdot\sqrt{10}}=$

e) $\sqrt{\dfrac{9}{49}}+\left(-\dfrac{8}{7}\right)^2+\dfrac{3}{21}=$

f) $\sqrt{\dfrac{16}{36}}-\left(-\dfrac{1}{6}\right)^2+\dfrac{2}{3^2}=$

g) $-\dfrac{2}{6}+\sqrt{4^2}-\dfrac{8}{9}=$

h) $\sqrt{\dfrac{9}{36}}+\sqrt{8}^2+\dfrac{5^2}{7}=$

i) $\dfrac{1+\dfrac{\sqrt{25}}{\sqrt{49}}}{2+\dfrac{\sqrt{64}}{\sqrt{81}}}-\sqrt{25}=$

j) $\dfrac{(3\cdot3+2)^2\cdot2}{(8:2)^2+21}-\sqrt{25+39}=$

Riešenie:

a) $\dfrac{\sqrt{16}+\sqrt{4}}{\sqrt{10^2-6^2}}=\dfrac{4+2}{\sqrt{100-36}}=\dfrac{6}{8}=\dfrac{3}{4}$

b) $\dfrac{2\sqrt{9}+5\sqrt{1}}{\dfrac{1}{2}\cdot\sqrt{64}+\sqrt{49}}=\dfrac{2\cdot3+5\cdot1}{\dfrac{1}{2}\cdot8+7}=\dfrac{11}{4+7}=1$

c) $\dfrac{\sqrt{1}\cdot\sqrt{25}}{\sqrt{2^2\cdot3^4\cdot5^2}}=\dfrac{1\cdot5}{2\cdot9\cdot5}=\dfrac{1}{18}$

d) $\dfrac{\sqrt{9\cdot16}}{\sqrt{2}\cdot\sqrt{5}\cdot\sqrt{10}}=\dfrac{3\cdot4}{\sqrt{100}}=\dfrac{12}{10}=\dfrac{6}{5}$

e) $\sqrt{\dfrac{9}{49}}+\left(-\dfrac{8}{7}\right)^2+\dfrac{3}{21}=\dfrac{3}{7}+\dfrac{64}{49}+\dfrac{1}{7}=\dfrac{21+64+7}{49}=\dfrac{92}{49}$

f) $\sqrt{\dfrac{16}{36}}-\left(-\dfrac{1}{6}\right)^2+\dfrac{2}{3^2}=\dfrac{4}{6}-\dfrac{1}{36}+\dfrac{2}{9}=\dfrac{24-1+8}{36}=\dfrac{31}{36}$

g) $-\dfrac{2}{6}+\sqrt{4^2}-\dfrac{8}{9}=-\dfrac{1}{3}+4-\dfrac{8}{9}=\dfrac{-3+36-8}{9}=\dfrac{25}{9}$

h) $\sqrt{\dfrac{9}{36}}+\sqrt{8}^2+\dfrac{5^2}{7}=\dfrac{3}{6}+8+\dfrac{25}{7}=\dfrac{21+336+150}{42}=\dfrac{507}{42}=\dfrac{169}{14}$

i) $$\frac{1+\frac{\sqrt{25}}{\sqrt{49}}}{2+\frac{\sqrt{64}}{\sqrt{81}}}-\sqrt{25}=\frac{1+\frac{5}{7}}{2+\frac{8}{9}}-5=\frac{\frac{12}{7}}{\frac{26}{9}}-5=\frac{12\cdot 9}{7\cdot 26}-5=\frac{54}{91}-5=\frac{54-455}{91}=\frac{-401}{91}$$

j) $$\frac{(3\cdot 3+2)^2\cdot 2}{(8:2)^2+21}-\sqrt{25+39}=\frac{11^2\cdot 2}{4^2+21}-\sqrt{64}=\frac{242}{37}-8=\frac{242-296}{37}=\frac{-54}{37}$$

11. Upravte:

a) $$\frac{9}{4}-\sqrt{\frac{16}{9}}+\frac{12^2}{8}=$$

b) $$\sqrt{\frac{25}{9}}-\frac{9^2}{8}+\frac{14}{18}:\frac{1}{9}=$$

c) $$\frac{18}{19}+\frac{24}{6}\cdot\frac{8}{9}+\sqrt{\frac{9}{19}}^2=$$

d) $$\sqrt{\frac{24}{6}}+\frac{9}{12}:\frac{9}{12}\cdot\frac{9^2}{12}-\sqrt{9}=$$

e) $$\sqrt{324}+\sqrt{289}+\sqrt{256}-\sqrt{225}-\sqrt{196}-\sqrt{169}-\sqrt{144}-\sqrt{121}+\sqrt{25}+\sqrt{16}=$$

f) $$\left\{-\left[-\left(\sqrt{324}+\frac{2}{10}:\frac{4}{6}\right)\cdot 2+6^2+\sqrt{0,2+1,24}\right]-3\right\}+1=$$

Riešenie:

a) $$\frac{9}{4}-\sqrt{\frac{16}{9}}+\frac{12^2}{8}=\frac{9}{4}-\frac{4}{3}+\frac{144}{8}=\frac{27-16+216}{12}=\frac{227}{12}$$

b) $$\sqrt{\frac{25}{9}}-\frac{9^2}{8}+\frac{14}{18}:\frac{1}{9}=\frac{5}{3}-\frac{81}{8}+\frac{7}{9}\cdot 9=\frac{40-243+168}{24}=\frac{-35}{24}$$

c) $$\frac{18}{19}+\frac{24}{6}\cdot\frac{8}{9}+\sqrt{\frac{9}{19}}^2=\frac{18}{19}+\frac{32}{9}+\frac{9}{19}=\frac{162+608+81}{9\cdot 19}=\frac{851}{171}$$

d) $$\sqrt{\frac{24}{6}}+\frac{9}{12}:\frac{9}{12}\cdot\frac{9^2}{12}-\sqrt{9}=\sqrt{4}+\frac{9}{12}\cdot\frac{12}{9}\cdot\frac{81}{12}-3=2+\frac{27}{4}-3=\frac{27-4}{4}=\frac{23}{4}$$

e) $$\sqrt{324}+\sqrt{289}+\sqrt{256}-\sqrt{225}-\sqrt{196}-\sqrt{169}-\sqrt{144}-\sqrt{121}+\sqrt{25}+\sqrt{16}=$$
$$=18+17+16-15-14-13-12-11+5+4=-5$$

$$\left\{-\left[-\left(\sqrt{324}+\frac{2}{10}:\frac{4}{6}\right)\cdot 2+6^2+\sqrt{0,2+1,24}\right]-3\right\}+1=$$

f) $$=\left\{-\left[-\left(18+\frac{1}{5}\cdot\frac{3}{2}\right)\cdot 2+36+\sqrt{1,44}\right]-3\right\}+1=$$
$$=\left\{-\left[-18,3\cdot 2+36+1,2\right]-3\right\}+1=\left\{-0,6-3\right\}+1=$$
$$=-3,6+1=-2,6$$

12. Riešte:

a) $\dfrac{1+\sqrt{\sqrt{\dfrac{256}{625}}:\dfrac{20}{5^2}}}{1+\dfrac{1}{\dfrac{1}{2}+\sqrt{5^2}}}=$

b) $\dfrac{\left(2+\sqrt{121}+2^2\right)^2}{9}=$

c) $\dfrac{14^2\cdot\sqrt{25}}{2}+\left(\dfrac{\dfrac{25}{5}}{\dfrac{25}{5}}\right)^2:(-2)=$

d) $5^2+\dfrac{1+\dfrac{\sqrt{16}}{\sqrt{4}}}{\dfrac{\sqrt{16}}{\sqrt{4}}+2}=$

e) $\sqrt{117,48+(-4)^2\cdot\sqrt{121}\cdot 0,02}=$

f) $-\left[-\dfrac{3+5-8}{8+5-3}\cdot\dfrac{16}{26}+(-3)^2\right]+\dfrac{5-3+8}{8-5+3}=$

Riešenie:

a) $\dfrac{1+\sqrt{\sqrt{\dfrac{256}{625}}:\dfrac{20}{5^2}}}{1+\dfrac{1}{\dfrac{1}{2}+\sqrt{5^2}}}=\dfrac{1+\sqrt{\dfrac{16}{25}\cdot\dfrac{25}{20}}}{1+\dfrac{1}{\dfrac{1}{2}+5}}=\dfrac{1+\dfrac{4}{5}\cdot\dfrac{5}{4}}{1+\dfrac{1}{\dfrac{11}{2}}}=\dfrac{2}{1+\dfrac{2}{11}}=\dfrac{2}{\dfrac{13}{11}}=\dfrac{22}{13}$

b) $\dfrac{\left(2+\sqrt{121}+2^2\right)^2}{9}=\dfrac{(2+11+4)^2}{9}=\dfrac{17^2}{9}=\dfrac{289}{9}$

c) $\dfrac{14^2\cdot\sqrt{25}}{2}+\left(\dfrac{\dfrac{25}{5}}{\dfrac{25}{5}}\right)^2:(-2)=\dfrac{490}{1}+1\cdot\dfrac{-1}{2}=489,5$

d) $5^2+\dfrac{1+\dfrac{\sqrt{16}}{\sqrt{4}}}{\dfrac{\sqrt{16}}{\sqrt{4}}+2}=25+\dfrac{1+2}{2+2}=25+\dfrac{3}{4}=25,75$

e) $\sqrt{117,48+(-4)^2\cdot\sqrt{121}\cdot 0,02}=\sqrt{117,48+16\cdot 11\cdot 0,02}=\sqrt{117,48+3,52}=\sqrt{121}=11$

f) $-\left[-\dfrac{3+5-8}{8+5-3}\cdot\dfrac{16}{26}+(-3)^2\right]+\dfrac{5-3+8}{8-5+3}=-\left[\dfrac{0}{10}\cdot\dfrac{16}{26}+9\right]+\dfrac{10}{6}=-9+\dfrac{5}{3}=\dfrac{-22}{3}$

13. Vypočítaj:

a) $\sqrt{3\sqrt{3\sqrt{3\sqrt{9}}}} =$

b) $\sqrt{\sqrt{64}+4\sqrt{4}} =$

c) $\sqrt{20\sqrt[3]{8000}} =$

d) $\sqrt[3]{24+\sqrt{6+\sqrt[3]{24+\sqrt{9}}}} =$

Riešenie:

a) $\sqrt{3\sqrt{3\sqrt{3\sqrt{9}}}} = \sqrt{3\sqrt{3\sqrt{3\cdot 3}}} = \sqrt{3\sqrt{3\cdot 3}} = \sqrt{3\cdot 3} = 3$

b) $\sqrt{\sqrt{64}+4\sqrt{4}} = \sqrt{8+4\cdot 2} = \sqrt{16} = 4$

c) $\sqrt{\sqrt{64}+4\sqrt{4}} = \sqrt{8+4\cdot 2} = \sqrt{16} = 4$

d) $\sqrt[3]{24+\sqrt{6+\sqrt[3]{24+\sqrt{9}}}} = \sqrt[3]{24+\sqrt{6+\sqrt[3]{24+3}}} = \sqrt[3]{24+\sqrt{6+3}} =$

$= \sqrt[3]{24+3} = 3$

11. Výrazy - operácie s mocninami - násobenie

1. Zjednoduš výrazy:

a) $2a^3 \cdot 3a^2 \cdot 5a$

b) $4b^2c \cdot 2c \cdot 2bc^3$

c) $3d^3e \cdot 5d^2e^2 \cdot 2d^7 \cdot e^4$

d) $5fg \cdot f^2g^3 \cdot 4g^4 \cdot f^3g$

e) $klm \cdot 2k^2l^3 \cdot 3lm^4$

Riešenie:

a) $2a^3 \cdot 3a^2 \cdot 5a = 30a^6$

b) $4b^2c \cdot 2c \cdot 2bc^3 = 16b^3c^5$

c) $3d^3e \cdot 5d^2e^2 \cdot 2d^7 \cdot e^4 = 30d^{12}e^7$

d) $5fg \cdot f^2g^3 \cdot 4g^4 \cdot f^3g = 20f^6g^9$

e) $klm \cdot 2k^2l^3 \cdot 3lm^4 = 6k^3l^5m^5$

2. Zjednoduš výrazy:

a) $\left(-2ab^2\right) \cdot 4a^2b^3$

b) $\left(-3c^2d^4\right) \cdot \left(-4cd^3\right)$

c) $4e^2f^3 \cdot \left(-2e^2f^3\right)$

d) $(-1) \cdot \left(-3g^2h^2\right) \cdot 2g^4h$

e) $4k^2l^2m \cdot (-2) \cdot (-2kl) \cdot lm$

Riešenie:

a) $\left(-2ab^2\right) \cdot 4a^2b^3 = -8a^3b^5$

b) $\left(-3c^2d^4\right) \cdot \left(-4cd^3\right) = 12c^3d^7$

c) $4e^2f^3 \cdot \left(-2e^2f^3\right) = -8e^4f^6$

d) $(-1) \cdot \left(-3g^2h^2\right) \cdot 2g^4h = 6g^6h^3$

e) $4k^2l^2m \cdot (-2) \cdot (-2kl) \cdot lm = 16k^3l^4m^2$

3. Zjednoduš výrazy:

a) $2ab \cdot \left[-2ab \cdot (-2ab)\right]$

b) $\left(-3c^2d^3\right) \cdot \left[2cd^2 \cdot \left(-2c^2d\right)\right]$

c) $\left[(-2ef) \cdot \left(-3e^2f^2\right)\right] \cdot 2f^3$

d) $klm \cdot \left[-\left(-3kl^2m^3\right) \cdot \left(-m^2\right)\right]$

e) $\left(-2pqr^2\right) \cdot \left[\left(-2p^3\right) \cdot \left(-3q^2\right) \cdot (-4r)\right]$

Riešenie:

a) $2ab\cdot\left[-2ab\cdot\left(-2ab\right)\right]=2ab\cdot\left[4a^2b^2\right]=8a^3b^3$

b) $\left(-3c^2d^3\right)\cdot\left[2cd^2\cdot\left(-2c^2d\right)\right]=\left(-3c^2d^3\right)\cdot\left[-4c^3d^3\right]=12c^5d^6$

c) $\left[\left(-2ef\right)\cdot\left(-3e^2f^2\right)\right]\cdot 2f^3=\left[6e^3f^3\right]\cdot 2f^3=12e^3f^6$

d) $klm\cdot\left[-\left(-3kl^2m^3\right)\cdot\left(-m^2\right)\right]=klm\cdot\left[-\left(3kl^2m^5\right)\right]=-3k^2l^3m^6$

e) $\left(-2pqr^2\right)\cdot\left[\left(-2p^3\right)\cdot\left(-3q^2\right)\cdot\left(-4r\right)\right]=\left(-2pqr^2\right)\cdot\left[-24p^3q^2r\right]=48p^4q^3r^3$

4. Zjednoduš výrazy:

a) $\frac{1}{2}u^2v\cdot\left(-\frac{2}{3}uv^3\right)$

b) $-\frac{3}{5}xy^3\cdot\frac{5}{6}x^3\cdot\frac{1}{2}y$

c) $\left(-\frac{5}{7}xyz\right)\cdot\frac{2}{5}yz^2\cdot\left(-\frac{7}{8}x^2\right)$

d) $-\frac{1}{2}p\cdot\left[\left(-\frac{1}{2}q\right)\cdot\left(\frac{-1}{2}r^2\right)\cdot p^2q^3\right]$

e) $\left[\left(-\frac{2}{3}x^2y^3\right)\cdot\frac{2}{5}xz^2\right]\cdot\left[\left(-\frac{5}{3}x^2yz^2\right)\cdot\frac{9}{4}xy^3z^2\right]$

Riešenie:

a) $\frac{1}{2}u^2v\cdot\left(-\frac{2}{3}uv^3\right)=-\frac{1}{3}u^3v^4$

b) $-\frac{3}{5}xy^3\cdot\frac{5}{6}x^3\cdot\frac{1}{2}y=-\frac{1}{4}x^4y^4$

c) $\left(-\frac{5}{7}xyz\right)\cdot\frac{2}{5}yz^2\cdot\left(-\frac{7}{8}x^2\right)=\frac{1}{4}x^3y^2z^3$

d) $-\frac{1}{2}p\cdot\left[\left(-\frac{1}{2}q\right)\cdot\left(\frac{-1}{2}r^2\right)\cdot p^2q^3\right]=-\frac{1}{2}p\cdot\left[\frac{1}{4}p^2q^4r^2\right]=-\frac{1}{8}p^3q^4r^2$

e) $\left[\left(-\frac{2}{3}x^2y^3\right)\cdot\frac{2}{5}xz^2\right]\cdot\left[\left(-\frac{5}{3}x^2yz^2\right)\cdot\frac{9}{4}xy^3z^2\right]=\left[-\frac{4}{15}x^3y^3z^2\right]\cdot\left[-\frac{45}{12}x^3y^4z^4\right]=x^6y^7z^6$

12. Výrazy - operácie s mocninami -delenie

1. Zjednoduš výrazy:
   a) $25a^6 : 5a^3$, kde $a \neq 0$
   b) $36b^4 : 9b$, kde $b \neq 0$
   c) $28c^2d^4 : 7cd^3$, kde $c, d \neq 0$
   d) $54e^5f^3 : 6ef^2$, kde $e, f \neq 0$
   e) $12g^2h^3k^4 : 4g^2h^2$, kde $ghk \neq 0$

   Riešenie:

   a) $25a^6 : 5a^3 = (25:5)a^{6-3} = 5a^3$, kde $a \neq 0$

   b) $36b^4 : 9b = (36:9)b^{4-1} = 4b^3$, kde $b \neq 0$

   c) $28c^2d^4 : 7cd^3 = 4cd$, kde $cd \neq 0$

   d) $54e^5f^3 : 6ef^2 = 9e^4f$, kde $ef \neq 0$

   e) $12g^2h^3k^4 : 4g^2h^2 = 3hk^4$, kde $ghk \neq 0$

2. Zjednoduš výrazy:
   a) $\frac{10ab^2c^4}{15a^2bc^3}$, kde $abc \neq 0$
   b) $\frac{12e^2f^3g^4}{8ef^4g^4}$, kde $efg \neq 0$
   c) $\frac{-15k^2l^2m^2}{20k^2l^2m^2}$, kde $klm \neq 0$
   d) $-\frac{12p^3qr^4}{-15pq^2r^3}$, kde $pqr \neq 0$
   e) $-\frac{-2x^2y^3z^2}{-3x^3y^3z^3}$, kde $xyz \neq 0$

   Riešenie:

   a) $\frac{10ab^2c^4}{15a^2bc^3} = \frac{2bc}{3a}$, kde $abc \neq 0$

   b) $\frac{12e^2f^3g^4}{8ef^4g^4} = \frac{3e}{2f}$, kde $efg \neq 0$

   c) $\frac{-15k^2l^2m^2}{20k^2l^2m^2} = -\frac{3}{4}$, kde $klm \neq 0$

   d) $-\frac{12p^3qr^4}{-15pq^2r^3} = \frac{4p^2r}{5q}$, kde $pqr \neq 0$

   e) $-\frac{-2x^2y^3z^2}{-3x^3y^3z^3} = -\frac{2}{3xz}$, kde $xyz \neq 0$

3. Zjednoduš výrazy:

a) $\frac{\left(-2ab^2\right)\cdot 3a^2b}{-3ab}$, kde $ab \neq 0$

b) $\frac{3cd^2}{2c^2d^3}\cdot\frac{2c^2d^2}{cd}$, kde $cd \neq 0$

c) $\frac{e^2f^3}{2ef^4}\cdot\frac{\left(-2e^3f\right)}{\left(-1\right)\cdot e^2}$, kde $ef \neq 0$

d) $\frac{\left(-3a^4b^5\right)\cdot\left(-3a^3b^2\right)}{\left(-6ab^3\right)\cdot a^3b}$, kde $ab \neq 0$

e) $\frac{12xy^2\cdot\left(-2x^4y^3\right)}{\left(-6x^3y^3\right)\cdot 2y}$, kde $xy \neq 0$

Riešenie:

a) $\frac{\left(-2ab^2\right)\cdot 3a^2b}{-3ab}=\frac{-6a^3b^3}{-3ab}=2a^2b^2,$ kde $ab \neq 0$

b) $\frac{3cd^2}{2c^2d^3}\cdot\frac{2c^2d^2}{cd}=\frac{3}{2cd}\cdot\frac{2cd}{1}=3,$ kde $cd \neq 0$

c) $\frac{e^2f^3}{2ef^4}\cdot\frac{\left(-2e^3f\right)}{\left(-1\right)\cdot e^2}=\frac{e}{2f}\cdot\frac{2ef}{1}=e^2,$ kde $ef \neq 0$

d) $\frac{\left(-3a^4b^5\right)\cdot\left(-3a^3b^2\right)}{\left(-6ab^3\right)\cdot a^3b}=\frac{9a^7b^7}{-6a^4b^4}=\frac{-3a^3b^3}{2}=-\frac{3}{2}a^3b^3,$ kde $ab \neq 0$

e) $\frac{12xy^2\cdot\left(-2x^4y^3\right)}{\left(-6x^3y^3\right)\cdot 2y}=\frac{12\cdot 2x^5y^5}{6\cdot 2x^3y^4}=2x^2y,$ kde $xy \neq 0$

4. Zjednoduš výrazy:

a) $\frac{0,5a^2b^3\cdot\left(-0,3a^3b\right)}{0,03a^2b^2\cdot 5ab}$, kde $ab \neq 0$

b) $\frac{0,2u^3v^4}{0,3u^2v^5}\cdot\frac{0,03u^2v}{2u^2v^4}$, kde $uv \neq 0$

c) $\frac{-2pq^2r^3}{3q^3r^5}\cdot\frac{\left(-6p^4q^3r^2\right)}{4p^5q^2}$, kde $pqr \neq 0$

d) $\frac{0,2u^3v^4}{0,3u^2v^5}\cdot\frac{0,03u^2v}{2u^2v^4}$, kde $uv \neq 0$

e) $\frac{0,4k^2l^3m^5\cdot 0,3kl^4m}{0,2klm\cdot\left(-0,6k^2l^6m^5\right)}$, kde $klm \neq 0$

Riešenie:

a) $\dfrac{0,5a^2b^3\cdot\left(-0,3a^3b\right)}{0,03a^2b^2\cdot 5ab}=\dfrac{-0,15a^5b^4}{0,15a^3b^3}=-a^2b$, kde $ab\neq 0$

b) $\dfrac{0,2u^3v^4}{0,3u^2v^5}\cdot\dfrac{0,03u^2v}{2u^2v^4}=\dfrac{0,006u^5v^5}{0,6u^4v^9}=\dfrac{u}{100v^4}$, kde $uv\neq 0$

c) $\dfrac{-2pq^2r^3}{3q^3r^5}\cdot\dfrac{\left(-6p^4q^3r^2\right)}{4p^5q^2}=\dfrac{12p^5q^5r^5}{12p^5q^5r^5}=1,$ kde $pqr\neq 0$

d) $\dfrac{4xy^3z^5\cdot\left(-6y^2z^3\right)}{\left(-3x^2yz\right)\cdot 8y^3z^6}=\dfrac{-24xy^5z^8}{-24x^2y^4z^7}=\dfrac{yz}{x}$, kde $xyz\neq 0$

e) $\dfrac{0,4k^2l^3m^5\cdot 0,3kl^4m}{0,2klm\cdot\left(-0,6k^2l^6m^5\right)}=\dfrac{0,12k^3l^7m^6}{-0,12k^3l^7m^6}=-1,$ kde $klm\neq 0$