

Kvadriranje, algebarski izrazi i potencije

1) Izračunaj:

a) $-3^2 =$ b) $(-7.4)^2 =$ c) $-\left(\frac{7}{9}\right)^2 =$ d) $\frac{-1^2}{8} =$ e) $-0.008^2 =$

2) Izračunaj:

a) $5 - (-5)^2 - 5^2 =$ b) $-[7^2 - (-4)^2] =$

c) $\frac{-3^2}{2} \cdot \frac{1}{3} + \left(-\frac{1}{2}\right)^2 =$ d) $\frac{-5}{16} - \left(\frac{3}{2}\right)^2 \cdot \frac{-1^2}{4} + \frac{1}{8} =$

3) Primjenjujući svojstvo kvadriranja **$a^2 \cdot b^2 = (a \cdot b)^2$** , izračunaj:

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

d) $\left(\frac{8}{55}\right)^2 \cdot \left(-\frac{33}{4}\right)^2 =$ e) $\left(-1\frac{1}{3}\right)^2 \cdot \left(\frac{1}{6}\right)^2 =$ f) $0.02^2 \cdot 100^2 =$

4) Primjenjujući svojstvo kvadriranja **$(a \cdot b)^2 = a^2 \cdot b^2$** , izračunaj:

a) $(4 \cdot 5)^2 =$ b) $\left(-3 \cdot \frac{1}{9}\right)^2 =$ c) $(0.01 \cdot 7)^2 =$

5) Primjenjujući svojstvo kvadriranja **$a^2 : b^2 = (a : b)^2$** , izračunaj:

a) $10^2 : (-5)^2 =$ b) $\left(\frac{2}{3}\right)^2 : \left(-\frac{1}{9}\right)^2 =$ c) $\left(-\frac{2}{5}\right)^2 : \left(-\frac{3}{10}\right)^2 =$

d) $\left(-1\frac{1}{3}\right)^2 : \left(\frac{8}{9}\right)^2 =$ e) $1^2 : 0.2^2 =$ f) $-\left(\frac{4}{27}\right)^2 : \left(\frac{-24}{9}\right)^2 =$

6) Primjenjujući svojstvo kvadriranja **$(a : b)^2 = a^2 : b^2$** , izračunaj:

a) $(81 : 9)^2 =$ b) $(3 : 0.2)^2 =$ c) $-\left(\frac{-1}{3}\right)^2 =$ d) $\left(\frac{7}{11}\right)^2 =$

7) Izračunaj **primjenjujući svojstva** kvadriranja:

a) $\left(-\frac{7}{3}\right)^2 \cdot (-9)^2 \cdot \left(-\frac{1}{14}\right)^2 =$ b) $-(-0.03)^2 \cdot 100^2 \cdot (-0.01)^2 =$

c) $-(-6)^2 \cdot \left(-\frac{5}{3}\right)^2 : (-5)^2 : 0.1^2 =$ d) $100^2 \cdot (-10)^2 \cdot (-0.01)^2 \cdot (-0.1)^2 =$

8) Oslobodi se zagrada:

a) $-(5x)^2 =$ **b)** $(2xy)^2 =$ **c)** $(-3a2b)^2 =$ **d)** $-\left(\frac{-3bol}{2an}\right)^2 =$

9) Oslobodi se zagrada:

a) $-4(-3x - 2) =$ **b)** $-x(5 - 2x) =$ **c)** $-2a(3a + 5ab) =$

d) $\frac{-1}{3}x\left(6x - \frac{1}{2}\right) =$ **e)** $(a - 4)(-a - 3) =$ **f)** $-2(x - 1)(x - 2) =$

g) $(2x - 3)^2 =$ **h)** $-4(1 - x)^2 =$ **i)** $\left(\frac{2}{3}a + 1\right)\left(a - \frac{3}{5}\right) =$

10) Izluči najveći zajednički faktor:

a) $x - x^2 =$ **b)** $3x^2 + 6x - 3 =$ **c)** $20x^2 - 5xy =$

d) $-2a^2 + 4a =$ **e)** $4x^2y^2 + 2xy - y =$ **f)** $-5x^2 - 10xy + 2x =$

11) Izračunaj:

a) $2 - 3(x - 2y) - (4x + 5y) =$

b) $-3x + 2x(-2 - 3x) - (5x^2 - 2x + 1) =$

c) $x + (2 - 3x)^2 - (x - 1)(2 - 4x) =$

12) Izračunaj vrijednost izraza $-x^2 - 3x + 1$ ako je $x = \frac{-1}{3}$.

13) Za $x = -1$ i $y = 0.2$ izračunaj vrijednost izraza $x^2 - (2y)^2$.

14) Umnožak napiši u obliku potencije:

a) $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 =$ **b)** $\frac{-1}{10} \cdot \left(\frac{-1}{10}\right) \cdot \left(\frac{-1}{10}\right) =$ **c)** $(-5) \cdot (-5) \cdot (-5) \cdot (-5) \cdot (-5) =$

15) Potenciju napiši u obliku umnoška:

a) $6^4 =$ **b)** $(10a)^4 =$ **c)** $(-1)^6 =$

16) Izračunaj:

a) $10^{-7} \cdot 10^3 =$

b) $-10^4 : 10^5 =$

c) $(-10)^3 : (-10)^{-5} =$

d) $-(-10)^{-2} \cdot (-10)^{-5} =$

e) $10^{-8} : 10^{-8} =$

f) $10^8 \cdot 10^{-5} \cdot 10 =$

g) $(-10) : (-10)^{-2} =$

h) $(-1^3) \cdot (-1^6) =$

i) $10^{-3} \cdot 10^2 : 10^{-1} =$

17) Izračunaj:

a) $(2xy)^4 =$

b) $-(-10a)^5 =$

c) $(-1 : a)^5 =$

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

e) $(2^5)^3 =$

f) $-(10^{-4})^5 =$

g) $(-10^5)^4 =$

h) $(((-10)^2)^3)^4 =$

18) Izračunaj:

a) $(-10^2)^4 : 10^{-7} : 10^2 =$

b) $10^{-6} \cdot \left(\frac{1}{10}\right)^5 =$

c) $\left(-\frac{1}{10}\right)^3 \cdot 10^5 : \left(\frac{1}{10}\right)^{-6} =$

19) Izračunaj:

a) $4 \cdot 10^8 - 3 \cdot 10^8 + 10^8 =$

b) $2 \cdot 10^7 - 5 \cdot 10^8 + 10^8 + 8 \cdot 10^7 =$

c) $-10^4 + 2 \cdot 10^4 - 10^4 =$

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

20) Izračunaj vrijednost izraza $2x^2y^3 - 3x^2y^3 + 5x^2y^3$ ako je $x = 3$, a $y = -1$.

(Napomena: najprije reduciraj zadani izraz).

RJEŠENJA

1) Izračunaj:

a) $-3^2 = -9^2$ b) $(-7.4)^2 = 54.76$ c) $-\left(\frac{7}{9}\right)^2 = -\frac{49}{81}$ d) $\frac{-1^2}{8} = \frac{-1}{8}$ e) $-0.008^2 = -0.000064$

2) Izračunaj:

a) $5 - (-5)^2 - 5^2 = 5 - 25 - 25$
 $= 5 - 50$
 $= -45$

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

c) $\frac{-3^2}{2} \cdot \frac{1}{3} + \left(-\frac{1}{2}\right)^2 = -\frac{\cancel{9}^3}{2} \cdot \frac{1}{\cancel{3}_1} + \frac{1}{4}$
 $= -\frac{3}{2} + \frac{1}{4}$
 $= \frac{-12 + 2}{4}$
 $= -\frac{10}{4}$
 $= -2\frac{1}{2}$

d) $\frac{-5}{16} - \left(\frac{3}{2}\right)^2 \cdot \frac{-1^2}{4} + \frac{1}{8} = \frac{-5}{16} - \frac{9}{4} \cdot \frac{-1}{4} + \frac{1}{8}$
 $= \frac{-5}{16} + \frac{9}{16} + \frac{2}{16}$
 $= \frac{\cancel{6}^3}{\cancel{16}_8}$
 $= \frac{3}{8}$

3) Primjenjujući svojstvo kvadriranja $a^2 \cdot b^2 = (a \cdot b)^2$, izračunaj:

a) $-3^2 \cdot 4^2 = -(3 \cdot 4)^2$
 $= -12^2$
 $= -144$

b) $4^2 \cdot \left(-\frac{1}{2}\right)^2 = \left(-\frac{\cancel{4}^2}{1} \cdot \frac{1}{\cancel{2}_1}\right)^2$
 $= (-4)^2$
 $= 16$

c) $\left(\frac{-1}{6}\right)^2 \cdot \left(\frac{-3}{4}\right)^2 = \left(\frac{-1}{\cancel{6}_2} \cdot \frac{-\cancel{3}^1}{4}\right)^2$
 $= \left(\frac{1}{8}\right)^2$
 $= \frac{1}{64}$

d) $\left(\frac{8}{55}\right)^2 \cdot \left(-\frac{33}{4}\right)^2 = \left(-\frac{\cancel{8}^2}{\cancel{55}_5} \cdot \frac{\cancel{33}^3}{\cancel{4}_1}\right)^2$
 $= \left(-\frac{6}{5}\right)^2$
 $= \frac{36}{25}$

e) $\left(-1\frac{1}{3}\right)^2 \cdot \left(\frac{1}{6}\right)^2 = \left(-\frac{\cancel{4}^2}{3} \cdot \frac{1}{\cancel{6}_3}\right)^2$
 $= \left(-\frac{2}{9}\right)^2$
 $= \frac{4}{81}$

f) $0.02^2 \cdot 100^2 = (0.02 \cdot 100)^2$
 $= 2^2$
 $= 4$

Ako su razdvojeni kvadrati, stavljamo faktore pod isti kvadrat.

4) Primjenjujući svojstvo kvadriranja $(a \cdot b)^2 = a^2 \cdot b^2$, izračunaj:

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

b) $\left(-3 \cdot \frac{1}{9}\right)^2 = (-3)^2 \cdot \left(\frac{1}{9}\right)^2$
 $= \frac{\cancel{9}^1}{1} \cdot \frac{1}{\cancel{81}_9}$
 $= \frac{1}{9}$

c) $(0.01 \cdot 7)^2 = 0.01^2 \cdot 7^2$
 $= 0.0001 \cdot 49$
 $= 0.0049$

Ako kvadriramo umnožak, onda možemo kvadrirati svaki faktor umnoška.

Napomena: drugi red rješavanja može se izostaviti (prvi mora biti zapisan)

5) Primjenjujući svojstvo kvadriranja $a^2 : b^2 = (a : b)^2$, izračunaj:

$$\begin{aligned} \text{a) } 10^2 : (-5)^2 &= (-10 : 5)^2 \\ &= (-2)^2 \\ &= 4 \end{aligned}$$

$$\begin{aligned} \text{b) } \left(\frac{2}{3}\right)^2 : \left(-\frac{1}{9}\right)^2 &= \left(-\frac{2}{3} \cdot \frac{9}{1}\right)^2 \\ &= (-6)^2 \\ &= 36 \end{aligned}$$

$$\begin{aligned} \text{c) } \left(-\frac{2}{5}\right)^2 : \left(-\frac{3}{10}\right)^2 &= \left(\frac{2}{5} \cdot \frac{10}{3}\right)^2 \\ &= \left(\frac{4}{3}\right)^2 \\ &= \frac{16}{9} \end{aligned}$$

$$\begin{aligned} \text{d) } \left(-1\frac{1}{3}\right)^2 : \left(\frac{8}{9}\right)^2 &= \left(-\frac{4}{3} \cdot \frac{9}{8}\right)^2 \\ &= \left(-\frac{3}{2}\right)^2 \\ &= \frac{9}{4} \end{aligned}$$

$$\begin{aligned} \text{e) } 1^2 : 0.2^2 &= (1 : 0.2)^2 \\ &= 5^2 \\ &= 25 \end{aligned}$$

$$\begin{aligned} \text{f) } -\left(\frac{4}{27}\right)^2 : \left(\frac{-24}{9}\right)^2 &= -\left(-\frac{4}{27} \cdot \frac{9}{24}\right)^2 \\ &= -\left(-\frac{1}{18}\right)^2 \\ &= -\frac{1}{324} \end{aligned}$$

Ako su razdvojeni kvadrati, spajamo ih i stavljamo pod isti kvadrat.

6) Primjenjujući svojstvo kvadriranja $(a : b)^2 = a^2 : b^2$, izračunaj:

$$\begin{aligned} \text{a) } (81 : 9)^2 &= 81^2 : 9^2 \\ &= 6561 : 81 \\ &= 81 \end{aligned}$$

$$\begin{aligned} \text{b) } (3 : 0.2)^2 &= 3^2 : 0.2^2 \\ &= 9 : 0.04 \\ &= 225 \end{aligned}$$

$$\text{c) } -\left(\frac{-1}{3}\right)^2 = -\frac{1}{9}$$

$$\text{d) } \left(\frac{7}{11}\right)^2 = \frac{49}{121}$$

Ako kvadriramo količnik, onda možemo kvadrirati svaki član zasebno.

Napomena: drugi red rješavanja može se izostaviti (prvi mora biti zapisan)

7) Izračunaj primjenjujući svojstva kvadriranja:

$$\begin{aligned} \text{a) } \left(-\frac{7}{3}\right)^2 \cdot (-9)^2 \cdot \left(-\frac{1}{14}\right)^2 &= \left(-\frac{7}{3} \cdot \frac{9}{1} \cdot \frac{1}{14}\right)^2 \\ &= \left(-\frac{3}{2}\right)^2 \\ &= \frac{9}{4} \end{aligned}$$

$$\begin{aligned} \text{b) } -(-0.03)^2 \cdot 100^2 \cdot (-0.01)^2 &= -(0.03 \cdot 100 \cdot 0.01)^2 \\ &= -(0.03)^2 \\ &= -0.0009 \end{aligned}$$

$$\begin{aligned} \text{c) } -(-6)^2 \cdot \left(-\frac{5}{3}\right)^2 : (-5)^2 : 0.1^2 &= -\left(-\frac{6}{1} \cdot \frac{5}{3} \cdot \frac{1}{5} \cdot \frac{10}{1}\right)^2 \\ &= -(-20)^2 \\ &= -400 \end{aligned}$$

$$\begin{aligned} \text{d) } 100^2 \cdot (-10)^2 \cdot (-0.01)^2 \cdot (-0.1)^2 &= (-100 \cdot 10 \cdot 0.01 \cdot 0.1)^2 \\ &= (-1)^2 \\ &= 1 \end{aligned}$$

8) Oslobodi se zagrada:

$$\begin{array}{llll} \text{a)} -(5x)^2 = -25x^2 & \text{b)} (2xy)^2 = 4x^2y^2 & \text{c)} (-3a2b)^2 = 9a^24b^2 & \text{d)} -\left(\frac{-3bol}{2an}\right)^2 = -\frac{9b^2o^2l^2}{4a^2n^2} \\ & & & = 36a^2b^2 \end{array}$$

9) Oslobodi se zagrada:

$$\begin{array}{ll} \text{a)} -4(-3x - 2) = 12x + 8 & \text{b)} -x(5 - 2x) = -5x + 2x^2 \\ \\ \text{c)} -2a(3a + 5ab) = -6a^2 - 10a^2b & \text{d)} \frac{-1}{3}x\left(6x - \frac{1}{2}\right) = -2x^2 + \frac{1}{6}x \\ \\ \text{e)} (a - 4)(-a - 3) = -a^2 - 3a + 4a + 12 \\ & = -a^2 + a + 12 & \text{f)} -2(x - 1)(x - 2) = (-2x + 2)(x - 2) \\ & & = -2x^2 + 2x + 2x - 4 \\ & & = -2x^2 + 4x - 4 \\ \\ \text{g)} (2x - 3)^2 = (2x - 3)(2x - 3) \\ & = 4x^2 - 6x - 6x + 9 \\ & = 4x^2 - 12x + 9 & \text{h)} -4(1 - x)^2 = -4(1 - x)(1 - x) \\ & & = (-4 + 4x)(1 - x) \\ & & = -4 + 4x + 4x - 4x^2 \\ & & = -4 + 8x - 4x^2 \\ \\ \text{i)} \left(\frac{2}{3}a + 1\right)\left(a - \frac{3}{5}\right) = \frac{2}{3}a^2 - \frac{2}{5}a + a - \frac{3}{5} \\ & = \frac{2}{3}a^2 - \frac{3}{5}a - \frac{3}{5} \end{array}$$

10) Izluči najveći zajednički faktor:

$$\begin{array}{lll} \text{a)} x - x^2 = x(1 - x) & \text{b)} 3x^2 + 6x - 3 = 3(x^2 + 2x - 1) & \text{c)} 20x^2 - 5xy = 5x(4x - y) \\ \text{d)} -2a^2 + 4a = 2a(-a + 2) & \text{e)} 4x^2y^2 + 2xy - y = y(4x^2y + 2x - 1) & \text{f)} -5x^2 - 10xy + 2x = x(-5x - 10y + 2) \end{array}$$

11) Izračunaj:

$$\begin{array}{ll} \text{a)} 2 - 3(x - 2y) - (4x + 5y) = 2 - 3x + 6y - 4x - 5y \\ & = 2 - 7x + y \\ \\ \text{b)} -3x + 2x(-2 - 3x) - (5x^2 - 2x + 1) = -3x - 4x - 6x^2 - 5x^2 + 2x - 1 \\ & = -11x^2 - 5x - 1 \\ \\ \text{c)} x + (2 - 3x)^2 - (x - 1)(2 - 4x) = x + (2 - 3x)(2 - 3x) - (2x - 4x^2 - 2 + 4x) \\ & = x + 4 - 6x - 6x + 9x^2 - 2x + 4x^2 + 2 - 4x \\ & = 13x^2 - 17x + 6 \end{array}$$

12) Izračunaj vrijednost izraza $-x^2 - 3x + 1$ ako je $x = \frac{-1}{3}$.

$$\begin{aligned} -x^2 - 3x + 1 &= -\left(\frac{-1}{3}\right)^2 - 3^1 \cdot \frac{-1}{3_1} + 1 \\ &= \frac{-1}{9} + 1 + 1 \\ &= \frac{-1}{9} + 2 \\ &= 1\frac{8}{9} \end{aligned}$$

13) Za $x = -1$ i $y = 0.2$ izračunaj vrijednost izraza $x^2 - (2y)^2$.

$$\begin{aligned}x^2 - (2y)^2 &= (-1)^2 - (2 \cdot 0.2)^2 \\&= 1 - 0.4^2 \\&= 1 - 0.16 \\&= \mathbf{0.84}\end{aligned}$$

14) Umnožak napiši u obliku potencije:

$$\text{a) } 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = \mathbf{3^5} \quad \text{b) } \frac{-1}{10} \cdot \left(\frac{-1}{10}\right) \cdot \left(\frac{-1}{10}\right) = \left(\frac{-1}{10}\right)^3 \quad \text{c) } (-5) \cdot (-5) \cdot (-5) \cdot (-5) \cdot (-5) = \mathbf{(-5)^5}$$

15) Potenciju napiši u obliku umnoška:

$$\text{a) } 6^4 = \mathbf{6 \cdot 6 \cdot 6 \cdot 6} \quad \text{b) } (10a)^4 = \mathbf{10a \cdot 10a \cdot 10a \cdot 10a} \quad \text{c) } (-1)^6 = \mathbf{(-1) \cdot (-1) \cdot (-1) \cdot (-1) \cdot (-1) \cdot (-1)}$$

16) Izračunaj:

$$\text{a) } 10^{-7} \cdot 10^3 = \mathbf{10^{-4}} \quad \text{b) } -10^4 : 10^5 = \mathbf{-10^{-1}} \quad \text{c) } (-10)^3 : (-10)^{-5} = \mathbf{(-10)^8 = 10^8}$$

$$\text{d) } -(-10)^{-2} \cdot (-10)^{-5} = \mathbf{-(-10)^{-7} = 10^{-7}} \quad \text{e) } 10^{-8} : 10^{-8} = \mathbf{10^0 = 1} \quad \text{f) } 10^8 \cdot 10^{-5} \cdot 10 = \mathbf{10^{8-5+1} = 10^4}$$

$$\text{g) } (-10) : (-10)^{-2} = \mathbf{(-10)^3 = -1\,000} \quad \text{h) } (-1^3) \cdot (-1^6) = \mathbf{-1 \cdot (-1) = 1} \quad \text{i) } 10^{-3} \cdot 10^2 : 10^{-1} = \mathbf{10^{-3+2+1} = 10^0 = 1}$$

17) Izračunaj:

$$\text{a) } (2xy)^4 = \mathbf{16x^4y^4} \quad \text{b) } -(-10a)^5 = \mathbf{10^5a^5} \quad \text{c) } (-1 : a)^5 = \mathbf{\frac{-1}{a^5}} \quad \text{d) } \left(-\frac{2a}{b}\right)^4 = \mathbf{\frac{16a^4}{b^4}}$$

$$\text{e) } (2^5)^3 = \mathbf{2^{15}} \quad \text{f) } -(10^{-4})^5 = \mathbf{-10^{-20}} \quad \text{g) } (-10^5)^4 = \mathbf{10^{20}} \quad \text{h) } (((-10)^2)^3)^4 = \mathbf{10^{24}}$$

18) Izračunaj:

$$\begin{aligned}\text{a) } (-10^2)^4 : 10^{-7} : 10^2 &= \mathbf{10^8 : 10^{-7} : 10^2} \\&= \mathbf{10^{8+7-2}} \\&= \mathbf{10^{13}}\end{aligned} \quad \begin{aligned}\text{b) } 10^{-6} \cdot \left(\frac{1}{10}\right)^5 &= \mathbf{10^{-6} \cdot (10^{-1})^5} \\&= \mathbf{10^{-6} \cdot 10^{-5}} \\&= \mathbf{10^{-11}}\end{aligned}$$

$$\begin{aligned}\text{c) } \left(-\frac{1}{10}\right)^3 \cdot 10^5 : \left(\frac{1}{10}\right)^{-6} &= \mathbf{(-10^{-1})^3 \cdot 10^5 : (10^{-1})^{-6}} \\&= \mathbf{-10^{-3} \cdot 10^5 : 10^6} \\&= \mathbf{-10^{-3+5-6}} \\&= \mathbf{-10^{-4}}\end{aligned}$$

19) Izračunaj:

a) $4 \cdot 10^8 - 3 \cdot 10^8 + 10^8 = 2 \cdot 10^8$

b) $\underline{2 \cdot 10^7} - 5 \cdot 10^8 + 10^8 + \underline{8 \cdot 10^7} = 10 \cdot 10^7 - 4 \cdot 10^8$
 $= 10^8 - 4 \cdot 10^8$
 $= -3 \cdot 10^8$

c) $-10^4 + 2 \cdot 10^4 - 10^4 = 0 \cdot 10^4$
 $= 0$

d) $\underline{-5 \cdot 10^6} + \underline{2 \cdot 10^6} + 10^5 - 2 \cdot 10^5 = -3 \cdot 10^6 - 10^5$
 $= -3 \cdot 10 \cdot 10^5 - 10^5$
 $= -30 \cdot 10^5 - 10^5$
 $= -31 \cdot 10^5$

20) Izračunaj vrijednost izraza $2x^2y^3 - 3x^2y^3 + 5x^2y^3$ ako je $x = 3$, a $y = -1$.

(*Napomena:* najprije reduciraj zadani izraz).

$$\begin{aligned} 2x^2y^3 - 3x^2y^3 + 5x^2y^3 &= 4x^2y^3 = 4 \cdot 3^2 \cdot (-1)^3 \\ &= 4 \cdot 9 \cdot (-1) \\ &= -36 \end{aligned}$$