

KORIJENI

Zbrajanje i oduzimanje – isto s istim

$$\triangleright \sqrt{5} + 3\sqrt{5} = 4\sqrt{5}$$

$$\triangleright 2\sqrt{3} + \sqrt{2} - 5\sqrt{2} - 8\sqrt{3} = -6\sqrt{3} - 4\sqrt{2}$$

$$\triangleright \sqrt{25} - 7\sqrt{7} + 10\sqrt{7} - 6 = 5 + 3\sqrt{7} - 6 \\ = -1 + 3\sqrt{7}$$

Množenje i dijeljenje – radikande stavimo pod isti korijen pa ih pomnožimo/podijelimo

$$\triangleright \sqrt{3} \cdot \sqrt{2} = \sqrt{6}$$

$$\triangleright \sqrt{5} \cdot \sqrt{5} = 5$$

$$\triangleright \sqrt{8} : \sqrt{2} = \sqrt{4} = 2$$

$$\triangleright -3\sqrt{3} \cdot 3\sqrt{2} = -9\sqrt{6}$$

1) Korjenuj:

$$\text{a) } \sqrt{36} =$$

$$\text{b) } -\sqrt{121} =$$

$$\text{c) } \sqrt{\frac{9}{100}} =$$

$$\text{d) } \sqrt{\frac{25}{169}} =$$

$$\text{e) } \sqrt{0.000004} =$$

$$\text{f) } \sqrt{5.76} =$$

$$\text{g) } \frac{-\sqrt{49}}{16} =$$

$$\text{h) } \sqrt{(-4)^2} =$$

2) Djelomično korjenuj:

$$\text{a) } \sqrt{300} =$$

$$\text{b) } \sqrt{8} =$$

$$\text{c) } \sqrt{12} =$$

$$\text{d) } \sqrt{27} =$$

$$\text{e) } \sqrt{216} =$$

$$\text{f) } \sqrt{150} =$$

$$\text{g) } \sqrt{252} =$$

$$\text{h) } \sqrt{162} =$$

3) Pojednostavi, rješenje napiši s najmanjim mogućim radikandom:

$$\text{a) } \sqrt{144 \cdot 9} =$$

$$\text{b) } \sqrt{25 \cdot 196} =$$

$$\text{c) } \sqrt{12} \cdot \sqrt{48} =$$

$$\text{d) } -3\sqrt{5} \cdot \sqrt{2} =$$

$$\text{e) } 3\sqrt{2} + \sqrt{2} =$$

$$\text{f) } \sqrt{8} \cdot (-3\sqrt{2}) =$$

$$\text{g) } 2\sqrt{9} \cdot \sqrt{5} =$$

$$\text{h) } \sqrt{243} : \sqrt{3} =$$

$$\text{i) } 3\sqrt{5} \cdot 2\sqrt{5} =$$

$$\text{j) } \sqrt{\frac{10}{8}} \cdot \sqrt{3\frac{1}{5}} =$$

$$\text{k) } \sqrt{1\frac{1}{8}} : \sqrt{4\frac{1}{2}} =$$

$$\text{d) } \sqrt{6} \cdot \sqrt{3} \cdot \sqrt{\frac{1}{9}} : \sqrt{1\frac{1}{8}} =$$

4) Ako je moguće najprije djelomično korjenij, zatim izračunaj:

a) $3\sqrt{3} - 3\sqrt{2} - 5\sqrt{2} - \sqrt{3} =$

b) $-3\sqrt{6} - 5\sqrt{9} + 2\sqrt{6} + 5 - 2\sqrt{16} =$

c) $-2\sqrt{12} + \sqrt{48} - 8\sqrt{3} - 2\sqrt{27} =$

d) $-4\sqrt{81} - 3\sqrt{3} \cdot 2\sqrt{3} - 5\sqrt{20} : \sqrt{5} =$

e) $-\sqrt{8} + 2\sqrt{12} - \sqrt{75} + 6\sqrt{32} =$

5) Izračunaj:

a) $\sqrt{5}(\sqrt{2} - \sqrt{5}) =$

f) $(4\sqrt{3} - 3\sqrt{7})^2 =$

b) $(-3\sqrt{24} + \sqrt{54}) : \sqrt{2} =$

g) $(3\sqrt{5} - 3)^2 - (2\sqrt{5} - 4)(3\sqrt{5} - 5) =$

c) $2\sqrt{2}(3\sqrt{2} - 2\sqrt{3}) =$

h) $-\sqrt{10} + 4\sqrt{2} \cdot 2\sqrt{5} - (3\sqrt{5} + \sqrt{2})^2 =$

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

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

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

6) Racionaliziraj nazivnik:

a) $\frac{1}{\sqrt{8}}$

b) $\frac{-3}{\sqrt{6}}$

c) $\frac{3}{2\sqrt{3}}$

d) $\frac{\sqrt{3}-1}{3\sqrt{2}}$

e) $\frac{\sqrt{2}+\sqrt{5}}{2\sqrt{5}}$

f) $\frac{2-\sqrt{8}}{2\sqrt{2}}$

7) Koji su brojevi racionalni, a koji iracionalni?

a) $\frac{-5}{8}$

b) $\frac{\pi}{4} + 4$

c) $0.22\dot{7}$

d) $\sqrt{18}$

e) $\sqrt{8} \cdot \sqrt{2}$

f) $(5\sqrt{2})^2$

g) $3\sqrt{9}$

h) $5.424298941\dots$

j) $\sqrt{5} + 4$

8) Koji su brojevi racionalni, a koji iracionalni?

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

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

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

d) $2\sqrt{50} - 2\sqrt{9} - 5\sqrt{8} =$

9) Riješi jednadžbu:

a) $x^2 = \frac{36}{100}$

b) $5x^2 - 45 = 0$

c) $(2x + 6)^2 = 0$

d) $(3x - 1)^2 = 25$

1) Korjenuj:

a) $\sqrt{36} = 6$

b) $-\sqrt{121} = -11$

c) $\sqrt{\frac{9}{100}} = \frac{3}{10}$

d) $\sqrt{\frac{25}{169}} = \frac{5}{13}$

e) $\sqrt{0.000004} = 0.002$

f) $\sqrt{5.76} = 2.4$

g) $\frac{-\sqrt{49}}{16} = \frac{-7}{4}$

h) $\sqrt{(-4)^2} = 4$

2) Djelomično korjenuj:

a) $\sqrt{300} = \sqrt{3 \cdot 100}$
 $= 10\sqrt{3}$

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

c) $\sqrt{12} = \sqrt{4 \cdot 3}$
 $= 2\sqrt{3}$

d) $\sqrt{27} = \sqrt{9 \cdot 3}$
 $= 3\sqrt{3}$

e) $\sqrt{216} = \sqrt{4 \cdot 9 \cdot 6}$
 $= 2 \cdot 3\sqrt{6}$
 $= 10\sqrt{3}$

f) $\sqrt{150} = \sqrt{25 \cdot 6}$
 $= 5\sqrt{6}$

g) $\sqrt{252} = \sqrt{4 \cdot 9 \cdot 7}$
 $= 2 \cdot 3\sqrt{7}$
 $= 6\sqrt{7}$

h) $\sqrt{162} = \sqrt{81 \cdot 2}$
 $= 9\sqrt{2}$

$$\begin{array}{r|l} 216 & 2 \\ 108 & 2 \\ 54 & 2 \\ 27 & 3 \\ 9 & 3 \\ 3 & 3 \\ 1 & \end{array}$$

$$\begin{array}{r|l} 150 & 2 \\ 75 & 5 \\ 15 & 5 \\ 3 & 3 \\ 1 & \end{array}$$

$$\begin{array}{r|l} 252 & 2 \\ 126 & 2 \\ 63 & 3 \\ 21 & 3 \\ 7 & 7 \\ 1 & \end{array}$$

$$\begin{array}{r|l} 162 & 2 \\ 81 & 81 \\ 1 & \end{array}$$

3) Pojednostavi, rješenje napiši s najmanjim mogućim radikandom:

a) $\sqrt{144 \cdot 9} = \sqrt{144} \cdot \sqrt{9}$
 $= 12 \cdot 3$
 $= 36$

b) $\sqrt{25 \cdot 196} = \sqrt{25} \cdot \sqrt{196}$
 $= 5 \cdot 14$
 $= 70$

c) $\sqrt{12} \cdot \sqrt{48} = \sqrt{12 \cdot 48}$
 $= \sqrt{4 \cdot 3 \cdot 16 \cdot 3}$
 $= \sqrt{4 \cdot 9 \cdot 16}$
 $= 2 \cdot 3 \cdot 4$
 $= 24$

d) $-3\sqrt{5} \cdot \sqrt{2} = -3\sqrt{10}$

e) $3\sqrt{2} + \sqrt{2} = 4\sqrt{2}$

f) $\sqrt{8} \cdot (-3\sqrt{2}) = -3 \cdot \sqrt{16}$
 $= -3 \cdot 4$
 $= -12$

g) $2\sqrt{9} \cdot \sqrt{5} = 2 \cdot 3\sqrt{5}$
 $= 6\sqrt{5}$

h) $\sqrt{243} : \sqrt{3} = \sqrt{243 : 3}$
 $= \sqrt{81}$
 $= 9$

i) $3\sqrt{5} \cdot 2\sqrt{5} = 6 \cdot 5$
 $= 30$

j) $\sqrt{\frac{10}{8}} \cdot \sqrt{3\frac{1}{5}} = \sqrt{\frac{10^2}{8^1} \cdot \frac{16^2}{5^1}}$
 $= \sqrt{4}$
 $= 2$

k) $\sqrt{1\frac{1}{8}} : \sqrt{4\frac{1}{2}} = \sqrt{\frac{9^1}{8^4} \cdot \frac{2^1}{9^1}}$
 $= \sqrt{\frac{1}{4}}$
 $= \frac{1}{2}$

d) $\sqrt{6} \cdot \sqrt{3} \cdot \sqrt{\frac{1}{9}} : \sqrt{1\frac{1}{8}} =$
 $= \sqrt{\frac{6^2}{1} \cdot \frac{3^1}{1} \cdot \frac{1}{9_3} \cdot \frac{8}{9_3}}$
 $= \sqrt{\frac{16}{9}} = \frac{4}{3} = 1\frac{1}{3}$

4) Ako je moguće najprije djelomično korjenuj, zatim izračunaj:

a) $3\sqrt{3} - 3\sqrt{2} - 5\sqrt{2} - \sqrt{3} = 2\sqrt{3} - 8\sqrt{2}$

b) $-3\sqrt{6} - 5\sqrt{9} + 2\sqrt{6} + 5\sqrt{6} - 2\sqrt{16} = 4\sqrt{6} - 5 \cdot 3 - 2 \cdot 4$
 $= 4\sqrt{6} - 15 - 8$
 $= 4\sqrt{6} - 23$

c) $-2\sqrt{12} + \sqrt{48} - 8\sqrt{3} - 2\sqrt{27} = -2\sqrt{4 \cdot 3} + \sqrt{16 \cdot 3} - 8\sqrt{3} - 2\sqrt{9 \cdot 3}$
 $= -2 \cdot 2\sqrt{3} + 4\sqrt{3} - 8\sqrt{3} - 2 \cdot 3\sqrt{3}$
 $= -4\sqrt{3} + 4\sqrt{3} - 8\sqrt{3} - 6\sqrt{3}$
 $= -14\sqrt{3}$

d) $-4\sqrt{81} - 3\sqrt{3} \cdot 2\sqrt{3} - 5\sqrt{20} : \sqrt{5} = -4 \cdot 9 - 6 \cdot 3 - 5\sqrt{4}$
 $= -36 - 18 - 5 \cdot 2$
 $= -36 - 18 - 10$
 $= -64$

e) $-\sqrt{8} + 2\sqrt{12} - \sqrt{75} + 6\sqrt{32} = -\sqrt{4 \cdot 2} + 2\sqrt{4 \cdot 3} - \sqrt{25 \cdot 3} + 6\sqrt{16 \cdot 2}$
 $= -2\sqrt{2} + 2 \cdot 2\sqrt{3} - 5\sqrt{3} + 6 \cdot 4\sqrt{2}$
 $= -2\sqrt{2} + 4\sqrt{3} - 5\sqrt{3} + 24\sqrt{2}$
 $= 22\sqrt{2} - \sqrt{3}$

5) Izračunaj:

a) $\sqrt{5}(\sqrt{2} - \sqrt{5}) = \sqrt{10} - 5$

b) $(-3\sqrt{24} + \sqrt{54}) : \sqrt{2} = (-3\sqrt{4 \cdot 6} + \sqrt{9 \cdot 6}) : \sqrt{2}$
 $= (-3 \cdot 2\sqrt{6} + 3\sqrt{6}) : \sqrt{2}$
 $= (-6\sqrt{6} + 3\sqrt{6}) : \sqrt{2}$
 $= -3\sqrt{6} : \sqrt{2}$
 $= -3\sqrt{3}$

c) $2\sqrt{2}(3\sqrt{2} - 2\sqrt{3}) = 2\sqrt{2} \cdot 3\sqrt{2} - 2\sqrt{2} \cdot 2\sqrt{3}$
 $= 6 \cdot 2 - 4\sqrt{6}$
 $= 12 - 4\sqrt{6}$

d) $(2\sqrt{6} - \sqrt{3})(3\sqrt{3} - 2\sqrt{6}) = 2\sqrt{6} \cdot 3\sqrt{3} - 2\sqrt{6} \cdot 2\sqrt{6} - \sqrt{3} \cdot 3\sqrt{3} + \sqrt{3} \cdot 2\sqrt{6}$
 $= 6\sqrt{18} - 4 \cdot 6 - 3 \cdot 3 + 2\sqrt{18}$
 $= 8\sqrt{18} - 24 - 9$
 $= 8\sqrt{9 \cdot 2} - 33$
 $= 8 \cdot 3\sqrt{2} - 33$
 $= 24\sqrt{2} - 33$

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

$$\begin{aligned}
 \text{f)} \quad (4\sqrt{3} - 3\sqrt{7})^2 &= (4\sqrt{3} - 3\sqrt{7})(4\sqrt{3} - 3\sqrt{7}) \\
 &= 4\sqrt{3} \cdot 4\sqrt{3} - 4\sqrt{3} \cdot 3\sqrt{7} - 3\sqrt{7} \cdot 4\sqrt{3} + 3\sqrt{7} \cdot 3\sqrt{7} \\
 &= 16 \cdot 3 - 12\sqrt{21} - 12\sqrt{21} + 9 \cdot 7 \\
 &= 48 - 24\sqrt{21} + 63 \\
 &= \mathbf{111 - 24\sqrt{21}}
 \end{aligned}$$

$$\begin{aligned}
 \text{g)} \quad (3\sqrt{5} - 3)^2 - (2\sqrt{5} - 4)(3\sqrt{5} - 5) &= (3\sqrt{5} - 3)(3\sqrt{5} - 3) - (6 \cdot 5 - 10\sqrt{5} - 12\sqrt{5} + 20) \\
 &= 9 \cdot 5 - 9\sqrt{5} - 9\sqrt{5} + 9 - (50 - 22\sqrt{5}) \\
 &= 45 - 18\sqrt{5} + 9 - 50 + 22\sqrt{5} \\
 &= \mathbf{4 + 4\sqrt{5}}
 \end{aligned}$$

$$\begin{aligned}
 \text{h)} \quad -\sqrt{10} + 4\sqrt{2} \cdot 2\sqrt{5} - (3\sqrt{5} + \sqrt{2})^2 &= -\sqrt{10} + 8\sqrt{10} - (3\sqrt{5} + \sqrt{2})(3\sqrt{5} + \sqrt{2}) \\
 &= 7\sqrt{10} - (9 \cdot 5 + 3\sqrt{10} + 3\sqrt{10} + 2) \\
 &= 7\sqrt{10} - (47 + 6\sqrt{10}) \\
 &= 7\sqrt{10} - 47 - 6\sqrt{10} \\
 &= \mathbf{\sqrt{10} - 47}
 \end{aligned}$$

$$\begin{aligned}
 \text{i)} \quad (\sqrt{2} - 5\sqrt{3})^2 - (4\sqrt{3} + 4\sqrt{2})(3\sqrt{2} - \sqrt{3}) &= (\sqrt{2} - 5\sqrt{3})(\sqrt{2} - 5\sqrt{3}) - (12\sqrt{6} - 4 \cdot 3 + 12 \cdot 2 - 4\sqrt{6}) \\
 &= 2 - 5\sqrt{6} - 5\sqrt{6} + 25 \cdot 3 - (8\sqrt{6} - 12 + 24) \\
 &= 2 - 10\sqrt{6} + 75 - 8\sqrt{6} - 12 \\
 &= \mathbf{65 - 18\sqrt{6}}
 \end{aligned}$$

6) Racionaliziraj nazivnik:

$$\begin{aligned}
 \text{a)} \quad \frac{1}{\sqrt{8}} &= \frac{1}{\sqrt{8}} \cdot \frac{\sqrt{8}}{\sqrt{8}} \\
 &= \frac{\sqrt{8}}{8} \\
 &= \frac{2\sqrt{2}}{8} \\
 &= \frac{\sqrt{2}}{4}
 \end{aligned}$$

$$\begin{aligned}
 \text{b)} \quad \frac{-3}{\sqrt{6}} &= \frac{-3}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} \\
 &= \frac{-3\sqrt{6}}{6} \\
 &= \frac{-\sqrt{6}}{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{c)} \quad \frac{3}{2\sqrt{3}} &= \frac{3}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \\
 &= \frac{3\sqrt{3}}{2 \cdot 3} \\
 &= \frac{\sqrt{3}}{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{d)} \quad \frac{\sqrt{3}-1}{3\sqrt{2}} &= \frac{\sqrt{3}-1}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} \\
 &= \frac{\sqrt{2}(\sqrt{3}-1)}{3 \cdot 2} \\
 &= \frac{\sqrt{6}-\sqrt{2}}{6}
 \end{aligned}$$

$$\begin{aligned}
 \text{e)} \quad \frac{\sqrt{2}+\sqrt{5}}{2\sqrt{5}} &= \frac{\sqrt{2}+\sqrt{5}}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} \\
 &= \frac{\sqrt{5}(\sqrt{2}+\sqrt{5})}{2 \cdot 5} \\
 &= \frac{\sqrt{10}+5}{10}
 \end{aligned}$$

$$\begin{aligned}
 \text{f)} \quad \frac{2-\sqrt{8}}{2\sqrt{2}} &= \frac{2-\sqrt{8}}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} \\
 &= \frac{\sqrt{2}(2-\sqrt{8})}{2 \cdot 2} \\
 &= \frac{2\sqrt{2}-\sqrt{16}}{4} \\
 &= \frac{2\sqrt{2}-4}{4} \\
 &= \frac{2(\sqrt{2}-2)}{4} \\
 &= \frac{\sqrt{2}-2}{2}
 \end{aligned}$$

7) Koji su brojevi racionalni, a koji iracionalni?

a) $\frac{-5}{8} \in \mathbb{Q}$

b) $\frac{\pi}{4} + 4 \in \mathbb{I}$

c) $0.22\dot{7} \in \mathbb{Q}$

d) $\sqrt{18} \in \mathbb{I}$

e) $\sqrt{8} \cdot \sqrt{2} = \sqrt{16}$
 $= 4 \in \mathbb{Q}$

f) $(5\sqrt{2})^2 = (5\sqrt{2})(5\sqrt{2})$
 $= 25 \cdot 2 = 50 \in \mathbb{Q}$

g) $3\sqrt{9} = 3 \cdot 3$
 $= 9 \in \mathbb{Q}$

h) $5.424298941... \in \mathbb{I}$

j) $\sqrt{5} + 4 \in \mathbb{I}$

8) Koji su brojevi racionalni, a koji iracionalni?

a) $(\sqrt{3} - 3)^2 = (\sqrt{3} - 3)(\sqrt{3} - 3)$
 $= 3 - 3\sqrt{3} - 3\sqrt{3} + 9$
 $= 12 - 6\sqrt{3} \in \mathbb{I}$

b) $(\sqrt{6} - 2)(\sqrt{6} + 2) = 6 + \cancel{2\sqrt{6}} - \cancel{2\sqrt{6}} - 4$
 $= 2 \in \mathbb{Q}$

c) $\sqrt{\sqrt{5} + \sqrt{3}} \cdot \sqrt{\sqrt{5} - \sqrt{3}} = \sqrt{(\sqrt{5} + \sqrt{3})(\sqrt{5} - \sqrt{3})}$
 $= \sqrt{5 - \sqrt{15} + \sqrt{15} - 3}$
 $= \sqrt{2} \in \mathbb{I}$

d) $2\sqrt{50} - 2\sqrt{9} - 5\sqrt{8} = 2\sqrt{25 \cdot 2} - 2 \cdot 3 - 5\sqrt{4 \cdot 2}$
 $= 2 \cdot 5\sqrt{2} - 6 - 5 \cdot 2\sqrt{2}$
 $= 10\sqrt{2} - 6 - 10\sqrt{2}$
 $= -6 \in \mathbb{Q}$

9) Riješi jednađžbu:

a) $x^2 = \frac{36}{100}$ $\sqrt{\quad}$

$$\sqrt{x^2} = \sqrt{\frac{36}{100}}$$

$$|x| = \frac{6}{10}$$

$$|x| = \frac{3}{5}$$

$$\begin{array}{cc} \swarrow & \searrow \\ \boxed{x_1 = \frac{3}{5}} & \boxed{x_2 = -\frac{3}{5}} \end{array}$$

b) $5x^2 - 45 = 0$

$$5x^2 = 45 \quad / : 5$$

$$x^2 = 9 \quad \sqrt{\quad}$$

$$\sqrt{x^2} = \sqrt{9}$$

$$|x| = 3$$

$$\begin{array}{cc} \swarrow & \searrow \\ \boxed{x_1 = 3} & \boxed{x_2 = -3} \end{array}$$

c) $(2x + 6)^2 = 0$ ✓

$$|2x + 6| = 0$$

$$\downarrow$$
$$2x + 6 = 0$$

$$2x = -6 \quad / : 2$$

$$\boxed{x_1 = -3}$$

d) $(3x - 1)^2 = 25$ ✓

$$|3x - 1| = 5$$

$$\swarrow$$
$$3x - 1 = 5$$

$$3x = 6 \quad / : 3$$

$$\boxed{x_1 = 2}$$

$$\searrow$$
$$3x - 1 = -5$$

$$3x = -4 \quad / : 3$$

$$\boxed{x_2 = \frac{-4}{3}}$$