

Ejercicios de radicales

1. Extraer factores del radical:

1. $\sqrt{2 \cdot 3^2 \cdot 5^5}$

2. $\sqrt[4]{2^7 \cdot 3^{14} \cdot 5^4}$

2. Introducir factores:

1. $2\sqrt{3}$

2. $2^2 \cdot 3^3 \sqrt[4]{6}$

3. Poner a común índice los radicales:

$\sqrt{2}$

$\sqrt[3]{2^2 \cdot 3^2}$

$\sqrt[4]{2^2 \cdot 3^3}$

4. Realiza las sumas de radicales:

1. $2\sqrt{2} - 4\sqrt{2} + \sqrt{2}$

3. $\sqrt{12} - 3\sqrt{3} + 2\sqrt{75}$

2. $3\sqrt[4]{5} - 2\sqrt[4]{5} - \sqrt[4]{5}$

4. $\sqrt[4]{4} + \sqrt[6]{8} - \sqrt[12]{64}$

5. Halla las sumas de radicales:

1. $2\sqrt{12} - 3\sqrt{75} + \sqrt{27} =$

2. $\sqrt{24} - 5\sqrt{6} + \sqrt{486} =$

3. $2\sqrt{5} + \sqrt{45} + \sqrt{180} - \sqrt{80} =$

4. $\sqrt[3]{54} - \sqrt[3]{16} + \sqrt[3]{250} =$

6. Efectúa las sumas de radicales:

1. $\sqrt{2} + \frac{1}{\sqrt{2}}$

2. $\sqrt[3]{16} + \sqrt[3]{250} + \sqrt[6]{4} - \frac{1}{\sqrt[3]{4}} =$

7. Realizar los productos de radicales:

1. $\sqrt{2} \cdot \sqrt{6} =$

2. $\sqrt{3} \cdot \sqrt[3]{9} \cdot \sqrt[4]{27} =$

3. $\sqrt{12} \cdot \sqrt[3]{36} =$

8. Efectúa las divisiones de radicales:

1. $\frac{\sqrt[5]{128}}{\sqrt[5]{16}} =$

2. $\frac{\sqrt[3]{4}}{\sqrt{2}} =$

3. $\frac{\sqrt{256}}{\sqrt[3]{16}} =$

9. Calcula:

$$\frac{\sqrt{a} \cdot \sqrt[3]{a^2} \cdot \sqrt[4]{a^3}}{\sqrt[6]{a^4}} =$$

10. Realiza las operaciones:

$$1. (\sqrt{7} - \sqrt{2})^2 =$$

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

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

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

11. Calcula:

$$\frac{1}{2 - \sqrt{3}} \cdot \frac{1}{2 + \sqrt{3}} =$$

Soluciones

1. Extraer factores del radical:

$$1. \sqrt{2 \cdot 3^2 \cdot 5^5}$$

$$\sqrt{2 \cdot 3^2 \cdot 5^5} = 3 \cdot 5^2 \sqrt{2 \cdot 5}$$

$$2. \sqrt[4]{2^7 \cdot 3^{14} \cdot 5^4}$$

$$\sqrt[4]{2^7 \cdot 3^{14} \cdot 5^4} = 2 \cdot 3^3 \cdot 5 \sqrt[4]{2^3 \cdot 3^2}$$

2. Introducir factores:

$$1. 2\sqrt{3}$$

$$2\sqrt{3} = \sqrt{2^2 \cdot 3} = \sqrt{12}$$

$$2. 2^2 \cdot 3^3 \sqrt[4]{6}$$

$$= \sqrt[4]{(2^2)^4 \cdot (3^3)^4 \cdot 2 \cdot 3} = \sqrt[4]{2^8 \cdot 3^{12} \cdot 2 \cdot 3} = \sqrt[4]{2^9 \cdot 3^{13}}$$

3. Poner a común índice los radicales:

$$\sqrt{2}$$

$$\sqrt[3]{2^2 \cdot 3^2}$$

$$\sqrt[4]{2^2 \cdot 3^3}$$

$$\text{m.c.m.}(2, 3, 4) = 12$$

$$\sqrt[12]{2^6}$$

$$\sqrt[12]{(2^2)^4 \cdot (3^2)^4}$$

$$\sqrt[12]{(2^2)^3 \cdot (3^3)^3}$$

$$\sqrt[12]{2^6}$$

$$\sqrt[12]{2^8 \cdot 3^8}$$

$$\sqrt[12]{2^6 \cdot 3^9}$$

4. Realiza las sumas de radicales:

- $2\sqrt{2} - 4\sqrt{2} + \sqrt{2}$ $2\sqrt{2} - 4\sqrt{2} + \sqrt{2} = (2 - 4 + 1)\sqrt{2} = -\sqrt{2}$
- $3\sqrt[4]{5} - 2\sqrt[4]{5} - \sqrt[4]{5}$ $3\sqrt[4]{5} - 2\sqrt[4]{5} - \sqrt[4]{5} = (3 - 2 - 1)\sqrt[4]{5} = 0$
- $\sqrt{12} - 3\sqrt{3} + 2\sqrt{75}$ $\sqrt{12} - 3\sqrt{3} + 2\sqrt{75} = \sqrt{2^2 \cdot 3} - 3\sqrt{3} + 2\sqrt{5^2 \cdot 3} =$
 $2\sqrt{3} - 3\sqrt{3} + 10\sqrt{3} = 9\sqrt{3}$
- $\sqrt[4]{4} + \sqrt[6]{8} - \sqrt[12]{64}$ $\sqrt[4]{4} + \sqrt[6]{8} - \sqrt[12]{64} = \sqrt[4]{2^2} + \sqrt[6]{2^3} - \sqrt[12]{2^6} = \sqrt{2} + \sqrt[6]{2^3} - \sqrt[12]{2^6} = \sqrt{2} + \sqrt{2} - \sqrt{2} = \sqrt{2}$

5. Halla las sumas de radicales:

- $2\sqrt{12} - 3\sqrt{75} + \sqrt{27} = 2\sqrt{2^2 \cdot 3} - 3\sqrt{3 \cdot 5^2} + \sqrt{3^3} = 4\sqrt{3} - 15\sqrt{3} + 3\sqrt{3} = -8\sqrt{3}$
- $\sqrt{24} - 5\sqrt{6} + \sqrt{486} = \sqrt{2^3 \cdot 3} - 5\sqrt{6} + \sqrt{2 \cdot 3^5} = 2\sqrt{6} - 5\sqrt{6} + 9\sqrt{6} = 6\sqrt{6}$
- $2\sqrt{5} + \sqrt{45} + \sqrt{180} - \sqrt{80} = 2\sqrt{5} + \sqrt{3^2 \cdot 5} + \sqrt{2^2 \cdot 3^2 \cdot 5} - \sqrt{2^4 \cdot 5} =$
 $2\sqrt{5} + 3\sqrt{5} + 6\sqrt{5} - 4\sqrt{5} = 7\sqrt{5}$
- $\sqrt[3]{54} - \sqrt[3]{16} + \sqrt[3]{250} = \sqrt[3]{2 \cdot 3^3} - \sqrt[3]{2^4} + \sqrt[3]{2 \cdot 5^3} =$
 $3\sqrt[3]{2} - 2\sqrt[3]{2} + 5\sqrt[3]{2} = 6\sqrt[3]{2}$

6. Efectúa las sumas de radicales:

- $\sqrt{2} + \frac{1}{\sqrt{2}}$ $\sqrt{2} + \frac{1}{\sqrt{2}} = \sqrt{2} + \frac{\sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \sqrt{2} + \frac{\sqrt{2}}{(\sqrt{2})^2} =$
 $= \sqrt{2} + \frac{\sqrt{2}}{2} = \left(1 + \frac{1}{2}\right)\sqrt{2} = \frac{3}{2}\sqrt{2}$
- $\sqrt[3]{16} + \sqrt[3]{250} + \sqrt[6]{4} - \frac{1}{\sqrt[3]{4}} = \sqrt[3]{2^4} + \sqrt[3]{2 \cdot 5^3} + \sqrt[6]{2^2} - \frac{1}{\sqrt[3]{2^2}} =$
 $= 2\sqrt[3]{2} + 5\sqrt[3]{2} + \sqrt[3]{2} - \frac{\sqrt[3]{2}}{\sqrt[3]{2^2 \cdot 2}} =$
 $= 2\sqrt[3]{2} + 5\sqrt[3]{2} + \sqrt[3]{2} - \frac{\sqrt[3]{2}}{2} = \frac{15}{2}\sqrt[3]{2}$

7. Realizar los productos de radicales:

- $\sqrt{2} \cdot \sqrt{6} = \sqrt{12} = \sqrt{2^2 \cdot 3} = 2\sqrt{3}$
- $\sqrt{3} \cdot \sqrt[3]{9} \cdot \sqrt[4]{27} = m.c.m.(2, 3, 4) = 12$

$${}^{12}\sqrt{3^6} \cdot {}^{12}\sqrt{(3^2)^4} \cdot {}^{12}\sqrt{(3^3)^3} = {}^{12}\sqrt{3^6 \cdot 3^8 \cdot 3^9} = {}^{12}\sqrt{3^{23}} = 3 \cdot {}^{12}\sqrt{3^{11}}$$

$$3. \sqrt{12} \cdot \sqrt[3]{36} =$$

$$\text{m.c.m.}(2, 3) = 6$$

$$\sqrt[6]{12^3} \cdot \sqrt[6]{36^2} = \sqrt[6]{(2^2 \cdot 3)^3 \cdot (2^2 \cdot 3^2)^2} = \sqrt[6]{2^6 \cdot 3^3 \cdot 2^4 \cdot 3^4} = \sqrt[6]{2^{10} \cdot 3^7} = 6 \sqrt[6]{2^4 \cdot 3}$$

8. Efectúa las divisiones de radicales:

$$1. \frac{\sqrt[6]{128}}{\sqrt[6]{16}} =$$

$$\frac{\sqrt[6]{128}}{\sqrt[6]{16}} = \sqrt[6]{\frac{128}{16}} = \sqrt[6]{2^7} = \sqrt[6]{2^3} = \sqrt{2}$$

$$2. \frac{\sqrt[3]{4}}{\sqrt{2}} =$$

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

$$3. \frac{\sqrt{256}}{\sqrt[3]{16}} =$$

$$\frac{\sqrt{256}}{\sqrt[3]{16}} = \sqrt[6]{\frac{(256)^3}{16^2}} = \sqrt[6]{\frac{(2^8)^3}{(2^4)^2}} = \sqrt[6]{\frac{2^{24}}{2^8}} = \sqrt[6]{2^{16}} = \sqrt[3]{2^8} = 2^2 \sqrt[3]{2^2} = 4 \sqrt[3]{4}$$

9. Calcula:

$$\frac{\sqrt{a} \cdot \sqrt[3]{a^2} \cdot \sqrt[4]{a^3}}{\sqrt[6]{a^4}} =$$

$$= \sqrt[12]{\frac{a^6 \cdot (a^2)^4 \cdot (a^3)^3}{(a^4)^2}} = \sqrt[12]{\frac{a^6 \cdot a^8 \cdot a^9}{a^8}} = \sqrt[12]{a^{15}} = \sqrt[4]{a^5}$$

10. Realiza las operaciones:

$$1. (\sqrt{7} - \sqrt{2})^2 =$$

$$= (\sqrt{7})^2 - 2 \cdot \sqrt{7} \cdot \sqrt{2} + (\sqrt{2})^2 = 7 - 2\sqrt{14} + 2 = 9 - 2\sqrt{14}$$

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

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

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

$$= (\sqrt{5})^2 - 2^2 = 5 - 4 = 1$$

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

$$= (2\sqrt{5})^2 - (3\sqrt{2})^2 = 2^2 \cdot (\sqrt{5})^2 - 3^2 (\sqrt{2})^2 = 4 \cdot 5 - 9 \cdot 2 = 20 - 18 = 2$$

11. Calcula:

$$\frac{1}{2 - \sqrt{3}} \cdot \frac{1}{2 + \sqrt{3}} =$$

$$= \frac{1}{2^2 - (\sqrt{3})^2} = \frac{1}{4 - 3} = 1$$