

1.- Calcula los valores de las siguientes potencias:

1.  $16^{\frac{3}{2}} =$

2.  $8^{\frac{2}{3}} =$

3.  $81^{0.75} =$

4.  $8^{0.333...} =$

2.- Escribe en forma de una sola potencia:

1.  $30^3 \cdot (-3)^4 \cdot 3$

2.  $5^7 : 5^3 =$

3.  $(5^3)^4 =$

4.  $(5 \cdot 2 \cdot 3)^4 =$

5.  $(3^4)^4 =$

6.  $[(5^3)^4]^2 =$

7.  $(8^2)^3 =$

8.  $3^5 \cdot (-2 \cdot 3)^3 \cdot 2^2 \cdot 3^4 =$

9.  $2^5 \cdot 2^4 \cdot 2 =$

10.  $2^7 : 2^6 =$

11.  $(2^2)^4 =$

12.  $(9^3)^2 =$

13.  $(2^5)^4 =$

14.  $[(2^3)^4]^0 =$

15.  $(4^3)^2 =$

16.  $(4^{-2})^{-2} =$

3.- Extrae o introduce factores en las raíces:

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

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

3.  $2\sqrt{3}$

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

4.- Poner en índice común:  $\sqrt{2}$

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

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

5.- Realiza los siguientes productos y cocientes:

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

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

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

4.  $\frac{\sqrt[4]{128}}{\sqrt[4]{16}} =$

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

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

6.- Halla las sumas:

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

7.- Realiza las operaciones:

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

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

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

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

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

8.- Opera y simplifica

1.  $\sqrt{\frac{\sqrt[3]{2}}{\sqrt[4]{8}}}$

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

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

4.  $\frac{\sqrt{a} \cdot \sqrt[3]{a^2} \cdot \sqrt[4]{a^3}}{\sqrt[5]{a^4}} =$

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

6.  $\sqrt{\frac{a-b}{(a-b)^2} \cdot \frac{a+b}{a^2-b^2}} =$

7.  $\left(\frac{\sqrt[3]{12} \cdot \sqrt[4]{18}}{\sqrt{6}}\right)^4 =$

9.- Racionaliza y simplifica:

1.  $\frac{5}{2\sqrt{2}} =$

2.  $\frac{1}{\sqrt[3]{3}} =$

3.  $\frac{2}{3 + \sqrt{3}} =$

4.  $\frac{\sqrt{2}}{\sqrt{3} - \sqrt{2}} =$

5.  $\frac{3\sqrt{2} - 2\sqrt{3}}{3\sqrt{2} + 2\sqrt{3}} =$

# SOLUCIONES

## Ejercicio n° 1.

1.  $16^{\frac{3}{2}} = \sqrt{16^3} = \sqrt{(2^4)^3} = \sqrt{2^{12}} = 2^6 = 64$
2.  $8^{\frac{2}{3}} = \sqrt[3]{8^2} = \sqrt[3]{(2^3)^2} = \sqrt[3]{2^6} = 2^2 = 4$
3.  $81^{0.75} = 81^{\frac{75}{100}} = 81^{\frac{3}{4}} = \sqrt[4]{81^3} = \sqrt[4]{(3^4)^3} = \sqrt[4]{3^{12}} = 3^3 = 27$
4.  $8^{0.333...} = 8^{\frac{3}{9}} = 8^{\frac{1}{3}} = \sqrt[3]{8} = \sqrt[3]{2^3} = 2$

## Ejercicio n° 2.-

1.  $30^3 \cdot (-3)^4 \cdot 3 = (2 \cdot 3 \cdot 5)^3 \cdot 3^4 \cdot 3 = 2^3 \cdot 3^3 \cdot 5^3 \cdot 3^4 \cdot 3 = 2^3 \cdot 3^8 \cdot 5^3 = 2^3 3^8 5^3$
2.  $5^7 : 5^3 = 5^4$
3.  $(5^3)^4 = 5^{12}$
4.  $(5 \cdot 2 \cdot 3)^4 = 30^4$
5.  $(3^4)^4 = 3^{16}$
6.  $[(5^3)^4]^2 = (5^{12})^2 = 5^{24}$
7.  $(8^2)^3 = [(2^3)^2]^3 = (2^6)^3 = 2^{18}$
8.  $3^5 \cdot (-2 \cdot 3)^3 \cdot 2^2 \cdot 3^4 = -3^5 \cdot 2^3 \cdot 3^3 \cdot 2^2 \cdot 3^4 = -2^5 3^4$
9.  $2^5 \cdot 2^4 \cdot 2 = 2^{10}$
10.  $2^7 : 2^6 = 2$
11.  $(2^2)^4 = 2^8$
12.  $(9^3)^2 = [(3^2)^3]^2 = (3^6)^2 = 3^{12}$
13.  $(2^5)^4 = 2^{20}$
14.  $[(2^3)^4]^0 = (2^{12})^0 = 2^0 = 1$
15.  $(4^3)^2 = [(2^2)^3]^2 = (2^6)^2 = 2^{12}$
16.  $(4^{-2})^{-2} = (2^2)^4 = 2^8$

## Ejercicio n° 3.-

1.  $\sqrt{2 \cdot 3^2 \cdot 5^5} = 3 \cdot 5^2 \sqrt{2 \cdot 5}$
2.  $\sqrt[4]{2^7 \cdot 3^{14} \cdot 5^4} = 2 \cdot 3^3 \cdot 5 \sqrt[4]{2^3 \cdot 3^2}$
3.  $2\sqrt{3} = \sqrt{2^2 \cdot 3} = \sqrt{12}$
4.  $2^2 \cdot 3^3 \sqrt[6]{6} = \sqrt[6]{(2^2)^4 \cdot (3^3)^4 \cdot 2 \cdot 3} = \sqrt[6]{2^8 \cdot 3^{12} \cdot 2 \cdot 3} = \sqrt[6]{2^9 \cdot 3^{13}}$

## Ejercicio n° 4.-

m.c.m.(2, 3, 4) = 12;  $\sqrt[12]{2^8}$        $\sqrt[12]{(2^2)^4 \cdot (3^2)^4}$        $\sqrt[12]{(2^2)^8 \cdot (3^2)^8}$ ;  $\sqrt[12]{2^6}$        $\sqrt[12]{2^8 \cdot 3^8}$        $\sqrt[12]{2^6 \cdot 3^8}$

## Ejercicio n° 5.-

1.  $\sqrt{2} \cdot \sqrt{6} = \sqrt{12} = \sqrt{2^2 \cdot 3} = 2\sqrt{3}$
2.  $\sqrt{3} \cdot \sqrt[3]{9} \cdot \sqrt[4]{27} = \sqrt[12]{3^6} \cdot \sqrt[12]{(3^2)^4} \cdot \sqrt[12]{(3^3)^3} = \sqrt[12]{3^6 \cdot 3^8 \cdot 3^9} = \sqrt[12]{3^{23}} = 3 \sqrt[12]{3^{11}}$
3.  $\sqrt{12} \cdot \sqrt[3]{36} = \sqrt[6]{12^3} \cdot \sqrt[6]{36^2} = \sqrt[6]{(2^2 \cdot 3)^3 \cdot (2^2 \cdot 3^2)^2} = \sqrt[6]{2^6 \cdot 3^3 \cdot 2^4 \cdot 3^4} = \sqrt[6]{2^{10} \cdot 3^7} = 6 \sqrt[6]{2^4 \cdot 3}$
4.  $\frac{\sqrt[6]{128}}{\sqrt[6]{16}} = \sqrt[6]{\frac{128}{16}} = \sqrt[6]{\frac{2^7}{2^4}} = \sqrt[6]{2^3} = \sqrt{2}$
5.  $\frac{\sqrt[3]{4}}{\sqrt{2}} = \sqrt[6]{\frac{4^2}{2^3}} = \sqrt[6]{\frac{(2^2)^2}{2^3}} = \sqrt[6]{\frac{2^4}{2^3}} = \sqrt[6]{2} = \sqrt[6]{2}$
6.  $\frac{\sqrt{256}}{\sqrt[3]{16}} = \sqrt[6]{\frac{(256)^3}{16^2}} = \sqrt[6]{\frac{(2^8)^3}{(2^4)^2}} = \sqrt[6]{\frac{2^{24}}{2^8}} = \sqrt[6]{2^{16}} = \sqrt[3]{2^8} = 2^2 \sqrt[3]{2^2} = 4 \sqrt[3]{4}$

Ejercicio n° 6.-

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

Ejercicio n° 7.-

- $(\sqrt{7} - \sqrt{2})^2 = (\sqrt{7})^2 - 2 \cdot \sqrt{7} \cdot \sqrt{2} + (\sqrt{2})^2 = 7 - 2\sqrt{14} + 2 = 9 - 2\sqrt{14}$
- $(2 - \sqrt{3})^2 = 2^2 - 2 \cdot 2 \cdot \sqrt{3} + (\sqrt{3})^2 = 4 - 4\sqrt{3} + 3 = 7 - 4\sqrt{3}$
- $(\sqrt{5} + 2) \cdot (\sqrt{5} - 2) = (\sqrt{5})^2 - 2^2 = 5 - 4 = 1$
- $(2\sqrt{5} + 3\sqrt{2}) \cdot (2\sqrt{5} - 3\sqrt{2}) = (2\sqrt{5})^2 - (3\sqrt{2})^2 = 2^2 \cdot (\sqrt{5})^2 - 3^2 (\sqrt{2})^2 = 4 \cdot 5 - 9 \cdot 2 = 20 - 18 = 2$
- $= \sqrt[3]{2^4} + \sqrt[3]{2 \cdot 5^3} + \sqrt[6]{2^2} - \frac{1}{\sqrt[3]{2^2}} = 2\sqrt[3]{2} + 5\sqrt[3]{2} + \sqrt[3]{2} - \frac{\sqrt[3]{2}}{\sqrt[3]{2^2 \cdot 3^2}}$   
 $= 2\sqrt[3]{2} + 5\sqrt[3]{2} + \sqrt[3]{2} - \frac{\sqrt[3]{2}}{2} = \frac{15\sqrt[3]{2}}{2}$

Ejercicio n° 8.-

- $\sqrt[4]{\frac{1}{8}} = \sqrt[4]{\frac{1}{2^3}} = \sqrt[4]{\frac{2^2}{(2^3)^3}} = \sqrt[4]{\frac{2^2}{2^9}} = \sqrt[4]{2^{-7}} = \sqrt[4]{2^{11}} = \sqrt[4]{2^{11}}$
- $\sqrt[3]{\sqrt[3]{\sqrt[3]{2 \cdot 2}}} = \sqrt[3]{\sqrt[3]{\sqrt[3]{2 \cdot 2^2}}} = \sqrt[3]{\sqrt[3]{\sqrt[3]{2^3}}} = \sqrt[3]{2^3} = 2\sqrt[3]{2}$
- $\sqrt{2 \sqrt[3]{2 \sqrt[3]{2}}} = \sqrt{2^2 \cdot 2 \sqrt[3]{2}} = \sqrt{2^3 \sqrt[3]{2}} = \sqrt{\sqrt[3]{2^4} \cdot 2} = \sqrt{\sqrt[3]{2^{16}} \cdot 2} = 2\sqrt[3]{2^{17}}$
- $\frac{\sqrt{a} \cdot \sqrt[3]{a^2} \cdot \sqrt[4]{a^3}}{\sqrt[6]{a^4}} = \sqrt[12]{\frac{a^6 \cdot (a^2)^4 \cdot (a^3)^3}{(a^4)^2}} = \sqrt[12]{\frac{a^6 \cdot a^8 \cdot a^9}{a^8}} = \sqrt[12]{a^{15}} = \sqrt[4]{a^5}$
- $\frac{1}{2 - \sqrt{3}} \cdot \frac{1}{2 + \sqrt{3}} = \frac{1}{2^2 - (\sqrt{3})^2} = \frac{1}{4 - 3} = 1$
- $\sqrt{\frac{a-b}{(a-b)^2}} \cdot \frac{a+b}{a^2 - b^2} = \sqrt{\frac{1}{(a-b)^2}} = \frac{1}{a-b}$
- $\left(\frac{\sqrt[3]{12} \cdot \sqrt[3]{18}}{\sqrt{5}}\right)^4 = \frac{\sqrt[3]{(12)^4} \cdot \sqrt[3]{(18)^4}}{\sqrt{(5)^4}} = \frac{\sqrt[3]{(2^2 \cdot 3)^4} \cdot 18}{\sqrt{(2 \cdot 3)^4}} = \frac{18 \cdot \sqrt[3]{2^8 \cdot 3^4}}{\sqrt{2^4 \cdot 3^4}} = 18 \sqrt[3]{\frac{(2^8 \cdot 3^4)^2}{(2^4 \cdot 3^4)^3}} = 18 \sqrt[3]{\frac{2^{16} \cdot 3^8}{2^{12} \cdot 3^{12}}} = 18 \sqrt[3]{\frac{2^4}{3^4}} = 18 \sqrt[3]{\frac{2^2}{3^2}} = 18 \sqrt[3]{\left(\frac{2}{3}\right)^2}$

Ejercicio n° 9.-

$$1. \frac{5}{2\sqrt{2}} = \frac{5 \cdot \sqrt{2}}{2 \cdot \sqrt{2} \cdot \sqrt{2}} = \frac{5 \cdot \sqrt{2}}{2 \cdot \sqrt{2^2}} = \frac{5 \cdot \sqrt{2}}{2 \cdot 2} = \frac{5 \cdot \sqrt{2}}{4}$$

$$2. \frac{1}{\sqrt[3]{3}} = \frac{\sqrt[3]{3^2}}{\sqrt[3]{3} \cdot \sqrt[3]{3^2}} = \frac{\sqrt[3]{3^2}}{\sqrt[3]{3^3}} = \frac{\sqrt[3]{9}}{3}$$

$$3. \frac{2}{3 + \sqrt{3}} = \frac{2 \cdot (3 - \sqrt{3})}{(3 + \sqrt{3}) \cdot (3 - \sqrt{3})} = \frac{6 - 2\sqrt{3}}{3^2 - (\sqrt{3})^2} = \frac{6 - 2\sqrt{3}}{9 - 3} = \frac{6 - 2\sqrt{3}}{6} = \frac{3 - \sqrt{3}}{3}$$

$$4. \frac{\sqrt{2}}{\sqrt{3} - \sqrt{2}} = \frac{\sqrt{2} \cdot (\sqrt{3} + \sqrt{2})}{(\sqrt{3} - \sqrt{2}) \cdot (\sqrt{3} + \sqrt{2})} = \frac{\sqrt{6} + \sqrt{2^2}}{(\sqrt{3})^2 - (\sqrt{2})^2} = \frac{2 + \sqrt{6}}{3 - 2} = 2 + \sqrt{6}$$

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

$$= \frac{(3\sqrt{2})^2 - 2 \cdot 3 \cdot \sqrt{2} \cdot 2\sqrt{3} + (2\sqrt{3})^2}{(3\sqrt{2})^2 - (2\sqrt{3})^2} = \frac{9 \cdot 2 - 12\sqrt{6} + 4 \cdot 3}{9 \cdot 2 - 4 \cdot 3} = \frac{18 - 12\sqrt{6} + 12}{18 - 12} = \frac{30 - 12\sqrt{6}}{6} = 5 - 2\sqrt{6}$$