

1. Resuelve: $9^x - 2 \cdot 3^{x+2} + 81 = 0$

2. Resuelve: $2 \log(3x-2) - 1 = \log(x+6)$

3. Resuelve: $\begin{cases} x + y = 22 \\ \log x - \log y = 1 \end{cases}$

4. Si $\log 2=0,3010$, $\log 3=0,4771$, $\log 5=0,6990$. Calcula:

a. $\log \sqrt[5]{\frac{1}{0,64}}$ b. $\log \frac{270}{128}$

5. Escribe la expresión algebraica de: $\log A = 3 + 3 \log x - \frac{2}{5} \log(y) - 5 \log z - 4 \log \frac{x}{y}$

6. Resuelve: $\begin{cases} \log x + \log y = 3 \\ x + \frac{y}{10} = 20 \end{cases}$

7. Resuelve $\frac{\log 2 + \log(11-x^2)}{\log(5-x)} = 2$

8. Resuelve $8^{1+x} + 2^{3x-1} = \frac{17}{16}$

$$\begin{aligned} (1) \quad 9^x - 2 \cdot 3^{x+2} + 81 &= 0 \rightarrow (3^x)^2 - 2 \cdot 3^x \cdot 3^2 + 81 = 0 \rightarrow \\ (3^x)^2 - 18 \cdot 3^x + 81 &= 0 \quad \xrightarrow{3^x=t} \quad t^2 - 18t + 81 = 0 \\ t &= \frac{18 \pm \sqrt{18^2 - 4 \cdot 81}}{2} = 9 \rightarrow 3^x = 9 \rightarrow \boxed{x=2} \end{aligned}$$

$$\begin{aligned} (2) \quad 2 \log(3x-2) - 1 &= \log(x+6) \\ \log(3x-2)^2 - \log 10 &= \log(x+6) \rightarrow \log \frac{(3x-2)^2}{10} = \log(x+6) \rightarrow \\ (3x-2)^2 &= 10(x+6) \rightarrow 9x^2 - 12x + 4 = 10x + 60 \rightarrow \\ 9x^2 - 22x - 56 &= 0 \quad \begin{cases} \rightarrow x=4 \\ \rightarrow x = -\frac{14}{9} \text{ No vale.} \end{cases} \end{aligned}$$

$$(3) \quad \begin{array}{l} x+y=22 \\ \log x - \log y = 1 \end{array} \quad \left\{ \begin{array}{l} x+y=22 \\ \log \frac{x}{y} = \log 10 \end{array} \right. \quad \left\{ \begin{array}{l} x+y=22 \\ x=10y \end{array} \right. \quad \left\{ \begin{array}{l} 11y=22 \\ y=2 \\ x=20 \end{array} \right.$$

$$(4) \quad \log 2 = 0,3010 ; \log 3 = 0,4771 ; \log 5 = 0,6990$$

$$\begin{aligned} a) \quad \log \sqrt[5]{\frac{1}{0,64}} &= \frac{1}{5} \log \frac{100}{64} = \frac{1}{5} [\log 100 - \log 64] = \\ &= \frac{1}{5} [2 - \log 2^6] = \frac{1}{5} [2 - 6 \cdot \log 2] = \frac{1}{5} [2 - 6 \cdot 0,3010] = \\ &= \frac{97}{2500} = 0,0388 \end{aligned}$$

$$\begin{aligned} b) \quad \log \frac{270}{128} &= \log 270 - \log 128 = \log 3^3 \cdot 2 \cdot 5 - \log 2^7 = \\ &= 3 \log 3 + \log 2 + \log 5 - 7 \log 2 = 0,3243 \end{aligned}$$

$$\begin{aligned} (5) \quad \log A &= \log 1000 + \log x^3 - \log y^{2/5} - \log z^5 - \log \left(\frac{x}{y}\right)^4 \\ \log A &= \log \frac{1000 \cdot x^3}{\sqrt[5]{y^2} \cdot z^5 \cdot \frac{x^4}{y^4}} \rightarrow A = \frac{1000 x^3 y^4}{\sqrt[5]{y^2} z^5 x^4} = \frac{1000 \cdot y^{18/5}}{z^5 \cdot x} \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad \log x + \log y = 3 & \quad \left\{ \begin{array}{l} \log xy = \log 1000 \\ xy = 1000 \\ 10x + y = 200 \end{array} \right. \\ x + \frac{y}{10} = 20 & \quad \left\{ \begin{array}{l} y = 200 - 10x \\ x(200 - 10x) = 1000 \\ 200x - 10x^2 = 1000 \end{array} \right. \end{aligned}$$

$$10x^2 - 200x + 1000 = 0 \rightarrow x^2 - 20x + 100 = 0 \rightarrow x = 10$$

$$y = 200 - 100 = 100$$

$$\textcircled{7} \quad \frac{\log 2 + \log (11 - x^2)}{\log (5 - x)} = 2 \Rightarrow \log [2(11 - x^2)] = 2 \log (5 - x) \Rightarrow$$

$$\log [22 - 2x^2] = \log (5 - x)^2 \rightarrow 22 - 2x^2 = 25 - 10x + x^2$$

$$3x^2 - 10x + 3 = 0 \quad \begin{array}{l} \rightarrow x = 3 \\ \rightarrow x = \frac{1}{3} \end{array}$$

$$\textcircled{8} \quad 8^{1+x} + 2^{3x-1} = \frac{17}{16}$$

$$8 \cdot 8^x + (2^x)^3 \cdot \frac{1}{2} = \frac{17}{16} \rightarrow \frac{8(2^x)^3 \cdot 2 + (2^x)^3}{2} = \frac{17}{16}$$

$$2^x = t \rightarrow 16t^3 + t^3 = \frac{34}{16} \rightarrow 17t^3 = \frac{34}{16} \rightarrow t^3 = \frac{2}{16} = \frac{1}{8}$$

$$t^3 = 2^{-3} = \left(\frac{1}{2}\right)^3 \rightarrow t = \frac{1}{2}$$

$$2^x = \frac{1}{2} = 2^{-1} \rightarrow \boxed{x = -1}$$