

1. Resuelve:  $2^{x+3} + 4^{x+1} - 320 = 0$

2. Resuelve:  $2 \log(x) + 1 = \log\left(\frac{x}{2}\right)$

3. Resuelve:  $\begin{cases} x - y = 27 \\ \log x - \log y = 1 \end{cases}$

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

a.  $\log \sqrt[8]{\frac{1}{0,256}}$       b.  $\log \frac{540}{512}$

5. Escribe la expresión algebraica de:  $\log A = 4 + 2 \log x + \frac{1}{3} \log(y) - 6 \log z - 3 \log x$

6. Resuelve:  $\begin{cases} 2 \log x - \log y = 5 \\ \log(xy) = 4 \end{cases}$

7. Resuelve  $\frac{\log(16-x^2)}{\log(3x-4)} = 2$

8. Resuelve  $3^{9x^4-10x^2+1} = 1$

(1)  $2^{x+3} + 4^{x+1} - 320 = 0$

$$2^x \cdot 2^3 + 2^{2(x+1)} - 320 = 0 \rightarrow 2^x \cdot 8 + 2^{2x} \cdot 2^2 - 320 = 0$$

$$8 \cdot 2^x + 4(2^x)^2 - 320 = 0 \quad \boxed{2^x = t} \quad 4t^2 + 8t - 320 = 0$$

$$t = \frac{-8 \pm \sqrt{64 + 5120}}{8} = \frac{-8 \pm \sqrt{5184}}{8} = \frac{-8 \pm 72}{8} = \begin{cases} 8 \\ -10 \end{cases}$$

$$2^x = 8 \rightarrow x = 3$$

$$2^x = -10 \rightarrow \text{X}$$

$$(2) \quad 2 \log x + 1 = \log\left(\frac{x}{2}\right)$$

$$\log x^2 + \log 10 = \log \left( \frac{x}{2} \right) \Rightarrow \cancel{\log (x^2 \cdot 10)} = \log \left( \frac{x}{2} \right) \Rightarrow$$

$$10x^2 = \frac{x}{2} \rightarrow 20x^2 - x = 0 \rightarrow x(20x - 1) = 0 \rightarrow x = 0 \rightarrow \text{No value}$$

$$\rightarrow x = \frac{1}{20} \quad \checkmark$$

(3)  $x - y = 27$   
 $\log x - \log y = 1$   $\left\{ \begin{array}{l} x - y = 27 \\ \log \frac{x}{y} = \log 10 \end{array} \right. \quad \left\{ \begin{array}{l} x - y = 27 \\ \frac{x}{y} = 10 \end{array} \right. \quad \left\{ \begin{array}{l} x = 10y \\ 10y - y = 27 \end{array} \right.$   
 $y = \frac{27}{9} = 3$   
 $x = 10 \cdot 3 = 30$

Solución  $x=30, y=3$

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

$$\begin{aligned} a) \log \sqrt[8]{\frac{1}{0,256}} &= \log \left( \frac{1}{0,256} \right)^{1/8} = \frac{1}{8} \log \left( \frac{1}{0,256} \right) = \frac{1}{8} \log \left( \frac{1000}{256} \right) = \\ &= \frac{1}{8} [\log 1000 - \log 256] = \frac{1}{8} [3 - \log 2^8] = \frac{1}{8} [3 - 8 \log 2] = \\ &= \frac{1}{8} [-3 - 8 \cdot 0,3010] = \frac{1}{8} [0,592] = \frac{37}{500} = 0,074 \end{aligned}$$

$$\begin{aligned} b) \log \frac{540}{512} &= \log \frac{2^2 \cdot 3^3 \cdot 5}{2^9} = \log \frac{3^3 \cdot 5}{2^7} = \log 3^3 + \log 5 - \log 2^7 = \\ &= 3 \cdot \log 3 + \log 5 - 7 \log 2 = 3 \cdot 0,4771 + 0,6990 - 7 \cdot 0,3010 = \\ &= \frac{233}{10000} = 0,0233 \end{aligned}$$

$$(5) \log A = 4 + 2 \log x + \frac{1}{3} \log y - 6 \log z - 3 \log x$$

$$\log A = \log 10000 + \log x^2 + \log \sqrt[3]{y} - \log z^6 - \log x^3 =$$

$$= \log 1000 \cdot x^2 \cdot \sqrt[3]{y} - \log z^6 x^3 = \log \frac{1000 x^2 \sqrt[3]{y}}{z^6 x^3} =$$

$$= \log \frac{1000 \sqrt[3]{y}}{z^6 x}$$

$$\log A = \log \frac{1000 \sqrt[3]{y}}{z^6 x} \Rightarrow A = \frac{1000 \sqrt[3]{y}}{z^6 x}$$

$$(6) \begin{cases} 2 \log x - \log y = 5 \\ \log(xy) = 4 \end{cases} \quad \begin{cases} 2 \log x - \log y = 5 \\ \log x + \log y = 4 \end{cases} \quad \begin{cases} \log x = A \\ \log y = B \end{cases}$$

$$\begin{cases} 2A - B = 5 \\ A + B = 4 \end{cases} \quad \begin{array}{r} 2A - B = 5 \\ A + B = 4 \\ \hline 3A = 9 \rightarrow A = 3 \end{array}$$

$$\begin{array}{r} 2A - B = 5 \\ (-2) \cdot 2A - 2B = -8 \\ \hline -3B = -3 \\ B = 1 \end{array}$$

$$\log x = A = 3 \rightarrow x = 10^3 = 1000$$

$$\log y = B = 1 \rightarrow y = 10$$

$$(7) \frac{\log(16-x^2)}{\log(3x-4)} = 2 \rightarrow \log(16-x^2) = 2 \log(3x-4) \Rightarrow \log(16-x^2) = \log(3x-4)^2$$

$$16-x^2 = 9x^2 - 24x + 16 \Rightarrow 10x^2 - 24x = 0 \Rightarrow x(10x - 24) = 0 \quad \begin{cases} x=0 \text{ no} \\ x = \frac{24}{10} = \frac{12}{5} \end{cases}$$

$$(8) 3^{9x^4 - 10x^2 + 1} = 1 \Rightarrow 3^{9x^4 - 10x^2 + 1} = 3^0 \Rightarrow 9x^4 - 10x^2 + 1 = 0$$

$$x^2 = t \Rightarrow 9t^2 - 10t + 1 = 0 \quad t = \frac{10 \pm \sqrt{100 - 36}}{18} = \frac{10 \pm 8}{18} = \begin{cases} \frac{18}{18} = 1 \\ \frac{2}{18} = \frac{1}{9} \end{cases}$$

$$t_1 = 1 \rightarrow x^2 = 1 \rightarrow x = \pm 1$$

$$t_2 = \frac{1}{9} \rightarrow x^2 = \frac{1}{9} \rightarrow x = \pm \frac{1}{3}$$