

## EJERCICIOS DE LOGARITMOS

1 Calcular por la **definición de logaritmo** el valor de  $y$ .

$$1 \quad \log_{\frac{1}{2}} 0.25 = y$$

$$2 \quad \log_{\sqrt{5}} 125 = y$$

$$3 \quad \log 0.001 = y$$

$$4 \quad \ln \frac{1}{e^5} = y$$

$$5 \quad \log_{\sqrt{3}} \sqrt[5]{\frac{1}{81}} = y$$

2 Calcula el valor de  $x$  aplicando la **definición de logaritmo**.

$$1 \quad \log_2 32 = x$$

$$2 \quad \log_5 \frac{1}{3} = x$$

$$3 \quad \log_{\frac{1}{2}} 0.25 = x$$

$$4 \quad \log_9 \sqrt[4]{3} = x$$

$$5 \quad \log_{\frac{1}{4}} \frac{1}{4} = x$$

$$6 \quad \log_x 81 = -4$$

$$7 \quad \log_2 x^3 = 6$$

3 Conociendo que  $\log 2 = 0.3010$ , **calcula** los siguientes **logaritmos decimales**.

$$1 \quad \log 0.02$$

$$2 \quad \log \sqrt[4]{8}$$

$$3 \quad \log 5$$

$$4 \log 0.0625$$

4 Calcular los **logaritmos** de de las expresiones que se indican:

$$1 \ln \frac{x^2 \cdot y \cdot (m+n)}{m \cdot n} =$$

$$2 \log_2 \frac{a^2 - b^2}{a \cdot b} =$$

$$3 \log 2\sqrt{2}\sqrt{2}\sqrt{2}$$

5 Calcula mediante **logaritmos** el valor de x.

$$1 x = \sqrt[3]{493}$$

$$2 x = \frac{\sqrt[3]{0.3688}}{22.958^5}$$

$$3 x = \frac{425 \cdot \sqrt{2.73}}{\sqrt[3]{48.4}}$$

# SOLUCIONES

1 Calcular por la **definición de logaritmo** el valor de y.

$$1 \quad \log_{\frac{1}{2}} 0.25 = y$$

$$\left(\frac{1}{2}\right)^y = 0.25 \quad \left(\frac{1}{2}\right)^y = \left(\frac{1}{2}\right)^2 \quad y = 2$$

$$2 \quad \log_{\sqrt{5}} 125 = y$$

$$\sqrt{5}^y = 125 \quad 5^{\frac{1}{2}y} = 5^3 \quad y = 6$$

$$3 \quad \log 0.001 = y$$

$$10^y = 0.001 \quad 10^y = 10^{-3} \quad y = -3$$

$$4 \quad \ln \frac{1}{e^5} = y$$

$$e^y = \frac{1}{e^5} \quad e^y = e^{-5} \quad y = -5$$

$$5 \quad \log_{\sqrt{3}} \sqrt[5]{\frac{1}{81}} = y$$

$$\sqrt{3}^y = \sqrt[5]{\frac{1}{81}} \quad 3^{\frac{1}{2}y} = 3^{-\frac{4}{5}} \quad y = -\frac{8}{5}$$

2 Calcula el **valor de x** aplicando la **definición de logaritmo**:

$$1 \quad \log_2 32 = x$$

$$2^x = 32 \quad 2^x = 2^5 \quad x = 5$$

$$2 \quad \log_5 \frac{1}{3} = x$$

$$(9)^x = \frac{1}{3} \quad 3^{2x} = 3^{-1} \quad x = -\frac{1}{2}$$

$$3 \log_{\frac{1}{2}} 0.25 = x$$

$$\left(\frac{1}{2}\right)^x = \frac{25}{100} \quad \left(\frac{1}{2}\right)^x = \left(\frac{1}{4}\right)$$

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

$$4 \log_9 \sqrt[4]{3} = x$$

$$(9)^x = \sqrt[4]{3} \quad 3^{2x} = 3^{\frac{1}{4}} \quad x = \frac{1}{8}$$

$$5 \log_{\sqrt{2}} \frac{1}{4} = x$$

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

$$6 \log_x 81 = -4$$

$$x^{-4} = 81 \quad x^4 = \frac{1}{81} \quad x = \frac{1}{3}$$

$$7 \log_2 x^3 = 6$$

$$x^3 = 2^6 \quad x = 4$$

3 Conociendo que  $\log 2 = 0.3010$ , calcula los siguientes logaritmos decimales.

$$1 \log 0.02$$

$$\log\left(\frac{2}{100}\right) = \log 2 - \log 10^2 = \log 2 - 2 = 0.3010 - 2 = -1.6989$$

$$2 \log \sqrt[4]{8}$$

$$\log \sqrt[4]{2^3} = \frac{3}{4} \log 2 = \frac{3}{4} \cdot 0.3010 = 0.2257$$

$$3 \log 5$$

$$\log\left(\frac{10}{2}\right) = \log 10 - \log 2 = 1 - 0.3010 = \mathbf{0.69897}$$

$$4 \log 0.0625$$

$$\log\left(\frac{625}{10000}\right) = \log\left(\frac{5^4}{2^4 \cdot 5^4}\right) = \log\left(\frac{1}{2^4}\right) =$$

$$\log 1 - \log 2^4 = 0 - 4 \log 2 = \mathbf{-1.2040}$$

4 Calcular los logaritmos de de las expresiones que se indican:

$$1 \ln \frac{x^2 \cdot y \cdot (m+n)}{m \cdot n} =$$

$$= \ln [x^2 \cdot y \cdot (m+n)] - \ln (m \cdot n) =$$

$$= \ln x^2 + \ln y + \ln(m+n) - (\ln m + \ln n) =$$

$$= \mathbf{2 \ln x + \ln y + \ln(m+n) - \ln m - \ln n}$$

$$2 \log_2 \frac{a^2 - b^2}{a \cdot b} =$$

$$= \log_2 \frac{(a+b) \cdot (a-b)}{a \cdot b} =$$

$$= \log_2 [(a+b) \cdot (a-b)] - \log_2 (a \cdot b) =$$

$$= \log_2 (a+b) + \log_2 (a-b) - (\log_2 a + \log_2 b) =$$

$$= \mathbf{\log_2 (a+b) + \log_2 (a-b) - \log_2 a - \log_2 b}$$

$$3 \log 2\sqrt{2\sqrt{2\sqrt{2}}}$$

$$\log 2\sqrt{2\sqrt{2\sqrt{2}}} = \log 2 + \log \sqrt{2\sqrt{2\sqrt{2}}} =$$

$$= \log 2 + \frac{1}{2} \log (2\sqrt{2\sqrt{2}}) = \log 2 + \frac{1}{2} \left[ \log 2 + \frac{1}{2} \log (2\sqrt{2}) \right] =$$

$$= \log 2 + \frac{1}{2} \left[ \log 2 + \frac{1}{2} (\log 2 + \log \sqrt{2}) \right] =$$

$$= \log 2 + \frac{1}{2} \left[ \log 2 + \frac{1}{2} \left( \log 2 + \frac{1}{2} \log 2 \right) \right] =$$

$$= \log 2 + \frac{1}{2} \log 2 + \frac{1}{4} \log 2 + \frac{1}{8} \log 2 = \frac{15}{8} \log 2$$

5 Calcula mediante logaritmos el valor de x.

$$1 \quad x = \sqrt[5]{493}$$

$$\log x = \log \sqrt[5]{493}$$

$$\log x = \frac{1}{5} \cdot \log 493 = \frac{1}{5} \cdot 2.6928 = 0.5386$$

Hallamos el [antilogaritmo](#):

$$x = \text{antilog } 0.5386 = \mathbf{3.456}$$

$$2 \quad x = \frac{\sqrt[3]{0.3688}}{22.958^5}$$

$$\log x = \log \frac{\sqrt[3]{0.3688}}{22.958^5}$$

$$\log x = \log \sqrt[3]{0.3688} - \log 22.958^5 = \frac{1}{3} \log 0.3688 - 5 \log 22.958$$

$$x = \text{antilog } 0.5386 = \mathbf{3.456}$$

$$3 \quad x = \frac{425 \cdot \sqrt{2.73}}{\sqrt[3]{48.4}}$$

$$\log x = \log \frac{425 \cdot \sqrt{2.73}}{\sqrt[3]{48.4}}$$

$$\log x = \log(425 \cdot \sqrt{2.73}) - \log \sqrt[3]{48.4}$$

$$\log x = 2.6284 + \frac{1}{2} \cdot 0.4362 - \frac{1}{3} \cdot 1.6848 = 2.2849$$

$$x = \text{antilog } 2.2849 = \mathbf{192.71}$$