EJERCICIOS DE LOGARITMOS

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

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

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

3 $\log 0.001 = y$

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

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

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

1 $\log_2 32 = x$

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

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

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

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

6 $\log_x 81 = -4$

7 $\log_2 x^3 = 6$

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

1 $\log 0.02$

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

3 $\log 5$

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 $x = \sqrt[4]{493}$

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

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

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

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

3 $\log 0.001 = y$

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

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

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

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

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

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

1 $\log_2 32 - x$

$2^x - 32$ $2^x - 2^5$ $x - 5$

2 $\log_5 \frac{1}{3} - x$

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

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

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

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

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

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

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

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

6 $\log_x 81 = -4$

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

7 $\log_2 x^3 = 6$

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

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 $\log 5$

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

4 $\log 0.0625$

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

$$\log 1 - \log 2^4 = 0 - 4\log 2 = -1.2040$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1 $x-\sqrt[5]{493}$

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

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

Hallamos el antilogaritmo:

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

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

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

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

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

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

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

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

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

$$x=\text{antlog}\ 2.2849=192.71$$