SOLUCIÓN EJERCICIOS OBLIGATORIOS TEMA 4
MATEMÁTICAS B 4º ESO A

7-

b) $\log_3 27 = x \Rightarrow 3^x = 27 \Rightarrow x = 3$

e) $\log_x 3 = -1 \Rightarrow x^{-1} = 3 \Rightarrow \frac{1}{x} = 3 \Rightarrow x = \frac{1}{3}$

h) $\log_{2x} 4 = 2 \Rightarrow (2x)^2 = 4 \Rightarrow 4x^2 = 4 \Rightarrow x^2 = 1 \Rightarrow x = \pm 1 \Rightarrow x = 1$

k) $\log_{\frac{1}{3}} x = -3 \Rightarrow \left(\frac{1}{3}\right)^{-3} = x \Rightarrow x = 3^3 = 27$

8-

e) $\log_2 \sqrt[3]{16} + \log_2 0'25 - \log_2 \sqrt{8} = \log_2 16^{1/3} + \log_2 \frac{1}{4} - \log_2 8^{1/2} =$

$= \frac{1}{3}\log_2 16 - 2 - \frac{1}{2}\log_2 8 = \frac{1}{3}\cdot 4 - 2 - \frac{1}{2}\cdot 3 = \frac{4}{3} - 2 - \frac{3}{2} = -\frac{13}{6}$

g) $\log \frac{1}{100} - \log 1 + \log_3 \frac{1}{81} = -2 - 0 - 4 = -6$

i) $\log_3 \frac{3}{27} - \log_3 0'3 = \log_3 \frac{1}{9} - \log_3 \frac{1}{3} = -2 - (-1) = -1$

k) $\log_2 \frac{1/8}{32} - \log_2 8^3 = \log_2 \frac{1}{256} - 3\log_2 8 = -8 - 3\cdot 3 = -8 - 9 = -17$

9-

e)

$\log_3 \sqrt{27N} - \log_2 M\sqrt{2} = \log_3 (27N)^{1/2} - \log_2 M\cdot 2^{1/2} = \frac{1}{2}\log_3 27N - (\log_2 M + \log_2 2^{1/2}) =$

$= \frac{1}{2}(\log_3 27 + \log_3 N) - \log_2 M - \frac{1}{2}\log_2 2 = \frac{1}{2}(3+q) - p - \frac{1}{2} = \frac{3}{2} + \frac{q}{2} - p - \frac{1}{2} = 1 + \frac{q}{2} - p$

g)

$2\log_3 \frac{N}{\sqrt[3]{9}} + \log_2 \frac{1024}{M} = 2(\log_3 N - \log_3 9^{1/3}) + \log_2 1024 - \log_2 M = 2(q - \frac{1}{3}\cdot 2) + 10 - p =$

$= 2q - \frac{4}{3} + 10 - p = 2q - \frac{26}{3} - p$

i)

$\log_2 \frac{\sqrt[3]{M^4}}{\sqrt{8}} = \log_2 M^{4/3} - \log_2 8^{1/2} = \frac{4}{3}\cdot p - \frac{1}{2}\cdot 3 = \frac{4p}{3} - \frac{3}{2}$

10-

b) $\log_7 4 = \frac{\log 4}{\log 7} = 0'71$ e) $\log_3 10 = \frac{\log 10}{\log 3} = 2'1$

11-

f)

$$\log \sqrt{3x+1} - \log \sqrt{2x-3} = 1 - \log 5 \Rightarrow \log \sqrt{3x+1} - \log \sqrt{2x-3} + \log 5 = 1 \Rightarrow$$

$$\Rightarrow \log \frac{\sqrt{3x+1}}{\sqrt{2x-3}} \cdot 5 = 1 \Rightarrow 10^1 = 5\frac{\sqrt{3x+1}}{\sqrt{2x-3}} \Rightarrow 2 = \sqrt{\frac{3x+1}{2x-3}} \Rightarrow 4 = \frac{3x+1}{2x-3} \Rightarrow 8x - 12 =$$

$$= 3x + 1 \Rightarrow 5x = 13 \Rightarrow x = \frac{13}{5}$$

h)

$$(x^2 - 4x + 7)\cdot \log 5 + \log 16 = 4 \Rightarrow \log 5^{x^2-4x+7} + \log 16 = 4 \Rightarrow \log 5^{x^2-4x+7} \cdot 16 = 4 \Rightarrow$$

$$\Rightarrow 10^4 = 5^{x^2-4x+7} \cdot 16 \Rightarrow \frac{10000}{16} = 5^{x^2-4x+7} \Rightarrow 625 = 5^{x^2-4x+7} \Rightarrow 5^4 = 5^{x^2-4x+7} \Rightarrow$$

$$\Rightarrow 4 = x^2 - 4x + 7 \Rightarrow x^2 - 4x + 3 = 0 \Rightarrow x = \frac{4 \pm \sqrt{16 - 4\cdot 3}}{2} = \frac{4 \pm 2}{2} \Rightarrow x_1 = 3, x_2 = 1$$

i)

$$5\log \frac{x}{2} + 2\log \frac{x}{3} = 3\log x - \log \frac{32}{9} \Rightarrow \log\left(\frac{x}{2}\right)^5 + \log\left(\frac{x}{3}\right)^2 = \log x^3 - \log \frac{32}{9} \Rightarrow$$

$$\Rightarrow \log \frac{x^5}{32} \cdot \frac{x^2}{9} = \log \frac{x^3}{32/9} \Rightarrow \frac{x^7}{288} = \frac{9x^3}{32} \Rightarrow 32x^7 = 2592x^3 \Rightarrow x^3(32x^4 - 2592) = 0 \Rightarrow$$

$$\Rightarrow x^3 = 0 \Rightarrow x_1 = 0$$

$$\Rightarrow 32x^4 - 2592 = 0 \Rightarrow x^4 = \frac{2592}{32} = 81 \Rightarrow x = \pm\sqrt[4]{81} = \pm 3$$ Sólo vale x=3

l)

$$\log_{x^2}(8 - 2x) = 1 \Rightarrow (x^2)^1 = 8 - 2x \Rightarrow x^2 + 2x - 8 = 0 \Rightarrow x = \frac{-2 \pm \sqrt{4 - 4\cdot(-8)}}{2} =$$

$$= \frac{-2 \pm \sqrt{4 + 32}}{2} = \frac{-2 \pm 6}{2} \Rightarrow x_1 = 2, x_2 = -4$$

12-

i)

$$5^x + 5^{x+1} + 5^{x+2} = \frac{31}{25} \Rightarrow 5^x + 5^x \cdot 5^1 + 5^x \cdot 5^2 = \frac{31}{25} \xrightarrow{5^x = a} a + 5a + 25a = \frac{31}{25} \Rightarrow$$

$$\Rightarrow 31a = \frac{31}{25} \Rightarrow a = \frac{1}{25} = 5^x \Rightarrow x = -2$$

k)

$$4^x + 2^{2x-1} = 24 \Rightarrow 2^{2x} + \frac{2^{2x}}{2^1} = 24 \xrightarrow{2^x=a} a^2 + \frac{a^2}{2} = 24 \Rightarrow 2a^2 + a^2 = 48 \Rightarrow$$

$$\Rightarrow 3a^2 = 48 \Rightarrow a^2 = 16 \Rightarrow a = \pm 4 = 2^x \Rightarrow x = 2$$

m)

$$4^{2x+1} - 4^{x+2} = 768 \Rightarrow 4^{2x} \cdot 4^1 - 4^x \cdot 4^2 = 768 \xrightarrow{4^x=a} 4a^2 - 16a - 768 = 0 \Rightarrow$$

$$\Rightarrow a = \frac{16 \pm \sqrt{256 - 4 \cdot 4 \cdot (-768)}}{8} = \frac{16 \pm \sqrt{256 + 12288}}{8} = \frac{16 \pm 112}{8} \Rightarrow$$

$$\Rightarrow a_1 = 16 = 4^x \Rightarrow x = 2$$

$$\Rightarrow a_2 = -12 \neq 4^x$$

o)

$$3^{x-1} + 3^x + 3^{x+1} = 117 \Rightarrow \frac{3^x}{3^1} + 3^x + 3^x \cdot 3^1 = 117 \xrightarrow{3^x=a} \frac{a}{3} + a + 3a = 117 \Rightarrow$$

$$\Rightarrow a + 3a + 9a = 351 \Rightarrow 13a = 351 \Rightarrow a = 27 = 3^x \Rightarrow x = 3$$

q)

$$5^x - \frac{5}{5^{x-1}} + 24 = 0 \Rightarrow 5^x - 5^{1-(x-1)} + 24 = 0 \Rightarrow 5^x - 5^{2-x} + 24 = 0 \Rightarrow 5^x - \frac{5^2}{5^x} + 24 = 0 \xrightarrow{5^x=a}$$

$$\rightarrow a - \frac{25}{a} + 24 = 0 \Rightarrow a^2 - 25 + 24a = 0 \Rightarrow a = \frac{-24 \pm \sqrt{576 - 4 \cdot (-25)}}{2} = \frac{-24 \pm 26}{2} \Rightarrow$$

$$\Rightarrow a_1 = 1 = 5^x \Rightarrow x = 0$$

$$\Rightarrow a_2 = -25 \neq 5^x$$

s)

$$4^x - 2^{x+3} + 12 = 0 \Rightarrow (2^x)^2 - 2^x \cdot 2^3 + 12 = 0 \xrightarrow{2^x=a} a^2 - 8a + 12 = 0 \Rightarrow$$

$$\Rightarrow a = \frac{8 \pm \sqrt{64 - 4 \cdot 12}}{2} = \frac{8 \pm 4}{2} \Rightarrow a_1 = 6 = 2^x \Rightarrow \log 6 = x \log 2 \Rightarrow x = \frac{\log 6}{\log 2} = 2'58$$

K K K K K K K K K K K K . $\Rightarrow a_2 = 2 = 2^x \Rightarrow x = 1$

u)

$$7^{2x+3} - 8 \cdot 7^{x+1} + 1 = 0 \Rightarrow 7^{2x} \cdot 7^3 - 8 \cdot 7^x \cdot 7^1 + 1 = 0 \xrightarrow{7^x=a} 343a - 56a + 1 = 0 \Rightarrow$$

$$\Rightarrow a = \frac{56 \pm \sqrt{3136 - 4 \cdot 343}}{686} = \frac{56 \pm 42}{686} \Rightarrow$$

$$\Rightarrow a_1 = \frac{98}{686} = \frac{1}{7} = 7^x \Rightarrow x = -1$$

$$\Rightarrow a_2 = \frac{14}{686} = \frac{1}{49} = 7^x \Rightarrow x = -2$$

w)

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

$$\Rightarrow 8x^2 - 8x + 2 = 0 \Rightarrow x = \frac{8 \pm \sqrt{64-64}}{16} = \frac{1}{2}$$

y)

$$2^{x-1} + 2^x + 2^{x+1} = 7 \Rightarrow \frac{2^x}{2^1} + 2^x + 2^x \cdot 2^1 = 7 \xrightarrow{2^x = a} \frac{a}{2} + a + 2a = 7 \Rightarrow a + 2a + 4a = 14 \Rightarrow$$

$$\Rightarrow 7a = 14 \Rightarrow a = 2 = 2^x \Rightarrow x = 1$$

aa)

$$3^{2x+1} - 14 \cdot 3^{x+1} + 135 = 0 \Rightarrow 3^{2x} \cdot 3^1 - 14 \cdot 3^x \cdot 3^1 + 135 = 0 \xrightarrow{3^x = a} 3a^2 - 42a + 135 = 0 \Rightarrow$$

$$\Rightarrow a = \frac{42 \pm \sqrt{1764 - 1620}}{6} = \frac{42 \pm 12}{6} \Rightarrow$$

$$\Rightarrow a_1 = 9 = 3^x \Rightarrow x = 2$$

$$\Rightarrow a_2 = 5 = 3^x \Rightarrow \log 5 = x \log 3 \Rightarrow x = \frac{\log 5}{\log 3} = 1'46$$