

EXAMEN DE 4º ESO ACADÈMICAS. ECUACIONES I.

1. $(x+1)^2 - (x-2)^2 = (x+3)^2 + x^2 - 20$

$x^2 + 2x + 1 - (x^2 - 4x + 4) = x^2 + 6x + 9 + x^2 - 20$ 0,2

~~$x^2 + 2x + 1 - x^2 + 4x - 4 = x^2 + 6x + 9 + x^2 - 20 \Rightarrow 6x - 3 = 2x^2 + 6x - 14$~~ 0,2

$2x^2 - 8 = 0 \Rightarrow 2x^2 = 8 \Rightarrow x^2 = 4 \Rightarrow x = \pm\sqrt{4} = \begin{cases} x_1 = 2 \\ x_2 = -2 \end{cases}$ 0,2

2. $x^4 - 29x^2 + 100 = 0$; $x^2 = t$

$t^2 - 29t + 100 = 0 \Rightarrow t = \frac{29 \pm \sqrt{441}}{2} = \frac{29 \pm 21}{2} = \begin{cases} 25 \\ 4 \end{cases}$ 0,5

$t = 25 \Rightarrow x^2 = 25 \Rightarrow x = \pm\sqrt{25} = \begin{cases} x_1 = 5 \\ x_2 = -5 \end{cases}$

$t = 4 \Rightarrow x^2 = 4 \Rightarrow x = \pm\sqrt{4} = \begin{cases} x_3 = +2 \\ x_4 = -2 \end{cases}$ 0,5

3. $x + \sqrt{7-3x} = 1 \Rightarrow (\sqrt{7-3x})^2 = (1-x)^2 \Rightarrow 7-3x = 1-2x+x^2$

$\Rightarrow x^2 + x - 6 = 0 \Rightarrow x = \frac{-1 \pm \sqrt{25}}{2} = \frac{-1 \pm 5}{2} = \begin{cases} 2 \text{ NO VALE} \\ -3 \text{ SI VALE} \end{cases}$ 0,5

COMPROBAR:

$x = 2 \Rightarrow 2 + \sqrt{1} \neq 1$ 0,5

$x = -3 \Rightarrow -3 + \sqrt{16} = 1 \Rightarrow -3 + 4 = 1$

4. $\frac{6}{x} + \frac{x+1}{x-2} = 6 \Rightarrow \frac{6(x-2)}{x(x-2)} + \frac{x(x+1)}{x(x-2)} = \frac{6x(x-2)}{x(x-2)}$

$\Rightarrow 6(x-2) + x(x+1) = 6x(x-2) \Rightarrow 6x - 12 + x^2 + x = 6x^2 - 12x$

$\Rightarrow 5x^2 - 19x + 12 = 0 \Rightarrow x = \frac{19 \pm \sqrt{1}}{10} = \frac{19 \pm 1}{10} = \begin{cases} 3 \text{ SI VALE} \\ \frac{4}{5} \text{ SI VALE} \end{cases}$

COMPROBAR:

$x = 3 \Rightarrow \frac{6}{3} + \frac{4}{1} = 6 \Rightarrow 2 + 4 = 6$ 0,1

$x = \frac{4}{5} \Rightarrow \frac{6}{\frac{4}{5}} + \frac{\frac{4}{5} + 1}{\frac{4}{5} - 2} = 6 \Rightarrow \frac{30}{4} + \frac{\frac{9}{5}}{-\frac{6}{5}} = 6 \Rightarrow \frac{30}{4} - \frac{9}{6} = 6$

$\Rightarrow \frac{15}{2} - \frac{3}{2} = \frac{12}{2} = 6$ 0,4

$$5. a) 81. \left(\frac{1}{3}\right)^x = 3^{x+2} \Rightarrow 3^4 \cdot 3^{-x} = 3^{x+2} \Rightarrow 3^{4-x} = 3^{x+2} = 0$$

$$\Rightarrow 4-x = x+2 \Rightarrow -2x = -2 \Rightarrow \boxed{x=1}$$

$$b) 3 \cdot 5^x + 5^{x+1} = 200 \Rightarrow 3 \cdot 5^x + 5^x \cdot 5 = 200$$

$$5^x = z \Rightarrow 3z + 5z = 200 \Rightarrow 8z = 200 \Rightarrow z = \frac{200}{8} = 25$$

$$z = 25 \Rightarrow 5^x = 25 \Rightarrow 5^x = 5^2 \Rightarrow \boxed{x=2}$$

6.

~~$$a) 2 \log_3 x - \log_3 4 = 4 \Rightarrow \log_3 \frac{x^2}{4} = \log_3 3^4 \Rightarrow \frac{x^2}{4} = 81$$

$$\rightarrow x^2 = 324 \Rightarrow x = \pm \sqrt{324} = \pm 18 \begin{cases} +18 \text{ SI VALE} \\ -18 \text{ NO VALE} \end{cases}$$~~

$$\log(x-9) - \log x = 1 \Rightarrow \log \frac{x-9}{x} = \log 10 \Rightarrow \frac{x-9}{x} = 10$$

$$\Rightarrow x-9 = 10x \Rightarrow -9x = 9 \Rightarrow x = -1 \text{ NO SOL.}$$

$$7. 2x^4 + 2x^3 - 14x^2 - 2x + 12 = 0$$

a) Factorización:

$$\begin{array}{r|rrrrr} & 2 & 2 & -14 & -2 & 12 \\ 1 & & 2 & 4 & -10 & -12 \\ \hline & 2 & 4 & -10 & -12 & 0 \\ -1 & & -2 & -2 & 12 & \\ \hline & 2 & 2 & -12 & 0 & \end{array}$$

$$\Rightarrow 2(x-1)(x+1)(x-2)(x+3) = 0$$

$$2x^2 + 2x - 12 = 0 \Rightarrow x = \frac{-2 \pm \sqrt{100}}{4} = \frac{-2 \pm 10}{4} = \begin{cases} 2 \\ -3 \end{cases}$$

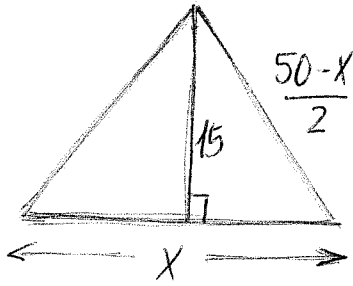
$$b) x-1=0 \Rightarrow x=1$$

$$x+1=0 \Rightarrow x=-1$$

$$x-2=0 \Rightarrow x=2$$

$$x+3=0 \Rightarrow x=-3$$

8.



$$P = 50 \text{ cm}$$

$$\left(\frac{50-x}{2}\right)^2 = 15^2 + \left(\frac{x}{2}\right)^2 \Rightarrow \frac{2500+x^2-100x}{4} = \frac{2025+x^2}{4}$$

$$\Rightarrow \frac{2500+x^2-100x}{4} = \frac{900}{4} + \frac{x^2}{4} \Rightarrow 2500+x^2-100x=900+x^2$$

$$\Rightarrow 2500 - 900 = 100x \Rightarrow 100x = 1600 \Rightarrow x = \frac{1600}{100} \Rightarrow x = 16$$

SOL: 16 cm, 17 cm y 17 cm