



**COLEGIO ALMA'S**  
bilingual school

APELLIDOS Y NOMBRE: Corrección Reimpresión  
CURSO: 4º ESO N° 1ª Evaluación  
FECHA: 10-01-2018 ASIGNATURA: Matemáticas

(1)

$$a) \frac{2}{5\sqrt{25}} = \frac{2}{5\sqrt{5}} \quad \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{25}$$

$$b) \frac{-3\sqrt[3]{2}}{\sqrt{5}-\sqrt{2}} \cdot \frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}+\sqrt{2}} = \frac{-3\sqrt[3]{2}\sqrt{5} - 3\sqrt[3]{2}\sqrt{2}}{5-2} =$$

$$\frac{-3\sqrt[6]{2^2 \cdot 5^3} - 3\sqrt[6]{2^2 \cdot 2^3}}{3} = \frac{-\sqrt[6]{500} - \sqrt[6]{32}}{3}$$

(2)

$$a) \log x \cdot \frac{1}{27} = 2 \rightarrow x^2 = \frac{1}{27} \rightarrow x = \pm \sqrt{\frac{1}{27}} \rightarrow x = \pm \frac{\sqrt{3}}{9}$$

$$b) \log_{\sqrt{3}} 3^{2x-1} = -4 \rightarrow (\sqrt{3})^{-4} = 3^{2x-1} \rightarrow 3^{-2} = 3^{2x-1}$$

$$-2 = 2x - 1$$

$$2x = -1$$

$$\boxed{x = \frac{-1}{2}}$$

(3)

$$a) \sqrt[9]{8} \cdot \sqrt{2^3} = \sqrt[3]{2^3} \cdot \sqrt[2]{2^3} = \sqrt[10]{2^{11}} = 4\sqrt[10]{2}$$

$$b) 2\sqrt[3]{2} - \sqrt[3]{128} - \sqrt[3]{54} = 2\sqrt[3]{2} - 3\sqrt[3]{2} = -5\sqrt[3]{2}$$

(4)

$$\frac{2x^3 - x^2 - 8x - 15}{x^2 - 2} = 2x - 1 + \frac{-4x - 17}{x^2 - 2}$$

$$\begin{array}{r|l} 2x^3 - x^2 - 8x - 15 & x^2 - 2 \\ \underline{-2x^3} & 2x - 1 \\ & + 4x \\ & \underline{-x^2 - 4x - 15} \\ & x^2 & -2 \\ & \underline{-4x - 17} \end{array}$$

$$\frac{2x^3}{x^2} = 2x$$

$$\frac{-x^2}{x^2} = -1$$



(5)

$$\begin{aligned} a) P(x) &= x^5 - 2x^4 - x^3 + 2x^2 \\ &= x^2(x^3 - 2x^2 - x + 2) \\ &= x^2(x-1)(x-2)(x+1) \end{aligned}$$

$$\begin{array}{r|rrrr} 1 & 1 & -2 & -1 & 2 \\ & & 1 & -1 & -2 \\ \hline & 1 & -1 & -2 & 0 \end{array}$$

$$\frac{1 \pm \sqrt{1+8}}{2} = \frac{1 \pm 3}{2} \begin{matrix} (2) \\ (-1) \end{matrix}$$

$$\begin{aligned} b) Q(x) &= x^3 - 3x^2 + 2x \\ &= x(x^2 - 3x + 2) = x(x-2)(x-1) \end{aligned}$$

$$\frac{3 \pm \sqrt{9-8}}{2} = \frac{3 \pm 1}{2} \begin{matrix} \nearrow 2 \\ \searrow 1 \end{matrix}$$

$$c) R(x) = x^4 - x^3 - 3x^2 + x + 12 = (x-1)(x+1)(x-4)(x+3)$$

$$\begin{array}{r|rrrrr} 1 & 1 & -1 & -3 & 1 & 12 \\ & & 1 & 0 & -13 & -12 \\ \hline -1 & 1 & 0 & -13 & -12 & 0 \\ & & -1 & 1 & 12 & \\ & & -1 & -12 & 0 & \end{array}$$

$$\frac{1 \pm \sqrt{1+48}}{2} = \frac{1 \pm 7}{2} \begin{matrix} \nearrow 4 \\ \searrow -3 \end{matrix}$$

(6)

$$a) \frac{3x-1}{x} - \frac{x+3}{x(x-2)} + \frac{2x+5}{x-2} =$$

$$\frac{3x^2 - 6x - x + 2 - x - 3 + 2x^2 + 5x}{x(x-2)} =$$

$$\frac{5x^2 - 3x - 1}{x(x-2)}$$

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



7) a)  $3x^3 + 12x^2 + 3x - 18 = 0$   
 $x^3 + 4x^2 + x - 6 = 0$

$$\begin{array}{r|rrrr} 1 & 4 & 1 & -6 & \\ & 1 & 5 & 6 & \\ \hline & 1 & 5 & 6 & 0 \end{array} \rightarrow \boxed{x=1}$$

$$\frac{-5 \pm \sqrt{25 - 24}}{2} = \frac{-5 \pm 1}{2} \rightarrow \begin{cases} \boxed{x=-3} \\ \boxed{x=-2} \end{cases}$$

b)  $\log_2 \frac{x+1}{x^2} = 1 \rightarrow \frac{x+1}{x^2} = 2 \rightarrow 2x^2 - x - 1 = 0$

$$x = \frac{1 \pm \sqrt{1+8}}{4} = \frac{1 \pm 3}{4} \rightarrow \begin{cases} \boxed{x=1} \\ x = -\frac{1}{2} \# \end{cases}$$

c)  $2 \cdot 2^{2x+3} + 2^{x+2} = \frac{3}{2}$     mcm = 2  
 $t = 2^x$

$$16t^2 + 8t - 3 = 0$$

$$t = \frac{-8 \pm \sqrt{64 + 192}}{32} = \frac{-8 \pm 16}{32} \rightarrow \begin{cases} t = \frac{8}{32} = \frac{1}{4} = 2^x \rightarrow \boxed{x=-2} \\ t = -\frac{24}{32} \# \end{cases}$$

d)  $\frac{3x-3}{x-1} + \frac{x^2+2}{x+1} = \frac{7x+1}{(x+1)(x-1)}$     mcm =  $(x+1)(x-1)$

$$(3x-3)(x+1) + (x^2+2)(x-1) = 7x+1$$

$$3x^2 - 3 + x^3 - x^2 + 2x - 2 = 7x + 1$$

$$x^3 + 2x^2 - 5x - 6 = 0$$

$$\begin{array}{r|rrrr} -1 & 2 & -5 & -6 & \\ & -1 & -1 & 6 & \\ \hline & 1 & -6 & 0 & \end{array} \rightarrow \boxed{x=-1}$$

$$x = \frac{-1 \pm \sqrt{1+24}}{2} = \frac{-1 \pm 5}{2} \rightarrow \begin{cases} \boxed{x=-3} \\ \boxed{x=2} \end{cases}$$

e)  $\sqrt{2x+5} = 3x-3$

$$2x+5 = (3x-3)^2$$

$$2x+5 = 9x^2 - 18x + 9$$

$$9x^2 - 20x + 4 = 0$$

$$x = \frac{20 \pm \sqrt{400 - 144}}{18} = \frac{20 \pm 16}{18} \rightarrow \begin{cases} \boxed{x=2} \\ x = \frac{2}{9} \# \end{cases}$$



8)  $X^4 + 3X^2 - 4 = 0 \rightarrow X^2 = \frac{-3 \pm \sqrt{9+16}}{2} = \frac{-3 \pm 5}{2}$   $\left\{ \begin{array}{l} X^2 = 1 \rightarrow X = \pm 1 \\ X^2 = -4 \# \end{array} \right.$

9)  $3^{x-1} = 9^{2x} \rightarrow 3^{x-1} = 3^{4x} \rightarrow x-1 = 4x \rightarrow 3x = -1 \rightarrow X = -1/3$

10) a)  $\begin{cases} X - 2y = 1 \\ 2x - 3y = 4 \end{cases} \rightarrow \begin{cases} X = 1 + 2y \\ 2(1+2y) - 3y = 4 \end{cases}$   
 $2 + 4y - 3y = 4 \rightarrow y = 2 \rightarrow X = 5$

b)  $\begin{cases} X + y = 4 \\ X^2 + y^2 = 10 \end{cases} \rightarrow \begin{cases} y = 4 - X \\ X^2 + (4 - X)^2 = 10 \end{cases}$   
 $X^2 + 16 - 8X + X^2 = 10$   
 $2X^2 - 8X + 6 = 0$   
 $X^2 - 4X + 3 = 0$   
 $X = \frac{4 \pm \sqrt{16-12}}{2} = \frac{4 \pm 2}{2}$   
 $\begin{cases} X = 3 \rightarrow y = 1 \\ X = 1 \rightarrow y = 3 \end{cases}$

11) a)  $X^3 - 3X^2 - X + 3 \leq 0$

$\begin{array}{r|rrrr} 1 & -3 & -1 & 3 & \\ 3 & 3 & 0 & -3 & \\ \hline & 1 & 0 & -1 & 0 \end{array} \rightarrow \begin{cases} X = 3 \\ X = \pm 1 \end{cases}$

$X \in (-\infty, -1] \cup [1, 3]$

b)  $X^2 - \frac{64}{X^2} > -12$   $X^4 + 12X^2 - 64 = 0$   $\begin{cases} X^2 = 4 \rightarrow X = \pm 2 \\ X^2 = -16 \# \end{cases}$

$X^2 = \frac{-12 \pm \sqrt{144 + 256}}{2} = \frac{-12 \pm 20}{2}$

$mcm = X^2 = 0 \rightarrow X = 0$

$X \in (-\infty, -2) \cup (2, \infty)$

12) a)  $\begin{cases} 2x + 3 > 6 \\ 4x - x^2 \leq 3 \end{cases} \rightarrow \begin{cases} X = 3/2 \\ X^2 - 4x + 3 = 0 \end{cases}$   $\begin{cases} X = 3 \\ X = 1 \end{cases}$

$X = \frac{4 \pm \sqrt{16-12}}{2} = \frac{4 \pm 2}{2}$

$X \in [3, \infty)$



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b)  $x^2 - 9x > 0$   $\left\{ \begin{array}{l} x^2 - 9x = 0 \rightarrow x(x-9) = 0 \begin{array}{l} \nearrow x=0 \\ \searrow x=9 \end{array} \\ x^2 - 4 < 0 \end{array} \right.$

$x^2 - 4 < 0 \rightarrow x^2 - 4 = 0 \rightarrow x = \pm 2$

$x \in (-2, 0)$