

## Soluciones Ecuaciones 2º Grado

■ ■ ■ Observa, razona y resuelve.

a)  $x^2 = 100$

c)  $5x^2 = 45$

e)  $x(x - 3) = 0$

g)  $x(3x - 1) = 0$

i)  $x^2 - 7x = 0$

k)  $3x^2 = 2x$

a)  $x = \pm 10$

c)  $x = \pm 3$

e)  $x = 0; x = 3$

g)  $x = 0; x = \frac{1}{3}$

i)  $x = 0; x = 7$

k)  $x = 0; x = \frac{2}{3}$

b)  $x^2 = 20$

d)  $12x^2 = 3$

f)  $(x + 5)x = 0$

h)  $3x(5x + 2) = 0$

j)  $x^2 + 4x = 0$

l)  $5x^2 = x^2 - 2x$

b)  $x = \pm \sqrt{20} = \pm 2\sqrt{5}$

d)  $x = \pm \frac{1}{2}$

f)  $x = 0; x = -5$

h)  $x = 0; x = -\frac{2}{5}$

j)  $x = 0; x = -4$

l)  $x = 0; x = -\frac{1}{2}$

■ ■ ■ Resuelve aplicando la fórmula.

a)  $x^2 - 10x + 21 = 0$

c)  $x^2 + 9x + 40 = 0$

e)  $15x^2 - 16x + 4 = 0$

g)  $x^2 - 10x + 25 = 0$

i)  $6x^2 - 5x + 2 = 0$

b)  $x^2 + 2x - 3 = 0$

d)  $5x^2 + 14x - 3 = 0$

f)  $14x^2 + 5x - 1 = 0$

h)  $9x^2 + 6x + 1 = 0$

j)  $6x^2 - x - 5 = 0$

a)  $x = \frac{10 \pm \sqrt{100 - 84}}{2} \rightarrow x = 7; x = 3$

b)  $x = \frac{-2 \pm \sqrt{4 + 12}}{2} \rightarrow x = 1; x = -3$

c)  $x = \frac{-9 \pm \sqrt{81 - 160}}{2} \rightarrow \text{Sin solución.}$

d)  $x = \frac{-14 \pm \sqrt{196 + 60}}{10} \rightarrow x = \frac{1}{5}; x = -3$

e)  $x = \frac{16 \pm \sqrt{256 - 240}}{30} \rightarrow x = \frac{2}{3}; x = \frac{2}{5}$

f)  $x = \frac{-5 \pm \sqrt{25 + 56}}{28} \rightarrow x = \frac{1}{7}; x = -\frac{1}{2}$

g)  $x = \frac{10 \pm \sqrt{100 - 100}}{2} \rightarrow x = 5; x = 5$

h)  $x = \frac{-6 \pm \sqrt{36 - 36}}{18} \rightarrow x = -\frac{1}{3}; x = -\frac{1}{3}$

i)  $x = \frac{5 \pm \sqrt{25 - 48}}{12} \rightarrow \text{Sin solución.}$

j)  $x = \frac{1 \pm \sqrt{1 + 120}}{2} \rightarrow x = 6; x = -5$

■ ■ ■ Resuelve, primero, mentalmente. Después, reduce a la forma general y aplica la fórmula.

a)  $(x - 4)^2 = 0$

b)  $(2x - 5)^2 = 0$

c)  $(x - 1) \cdot (x - 7) = 0$

d)  $(x + 2) \cdot (x + 4) = 0$

e)  $(x - 5) \cdot (x + 7) = 0$

f)  $(2x - 1) \cdot (2x + 1) = 0$

a)  $x^2 - 8x + 16 = 0 \rightarrow x = 4; x = 4$

b)  $4x^2 - 20x + 25 = 0 \rightarrow x = \frac{5}{2}; x = \frac{5}{2}$

c)  $x^2 - 8x + 7 = 0 \rightarrow x = 1; x = 7$

d)  $x^2 + 6x + 8 = 0 \rightarrow x = -2; x = -4$

e)  $x^2 + 2x - 35 = 0 \rightarrow x = 5; x = -7$

f)  $4x^2 - 1 = 0 \rightarrow x = \frac{1}{2}; x = -\frac{1}{2}$

■ ■ ■ Reduce a la forma general y aplica la fórmula.

a)  $x^2 - \frac{1}{4} = \frac{1}{5} \left( \frac{x}{4} - 1 \right)$

b)  $\frac{x}{2} \left( x + \frac{1}{30} \right) = \frac{x}{3} \left( x + \frac{2}{5} \right)$

c)  $\frac{x}{3} \left( x - \frac{1}{20} \right) = \frac{x^2}{2} - \frac{1}{15} \left( 2x - \frac{1}{2} \right)$

d)  $\frac{x^2}{2} + x = \frac{2x^2 - 5}{3} - 1$

a)  $20x^2 - x - 1 = 0 \rightarrow x = \frac{1}{4}; x = -\frac{1}{5}$

b)  $10x^2 - 7x = 0 \rightarrow x = 0; x = \frac{7}{10}$

c)  $10x^2 - 7x + 2 = 0 \rightarrow$  Sin solución.

d)  $x^2 - 6x - 16 = 0 \rightarrow x = 8; x = -2$

■ ■ ■ Resuelve las siguientes ecuaciones de segundo grado sin utilizar la fórmula de resolución:

a)  $3x^2 - 12x = 0$

b)  $x - 3x^2 = 0$

c)  $2x^2 - 5x = 0$

d)  $2x^2 - 8 = 0$

e)  $9x^2 - 25 = 0$

f)  $4x^2 + 100 = 0$

g)  $16x^2 = 100$

h)  $3x^2 - 6 = 0$

$$a) 3x^2 - 12x = 0 \rightarrow 3x(x - 4) = 0 \begin{cases} x = 0 \\ x = 4 \end{cases}$$

$$b) x - 3x^2 = 0 \rightarrow x(1 - 3x) = 0 \begin{cases} x = 0 \\ x = 1/3 \end{cases}$$

$$c) 2x^2 - 5x = 0 \rightarrow x(2x - 5) = 0 \begin{cases} x = 0 \\ x = 5/2 \end{cases}$$

$$d) 2x^2 - 8 = 0 \rightarrow 2x^2 = 8 \rightarrow x^2 = 4 \begin{cases} x = 2 \\ x = -2 \end{cases}$$

$$e) 9x^2 - 25 = 0 \rightarrow 9x^2 = 25 \rightarrow x^2 = \frac{25}{9} \begin{cases} x = 5/3 \\ x = -5/3 \end{cases}$$

$$f) 4x^2 + 100 = 0 \rightarrow 4x^2 = -100 \text{ No tiene solución.}$$

$$g) 16x^2 = 100 \rightarrow x^2 = \frac{100}{16} \begin{cases} x = 10/4 = 5/2 \\ x = -10/4 = -5/2 \end{cases}$$

$$h) 3x^2 - 6 = 0 \rightarrow 3x^2 = 6 \rightarrow x^2 = 2 \begin{cases} x = \sqrt{2} \\ x = -\sqrt{2} \end{cases}$$

Resuelve.

$$a) x^2 + 4x - 21 = 0$$

$$b) x^2 + 9x + 20 = 0$$

$$c) 9x^2 - 12x + 4 = 0$$

$$d) x^2 + x + 3 = 0$$

$$e) 4x^2 + 28x + 49 = 0$$

$$f) x^2 - 2x + 3 = 0$$

$$g) 4x^2 - 20x + 25 = 0$$

$$h) -2x^2 + 3x + 2 = 0$$

$$a) x^2 + 4x - 21 = 0 \rightarrow x = \frac{-4 \pm \sqrt{16 + 21 \cdot 4}}{2} = \frac{-4 \pm 10}{2} \begin{cases} x = 3 \\ x = -7 \end{cases}$$

$$b) x^2 + 9x + 20 = 0 \rightarrow x = \frac{-9 \pm \sqrt{81 - 4 \cdot 20}}{2} = \frac{-9 \pm 1}{2} \begin{cases} x = -4 \\ x = -5 \end{cases}$$

$$c) 9x^2 - 12x + 4 = 0 \rightarrow x = \frac{12 \pm \sqrt{144 - 4 \cdot 9 \cdot 4}}{18} = \frac{12 \pm 0}{18} = \frac{2}{3}$$

$$d) x^2 + x + 3 = 0 \rightarrow x = \frac{-1 \pm \sqrt{1 - 4 \cdot 3}}{2} \text{ No tiene solución.}$$

$$e) 4x^2 + 28x + 49 = 0 \rightarrow x = \frac{-28 \pm \sqrt{784 - 4 \cdot 4 \cdot 49}}{8} = \frac{-28 \pm 0}{8} = -\frac{7}{2}$$

$$f) x^2 - 2x + 3 = 0 \rightarrow x = \frac{2 \pm \sqrt{4 - 4 \cdot 3}}{2} \text{ No tiene solución.}$$

$$g) 4x^2 - 20x + 25 = 0 \rightarrow x = \frac{20 \pm \sqrt{400 - 4 \cdot 4 \cdot 25}}{8} = \frac{20 \pm 0}{8} = \frac{5}{2}$$

$$h) -2x^2 + 3x + 2 = 0 \rightarrow x = \frac{-3 \pm \sqrt{9 - 4(-2) \cdot 2}}{-4} = \frac{-3 \pm 5}{-4} \begin{cases} x = -2/4 = -1/2 \\ x = 2 \end{cases}$$

■ ■ ■ Resuelve las siguientes ecuaciones:

a)  $(2x + 1)(x - 3) = (x + 1)(x - 1) - 8$

b)  $(2x - 3)(2x + 3) - x(x + 1) - 5 = 0$

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

d)  $(x + 4)^2 - (2x - 1)^2 = 8x$

a)  $(2x + 1)(x - 3) = (x + 1)(x - 1) - 8 \rightarrow$

$\rightarrow 2x^2 - 6x + x - 3 = x^2 - 1 - 8 \rightarrow$

$\rightarrow x^2 - 5x + 6 = 0 \rightarrow x = \frac{5 \pm \sqrt{25 - 4 \cdot 6}}{2} \rightarrow x = \frac{5 \pm 1}{2} \begin{cases} x = 3 \\ x = 2 \end{cases}$

b)  $(2x - 3)(2x + 3) - x(x + 1) - 5 = 0 \rightarrow$

$\rightarrow 4x^2 - 9 - x^2 - x - 5 = 0 \rightarrow 3x^2 - x - 14 = 0 \rightarrow$

$\rightarrow x = \frac{1 \pm \sqrt{1 - 4 \cdot 3 \cdot (-14)}}{6} = \frac{1 \pm \sqrt{169}}{6} = \frac{1 \pm 13}{6} \begin{cases} x = 7/3 \\ x = -2 \end{cases}$

c)  $(2x + 1)^2 = 4 + (x + 2)(x - 2) \rightarrow$

$\rightarrow 4x^2 + 1 + 4x = 4 + x^2 - 4 \rightarrow 3x^2 + 4x + 1 = 0 \rightarrow$

$\rightarrow x = \frac{-4 \pm \sqrt{16 - 4 \cdot 3 \cdot 1}}{6} = \frac{-4 \pm \sqrt{4}}{6} = \frac{-4 \pm 2}{6} \begin{cases} x = -1/3 \\ x = -1 \end{cases}$

d)  $(x + 4)^2 - (2x - 1)^2 = 8x \rightarrow$

$\rightarrow x^2 + 16 + 8x - (4x^2 + 1 - 4x) - 8x = 0 \rightarrow$

$\rightarrow x^2 + 16 + 8x - 4x^2 - 1 + 4x - 8x = 0 \rightarrow -3x^2 + 4x + 15 = 0 \rightarrow$

$\rightarrow x = \frac{-4 \pm \sqrt{16 - 4 \cdot (-3) \cdot 15}}{-6} = \frac{-4 \pm \sqrt{196}}{-6} = \frac{-4 \pm 14}{-6} \begin{cases} x = -5/3 \\ x = 3 \end{cases}$

Resuelve las ecuaciones siguientes:

a)  $\frac{(5x-4)(5x+4)}{4} = \frac{(3x-1)^2-9}{2}$

b)  $\frac{x}{3}(x-1) - \frac{x}{4}(x+1) + \frac{3x+4}{12} = 0$

c)  $\frac{(x-1)(x+2)}{12} - \frac{(x+1)(x-2)}{6} - 1 = \frac{x-3}{3}$

d)  $\frac{(x-1)^2-3x+1}{15} + \frac{x+1}{5} = 0$

e)  $\frac{x+1}{2} - \frac{(x-1)^2}{4} - \frac{x+2}{3} + \frac{(x-2)^2}{6} = \frac{1}{6}$

a)  $\frac{(5x-4)(5x+4)}{4} = \frac{(3x-1)^2-9}{2} \rightarrow$

$$\rightarrow \frac{25x^2-16}{4} = \frac{2(9x^2+1-6x-9)}{4} \rightarrow$$

$$\rightarrow 25x^2-16 = 18x^2+2-12x-18 \rightarrow 7x^2+12x=0 \rightarrow$$

$$\rightarrow x(7x+12)=0 \begin{cases} x=0 \\ x=-12/7 \end{cases}$$

b)  $\frac{x}{3}(x-1) - \frac{x}{4}(x+1) + \frac{3x+4}{12} = 0 \rightarrow$

$$\rightarrow 12\left(\frac{x}{3}(x-1) - \frac{x}{4}(x+1) + \frac{3x+4}{12}\right) \rightarrow$$

$$\rightarrow 4x(x-1) - 3x(x+1) + 3x+4 = 0 \rightarrow$$

$$\rightarrow 4x^2-4x-3x^2-3x+3x+4=0 \rightarrow x^2-4x+4=0 \rightarrow$$

$$\rightarrow x = \frac{4 \pm \sqrt{16-4 \cdot 4}}{2} = 2$$

c)  $\frac{(x-1)(x+2)}{12} - \frac{(x+1)(x-2)}{6} - 1 = \frac{x-3}{3} \rightarrow$

$$\rightarrow \frac{x^2+x-2}{12} - \frac{x^2-x-2}{6} - 1 = \frac{x-3}{3} \rightarrow$$

$$\rightarrow 12\left(\frac{x^2+x-2}{12} - \frac{x^2-x-2}{6} - 1\right) = 12\left(\frac{x-3}{3}\right) \rightarrow$$

$$\rightarrow x^2+x-2-2(x^2-x-2)-12=4(x-3) \rightarrow$$

$$\rightarrow x^2+x-2-2x^2+2x+4-12=4x-12 \rightarrow -x^2-x+2=0 \rightarrow$$

$$\rightarrow x^2+x-2=0 \rightarrow x = \frac{-1 \pm \sqrt{1-4(-2)}}{2} = \frac{-1 \pm 3}{2} \begin{cases} x=1 \\ x=-2 \end{cases}$$

$$d) \frac{(x-1)^2 - 3x + 1}{15} + \frac{x+1}{5} = 0 \rightarrow$$

$$\rightarrow 15 \left[ \frac{(x-1)^2 - 3x + 1}{15} + \frac{x+1}{5} \right] = 0 \rightarrow$$

$$\rightarrow x^2 - 2x + 1 - 3x + 1 + 3x + 3 = 0 \rightarrow$$

$$\rightarrow x^2 - 2x + 5 = 0 \rightarrow x = \frac{2 \pm \sqrt{4 - 4 \cdot 5}}{2} \rightarrow \text{No tiene solución.}$$

$$e) \frac{x+1}{2} - \frac{(x-1)^2}{4} - \frac{x+2}{3} + \frac{(x-2)^2}{6} = \frac{1}{6} \rightarrow$$

$$\rightarrow 12 \left( \frac{x+1}{2} - \frac{(x-1)^2}{4} - \frac{x+2}{3} + \frac{(x-2)^2}{6} \right) = 12 \cdot \frac{1}{6} \rightarrow$$

$$\rightarrow 6(x+1) - 3(x^2 - 2x + 1) - 4(x+2) + 2(x^2 - 4x + 4) = 2 \rightarrow$$

$$\rightarrow 6x + 6 - 3x^2 + 6x - 3 - 4x - 8 + 2x^2 - 8x + 8 = 2 \rightarrow$$

$$\rightarrow -x^2 + 3 = 0 \rightarrow x^2 = 3 \begin{cases} x = \sqrt{3} \\ x = -\sqrt{3} \end{cases}$$