

Silver Outcome 1 - Graphically

No solutions required.

Silver Outcome 2 - By factorising



RIGOUR
N5 - Relationships
Exercise 3
Silver Level

Outcome 2
Working with Quadratic Equations - Factorising

Solve the following quadratic equations...

$x^2 - 8x + 7 = 0$ $x^2 - 6x + 5 = 0$
 $x^2 - 6x - 40 = 0$ $x^2 - 2x - 24 = 0$
 $x^2 + 6x - 12 = 0$ $x^2 - 4 = 0$
 $x^2 - 7x = 0$ $x^2 + 14x = 0$
 $2x^2 + 10x = 0$ $7x^2 - 42x = 0$

Examples:
Solve the following quadratic equations...
 $x^2 - 12x + 15 = 0$
 $(x-5)(x-3) = 0$
 $x-5=0$ or $x-3=0$
 $x=5$ or $x=3$
 $x^2 - 5x - 14 = 0$ $x = -7$
 $(x+7)(x-2) = 0$ $x = 2$
 $x^2 + 8x = 0$ $x = 0$
 $x(x+8) = 0$ $x = -8$

$$\begin{aligned} \textcircled{1} \quad x^2 + 8x + 7 &= 0 \\ (x+7)(x+1) &= 0 \\ x+7=0 & \quad x+1=0 \\ x=-7 & \quad x=-1 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad x^2 - 6x + 5 &= 0 \\ (x-1)(x-5) &= 0 \\ x-1=0 & \quad x-5=0 \\ x=1 & \quad x=5 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad x^2 + 6x - 40 &= 0 \\ (x+10)(x-4) &= 0 \\ x+10=0 & \quad x-4=0 \\ x=-10 & \quad x=4 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad x^2 - 2x - 24 &= 0 \\ (x-6)(x+4) &= 0 \\ x-6=0 & \quad x+4=0 \\ x=6 & \quad x=-4 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad x^2 + 4x - 12 &= 0 \\ (x+6)(x-2) &= 0 \\ x+6=0 & \quad x-2=0 \\ x=-6 & \quad x=2 \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad x^2 - 4 &= 0 \\ (x+2)(x-2) &= 0 \\ x+2=0 & \quad x-2=0 \\ x=-2 & \quad x=2 \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad x^2 - 7x &= 0 \\ x(x-7) &= 0 \\ x=0 & \quad x=7 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad x^2 + 14x &= 0 \\ x(x+14) &= 0 \\ x=0 & \quad x=-14 \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad 2x^2 + 10x &= 0 \\ 2x(x+5) &= 0 \\ 2x=0 & \quad x+5=0 \\ x=0 & \quad x=-5 \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad 7x^2 - 42x &= 0 \\ 7x(x-6) &= 0 \\ 7x=0 & \quad x-6=0 \\ x=0 & \quad x=6 \end{aligned}$$

Rigour Maths

Silver Outcome 3 - By using the quadratic formula

RIGOUR
N5 - Relationships
Exercise 3
Silver Level

Outcome 3
Working with Quadratic Equations - Quadratic Formula

Solve the following quadratic equations rounding your solutions to 1 decimal place...

$x^2 - 8x + 4 = 0$ $x^2 - 7x + 1 = 0$
 $x^2 - 10x + 1 = 0$ $x^2 - 6x + 2 = 0$
 $2x^2 - 7x + 4 = 0$ $3x^2 - 6x + 2 = 0$
 $x^2 - 11x + 8 = 0$ $2x^2 - 9x + 3 = 0$
 $x^2 - 10x + 2 = 0$ $x^2 - 8x + 4 = 0$

Examples:
Solve $x^2 - 9x + 2 = 0$ giving your solutions to 1 decimal place...
 $a=1$ $b=-9$ $c=2$
$$\frac{9 \pm \sqrt{81 - 4(1)(2)}}{2}$$

$$\frac{9 \pm \sqrt{73}}{2}$$

$$\frac{9 - \sqrt{73}}{2} \text{ and } \frac{9 + \sqrt{73}}{2}$$

$$x = 0.2 \text{ and } x = 8.8$$

$$\begin{aligned} \textcircled{1} \quad a=1 \quad b=-8 \quad c=4 \\ \frac{8 \pm \sqrt{64 - 4(1)(4)}}{2 \times 1} \\ = \frac{8 \pm \sqrt{48}}{2} \\ = \frac{8 - \sqrt{48}}{2} \text{ and } \frac{8 + \sqrt{48}}{2} \\ x = 0.5 \text{ and } x = 7.5 \end{aligned}$$

$$\begin{aligned} a=1 \quad b=-7 \quad c=1 \\ \frac{7 \pm \sqrt{49 - 4(1)(1)}}{2 \times 1} \\ = \frac{7 \pm \sqrt{45}}{2} \\ = \frac{7 - \sqrt{45}}{2} \text{ and } \frac{7 + \sqrt{45}}{2} \\ x = 0.1 \text{ and } x = 6.9 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad a=1 \quad b=-10 \quad c=1 \\ \frac{10 \pm \sqrt{100 - 4(1)(1)}}{2 \times 1} \\ = \frac{10 \pm \sqrt{96}}{2} \\ = \frac{10 - \sqrt{96}}{2} \text{ and } \frac{10 + \sqrt{96}}{2} \\ x = 0.1 \text{ and } x = 9.9 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad a=1 \quad b=-6 \quad c=2 \\ \frac{6 \pm \sqrt{36 - 4(1)(2)}}{2 \times 1} \\ = \frac{6 \pm \sqrt{28}}{2} \\ = \frac{6 - \sqrt{28}}{2} \text{ and } \frac{6 + \sqrt{28}}{2} \\ x = 0.4 \text{ and } x = 5.6 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad a=2 \quad b=-7 \quad c=4 \\ \frac{7 \pm \sqrt{49 - 4(2)(4)}}{2 \times 2} \\ = \frac{7 \pm \sqrt{17}}{4} \\ = \frac{7 - \sqrt{17}}{4} \text{ and } \frac{7 + \sqrt{17}}{4} \\ x = 0.7 \text{ and } x = 2.8 \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad a=3 \quad b=-6 \quad c=2 \\ \frac{6 \pm \sqrt{36 - 4(3)(2)}}{2 \times 3} \\ = \frac{6 \pm \sqrt{12}}{6} \\ = \frac{6 - \sqrt{12}}{6} \text{ and } \frac{6 + \sqrt{12}}{6} \\ x = 0.4 \text{ and } x = 1.6 \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad a=1 \quad b=-11 \quad c=8 \\ \frac{11 \pm \sqrt{121 - 4(1)(8)}}{2 \times 1} \\ = \frac{11 \pm \sqrt{89}}{2} \\ = \frac{11 - \sqrt{89}}{2} \text{ and } \frac{11 + \sqrt{89}}{2} \\ x = 0.8 \text{ and } x = 10.2 \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad a=2 \quad b=-9 \quad c=3 \\ \frac{9 \pm \sqrt{81 - 4(2)(3)}}{2 \times 2} \\ = \frac{9 \pm \sqrt{57}}{4} \\ = \frac{9 - \sqrt{57}}{4} \text{ and } \frac{9 + \sqrt{57}}{4} \\ x = 0.4 \text{ and } x = 4.1 \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad a=1 \quad b=-10 \quad c=2 \\ \frac{10 \pm \sqrt{100 - 4(1)(2)}}{2 \times 1} \\ = \frac{10 \pm \sqrt{92}}{2} \\ = \frac{10 - \sqrt{92}}{2} \text{ and } \frac{10 + \sqrt{92}}{2} \\ x = 0.2 \text{ and } x = 9.8 \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad a=1 \quad b=-8 \quad c=4 \\ \frac{8 \pm \sqrt{64 - 4(1)(4)}}{2 \times 1} \\ = \frac{8 \pm \sqrt{48}}{2} \\ = \frac{8 - \sqrt{48}}{2} \text{ and } \frac{8 + \sqrt{48}}{2} \\ x = 0.5 \text{ and } x = 7.5 \end{aligned}$$