

# Year 10

## REARRANGE AND SOLVE EQUATIONS

### Key Concepts

#### Solving equations:

Working with inverse operations to find the value of a variable.

#### Rearranging an equation:

Working with inverse operations to isolate a highlighted variable.

In solving and rearranging we **undo the operations** starting from the last one.

For each step in solving an equation we must do the **inverse** operation

Solve:

$$\begin{aligned}
 5(x-3) &= 20 \\
 \text{Expand} \\
 5x - 15 &= 20 \\
 +15 & \qquad \qquad +15 \\
 5x &= 35 \\
 \div 5 & \qquad \qquad \div 5 \\
 x &= 7
 \end{aligned}$$

Solve:

$$\begin{aligned}
 12 &= 3x - 18 \\
 +18 & \qquad \qquad +18 \\
 30 &= 3x \\
 \div 3 & \qquad \qquad \div 3 \\
 x &= 10
 \end{aligned}$$

Solve:

$$\begin{aligned}
 7p - 5 &= 3p + 3 \\
 -3p & \qquad \qquad -3p \\
 4p - 5 &= 3 \\
 +5 & \qquad \qquad +5 \\
 4p &= 8 \\
 \div 2 & \qquad \qquad \div 2 \\
 p &= 2
 \end{aligned}$$

### Examples

Rearrange to make  $r$  the subject of the formulae :

$$\begin{aligned}
 Q &= \frac{2r-7}{3} \\
 \times 3 & \\
 3Q &= 2r - 7 \\
 +7 & \qquad \qquad +7 \\
 3Q + 7 &= 2r \\
 \div 2 & \qquad \qquad \div 2 \\
 \frac{3Q+7}{2} &= r
 \end{aligned}$$


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### Key Words

Solve  
 Rearrange  
 Term  
 Inverse  
 operation

1) Solve  $7(x+2) = 35$

2) Solve  $4x - 12 = 28$

3) Solve  $4x - 12 = 2x + 20$

4) Rearrange to make  $x$  the subject:

$$y = \frac{3x+4}{2}$$

ANSWERS: 1)  $x = 3$  2)  $x = 10$  3)  $x = 16$  4)  $x = \frac{2y-4}{3}$

# Year 10

## SOLVING QUADRATICS

### Key Concepts

We can solve quadratic equations in 4 different ways:

$$ax^2 + bx + c = 0$$

**Factorising** – put into brackets first

**Completing the square**

$$\left(x + \frac{b}{2}\right)^2 + c - \left(\frac{b}{2}\right)^2 = 0$$

**Quadratic formula**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Graphically**

### Examples

**Factorising:**

$$x^2 + 7x + 10 = 0$$

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

$$\text{Either: } x + 2 = 0$$

$$x = -2$$

$$\text{Or: } x + 5 = 0$$

$$x = -5$$

**Completing the square –**  
leave your answer in root form:

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

$$\left(x + \frac{6}{2}\right)^2 + 5 - \left(\frac{6}{2}\right)^2 = 0$$

$$(x + 3)^2 + 5 - 3^2 = 0$$

$$(x + 3)^2 - 4 = 0$$

$$\text{Either: } x = \sqrt{4} - 3$$

$$\text{Or: } x = -\sqrt{4} - 3$$

**Quadratic formula –** give your answer to 2 decimal places:

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

$$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(-2)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{16 + 8}}{2}$$

$$\text{Either: } x = 0.45$$

$$\text{Or: } x = -4.45$$

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### Key Words

Solve  
Quadratic  
Equation  
Factorise  
Completing the  
Square  
Quadratic formula

- 1) Solve by factorising:  $x^2 + 6x + 8 = 0$
- 2) Solve by completing the square:  $x^2 + 8x + 10 = 0$
- 3) Solve by using the quadratic formula:  $x^2 + 9x - 1 = 0$