

1. Solving equations with unknowns on one side

This is where you work backwards to find the unknown number

$$\begin{array}{r} 2x + 8 = 18 \\ (-8) \quad (-8) \\ 2x = 10 \\ (\div 2) \quad (\div 2) \\ x = 5 \end{array}$$

$$\begin{array}{r} 3(x + 4) = 33 \\ (\div 3) \quad (\div 3) \\ x + 4 = 11 \\ (-4) \quad (-4) \\ x = 7 \end{array}$$

$$\begin{array}{r} \frac{x - 8}{2} = 6 \\ (\times 2) \quad (\times 2) \\ x - 8 = 12 \\ (+8) \quad (+8) \\ x = 20 \end{array}$$

2. Solving equations with unknowns on both sides

Start by eliminating the unknowns from one side of the equation

$$\begin{array}{r} 6x + 7 = 4x + 19 \\ (-4x) \quad (-4x) \\ 2x + 7 = 19 \\ (-7) \quad (-7) \\ 2x = 12 \\ (\div 2) \quad (\div 2) \\ x = 6 \end{array}$$

$$\begin{array}{r} 3x + 3 = 7x - 5 \\ (-3x) \quad (-3x) \\ 3 = 4x - 5 \\ (+5) \quad (+5) \\ 8 = 4x \\ (\div 4) \quad (\div 4) \\ 2 = x \end{array}$$

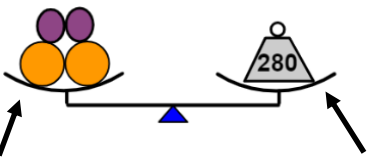
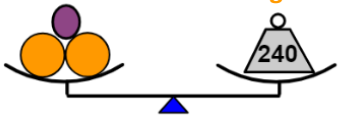
$$\begin{array}{r} 5x + 3 = -6x + 19 \\ (+6x) \quad (+6x) \\ 11x + 3 = 19 \\ (-3) \quad (-3) \\ 11x = 16 \\ (\div 11) \quad (\div 11) \\ x = 1.45 \text{ (to 2 dp)} \end{array}$$

3. Simultaneous equations

A. Using logic & reasoning

How much does each **plum** weigh?

How much does each **orange** weigh?



This scale has one additional plum The weight is 280 - 240 = 40g more

So, 1 plum must weigh 40g

2 oranges and 1 plum weigh 240g

We know 1 plum = 40g

So, 2 oranges = 200g

Therefore 1 orange = 100g

B. The elimination method with subtraction

$$2a + 3b = 130 \quad (1)$$

$$3a + 2b = 170 \quad (2)$$

Multiply (1) by 3 & (2) by 2 so both equations have 6a

$$(1) \times 3 \quad 6a + 9b = 390 \quad (3)$$

$$(2) \times 2 \quad 6a + 4b = 340 \quad (4)$$

Find the difference between the two equations.

$$(3) - (4) \quad 5b = 50$$

Work out what the letter is worth

$$b = 10$$

Substitute b into one of the equations

$$2a + 30 = 130$$

$$2a = 100$$

$$a = 50$$

C. The elimination method with addition

$$2f - 3g = 0 \quad (1)$$

$$3f + g = -11 \quad (2)$$

Multiply (2) by 3 so that both equations have 3g

$$2f - 3g = 0 \quad (1)$$

$$(2) \times 3 \quad 9f + 3g = -33 \quad (3)$$

Add the two equations to eliminate g.

$$(1) + (3) \quad 11f = -33$$

Work out what f is worth

$$f = -3$$

Substitute f into one of the equations

$$-9 + g = -11$$

$$g = -2$$

4. Inequalities

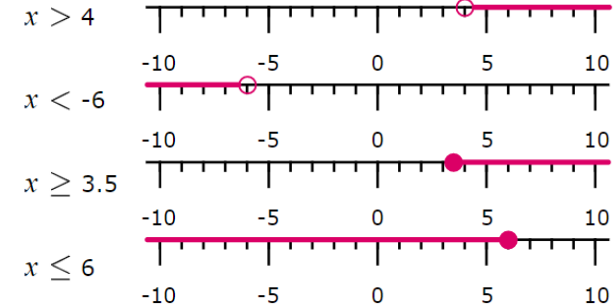
The word **inequality** means not equal.

We will be thinking about values that are **greater than** or **less than** a given value.

On the number line, draw an arrow above all the values that x could be.

If x is greater than 4 we draw a number line from 4 onwards.

The circle at 4 is hollow because it cannot equal 4



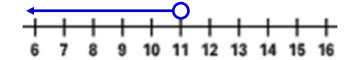
> greater than
< less than
≥ greater than or equal to
≤ less than or equal to

Maths, Y9 - Equations & inequalities

4. Solving linear inequalities

Solve these just like equations

$$\begin{array}{r} 2x - 4 < 18 \\ (+4) \quad (+4) \\ 2x < 22 \\ (\div 2) \quad (\div 2) \\ x < 11 \end{array}$$



$$\begin{array}{r} 10 - x < 6 \\ (+x) \quad (+x) \\ 10 < 6 + x \\ (-6) \quad (-6) \\ 4 < x \\ x > 4 \end{array}$$

