

Today's Learning:

To revise straight line graphs.

Where Straight Lines Meet

Straight lines cross each other when their x and y values are exactly equal.

e.g. By drawing straight line graphs, find the value of y such that both $y = x - 2$ and $y = 2x - 1$ are satisfied.

Today's Learning:

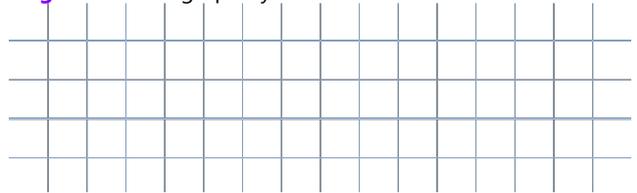
To solve simultaneous equations using graphs.

Plotting Straight Lines

Every equation for a straight line can be written in the form $y = mx + c$, where m is the gradient of the line and c is the y -intercept.

Another way to sketch a graph is to choose values of x and substitute these into the formula to find their y -coordinates.

e.g. Sketch the graph $y = 2x - 1$



Starter

1) Multiply out the brackets: $(2g - 3)(g + 4)$

$$= 2g^2 + 8g - 3g - 12$$

$$= 2g^2 + 5g - 12$$

2) Factorise fully: $4mn + 6m^2 = 2m(2n + 3m)$

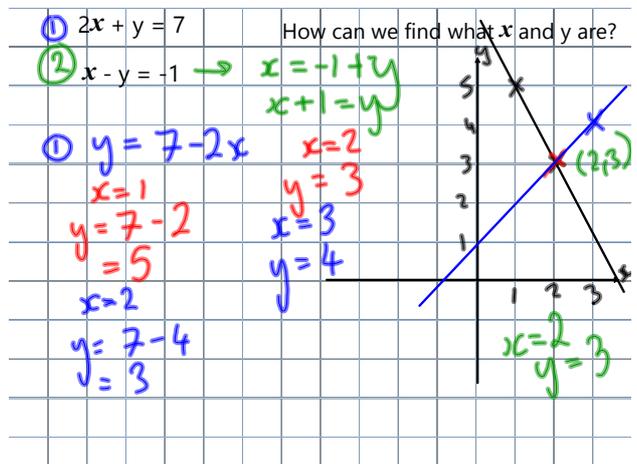
3) Find the gradient of the straight line joining $(-3, 4)$ to $(-1, 10)$.

$$gr = \frac{10 - 4}{-1 - (-3)} = \frac{6}{2} = 3$$

4) Simplify: $\frac{3}{m} - \frac{2}{3}$

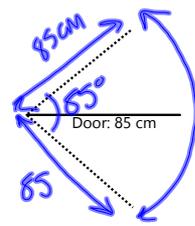
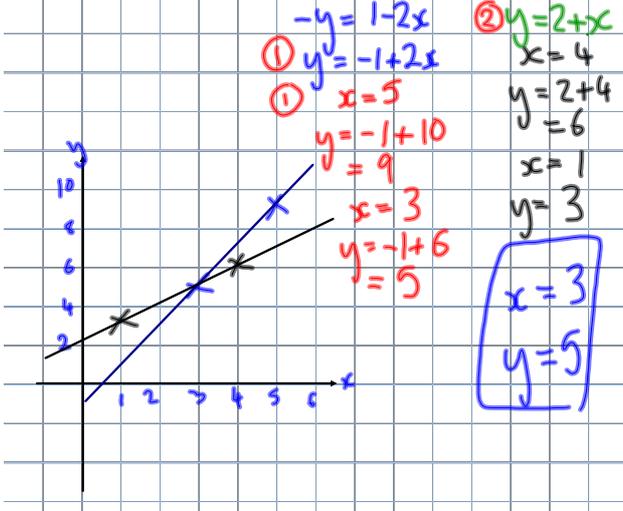
$$= \frac{9}{3m} - \frac{2m}{3m}$$

$$= \frac{9 - 2m}{3m}$$



Solving Simultaneous Equations Graphically

e.g. 1) Find x and y where: $2x - y = 1$ and $-x + y = 2$



Starter

The door swings through an angle of 85° . Calculate the length of the dotted perimeter, so it can be marked out in tape.

$$\begin{aligned} \text{Arc length} &= \frac{\theta}{360} \times \pi \times d \\ &= \frac{85}{360} \times \pi \times 170 \\ &= 126 \text{ cm} \\ P &= 296 \text{ cm} \end{aligned}$$

Today's Learning:

Solving simultaneous equations using substitution.

In McDonalds, Georgia bought 2 happy meals, and paid 8€. Harry got a happy meal and a McFlurry and paid 6€.

How much does each item cost?

$$\begin{aligned} H &= 4\text{€} \\ M &= 2\text{€} \\ 2H &= 8 \Rightarrow H = 4 \\ H + M &= 6 \\ 4 + M &= 6 \end{aligned}$$

Mike wanted to know the price of tickets and popcorn at the cinema.

All he knows is that James bought 2 tickets and 1 popcorn and that cost £28, and Sarah bought 1 ticket and 3 popcorns and that cost £24.

How could he figure out the price of popcorn and of tickets?

$$\begin{aligned} 2T + P &= 28 \\ T + 3P &= 24 \\ T &= 24 - 3P \\ 48 - 6P + P &= 28 \\ 48 - 5P &= 28 \\ 20 &= 5P \\ 4 &= P \end{aligned}$$

Simultaneous Equations - Substitution

e.g. Find x and y if $3x + 2y = 18$ and $y - x = -1$

$$\begin{aligned} 3x + 2y &= 18 \quad (1) \\ y - x &= -1 \quad (2) \\ \text{Substitute } (2) \text{ into } (1) & \\ 3x + 2(x - 1) &= 18 \\ 3x + 2x - 2 &= 18 \\ 5x - 2 &= 18 \\ 5x &= 20 \\ x &= 4 \\ \text{Use } (2) & \\ y - 4 &= -1 \\ y &= 4 - 1 \\ y &= 3 \end{aligned}$$

Solve each pair of equations below using the method of substitution.

- ★ a) $y = x$ and $3x - y = 10$
- ★ b) $y = 2x$ and $5x + y = 14$
- ★ c) $y = 3x + 1$ and $y = x + 7$
- ★ d) $y = x$ and $5x - y = 4$
- ★ e) $y = 2x$ and $2x + 3y = 24$
- ★ f) $y = 5x - 4$ and $y = 2x + 11$

Starter $p(p+5) - 2(p+5)$

- 1) Multiply out the brackets: $(p - 2)(p + 5)$
 $= p^2 + 5p - 2p - 10$
 $= p^2 + 3p - 10$
- 2) Without a calculator, find 41×54 2214
- 3) Factorise the following: $m^2 + 10m + 24$
 $(m + 6)(m + 4)$
- 4) Simplify the surd: $\sqrt{120} = \sqrt{4 \times 30}$
 $= 2\sqrt{30}$

Solving Simultaneous Equations 9/6/17

- ★ Label the equations
- ★ Multiply each equation so you can cancel something out
- ★ Add the equations together
- ★ Solve
- ★ Substitute to find the other unknown

Starter

1) Fully factorise: $2m^3 + 14m^2 + 24m$
 $= 2m(m^2 + 7m + 12)$
 $= 2m(m+4)(m+3)$

2) Solve for g: $2g + 9 > -g$
 $2g > -g - 9$
 $3g > -9$
 $g > -3$

3) Find the area of the shape:

① $A = L \times B$
 $= 6 \times 10$
 $= 60 \text{ cm}^2$

② $A = L \times B \div 2$
 $= 4 \times 6 \div 2$
 $= 12 \text{ cm}^2$

Total Area = 72 cm^2

Starter

1) Simplify the fraction: $\frac{(p-4)(p+2)}{(p-4)^2} = \frac{p+2}{p-4}$

2) Multiply out the brackets: $(g + 1)(g - 3)(g + 4)$
 $= (g^2 - 3g + g - 3)(g + 4)$
 $= (g^2 - 2g - 3)(g + 4)$
 $= g^3 + 4g^2 - 2g^2 - 8g - 3g - 12$
 $= g^3 + 2g^2 - 11g - 12$

3) Simplify the surd $\sqrt{75}$
 $\sqrt{25 \times 3}$
 $= 5\sqrt{3}$

4) Fully factorise: $4y^2 - 15y$
 $= y(4y - 15)$

e.g. 1) $7b - 5c = 35$ ①
 $9b - 4c = 45$ ②

$4 \times ①$ $28b - 20c = 140$
 $-5 \times ②$ $-45b + 20c = -225$

$-17b = -85$
 $-b = -5$
 $b = 5$

① $7b - 5c = 35$
 $35 - 5c = 35$
 $-5c = 0$
 $c = 0$

Starter1) Multiply out the brackets: a) $x(x^2 - 3x + 4)$ b) $2(x^2 - 3x + 4)$ Hence multiply out the brackets $(x + 2)(x^2 - 3x + 4)$

$$\begin{aligned} \text{a) } x^3 - 3x^2 + 4x &= x^3 - x^2 - 2x + 8 \\ \text{b) } 2x^2 - 6x + 8 & \end{aligned}$$

2) Simplify the following: $(2m - 3)(m + 1) - 4m + 5$ 3) If $a = 4$ and $b = 7$, evaluate $a^2 - b(2 - a) + 8$

$$\begin{aligned} &= 16 - 7(2 - 4) + 8 \\ &= 16 - 7(-2) + 8 \\ &= 16 + 14 + 8 \\ &= 38 \end{aligned}$$

4) Without a calculator, evaluate $4 \times 10^7 \times 3.1 \times 10^4$, leaving your answer in scientific notation.

$$\begin{aligned} &12.4 \times 10^{11} \\ &1.24 \times 10^{12} \\ &1.24 \times 10 \times 10^{11} \end{aligned}$$