

Starter

1) Solve for T: $5T < 8T - 3$

$$3 + 5T < 8T$$

$$-5T \quad -5T$$

$$3 < 3T$$

2) Simplify: $\frac{3m^2 - 6m}{m^2 - 8m + 12}$

3) Simplify: $\frac{C}{\sqrt[3]{C^2}} = \frac{C^1}{C^{\frac{2}{3}}} = C^{\frac{1}{3}} \quad T > 1$

4) Solve for m: $3(m - 2) = 2(3 - m) + 9$

$$3m - 6 = 6 - 2m + 9$$

$$3m - 6 = 15 - 2m$$

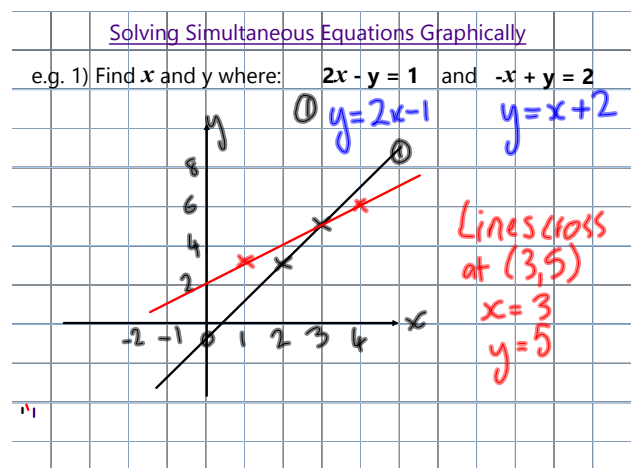
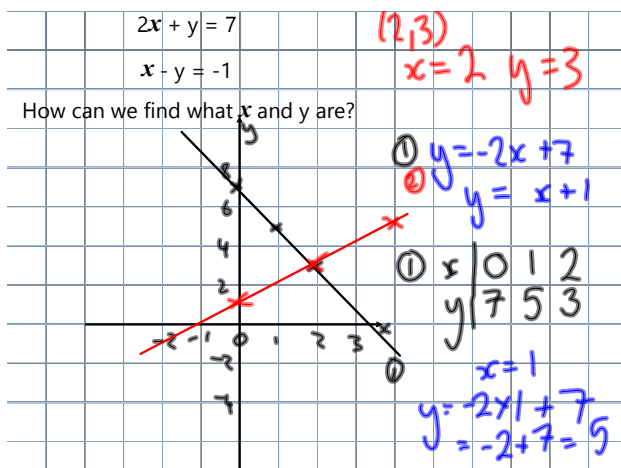
$$3m = 21 - 2m$$

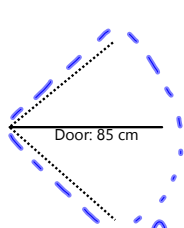
$$5m = 21$$

$$m = \frac{21}{5}$$

Today's Learning:

To solve simultaneous equations using graphs.



**Starter**

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

$$\begin{aligned} \text{Arc length} &= \frac{85}{360} \times \pi \times 170 \\ &= 126.1 \text{ cm} \\ &+ 170 \\ &= 196.1 \text{ cm} \end{aligned}$$

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?

$$\begin{aligned} 2h &= 8 \\ h &= 4 \\ h + m &= 6 \\ 4 + m &= 6 \\ m &= 2 \end{aligned}$$

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?

$$\begin{aligned} 2T + P &= 28 \\ P &= 28 - 2T \\ T + 3P &= 24 \\ T + 3(28 - 2T) &= 24 \\ T + 84 - 6T &= 24 \\ -5T + 84 &= 24 \\ 84 &= 24 + 5T \\ 60 &= 5T \\ 12 &= T \end{aligned}$$

Simultaneous Equations - Substitutione.g. Find x and y if $3x + 2y = 18$ and $y - x = -1$

$$\begin{array}{l}
 \text{Substitute } y = -1 + x \text{ into 1st equation} \\
 3x + 2y = 18 \\
 3x + 2(-1 + x) = 18 \\
 3x - 2 + 2x = 18 \\
 5x - 2 = 18 \\
 \quad +2 \quad +2 \\
 5x = 20 \\
 x = 4 \\
 \\
 \text{Sub. } x = 4 \text{ into equation:} \\
 y - x = -1 \\
 y - 4 = -1 \\
 \quad +4 \quad +4 \\
 y = 3
 \end{array}$$

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 $y = 2x + 11$

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

a) $y = x$ and $3x - y = 10$ $x = y = 5$

b) $y = 2x$ and $5x + y = 14$ $x = 2, y = 4$

c) $y = 3x + 1$ and $y = x + 7$ $x = 3, y = 10$

d) $y = x$ and $5x - y = 4$ $x = y = 1$

e) $y = 2x$ and $2x + 3y = 24$ $x = 3, y = 6$

f) $y = 5x - 4$ and $y = 2x + 11$ $x = 5, y = 21$

Solving by elimination:

$2y + x = 5$

$4y - x = 7$

$$\begin{array}{l}
 6y = 12 \\
 y = 2
 \end{array}$$

$$\begin{array}{l}
 2y + x = 5 \\
 4 + x = 5 \\
 x = 1
 \end{array}$$

Today's Learning:

Solving Simultaneous Equations by elimination.

$$T + B = 6$$

$$T - B = 4$$

Starter

1) Fully factorise: $2m^3 + 14m^2 + 24m$

$$= 2m(m^2 + 7m + 12)$$

$$= 2m(m + 3)(m + 4)$$

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

$$+g \quad +g$$

$$3g + 9 > 0$$

$$-9 \quad -9$$

$$3g > -9$$

$$\div 3 \quad \div 3$$

$$g > -3$$

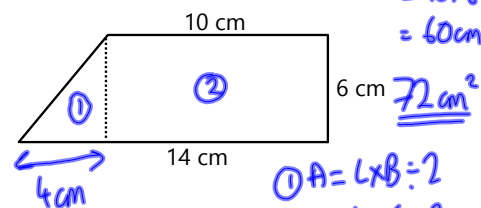
$$9 > -3g$$

$$-3 < g$$

Solve the pairs of simultaneous equations...

- | | | |
|----------------|----------------|----------------|
| a) $a + b = 4$ | b) $a + b = 9$ | c) $a + b = 7$ |
| $a - b = 2$ | $a - b = 5$ | $a - b = 3$ |

3) Find the area of the shape:



$$\textcircled{1} A = L \times B \div 2$$

$$= 4 \times 6 \div 2$$

$$= 12 \text{ cm}^2$$

$$\textcircled{2} A = L \times B$$

$$= 10 \times 6$$

$$= 60 \text{ cm}^2$$

$$\underline{\underline{72 \text{ cm}^2}}$$

$$4b + 2c = 50 \quad \textcircled{1}$$

$$2b + 2c = 30 \quad \textcircled{2}$$

$$\begin{array}{r} \textcircled{1} \quad 4b + 2c = 50 \\ -1 \times \textcircled{2} \quad -2b - 2c = -30 \\ \hline 2b = 20 \\ b = 10 \end{array} \quad \begin{array}{r} \textcircled{2} \quad 2b + 2c = 30 \\ 20 + 2c = 30 \\ -20 \quad -20 \\ \hline 2c = 10 \\ c = 5 \end{array}$$

$$\begin{array}{l} \text{d) } 3a + b = 9 \quad \textcircled{1} \\ a + b = 5 \quad \textcircled{2} \end{array}$$

$$\begin{array}{l} a = 2 \\ b = 3 \end{array}$$

$$\begin{array}{l} \text{e) } 4a + b = 11 \\ 2a + b = 5 \end{array}$$

$$\begin{array}{l} a = 3 \\ b = -1 \end{array}$$

$$\begin{array}{l} \text{f) } 7a + 2b = 36 \\ 2a + 2b = 16 \end{array}$$

$$\begin{array}{l} a = 4 \\ b = 4 \end{array}$$

Solve the following: (Hint - you may have to multiply one equation by -1, you may not)

1) $m + n = 6$	2) $p + q = 11$	3) $2a + b = 9$
$\frac{3m - n = 10}{4m = 16}$	$2p + q = 15$	$-a - b = -4$
4) $p + 2q = 0$	5) $2m + n = -3$	6) $4m + 3n = 2$
$p - 3q = 5$	$2m + 3n = -11$	$2m - 3n = -\frac{1}{2}$

Starter

1) Simplify as much as possible:

$$\text{a) } \frac{2x^2 + 10x + 12}{2x + 6} \quad \text{b) } \sqrt[3]{c^4} \times \frac{1}{\sqrt[3]{c^1}} \quad \text{c) } \sqrt{40} - \sqrt{90}$$

$$\begin{aligned} &= \frac{2(x^2 + 5x + 6)}{2(x+3)} \\ &= \frac{x^2 + 5x + 6}{x+3} \\ &= \frac{(x+3)(x+2)}{x+3} \\ &= \frac{x+2}{1} \\ &= x+2 \end{aligned}$$

$$\begin{aligned} &c^{\frac{4}{3}} \times \frac{1}{c^{\frac{1}{3}}} \\ &= c^{\frac{4}{3} - \frac{1}{3}} \\ &= c^{\frac{3}{3}} \\ &= c^1 \\ &= c \end{aligned}$$

$$\frac{4}{3} + \frac{-9}{3}$$

$$4b + c = 21 \quad \textcircled{1}$$

$$2b + 3c = 13 \quad \textcircled{2}$$

$$-3 \times \textcircled{1} \quad -12b - 3c = -63$$

$$\textcircled{2} \quad 2b + 3c = 13$$

$$-10b = -50$$

$$b = 5$$

$$\text{use } \textcircled{1} \quad 4b + c = 21$$

$$20 + c = 21$$

$$c = 1$$

$$2a + 3b = 40 \quad \textcircled{1}$$

$$3a + 2b = 35 \quad \textcircled{2}$$

$$3 \times \textcircled{1} : 6a + 9b = 120$$

$$-2 \times \textcircled{2} : -6a - 4b = -70$$

$$5b = 50$$

$$b = 10$$

$$\text{use } \textcircled{1} \quad 2a + 3b = 40$$

$$2a + 30 = 40$$

$$2a = 10$$

$$a = 5$$

$$3b = 30$$

$$b = 10$$

Solving Simultaneous Equations

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

e.g. 1) $7b - 5c = 35 \quad \textcircled{1}$

$$9b - 4c = 45 \quad \textcircled{2}$$

$$4 \times \textcircled{1} \quad 28b - 20c = 140$$

$$-5 \times \textcircled{2} \quad -45b + 20c = -225$$

$$-17b = -85$$

$$b = 5$$

$$\text{use } \textcircled{1} \quad 7b - 5c = 35$$

$$\textcircled{35} - 5c = 35$$

$$-5c = 0$$

$$c = 0$$

$$2) \quad 2x + 3y = 7 \quad \textcircled{1}$$

$$4x + 5y = 12 \quad \textcircled{2}$$

$$\begin{array}{r} 5 \times \textcircled{1} \quad 10x + 15y = 35 \\ -3 \times \textcircled{2} \quad -12x - 15y = -36 \\ \hline \end{array}$$

$$\begin{array}{r} -2x = -1 \\ x = \frac{-1}{-2} = \frac{1}{2} \end{array}$$

$$\begin{array}{r} \text{use } \textcircled{1} \quad 2x + 3y = 7 \\ 1 + 3y = 7 \\ 3y = 6 \\ y = 2 \end{array}$$

Starter

$$1) \text{ a) Factorise } 2d^2 - 7d - 4 = (2d+1)(d-4)$$

$$\text{b) Hence simplify } \frac{2d^2 - 7d - 4}{d^2 - 16}$$

$$\frac{(2d+1)(d-4)}{(d-4)(d+4)} = \frac{2d+1}{d+4}$$

2) Find the volume of a cylinder with radius 20 cm and height of 1 metre.

$$\begin{array}{r} V = \pi r^2 h \\ = \pi \times 20^2 \times 100 \\ = 125663.7 \text{ cm}^3 \end{array}$$

3) Evaluate: $2 \times (-3) + 4 - 2(3 - 2) + 2 \times (-5)$

$$\begin{array}{r} = 2 \times (-3) + 4 - 2(1) + 2 \times (-5) \\ = -6 + 4 - 2 + -10 \\ = -14 \end{array}$$

Today's Learning:

Practising exam type questions.

5) Four sandwiches and 3 hot-dogs cost £7.50.

Two sandwiches and 4 hot-dogs cost £6.



Form simultaneous equations and solve them to find the cost of each sandwich and hot-dog.

$$\begin{array}{r} \textcircled{1} \quad 4S + 3H = 7.50 \\ \textcircled{2} \quad 2S + 4H = 6 \end{array}$$

6) At Smith's Stationers, the cost of a ruler and a pencil together is 57p. The ruler costs 23p more than the pencil.

Find the cost of each.

$$\begin{array}{r} R + P = 57 \quad \textcircled{1} \\ P + 23 = R \\ P - R = -23 \quad \textcircled{2} \end{array}$$