

Some picture puzzles!

$$\begin{aligned} \text{☺} + \text{☺} + \text{☺} + \text{☺} + \text{★} &= 11 \\ \text{☺} + \text{★} &= 5 \end{aligned}$$

$$\begin{aligned} \text{🌸} + \text{🌸} + \text{🌸} + \text{🌸} + \text{🌸} + \text{★} + \text{★} &= 19 \\ \text{🌸} + \text{🌸} + \text{🌸} + \text{★} &= 9 \end{aligned}$$

$$\begin{aligned} \text{●} + \text{●} + \text{●} + \text{●} + \text{●} + \text{●} &= 64 \\ \text{●} + \text{●} &= 14 \end{aligned}$$

**a a a a a + b b b = 18**  
**a + b = 4**

**c c c c + d d d = 5**  
**c c + d = 2**

**e + f = 11**  
**2e + f = 16**

**3g + 2h = 7**  
**g + 2h = 5**

**i - j = 1** ①  
**2i - j = 7**

$i + i - j = 7$   
 $1$   
 $i = 6$

①  $6 - j = 1$   
 $j = 5$

Alternative

①  $\times 2$   
 $6e + 2f = 20$   
 ②  $e + 2f = 5$

$5e = 15$   
 $e = 3$

**5k - 2l = 3**  
**5k - l = 4**

$l =$   
 $5k - l - l = 3$   
 $4$

**3e + f = 10** ①

**e + 2f = 5** ②

$3e + 6f = 15$  ②  $\times 3$

$3e + f = 10$  ①

$5f = 5$   
 $f = 1$  in ①  $3e + 1 = 10$   
 $3e = 9$   
 $e = 3$

substituting  $e = 3$  into ②

$3 + 2f = 5$   
 $2f = 2$   
 $f = 1$

## Solving simultaneous equations by elimination

There are 3 methods for solving simultaneous equations:

1. By drawing graphs and finding the point of intersection
2. By elimination.
3. By substitution (We may do this nearer the exam but you only NEED to know one method.)

Marks are not awarded for trial and error!

example 1:

$$2x + y = 10 \quad \textcircled{1}$$

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

Subtract  $\textcircled{2}$  from  $\textcircled{1}$

$$x = 3$$

Subst: into  $x = 3$  into  $\textcircled{2}$

$$3 + y = 7$$
$$\underline{y = 4}$$

example 2:

$$4x + 3y = 5 \quad \textcircled{1}$$

$$2x + y = 2 \quad \textcircled{2}$$

multiply  $\textcircled{2}$  by 2

$$4x + 2y = 4 \quad \textcircled{3}$$

$$4x + 3y = 5 \quad \textcircled{1}$$

$$-y = -1 \quad \textcircled{y=1}$$

Substitute  $y = 1$  into  $\textcircled{1}$   $4x + 3 = 5$

$$4x = 2 \quad x = \frac{1}{2}$$

example 3:

$$\textcircled{1} \quad 4x - y = 11$$

$$\textcircled{2} \quad x - y = -1$$

Subtract  $\textcircled{2}$  from  $\textcircled{1}$

$$3x = 12$$
$$\underline{x = 4}$$

Substitute  $x = 4$  into  $\textcircled{2}$

$$4 - y = -1$$
$$\underline{y = 5}$$

Make up a pair of simultaneous equations and give them to your neighbour to solve.

$$\begin{array}{l}
 \text{B1 b)} \quad 3p - 4q = 10 \\
 \quad \quad \quad 5p + 4q = 6
 \end{array}
 \left. \vphantom{\begin{array}{l} 3p - 4q = 10 \\ 5p + 4q = 6 \end{array}} \right\} + \begin{array}{l} \textcircled{1} \\ \textcircled{2} \end{array}$$

$$8p = 16$$

$$\underline{\underline{p = 2}}$$

Substitute  $p=2$  into  $\textcircled{2}$

$$10 + 4q = 6$$

$$4q = 6 - 10$$

$$4q = -4$$

$$q = -1$$

$$2x \quad -2x$$

$$2x \quad -2x$$

$$\hline 4x$$

$$\hline -4x$$

Same signs  
subtract

Summary:  
The three types

Different signs - add

$$\left. \begin{array}{l} 3x+2y=1 \\ 5x-2y=7 \end{array} \right\} \begin{array}{l} \textcircled{1} \\ \textcircled{2} \end{array} \quad \begin{array}{l} 8x=8 \\ x=1 \end{array}$$

$x=1$  substituting into  $\textcircled{1}$

$$\begin{array}{l} 3+2y=1 \\ 2y=-2 \\ \underline{y=-1} \end{array}$$

• Rearrange

1.  $3x+y=11 \times 6$
2.  $6y-x=9$
3.  $-x+6y=9$
4.  $18x+6y=66$
5.  $-x+6y=9$

$$\left. \begin{array}{l} 4 \\ 5 \end{array} \right\} - \quad \begin{array}{l} 19x=57 \\ \underline{x=3} \\ \text{substitute} \end{array}$$

$$\begin{array}{l} \textcircled{1} \quad 2x+3y=7 \quad \times 2 \\ \textcircled{2} \quad 5x+2y=6.5 \quad \times 3 \end{array} \quad \begin{array}{l} 4x+6y=14 \\ 15x+6y=19.5 \\ \underline{4x+6y=14} \\ 11x=5.5 \\ \underline{x=\frac{1}{2}} \end{array}$$

$$\begin{array}{l} 2 \times \frac{1}{2} + 3y = 7 \\ 1 + 3y = 7 \quad 3y - 6 \quad \boxed{y=2} \end{array}$$

A/A\* questions are set in problems

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More if you like!  
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