

# Simultaneous Equations

## ***Learning objectives***

*By the end of this topic, you should be able to:*

- *solve simultaneous equations algebraically;*
- *solve simultaneous equations from a context.*

# Simultaneous Equations - Elimination

This is an **algebraic method** for solving simultaneous equations.

## Example 1

Solve the system of equations

$$2x + y = 11$$

$$x + y = 7$$

## Example 2

Find the point of intersection

$$2x + y = 5$$

$$x - 3y = 6$$

### Example 3

The Gray family booked tickets for the cinema. They purchased 2 adult and 3 child tickets for £23.50. The Marvins decide to go too and purchase 3 adult and 2 child tickets for £26.50.



Construct two equations where  $x$  is the adult price and  $y$  is a child price and determine the cost for 4 adults and 1 child.

**Q19:** Solve 
$$\begin{aligned} 7c - 3d &= 5 \\ 4c + d &= 11 \end{aligned}$$

- a) What is the value of  $c$ ?
  - b) What is the value of  $d$ ?
- .....

**Q20:** Solve 
$$\begin{aligned} e + 2f &= 2 \\ 5e + f &= 1 \end{aligned}$$

- a) What is the value of  $e$ ?
  - b) What is the value of  $f$ ?
- .....

**Q21:** Solve 
$$\begin{aligned} 4g - 3h &= 10 \\ 3g + 4h &= 20 \end{aligned}$$

- a) What is the value of  $g$ ?
  - b) What is the value of  $h$ ?
- .....

**Q22:** Solve 
$$\begin{aligned} 3m + 5n &= 23 \\ 5m + 2n &= 13 \end{aligned}$$

- a) What is the value of  $m$ ?
  - b) What is the value of  $n$ ?
- .....

**Q23:** Solve 
$$\begin{aligned} 5p - 4q &= -1 \\ 4p - 3q &= 0 \end{aligned}$$

- a) What is the value of  $p$ ?
- b) What is the value of  $q$ ?

## Answers

**Q19:**

a)  $c = 2$

b)  $d = 3$

**Q20:**

a)  $e = 0$

b)  $f = 1$

**Q21:**

a)  $g = 4$

b)  $h = 2$

**Q22:**

a)  $m = 1$

b)  $n = 4$

**Q23:**

a)  $p = 3$

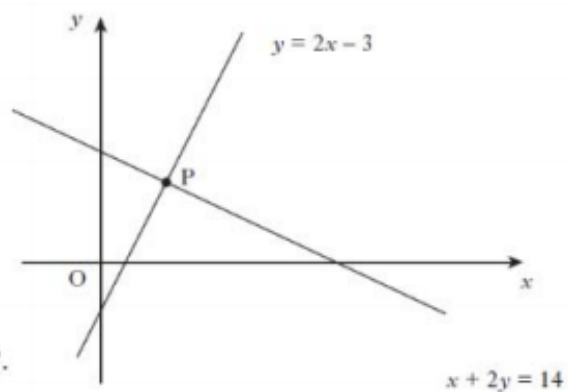
b)  $q = 4$

## Exam Questions

2012 Paper 1

8. The graph below shows two straight lines.

- $y = 2x - 3$
- $x + 2y = 14$



The lines intersect at the point P.

Find, **algebraically**, the coordinates of P.

4KU

2. Two groups of people go to a theatre.

Bill buys tickets for 5 adults and 3 children.

The total cost of his tickets is £158.25.

(a) Write down an equation to illustrate this information (1 mark)

(b) Ben buys tickets for 3 adults and 2 children.

The total cost of his tickets is £98.

Write down an equation to illustrate this information. (1 mark)

(c) Calculate the cost of a ticket for an adult and the cost of a ticket for a child. (4 marks)



