



**eClassroom**

GCSE Mathematics

# **Simultaneous Equations**

**Questions**

---

Pearson Edexcel GCSE & iGCSE Mathematics

## Section A — Foundation

### Worked Examples

#### [Fluency]

**Solve:**  $2x + y = 7$  and  $x - y = 2$

Add the equations:  $3x = 9 \rightarrow x = 3$ . Then  $y = 7 - 6 = 1$ .

$$x = 3, y = 1$$

#### [Reasoning]

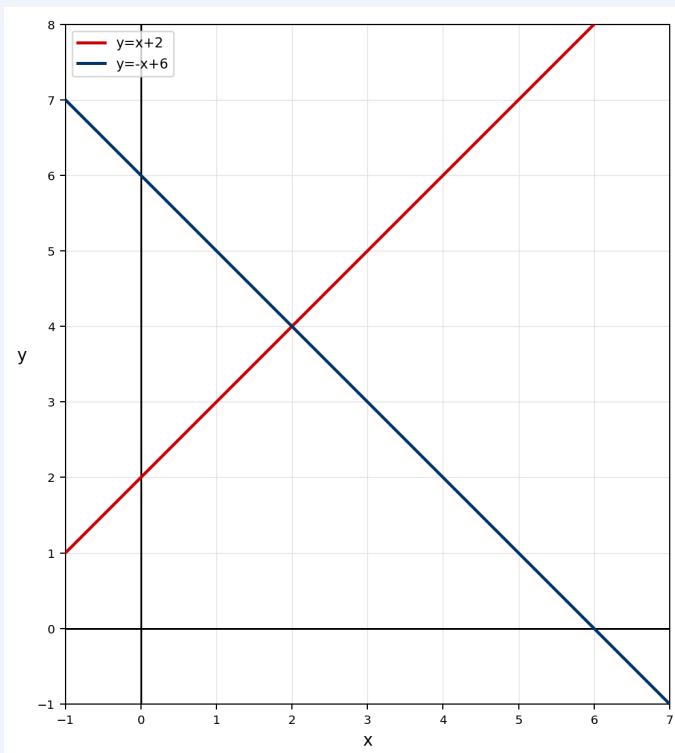
**Solve:**  $3x + 2y = 12$  and  $x + 2y = 8$

Subtract:  $2x = 4 \rightarrow x = 2$ . Then  $2 + 2y = 8 \rightarrow y = 3$ .

$$x = 2, y = 3$$

#### [Problem Solving]

**Solve graphically:**  $y = x + 2$  and  $y = -x + 6$



Intersection at **(2, 4)**

#### [Fluency]

1. Solve:  $2x + y = 7$  and  $x - y = 2$

(3 marks)



[Fluency]

2. Solve:  $3x + 2y = 12$  and  $x + 2y = 8$

(3 marks)

[Fluency]

3. Solve:  $5x - 3y = 9$  and  $2x - 3y = 3$

(3 marks)

[Fluency]

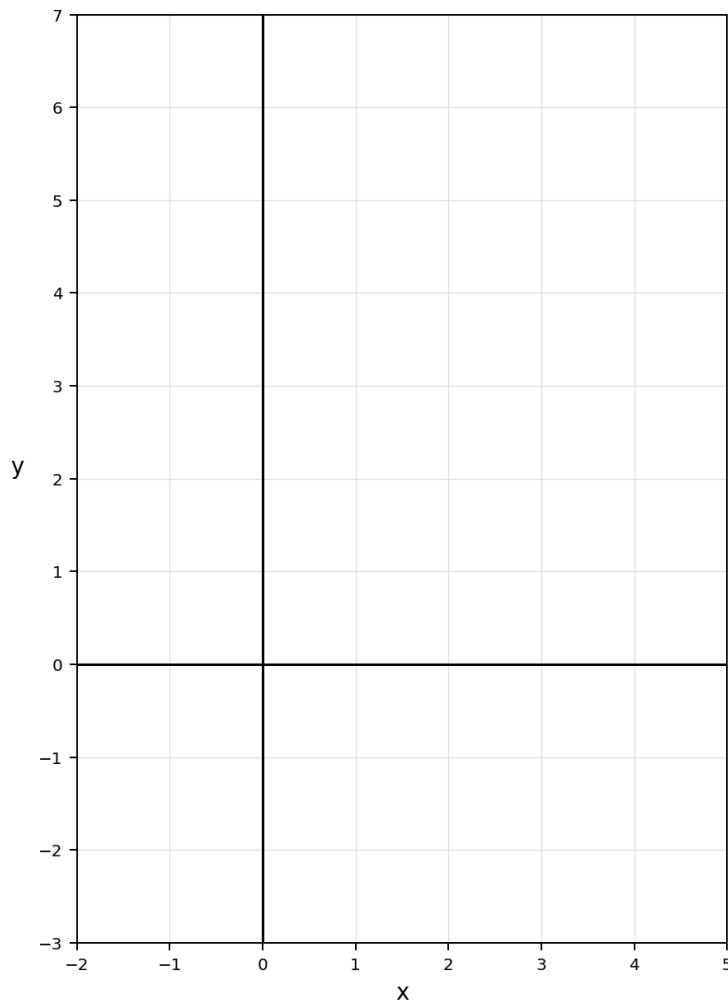
4. Solve:  $x + y = 10$  and  $3x + y = 18$

(3 marks)

[Fluency]

5.

Solve graphically:  $y = 2x + 1$  and  $y = -x + 4$



(4 marks)

**[Reasoning]****6.**

Two numbers sum to 15 and their difference is 3.  
Form two equations and solve to find the numbers.

**(4 marks)****[Reasoning]****7.**

Solve:  $4x + 3y = 17$  and  $2x - y = 3$

**(4 marks)****[Reasoning]****8.**

Adult tickets cost £a and child tickets cost £c.  
3 adults and 2 children cost £28. 1 adult and 4 children cost £20.  
Find a and c.

**(4 marks)****[Problem Solving]****9.**

Solve:  $3x + 2y = 16$  and  $5x - 4y = 6$

**(4 marks)****[Problem Solving]****10.**

A line  $y = 3x - 2$  and a line  $y = x + 4$  intersect at point P.  
Find the coordinates of P and show that P lies on the line  $y = 2x + 1$ .

**(4 marks)**



## Section B — Higher

### Worked Examples

#### [Fluency]

Solve:  $y = x + 3$  and  $y = x^2 + x - 1$

Substitute:  $x+3 = x^2+x-1 \rightarrow x^2-4=0 \rightarrow x=\pm 2$

$$x = -2, y = 1 \quad \text{and} \quad x = 2, y = 5$$

#### [Reasoning]

Solve:  $x^2 + y^2 = 25$  and  $y = 2x$

$$x^2 + 4x^2 = 25 \Rightarrow 5x^2 = 25 \Rightarrow x = \pm\sqrt{5}$$

$$(\sqrt{5}, 2\sqrt{5}) \quad \text{and} \quad (-\sqrt{5}, -2\sqrt{5})$$

#### [Problem Solving]

When do two curves not intersect? Check using discriminant.

If substituting one into the other gives a quadratic with  $\Delta < 0$ , they do not intersect.

#### [Fluency]

1.

Solve:  $y = x + 3$  and  $y = x^2 + x - 1$

(4 marks)

#### [Fluency]

2.

Solve:  $x^2 + y^2 = 25$  and  $y = 2x$

Give exact answers.

(5 marks)

#### [Fluency]

3.

Solve:  $y = 2x - 1$  and  $y = x^2 - 3x + 4$

(5 marks)

#### [Reasoning]

4.

Find the coordinates of intersections of  $y = x + 2$  and  $y = x^2 - 2$ .

Hence state the values of  $x$  for which  $x + 2 > x^2 - 2$ .

(5 marks)



**[Reasoning]****5.**

Show that the line  $y = x + 5$  does not intersect the curve  $y = x^2 + 3x + 7$ .

**(4 marks)****[Reasoning]****6.**

A rectangle has perimeter 28 cm and area 48 cm<sup>2</sup>.

Form and solve equations to find the dimensions.

**(5 marks)****[Problem Solving]****7.**

Solve:  $x^2 + y^2 = 10$  and  $x + y = 4$

Give exact answers.

**(5 marks)****[Problem Solving]****8.**

Find the coordinates of the points where the circle  $x^2 + y^2 = 20$  meets the line  $y = 2x - 2$ .

**(5 marks)**