

1 Simultaneous equations

Here are two simultaneous equations.

$$5x + 2y = 1$$

$$3x - 2y = 23$$

a) Solve them.

b) Explain why you add the equations, not subtract them.

$$\text{a) add: } 8x = 24, x = 3, 15 + 2y = 1$$

$$x = 3, y = -7$$

$$\text{b) } +2y \text{ and } -2y \text{ add to } 0$$

2 Multiplying first

Solve the simultaneous equations

$$4x - 3y = 25$$

$$6x + 5y = -10$$

$$\times 3 \text{ and } \times 2: 12x - 9y = 75, 12x + 10y = -20$$

$$\text{subtract: } -19y = 95, y = -5$$

$$4x + 15 = 25, x = 2.5, y = -5$$

3 Solving by substitution

Solve the simultaneous equations

$$x = 5 - 2y$$

$$4x + 3y = 5$$

$$4(5 - 2y) + 3y = 5$$

$$20 - 8y + 3y = 5, y = 3$$

$$x = -1, y = 3$$

4 Forming simultaneous equations

A jar holds 30 coins. Every coin is a 20p or a 50p. The coins are worth £10.20 in total.

a) Write two equations for this.

b) How many of each coin are in the jar?

$$\text{a) } t + f = 30, 20t + 50f = 1020$$

$$\text{b) } 20t + 20f = 600, 30f = 420$$

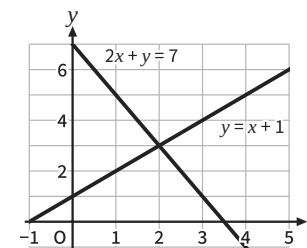
$$16 \text{ of the } 20\text{p coins and } 14 \text{ of the } 50\text{p coins}$$

Simultaneous equations revision mat answers

5 Solving with graphs

a) Use the graph to solve $y = x + 1$ and $2x + y = 7$.

b) Does $y = 3x - 3$ go through this point too?



$$\text{a) } x = 2, y = 3$$

$$\text{b) yes: } 3 \times 2 - 3 = 3$$

6 Linear and quadratic

Solve the simultaneous equations

$$y = x^2 - 4$$

$$x + y = 2$$

$$y = 2 - x, x^2 - 4 = 2 - x$$

$$x^2 + x - 6 = 0, (x + 3)(x - 2) = 0$$

$$x = 2, y = 0 \text{ and } x = -3, y = 5$$

7 Linear and quadratic: circles

The line $y = x + 1$ meets the circle $x^2 + y^2 = 25$ at A and B.

a) Find the coordinates of A and B.

b) Find the midpoint of AB.

$$x^2 + (x + 1)^2 = 25, x^2 + x - 12 = 0$$

$$\text{a) } (3, 4) \text{ and } (-4, -3)$$

$$\text{b) } (-0.5, 0.5)$$

8 Linear and quadratic: forming

Two numbers x and y add to 11, and the sum of their squares is 65.

a) Show that $x^2 - 11x + 28 = 0$

b) Find the two numbers.

$$\text{a) } y = 11 - x, x^2 + (11 - x)^2 = 65$$

$$2x^2 - 22x + 56 = 0, \div 2$$

$$\text{b) } (x - 4)(x - 7) = 0: 4 \text{ and } 7$$