

1 Simultaneous equations

Solve the simultaneous equations

$$3(x + y) = 2x + 9$$

$$4(x - y) = x + 1$$

$$x + 3y = 9 \text{ and } 3x - 4y = 1$$

$$\times 3: 3x + 9y = 27, \text{ subtract: } 13y = 26$$

$$x = 3, y = 2$$

2 Multiplying first

Solve the simultaneous equations, giving x and y in terms of a .

$$5x + 3y = 7a$$

$$3x + 2y = 4a$$

$$\times 2 \text{ and } \times 3: 10x + 6y = 14a, 9x + 6y = 12a$$

$$\text{subtract: } x = 2a$$

$$x = 2a, y = -a$$

3 Solving by substitution

The lines $y = kx + 3$ and $2x + y = 9$ meet at a point.

a) Find its x coordinate in terms of k .

b) For which value of k do the lines never meet? Explain.

$$a) 2x + kx + 3 = 9, x(2 + k) = 6$$

$$x = \frac{6}{k + 2}$$

$$b) k = -2: \text{ both have gradient } -2$$

4 Forming simultaneous equations

The curve $y = ax^2 + bx$ goes through $(2, 2)$ and $(-1, 5)$.

a) Find a and b .

b) Find where the curve crosses the x axis.

$$a) 4a + 2b = 2, a - b = 5$$

$$3a = 6: a = 2, b = -3$$

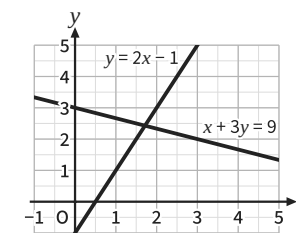
$$b) x(2x - 3) = 0: (0, 0) \text{ and } (1.5, 0)$$

Simultaneous equations revision mat answers

5 Solving with graphs

a) Use the graph to estimate the solution of the simultaneous equations.

b) Find the exact solution.



$$a) \text{ about } x = 1.7, y = 2.4$$

$$b) 7x = 12: x = \frac{12}{7}, y = \frac{17}{7}$$

6 Linear and quadratic

a) Show that the line $y = 2x - 6$ does not meet the curve

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

b) The line $y = 2x + c$ touches the curve. Find c .

$$a) x^2 - 6x + 10 = 0: b^2 - 4ac = 36 - 40 < 0$$

$$b) x^2 - 6x + 4 - c = 0$$

$$36 - 4(4 - c) = 0$$

$$c = -5$$

7 Linear and quadratic: circles

The line $y = 2x - 5$ meets the circle $x^2 + y^2 = 20$ at A and B.

a) Show that $x^2 - 4x + 1 = 0$ at A and B.

b) Find the length AB as a surd in its simplest form.

$$a) x^2 + 4x^2 - 20x + 25 = 20, \div 5$$

$$b) x = 2 \pm \sqrt{3}, \text{ so the gaps are } 2\sqrt{3} \text{ and } 4\sqrt{3}$$

$$\sqrt{(12 + 48)} = \sqrt{60} = 2\sqrt{15}$$

8 Linear and quadratic: forming

A right angled triangle has a hypotenuse of 13 cm and a perimeter of 30 cm. Its shorter sides are x cm and y cm.

a) Show that $x^2 - 17x + 60 = 0$

b) Find the lengths of the shorter sides.

$$a) x + y = 17, x^2 + (17 - x)^2 = 169$$

$$2x^2 - 34x + 120 = 0, \div 2$$

$$b) (x - 5)(x - 12) = 0: 5 \text{ cm and } 12 \text{ cm}$$