

# Straight Lines

## Question Paper 5

Level	A Level
Subject	Mathematics (Pure)
Exam Board	AQA
Module	Core 1
Topic	Co-ordinate geometry
Sub Topic	Straight lines
Booklet	Question Paper 5

**Time Allowed:** 86 minutes

**Score:** /72

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

**1**

The line  $AB$  has equation  $3x + 5y = 8$  and the point  $A$  has coordinates  $(6, -2)$ .

- (a) (i) Find the gradient of  $AB$ . (2)
- (ii) Hence find an equation of the straight line which is perpendicular to  $AB$  and which passes through  $A$ . (3)
- (b) The line  $AB$  intersects the line with equation  $2x + 3y = 3$  at the point  $B$ . Find the coordinates of  $B$ . (3)
- (c) The point  $C$  has coordinates  $(2, k)$  and the distance from  $A$  to  $C$  is 5. Find the **two** possible values of the constant  $k$ . (3)
- (Total 11 marks)**

**2**

A circle with centre  $C$  has equation  $x^2 + y^2 + 2x - 12y + 12 = 0$ .

- (a) By completing the square, express this equation in the form  $(x - a)^2 + (y - b)^2 = r^2$ . (3)
- (b) Write down:
- (i) the coordinates of  $C$ ; (1)
- (ii) the radius of the circle. (1)
- (c) Show that the circle does **not** intersect the  $x$ -axis. (2)
- (d) The line with equation  $x + y = 4$  intersects the circle at the points  $P$  and  $Q$ .
- (i) Show that the  $x$ -coordinates of  $P$  and  $Q$  satisfy the equation  $x^2 + 3x - 10 = 0$ . (3)

(ii) Given that  $P$  has coordinates  $(2, 2)$ , find the coordinates of  $Q$ .

(2)

(iii) Hence find the coordinates of the midpoint of  $PQ$ .

(2)

(Total 14 marks)

3

The points  $A$  and  $B$  have coordinates  $(6, -1)$  and  $(2, 5)$  respectively.

(a) (i) Show that the gradient of  $AB$  is  $-\frac{3}{2}$

(2)

(ii) Hence find an equation of the line  $AB$ , giving your answer in the form  $ax + by = c$ , where  $a$ ,  $b$  and  $c$  are integers.

(2)

(b) (i) Find an equation of the line which passes through  $B$  and which is perpendicular to the line  $AB$ .

(2)

(ii) The point  $C$  has coordinates  $(k, 7)$  and angle  $ABC$  is a right angle.

Find the value of the constant  $k$ .

(2)

(Total 8 marks)

4

The point  $A$  has coordinates  $(1, 1)$  and the point  $B$  has coordinates  $(5, k)$ .

The line  $AB$  has equation  $3x + 4y = 7$ .

(a) (i) Show that  $k = -2$ .

(1)

(ii) Hence find the coordinates of the mid-point of  $AB$ .

(2)

(b) Find the gradient of  $AB$ .

(2)

(c) The line  $AC$  is perpendicular to the line  $AB$ .

(i) Find the gradient of  $AC$ .

(2)

(ii) Hence find an equation of the line  $AC$ .

(1)

(iii) Given that the point  $C$  lies on the  $x$ -axis, find its  $x$ -coordinate.

(2)

(Total 10 marks)

5

The point  $A$  has coordinates  $(1, 7)$  and the point  $B$  has coordinates  $(5, 1)$ .

(a) (i) Find the gradient of the line  $AB$ .

(2)

(ii) Hence, or otherwise, show that the line  $AB$  has equation  $3x + 2y = 17$ .

(2)

(b) The line  $AB$  intersects the line with equation  $x - 4y = 8$  at the point  $C$ . Find the coordinates of  $C$ .

(3)

(c) Find an equation of the line through  $A$  which is perpendicular to  $AB$ .

(3)

(Total 10 marks)

6

The point  $A$  has coordinates  $(11, 2)$  and the point  $B$  has coordinates  $(-1, -1)$ .

(a) (i) Find the gradient of  $AB$ .

(2)

(ii) Hence, or otherwise, show that the line  $AB$  has equation

$$x - 4y = 3$$

(2)

(b) The line with equation  $3x + 5y = 26$  intersects the line  $AB$  at the point  $C$ . Find the coordinates of  $C$ .

(3)

(Total 7 marks)

**7**

The point  $A$  has coordinates  $(6, 5)$  and the point  $B$  has coordinates  $(2, -1)$ .

- (a) Find the coordinates of the midpoint of  $AB$ . (2)
- (b) Show that  $AB$  has length  $k\sqrt{13}$ , where  $k$  is an integer. (3)
- (c) (i) Find the gradient of the line  $AB$ . (2)
- (ii) Hence, or otherwise, show that the line  $AB$  has equation  $3x - 2y = 8$ . (2)
- (d) The line  $AB$  intersects the line with equation  $2x + y = 10$  at the point  $C$ . Find the coordinates of  $C$ . (3)

**(Total 12 marks)**