

# Equations of a Line

## (gradients, mid-points, perpendicular & parallel lines)

### Question Paper 5

Level	IGCSE
Subject	Maths (0580)
Exam Board	Cambridge International Examinations (CIE)
Paper Type	Extended
Topic	Co-ordinate geometry
Sub-Topic	Equations of a Line
Booklet	Question Paper 5

**Time Allowed:** 59 minutes

**Score:** /49

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1

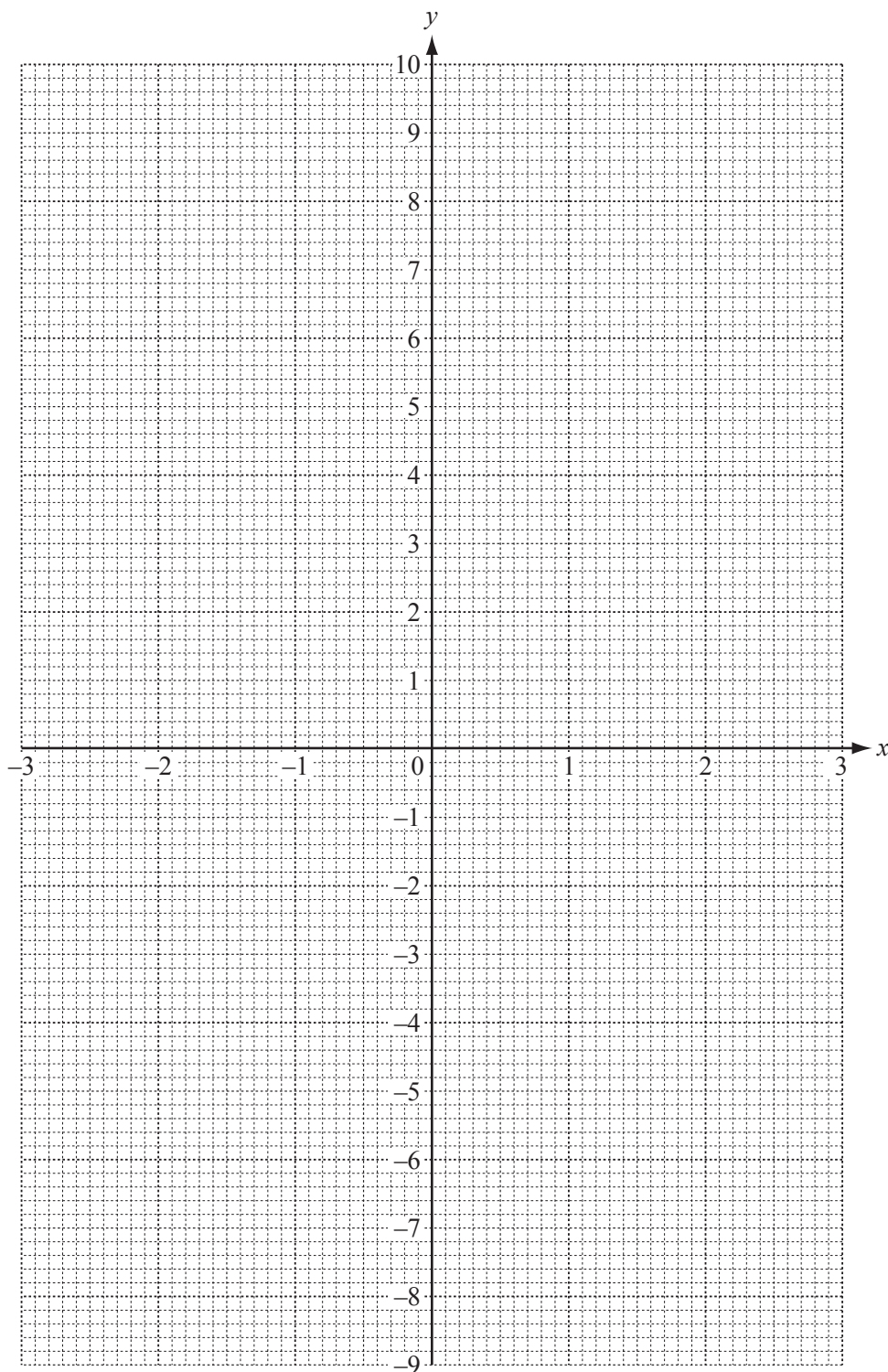
$$f(x) = \frac{2}{x^2} - 3x, \quad x \neq 0$$

(a) Complete the table.

$x$	-3	-2.5	-2	-1.5	-1	-0.5	0.5	1	1.5	2	2.5	3
$f(x)$	9.2	7.8	6.5	5.4		9.5	6.5		-3.6	-5.5	-7.2	-8.8

[2]

(b) On the grid, draw the graph of  $y = f(x)$ , for  $-3 \leq x \leq -0.5$  and  $0.5 \leq x \leq 3$ .



[5]

(c) Use your graph to solve the equations.

(i)  $f(x) = 4$

Answer(c)(i)  $x =$  ..... [1]

(ii)  $f(x) = 3x$

Answer(c)(ii)  $x =$  ..... [2]

(d) The equation  $f(x) = 3x$  can be written as  $x^3 = k$ .

Find the value of  $k$ .

Answer(d)  $k =$  ..... [2]

(e) (i) Draw the straight line through the points  $(-1, 5)$  and  $(3, -9)$ . [1]

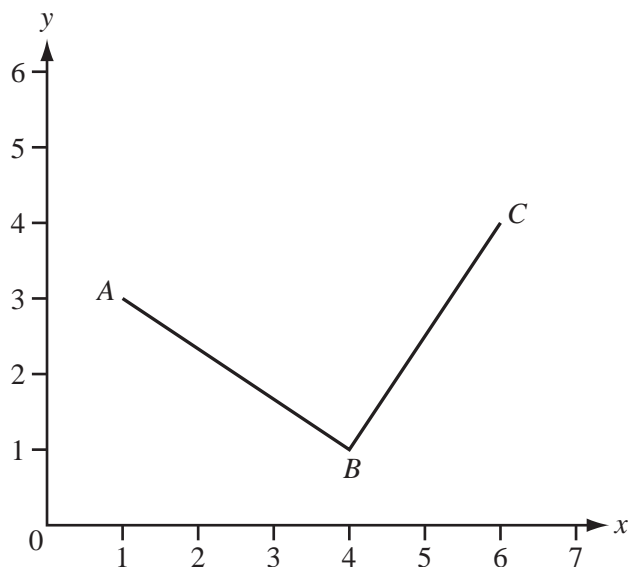
(ii) Find the equation of this line.

Answer(e)(ii) ..... [3]

(iii) Complete the statement.

The straight line in **part (e)(ii)** is a ..... to the graph of  $y = f(x)$ . [1]

2



$A(1, 3)$ ,  $B(4, 1)$  and  $C(6, 4)$  are shown on the diagram.

(a) Using a straight edge and compasses only, construct the angle bisector of angle  $ABC$ . [2]

(b) Work out the equation of the line  $BC$ .

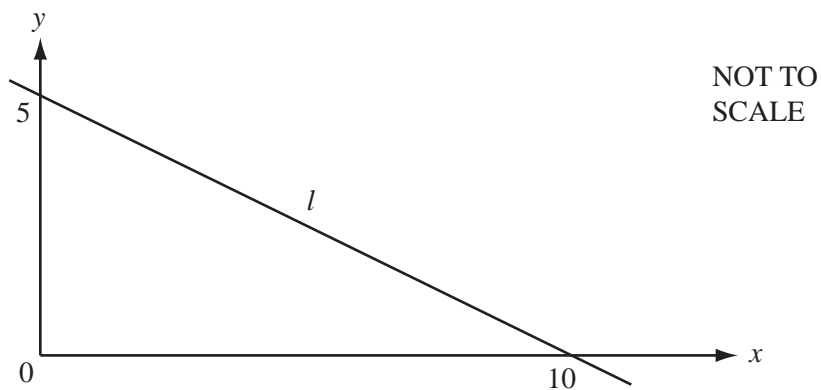
Answer(b) ..... [3]

(c)  $ABC$  forms a **right-angled isosceles** triangle of area  $6.5 \text{ cm}^2$ .

Calculate the length of  $AB$ .

Answer(c)  $AB =$  ..... cm [2]

3



(a) Calculate the gradient of the line  $l$ .

Answer(a) ..... [2]

(b) Write down the equation of the line  $l$ .

Answer(b) ..... [2]

**4 Answer the whole of this question on a sheet of graph paper.**

- (a) The table gives values of  $f(x) = \frac{24}{x^2} + x^2$  for  $0.8 \leq x \leq 6$ .

$x$	0.8	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
$f(x)$	38.1	25	12.9	10	10.1	11.7	$l$	$m$	$n$	26	31	36.7

Calculate, correct to 1 decimal place, the values of  $l$ ,  $m$  and  $n$ . [3]

- (b) Using a scale of 2 cm to represent 1 unit on the  $x$ -axis and 2 cm to represent 5 units on the  $y$ -axis, draw an  $x$ -axis for  $0 \leq x \leq 6$  and a  $y$ -axis for  $0 \leq y \leq 40$ .

Draw the graph of  $y = f(x)$  for  $0.8 \leq x \leq 6$ . [6]

- (c) Draw the tangent to your graph at  $x = 1.5$  and use it to calculate an estimate of the gradient of the curve at this point. [4]

- (d) (i) Draw a straight line joining the points (0, 20) and (6, 32). [1]

(ii) Write down the equation of this line in the form  $y = mx + c$ . [2]

(iii) Use your graph to write down the  $x$ -values of the points of intersection of this line and the curve  $y = f(x)$ . [2]

(iv) Draw the tangent to the curve which has the same gradient as your line in **part d(i)**. [1]

(v) Write down the equation for the tangent in **part d(iv)**. [2]