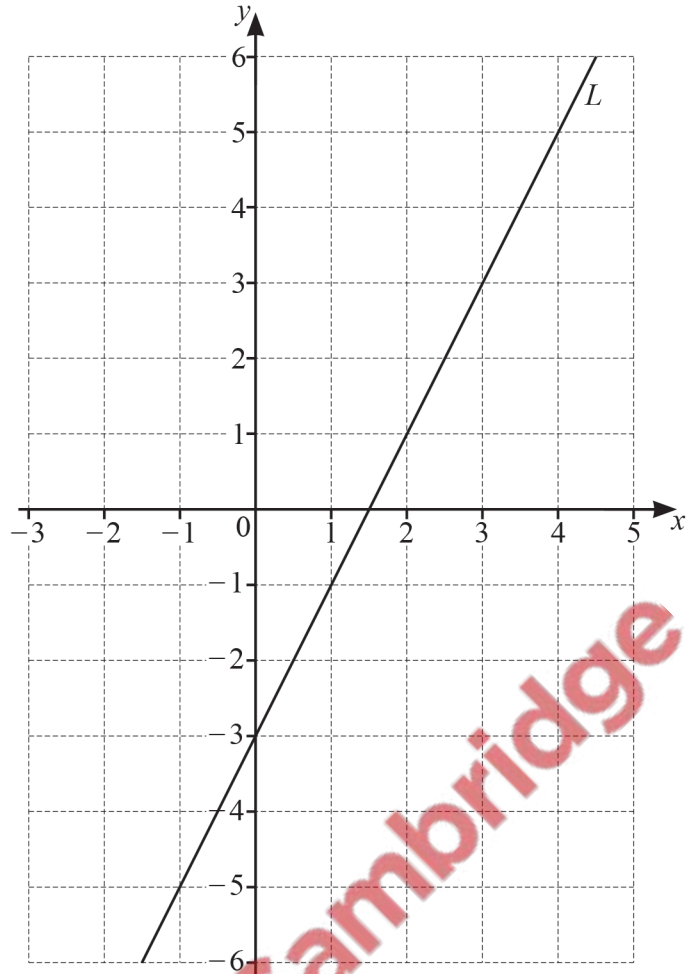# PapaCambridge

Topical Worksheets for Cambridge O LEVEL

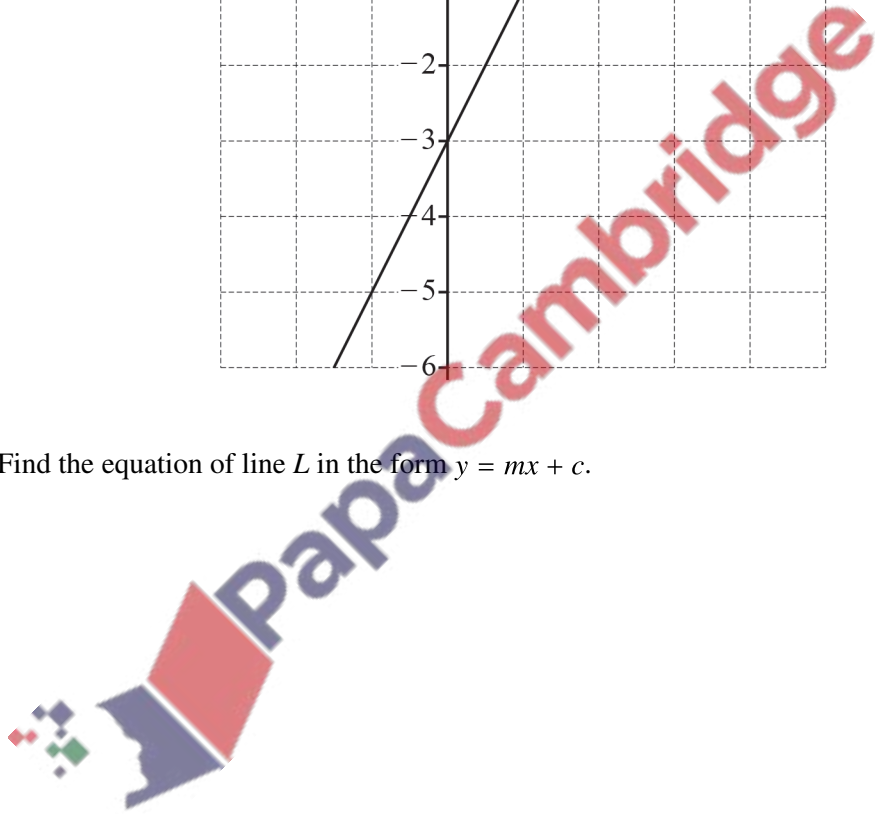# Mathematics D (4024)

Coordinate Geometry

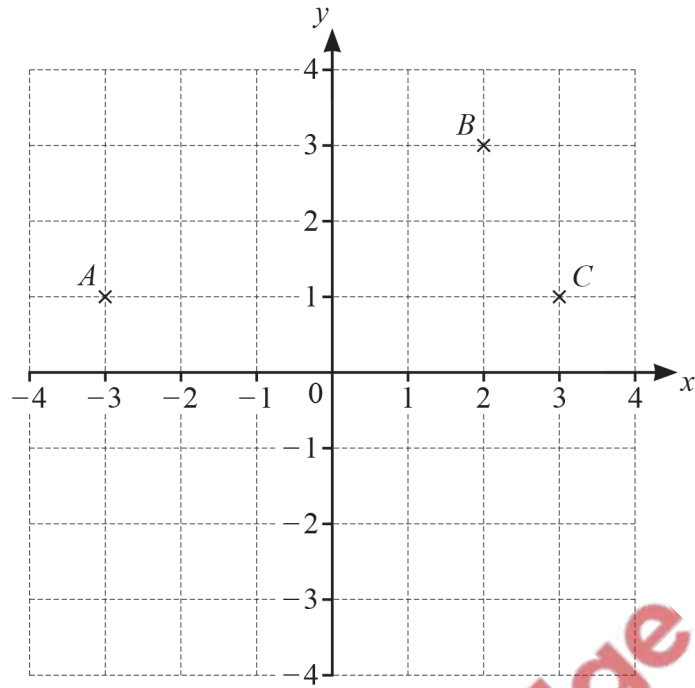1st edition, for examination until 2025

1

(a) Find the equation of line *L* in the form $y = mx + c$.

$y =$ .... [2]

(b) On the grid, draw a line that is perpendicular to line *L*. [1]

[Total: 3]

2

Points *A*, *B* and *C* are shown on the grid.

(a) Write down the coordinates of point *C*.

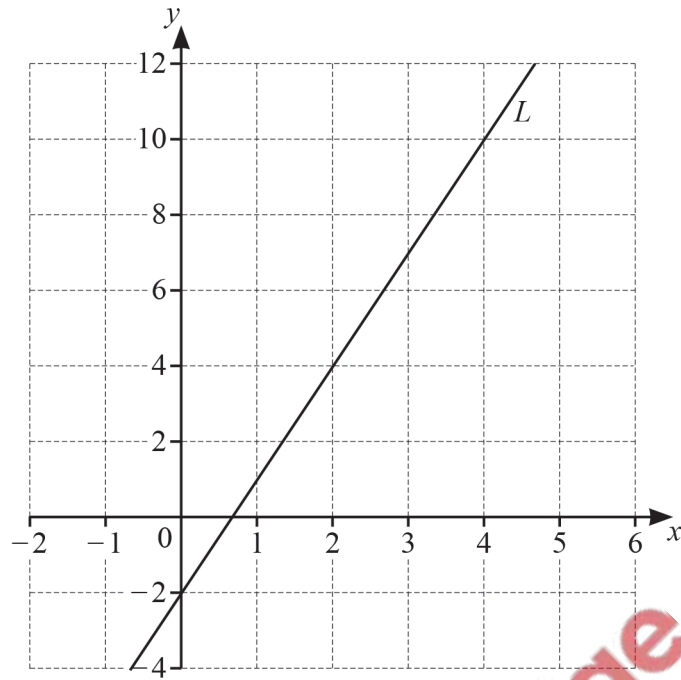(............................ , ...) [1]

(b) On the grid, plot point *D* so that *ABCD* is a parallelogram. [1]

(c) On the grid, plot point *E* so that $\overrightarrow{EA} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$. [2]

[Total: 4]

3

(a) Find the gradient of line *L*.

.... [2]

(b) Write down the equation of line *L* in the form $y = mx + c$.

y = ... [1]

[Total: 3]

4 **(a)** Complete the table of values for $y = 7 + 2x - x^2$.

x	-2	-1	0	1	2	3	4
y	-1			8	7		-1

[2]
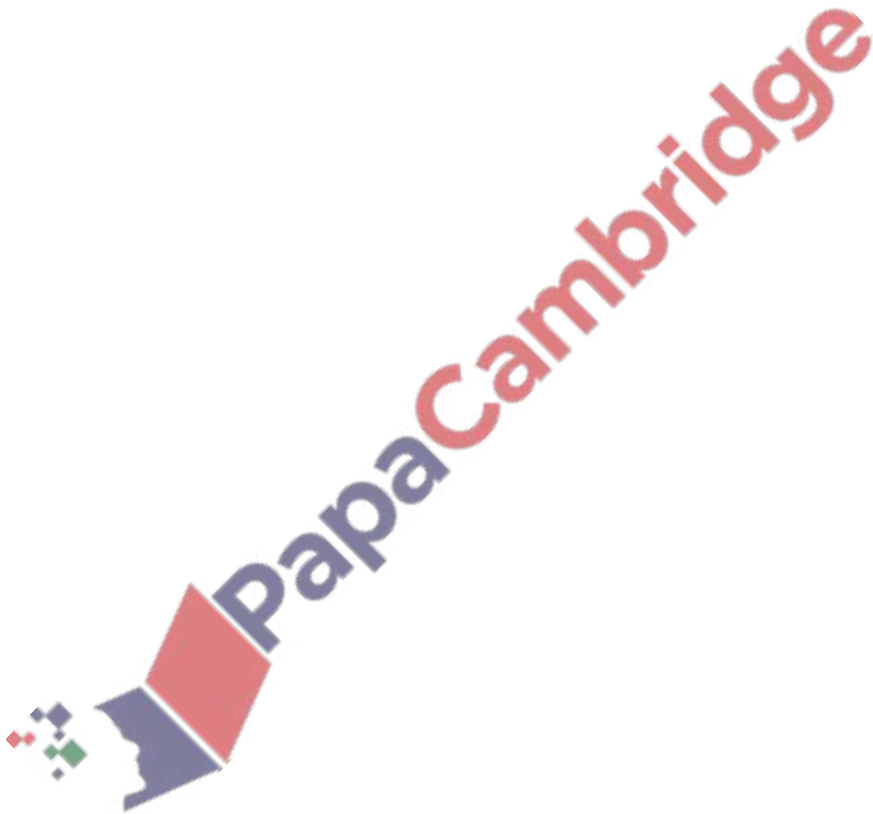
(b) On the grid, draw the graph of $y = 7 + 2x - x^2$ for $-2 \leqslant x \leqslant 4$.

[4]
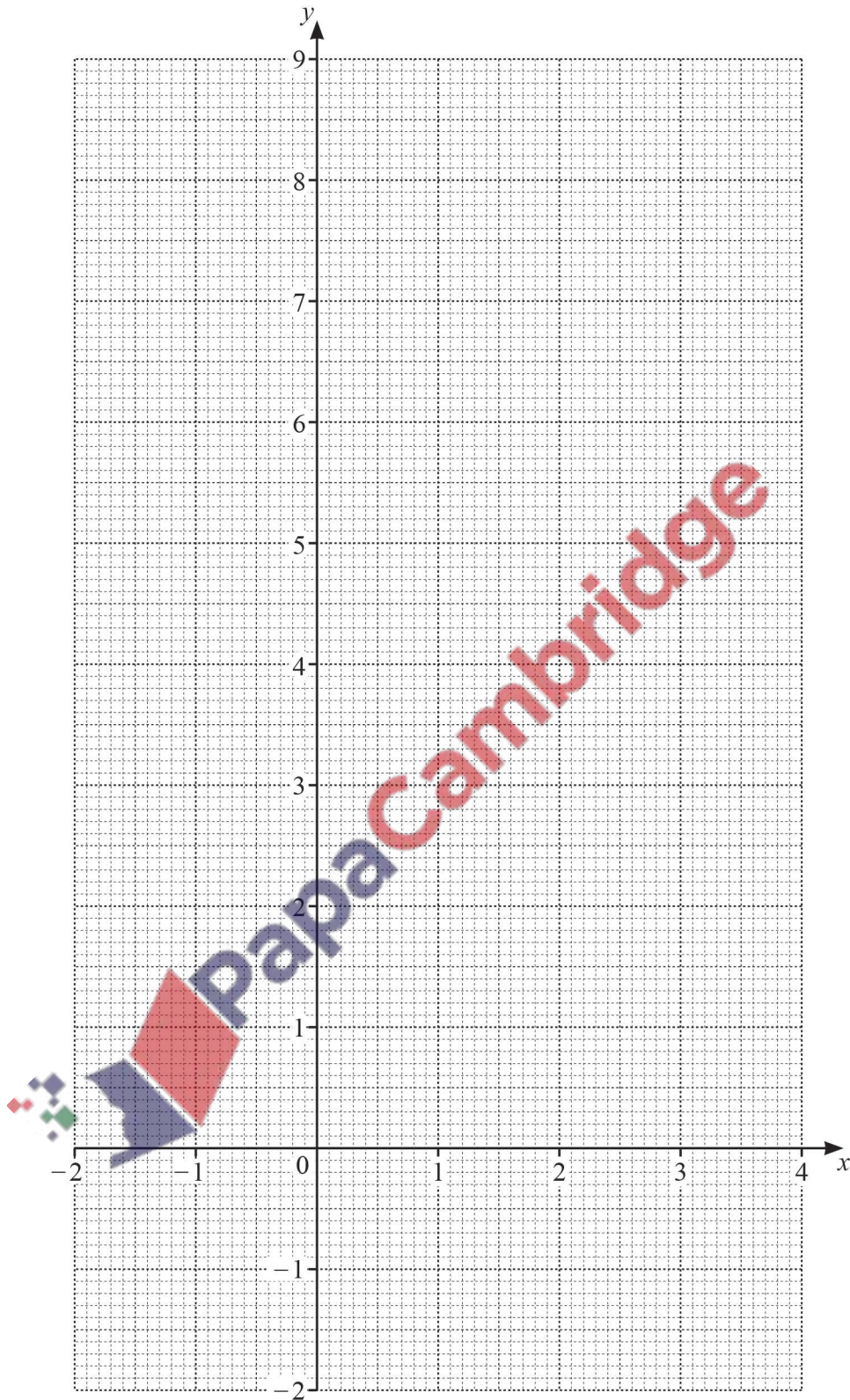
(c) Write down the equation of the line of symmetry of the graph.

.... [1]

(d) Use your graph to solve the equation $7 + 2x - x^2 = 0$.

$x =$ .... or $x =$ .... [2]

[Total: 9]

5 The grid shows a point E and four quadrilaterals, A, B, C and D.
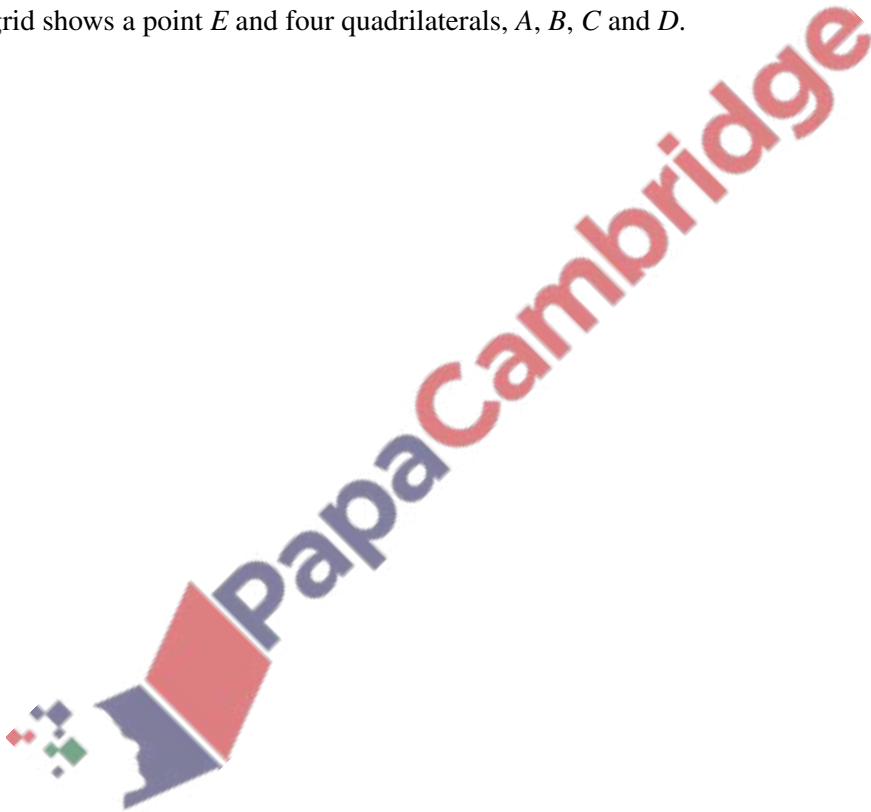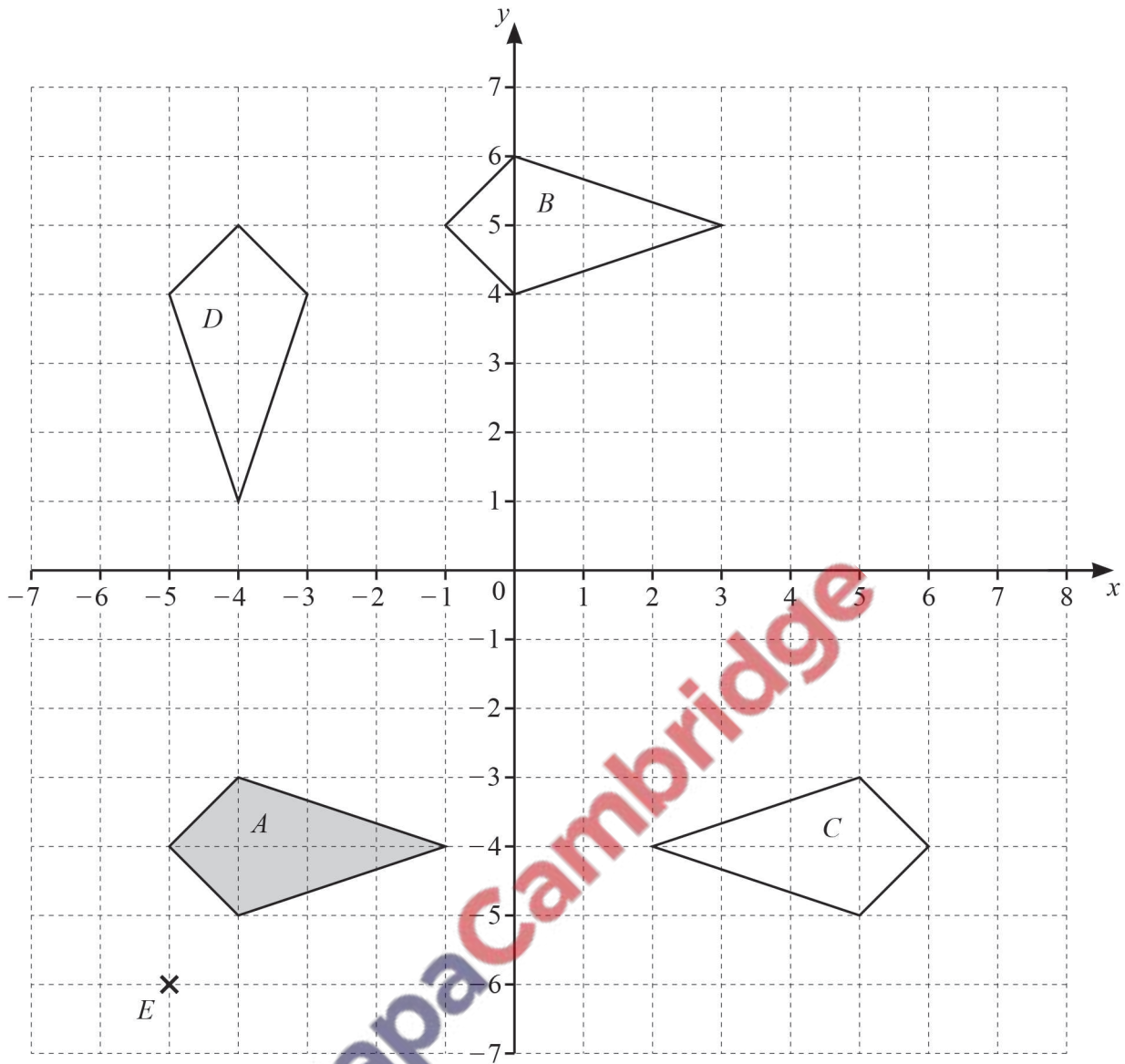
(a) Write down the mathematical name of shape *A*.

.... [1]

(b) Describe fully the **single** transformation that maps

    (i) shape *A* onto shape *B*,

    ....

    .... [2]

    (ii) shape *A* onto shape *C*,

    ....

    .... [2]

(iii) shape *A* onto shape *D*.

....

.... [3]

(c) **(i)** Write down the coordinates of the point *E*.

(.............................. , ...) [1]

(ii) On the grid, draw the image of shape *A* after an enlargement by scale factor 3, centre *E*. [2]

[Total: 11]

6 The diagram shows a line *AB* on a 1 cm² grid.
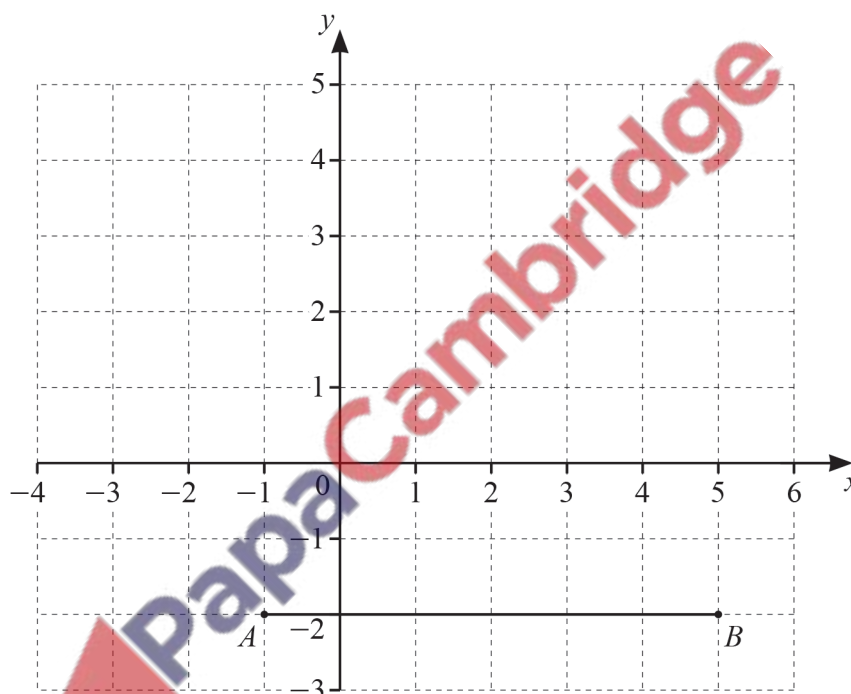
(a) Write down the coordinates of point *A*.

(.................... , ...) [1]

(b) Write down the vector $\overrightarrow{AB}$.

$\begin{pmatrix} \ \end{pmatrix}$ [1]

(c) $\overrightarrow{BC} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$

Mark point *C* on the grid. [1]

(d) **(i)** Work out $\overrightarrow{AB} + \overrightarrow{BC}$.

$$\begin{pmatrix} \\ \end{pmatrix}$$ [1]

(ii) Complete this statement.

$$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{}$$

. . . .

[1]

(e) *A*, *B* and *C* are three vertices of a parallelogram, *ABCD*.

(i) Mark point *D* on the diagram and draw the parallelogram *ABCD*. [1]

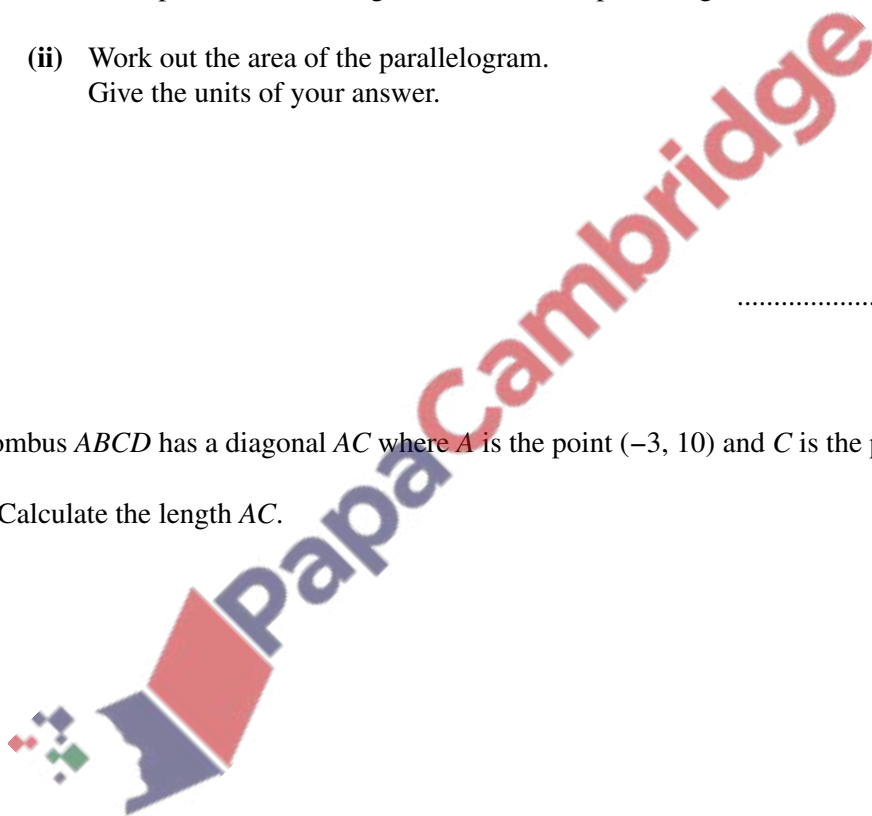**(ii)** Work out the area of the parallelogram.
Give the units of your answer.

.... [2]

[Total: 8]

7 A rhombus *ABCD* has a diagonal *AC* where *A* is the point (−3, 10) and *C* is the point (4, −4).
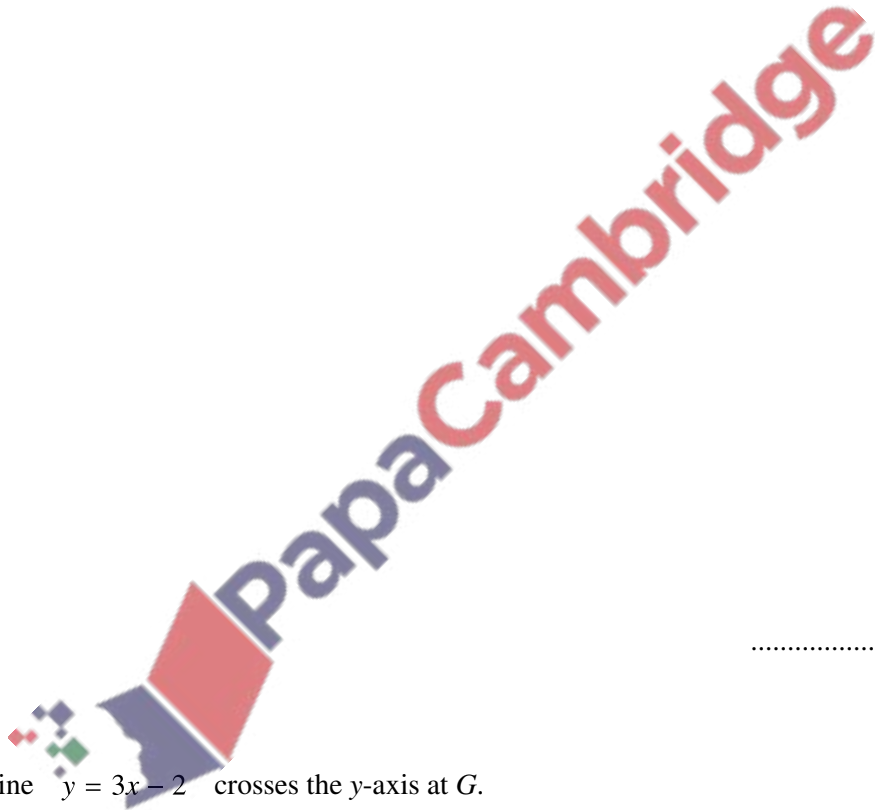
(a) Calculate the length *AC*.

.... [3]

(b) Show that the equation of the line *AC* is $y = -2x + 4$.

[2]

(c) Find the equation of the line *BD*.

.... [4]

[Total: 9]

8 The line $y = 3x - 2$ crosses the *y*-axis at *G*.

Write down the coordinates of *G*.

(.................... , ...) [1]

[Total: 1]

9 The equation of line *L* is $3x - 8y + 20 = 0$.

(a) Find the gradient of line *L*.

.... [2]

(b) Find the coordinates of the point where line *L* cuts the *y*-axis.

(.................... , ...) [1]

[Total: 3]

10 The coordinates of *P* are $(-3, 8)$ and the coordinates of *Q* are $(9, -2)$.

(a) Calculate the length *PQ*.

.... [3]

(b) Find the equation of the line parallel to *PQ* that passes through the point $(6, -1)$.

.... [3]
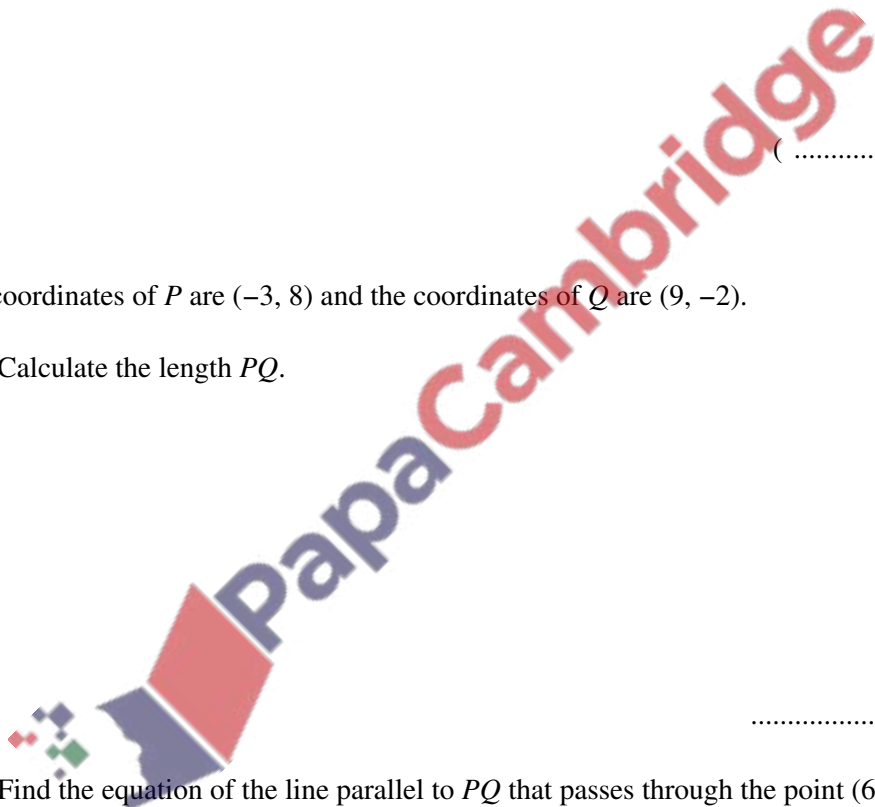
(c) Find the equation of the perpendicular bisector of *PQ*.

.... [4]

[Total: 10]

11 The line *L* is shown on the grid.
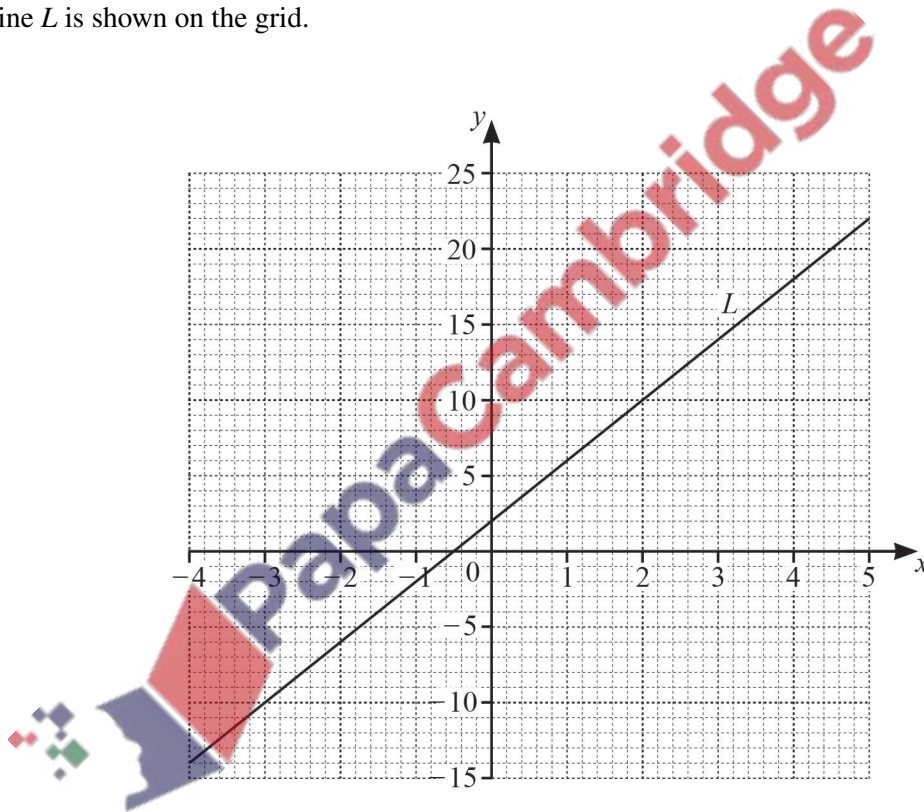
(a) Find the equation of the line *L* in the form $y = mx + c$.

$y =$ .... [3]

(b) The equation of a different line is $y = 3x - 4$.

    (i) Write down the gradient of this line.

                              .... [1]

    (ii) Write down the co-ordinates of the point where this line crosses the *y*-axis.

                    (.............................. , ...) [1]

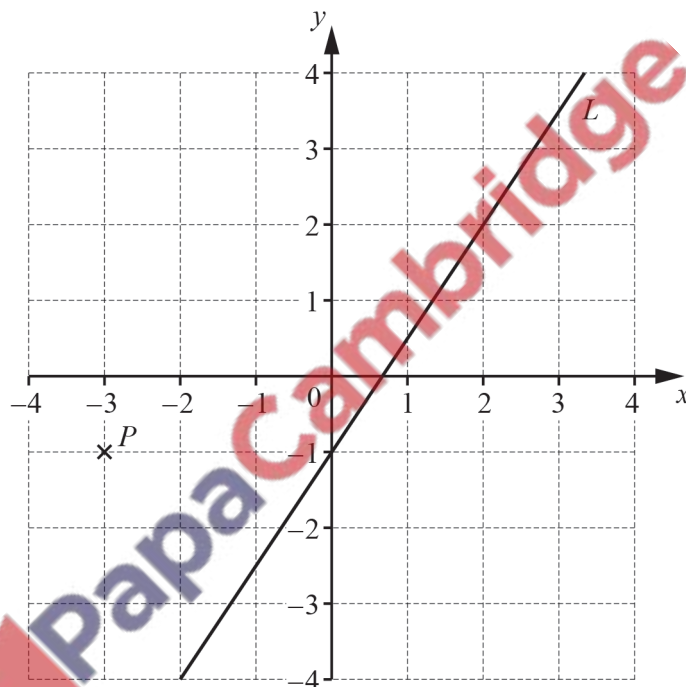**(c)** On the grid, draw the graph of $y = -2x + 1$ for $-4 \leqslant x \leqslant 5$.   [3]

                                              [Total: 8]

12 The diagram shows a point *P* and a line *L*.

(a) Write down the co-ordinates of point *P*.

                    (.............................. , ...) [1]

(b) Find the gradient of line *L*.

                              .... [2]

(c) Write down the equation of line *L* in the form $y = mx + c$.

$y =$ .... [2]

[Total: 5]

13 Find the co-ordinates of the point where the line $y = 3x - 8$ crosses the *y*-axis.

(............................. , ...) [1]

[Total: 1]

14 Line *L* passes through the points $(0, -3)$ and $(6, 9)$.

(a) Find the equation of line *L*.

.... [3]

(b) Find the equation of the line that is perpendicular to line *L* and passes through the point $(0, 2)$.

.... [2]

[Total: 5]

15 Write down the gradient of the line $y = 3x - 8$.
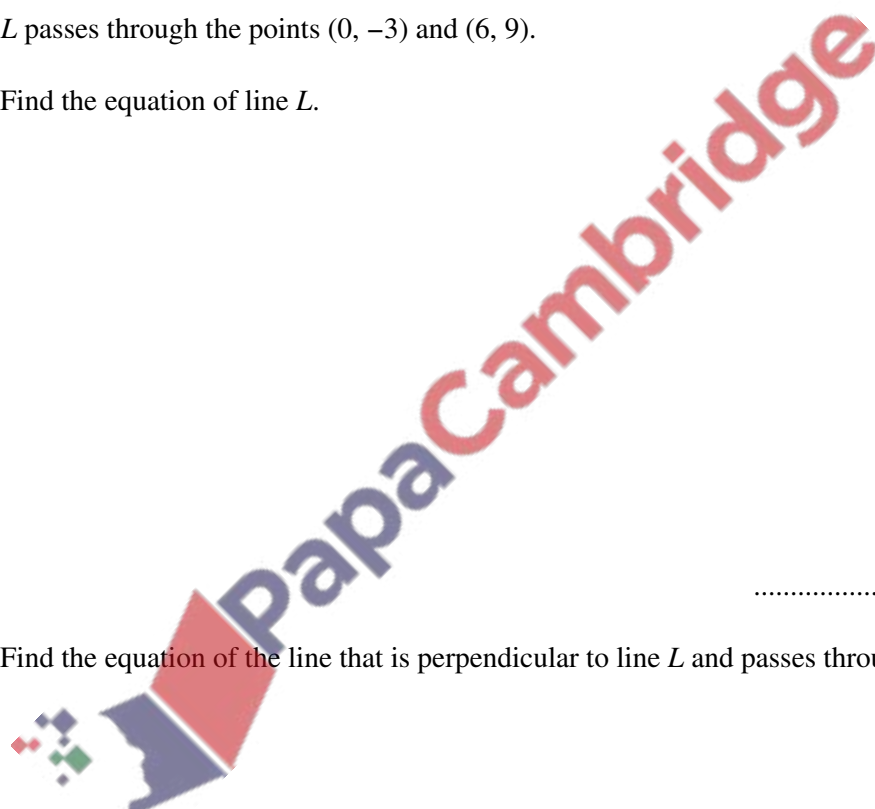
.... [1]

16 *A* is the point (7, 12) and *B* is the point (2, −1).

Find the length of *AB*.

.... [3]

[Total: 3]

17 Write down the equation of the straight line that

- passes through the origin

and

- is parallel to $y = 6x - 3$.

.... [1]

[Total: 1]

18 Write down the co-ordinates of the point where the line $y = 6x - 3$ crosses the *y*-axis.

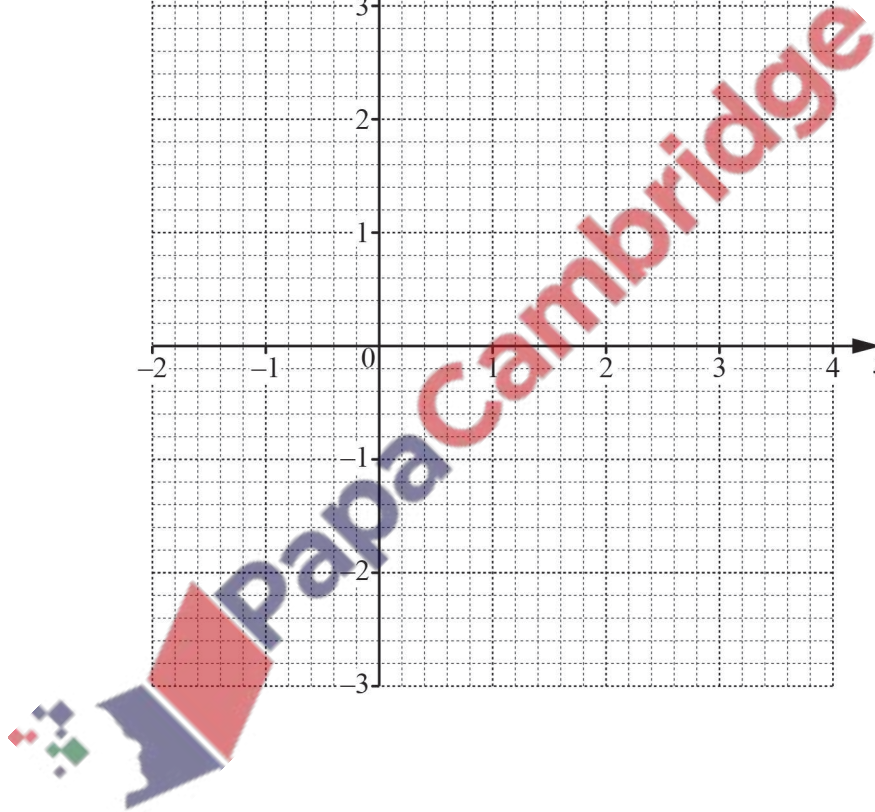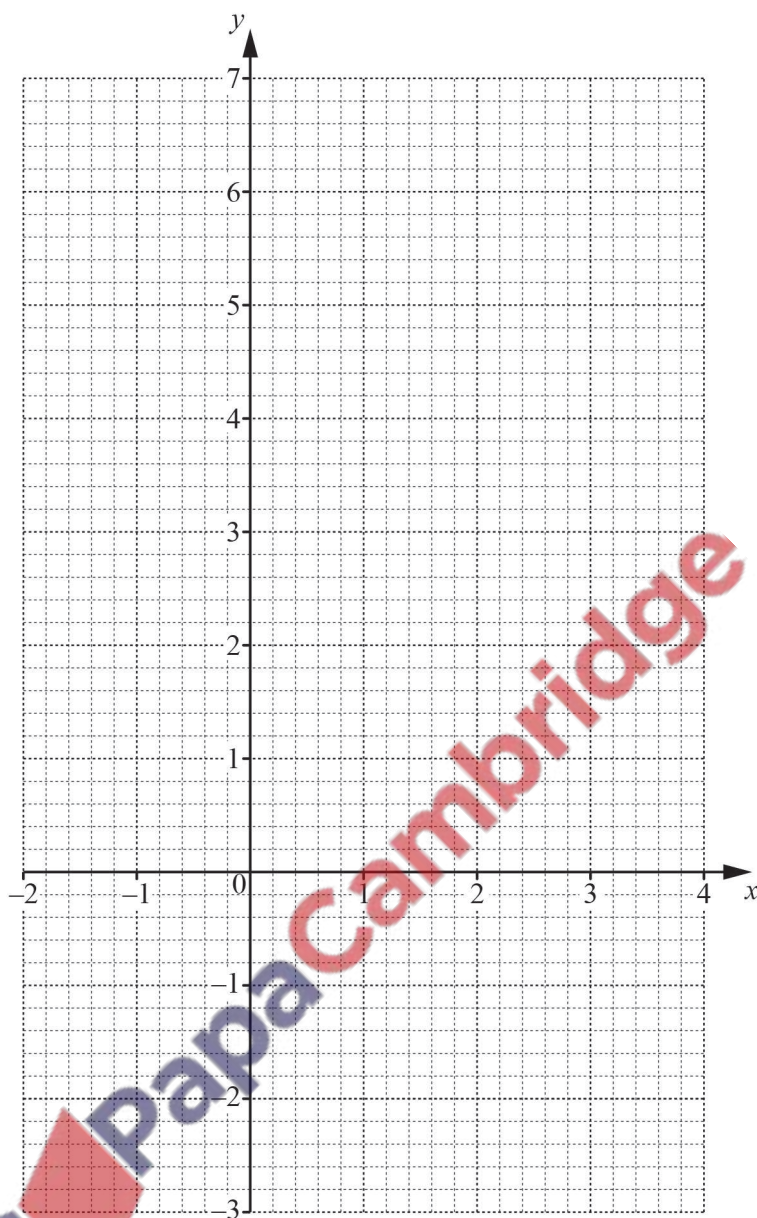(............................. , ...) [1]

[Total: 1]

19 (a) Complete the table of values for $y = 5 + 2x - x^2$.

x	−2	−1	0	1	2	3	4
y		2	5	6			−3

[2]

(b) On the grid, draw the graph of $y = 5 + 2x - x^2$ for $-2 \leqslant x \leqslant 4$.

[4]

(c) **(i)** On the grid, draw the line of symmetry. [1]

(ii) Write down the equation of the line of symmetry.

.... [1]

(d) Use your graph to find the solutions of the equation $5 + 2x - x^2 = 4$.

$x =$ .... or $x =$ .... [2]
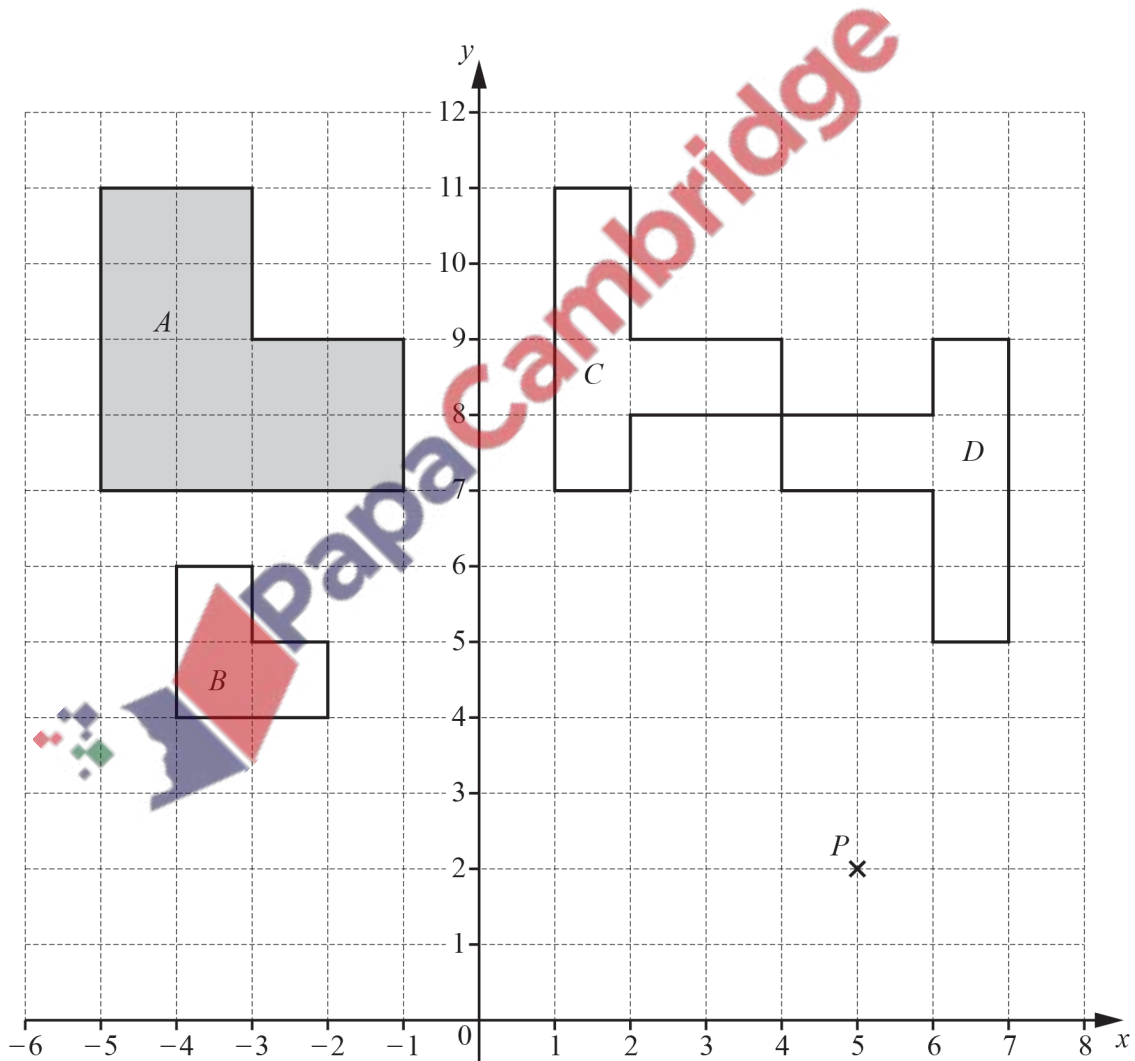
(e) **(i)** On the grid, draw a line from $(-1, 2)$ to $(1, 6)$. [1]

(ii) Find the equation of this line in the form $y = mx + c$.

$y = $ .... [3]

[Total: 14]

20 The diagram shows four shapes A, B, C and D and a point P on a 1 cm^2 grid.

(a) Find

    (i) the perimeter of shape *A*,

.... cm   [1]

    (ii) the area of shape *A*.

.... cm^2 [1]

(b)   **(i)** Write down the co-ordinates of point *P*.

(............................. , ...)   [1]

    (ii) Find the co-ordinates of the image of point *P* when

        A   *P* is reflected in the *y*-axis,

(............................. , ...)   [1]

        B   *P* is reflected in the line $y = 6$.

(............................. , ...)   [2]

    (iii) Find the vector that translates point *P* to the point $(49, -12)$.

$$\begin{pmatrix} \\ \end{pmatrix}$$ [2]

(c) Describe fully the **single** transformation that maps

    (i) shape *A* onto shape *B*,

....

....   [3]

    (ii) shape *C* onto shape *D*.

....

....   [3]

[Total: 14]

21 The points $(9, a)$ and $(b, 3)$ lie on the line $y = \dfrac{2}{3}x - 7$.
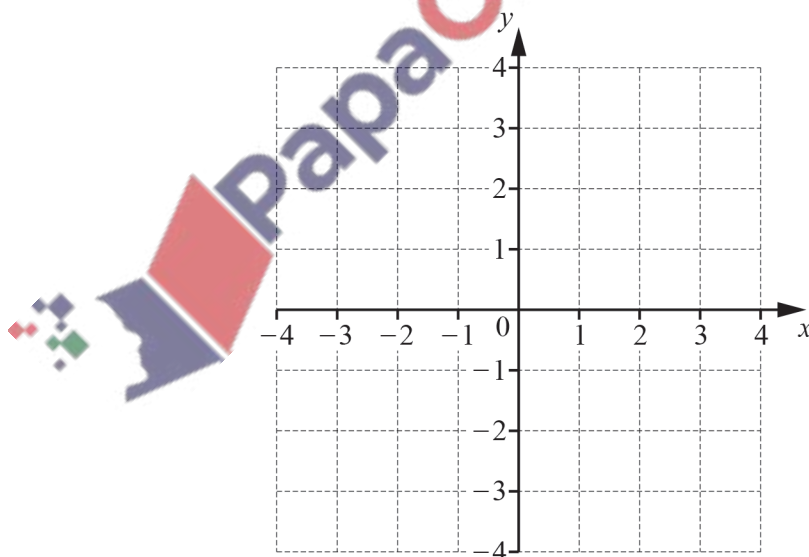
Work out the value of

(a) a,

$a =$ .... [2]

(b) b.

$b =$ .... [2]

[Total: 4]

22

(a) On the grid, draw the line through the point $(-3, -2)$ that is perpendicular to the y-axis.

[1]

(b) On the grid, draw the line $y = -2x$.

[1]

[Total: 2]

23 The equation of a straight line is $2y = 3x + 4$.

(a) Find the gradient of this line.

.... [1]

(b) Find the co-ordinates of the point where the line crosses the y-axis.

(................................. , ...) [1]

[Total: 2]

24 A is the point $(8, 5)$ and B is the point $(-4, 1)$.

(a) Calculate the length of AB.

.... [3]

(b) Find the co-ordinates of the midpoint of AB.

(............................. , ...) [2]

[Total: 5]

25 A straight line joins the points A $(-2, -3)$ and C $(1, 9)$.

(a) Find the equation of the line *AC* in the form $y = mx + c$.

y = ... [3]

(b) Calculate the acute angle between *AC* and the *x*-axis.

.... [2]

(c) *ABCD* is a kite, where *AC* is the longer diagonal of the kite.
B is the point (3.5, 2).

    (i) Find the equation of the line *BD* in the form $y = mx + c$.

y = ... [3]

    (ii) The diagonals *AC* and *BD* intersect at (−0.5, 3).

    Work out the co-ordinates of *D*.

(............................ , ...) [2]

[Total: 10]

26 The diagram shows a straight line *L*.
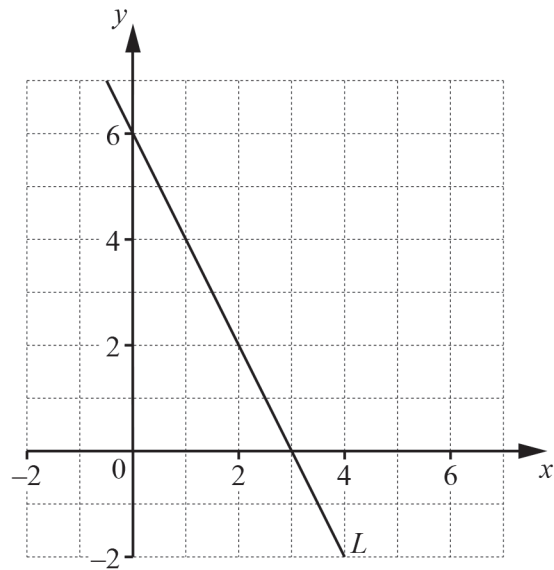
(a) Find the equation of line L.

.... [3]

(b) Find the equation of the line perpendicular to line L that passes through $(9, 3)$.

.... [3]

[Total: 6]
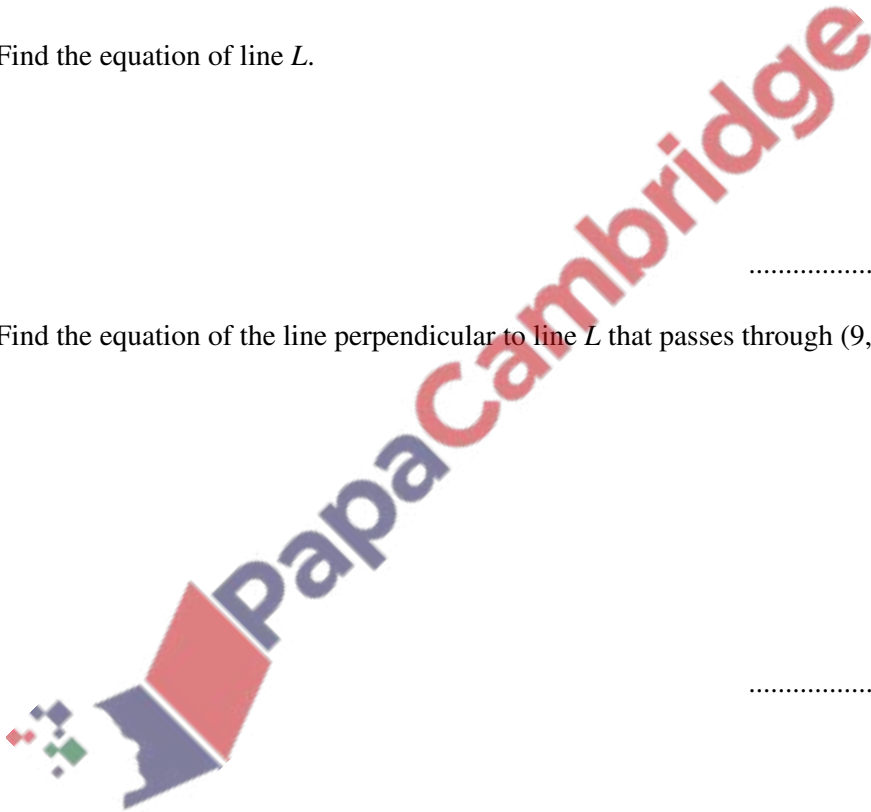
27 *A* is the point (2, 3) and *B* is the point (7, −5).

Find the equation of the line through *A* that is perpendicular to *AB*.
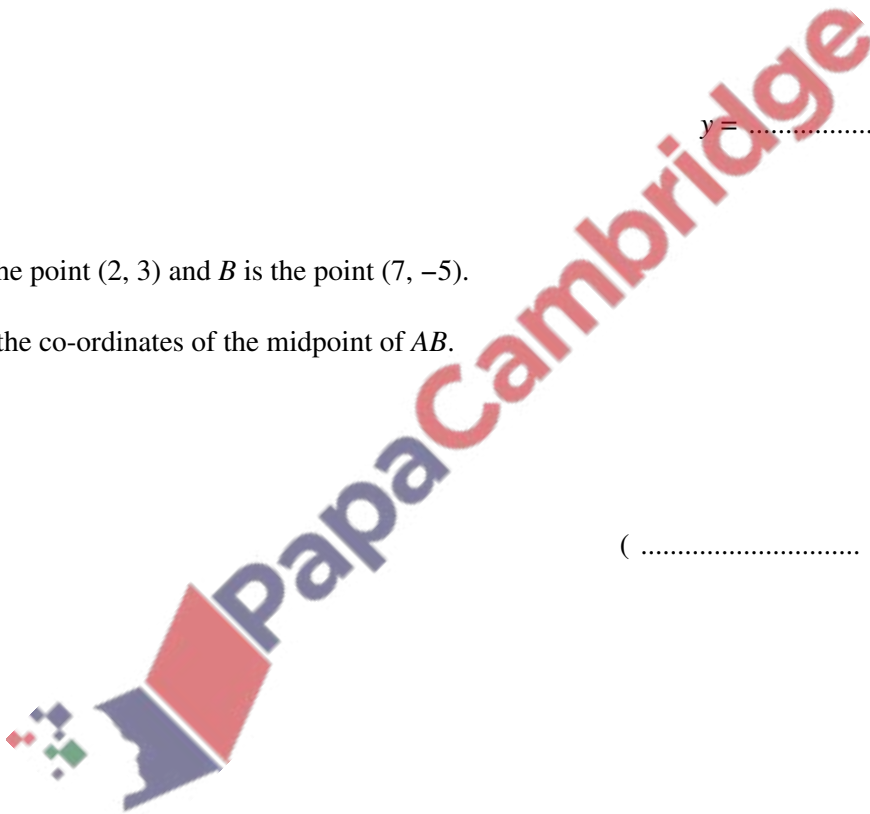Give your answer in the form $y = mx + c$.

$y =$ .... [4]

[Total: 4]

28 *A* is the point (2, 3) and *B* is the point (7, −5).

Find the co-ordinates of the midpoint of *AB*.

(............................ , ...) [2]

[Total: 2]

29
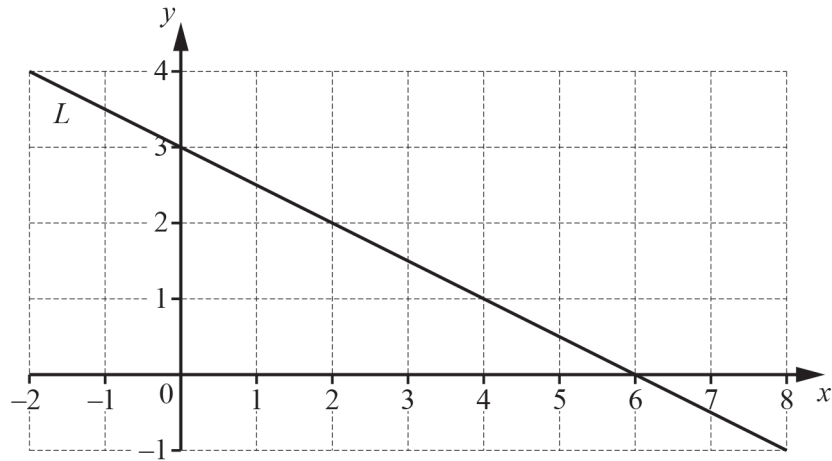
Line *L* is drawn on the grid.

Find the equation of line *L*.
Give your answer in the form $y = mx + c$.

$y =$ .... [3]

[Total: 3]
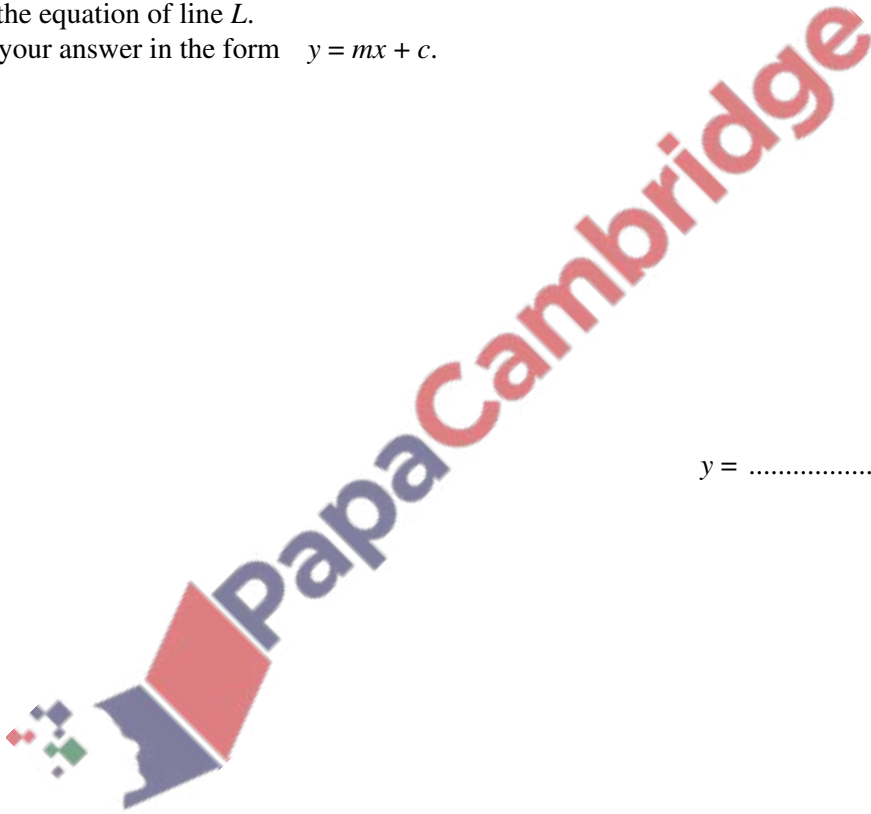
30
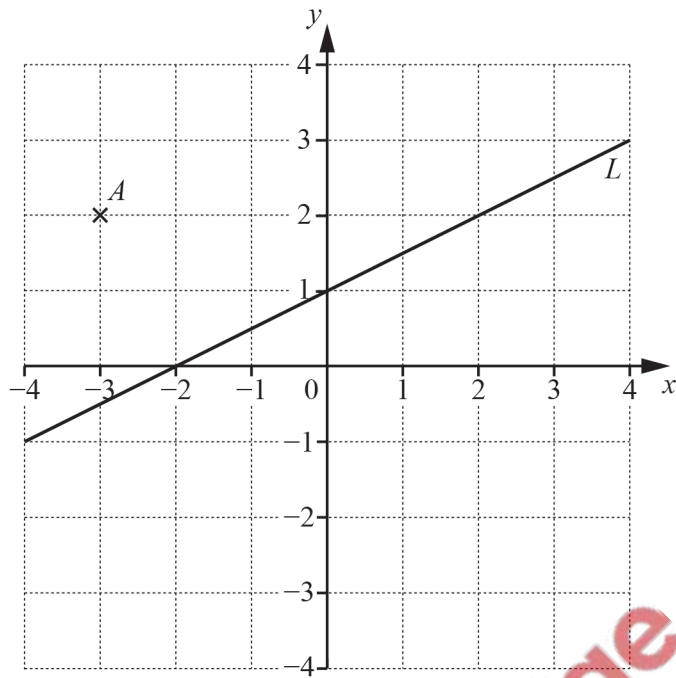
(a) Find the gradient of line *L*.

.... [2]

(b) Find the equation of line *L* in the form $y = mx + c$.

y = ... [1]

[Total: 3]

31
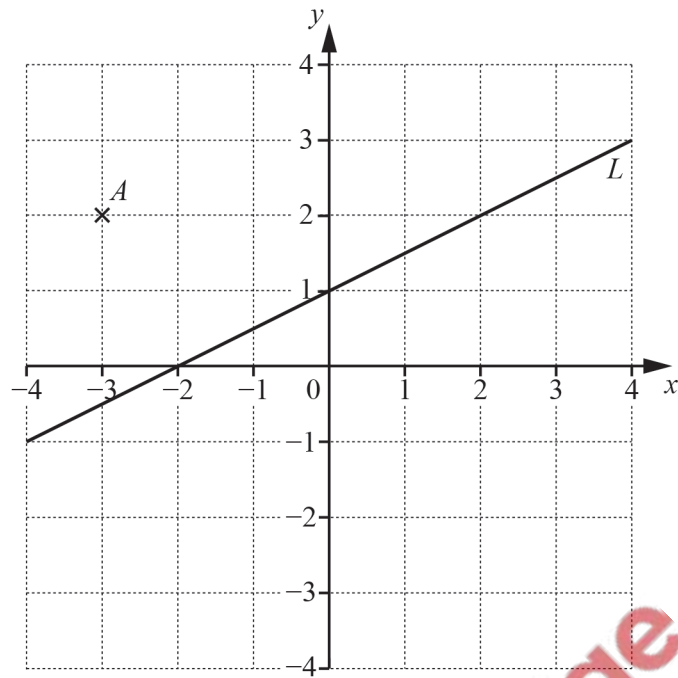
(a) Write down the co-ordinates of point *A*.

(.................... , ...) [1]

(b) On the grid, plot point *B* (1, –3).   [1]

[Total: 2]

32
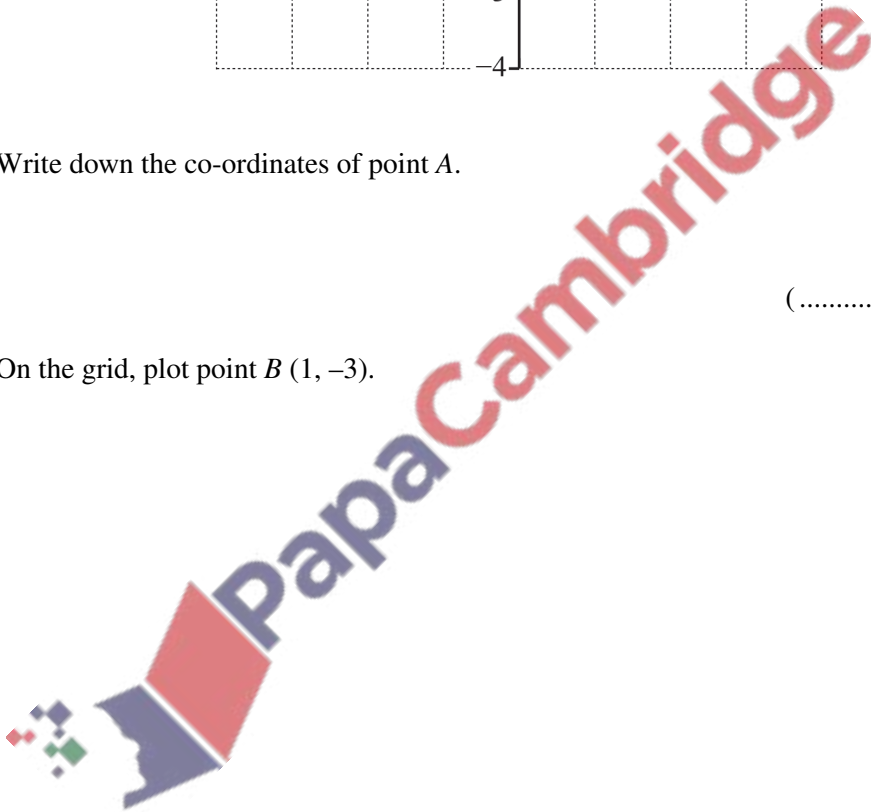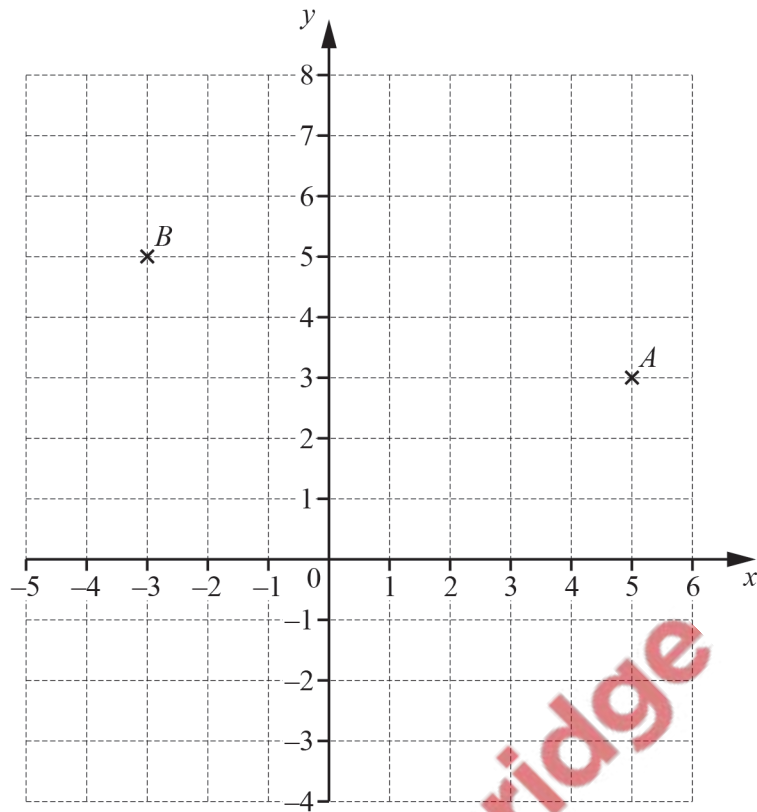
(a) Write down the co-ordinates of point *A*.

(.................... , ...) [1]

(b) Plot the point *C* at (4, −3). [1]

(c) Find the vector $\overrightarrow{AB}$.
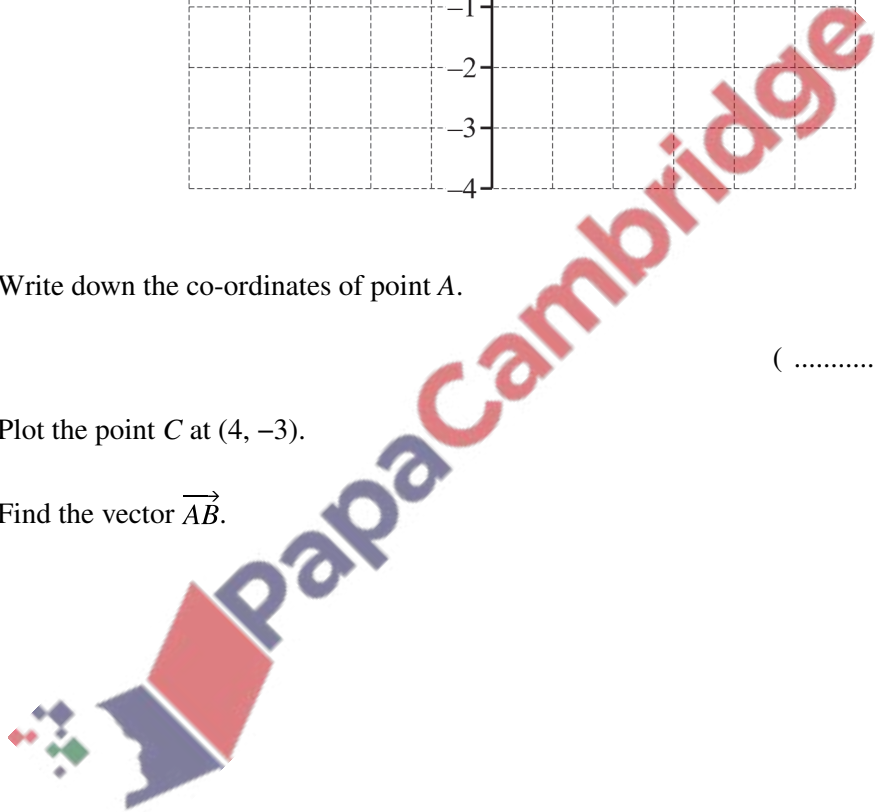
$\overrightarrow{AB} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

[Total: 3]

33 For the line $y = 4x - 6$, write down

(a) the gradient,

.... [1]

(b) the *y*-intercept.

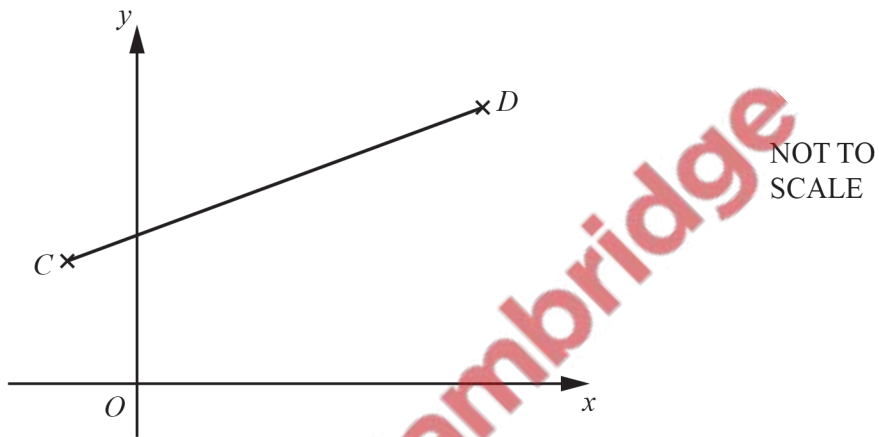... [1]

[Total: 2]

34 Find the mid-point of *AB* where *A* = (*w*, *r*) and *B* = (3*w*, *t*).
Give your answer in its simplest form in terms of *w*, *r* and *t*.

(............................. , ...) [2]
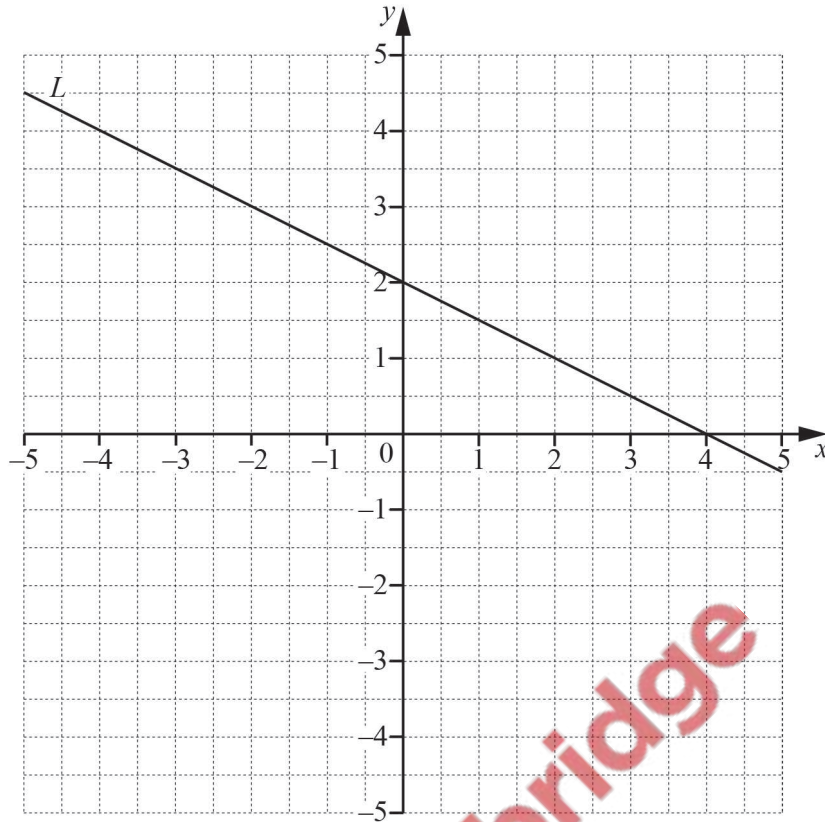
[Total: 2]

35

The diagram shows the points *C*(–1, 2) and *D*(9, 7).

Find the equation of the line perpendicular to *CD* that passes through the point (1, 3).
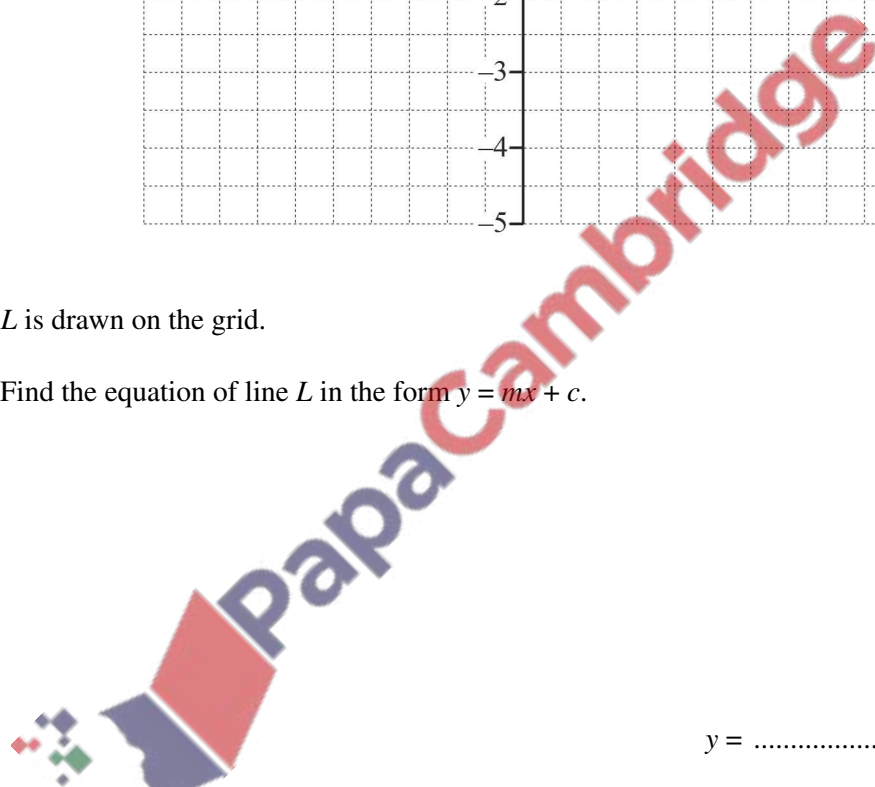Give your answer in the form *y* = *mx* + *c*.

y = ... [4]

[Total: 4]

36

Line *L* is drawn on the grid.

(a) Find the equation of line *L* in the form $y = mx + c$.

y = ... [3]
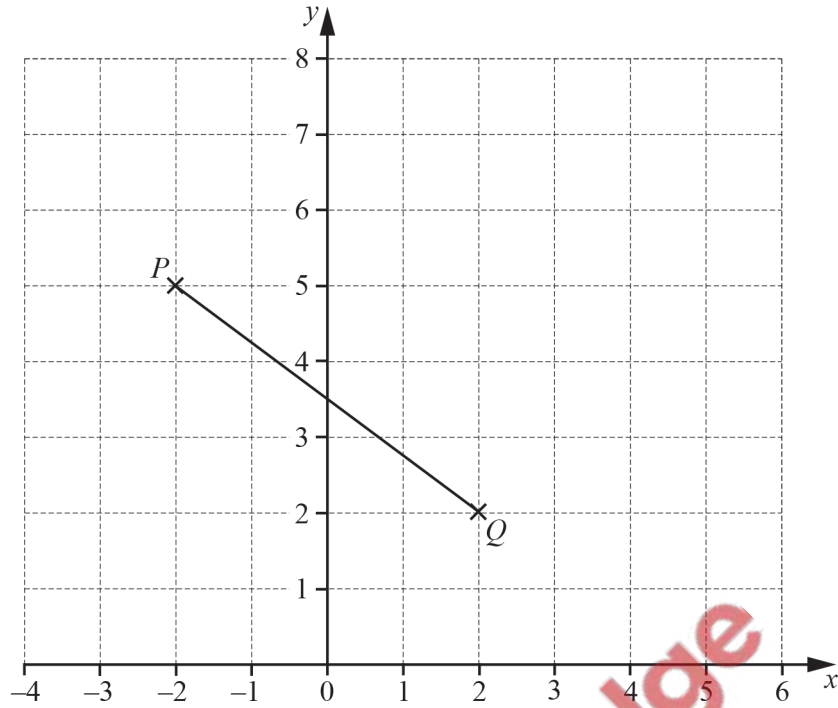
(b) Line *P* is parallel to line *L* and passes through the point (0, −1).

On the grid above, draw line *P* for $-5 \leqslant x \leqslant 5$. [2]

[Total: 5]

37

(a) Write down the co-ordinates of point *P*.

(........................... , ...) [1]

(b) Write down the column vector $\overrightarrow{PQ}$.

$$\overrightarrow{PQ} = \begin{pmatrix} \\ \end{pmatrix}$$ [1]

(c) $\overrightarrow{QR} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$

On the grid, plot point *R*. [1]
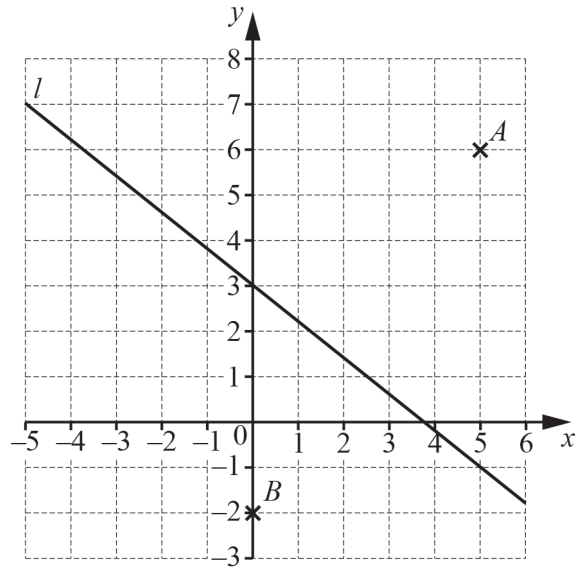
(d) *PQRS* is a parallelogram.

On the grid, complete the parallelogram *PQRS*.
Write down the co-ordinates of point *S*.

(........................... , ...) [2]

[Total: 5]

38

(a) Write down the co-ordinates of *A*.

(..................... , ...) [1]

(b) Find the equation of line *l* in the form $y = mx + c$.

$y =$ .... [3]

(c) Write down the equation of the line parallel to line *l* that passes through the point *B*.

.... [2]

(d) *C* is the point (8, 14).

(i) Write down the equation of the line perpendicular to line *l* that passes through the point *C*.

.... [3]

(ii) Calculate the length of *AC*.

.... [3]

(iii) Find the co-ordinates of the mid-point of *BC*.

(.................... , ...) [2]

[Total: 14]

39 The table shows some values of $y = x^3 - 3x - 1$.

x	-3	-2.5	-2	-1.5	-1	0	1	1.5	2	2.5	3
y	-19	-9.1		0.1	1	-1	-3	-2.1	1	7.1	

(a) Complete the table of values. [2]
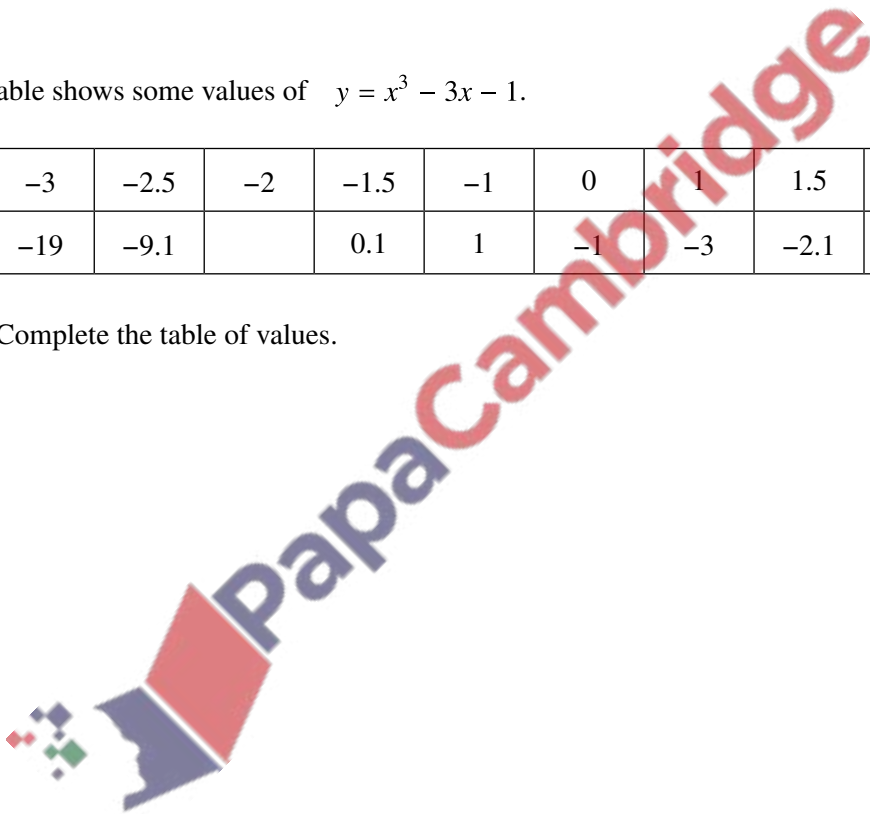
(b) Draw the graph of $y = x^3 - 3x - 1$ for $-3 \leqslant x \leqslant 3$.
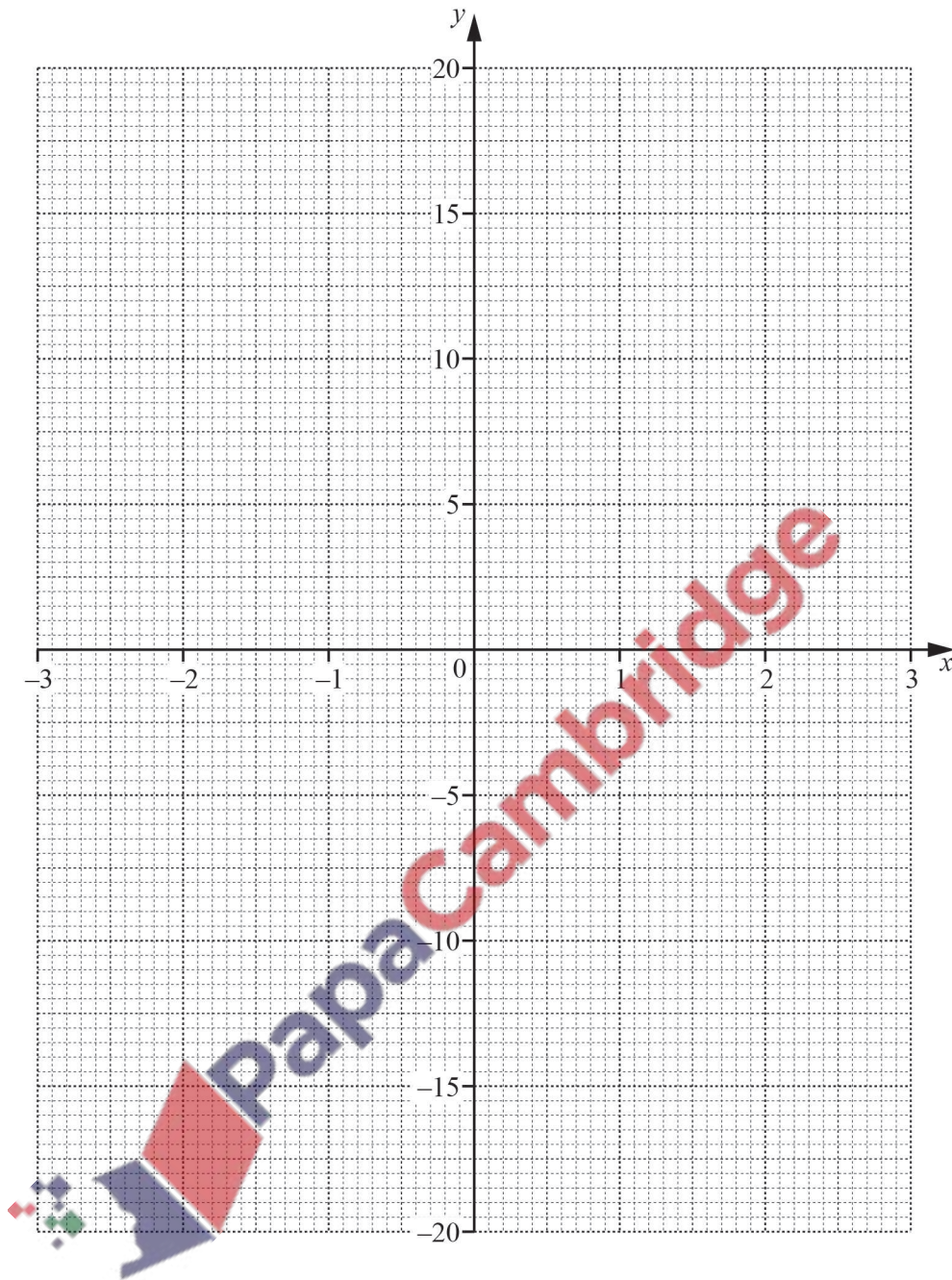
[4]

(c) A straight line through $(0, -17)$ is a tangent to the graph of $y = x^3 - 3x - 1$.

    (i) On the grid, draw this tangent. [1]

    (ii) Find the co-ordinates of the point where the tangent meets your graph.

                                                     (..................... , ...) [1]

(iii) Find the equation of the tangent.
Give your answer in the form $y = mx + c$.

$y =$ .... [3]

(d) By drawing a suitable straight line on the grid, solve the equation $x^3 - 6x - 3 = 0$.

$x =$ .... or $x =$ .... or $x =$ .... [4]

[Total: 15]

40
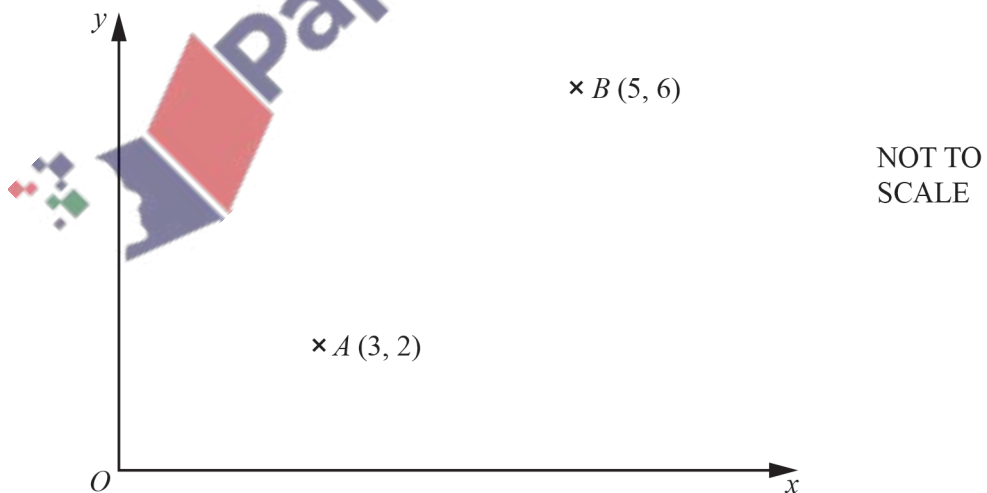
(a) Find the column vector $\overrightarrow{AB}$.

$\overrightarrow{AB} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) Find $\left|\overrightarrow{AB}\right|$.

$\left|\overrightarrow{AB}\right|$ = ... [2]

(c) *B* is the mid-point of the line *AC*.

Find the co-ordinates of *C*.

(............................. , ...) [2]

(d) Find the equation of the straight line that passes through *A* and *B*.

.... [3]

(e) The straight line that passes through *A* and *B* cuts the *y*-axis at *D*.

Write down the co-ordinates of *D*.

(............................. , ...) [1]

[Total: 9]