

Exam Questions

Linear Graphs

Equations of Straight Lines ($y = mx + c$) / Drawing Straight Line Graphs / Parallel Lines / Perpendicular Lines

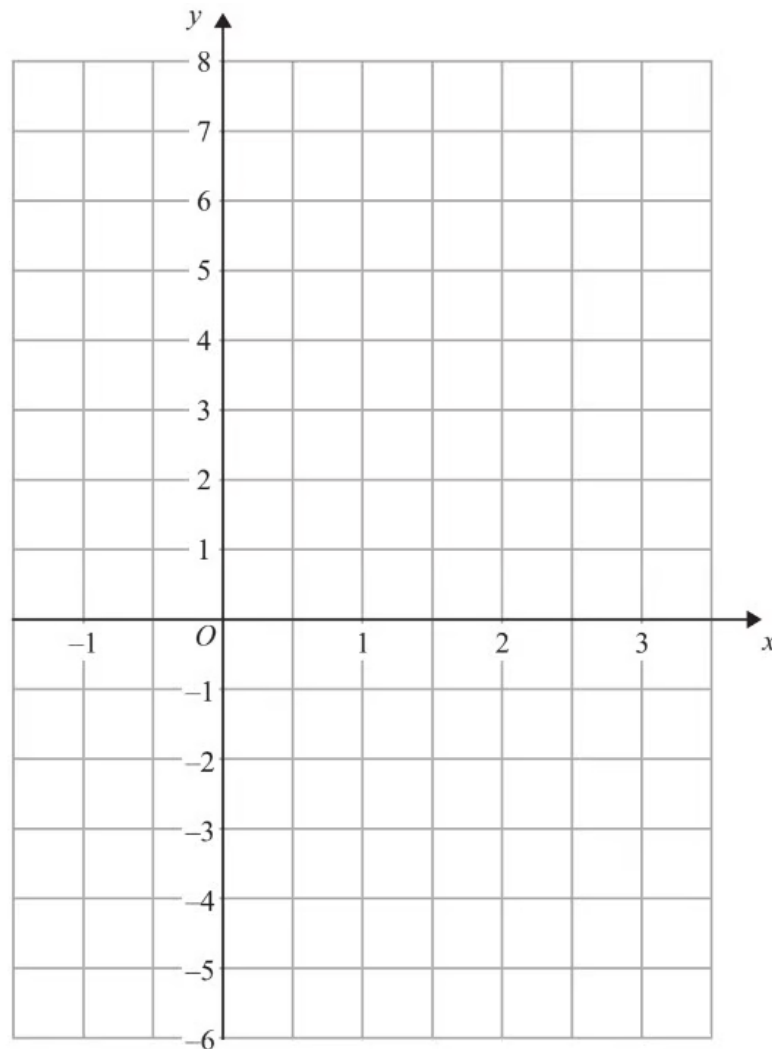
Easy (13 questions)	/31
Medium (17 questions)	/57
Hard (14 questions)	/60
Very Hard (12 questions)	/65
Total Marks	/213

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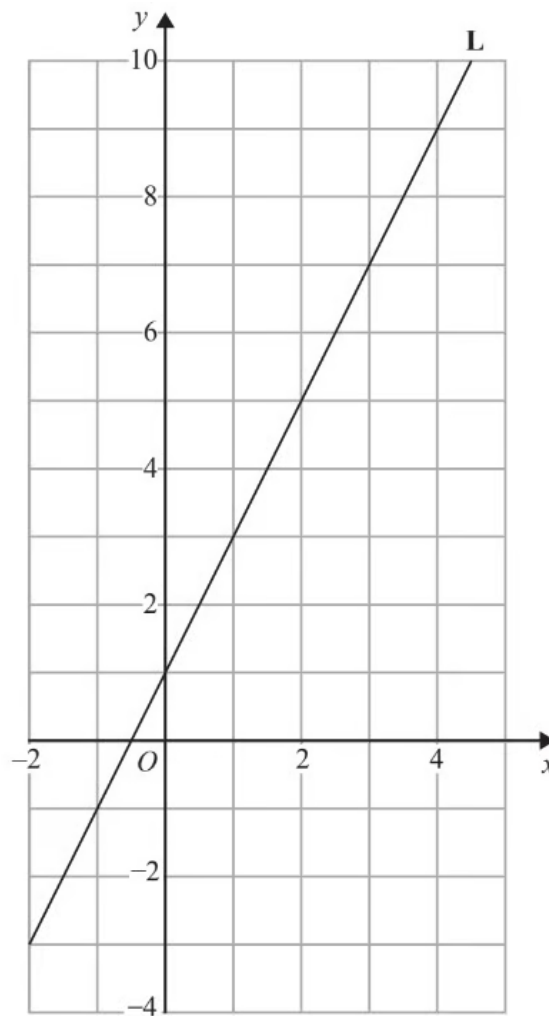
Easy Questions

- 1 On the grid, draw the graph of $y = 3x - 2$ for values of x from -1 to 3



(3 marks)

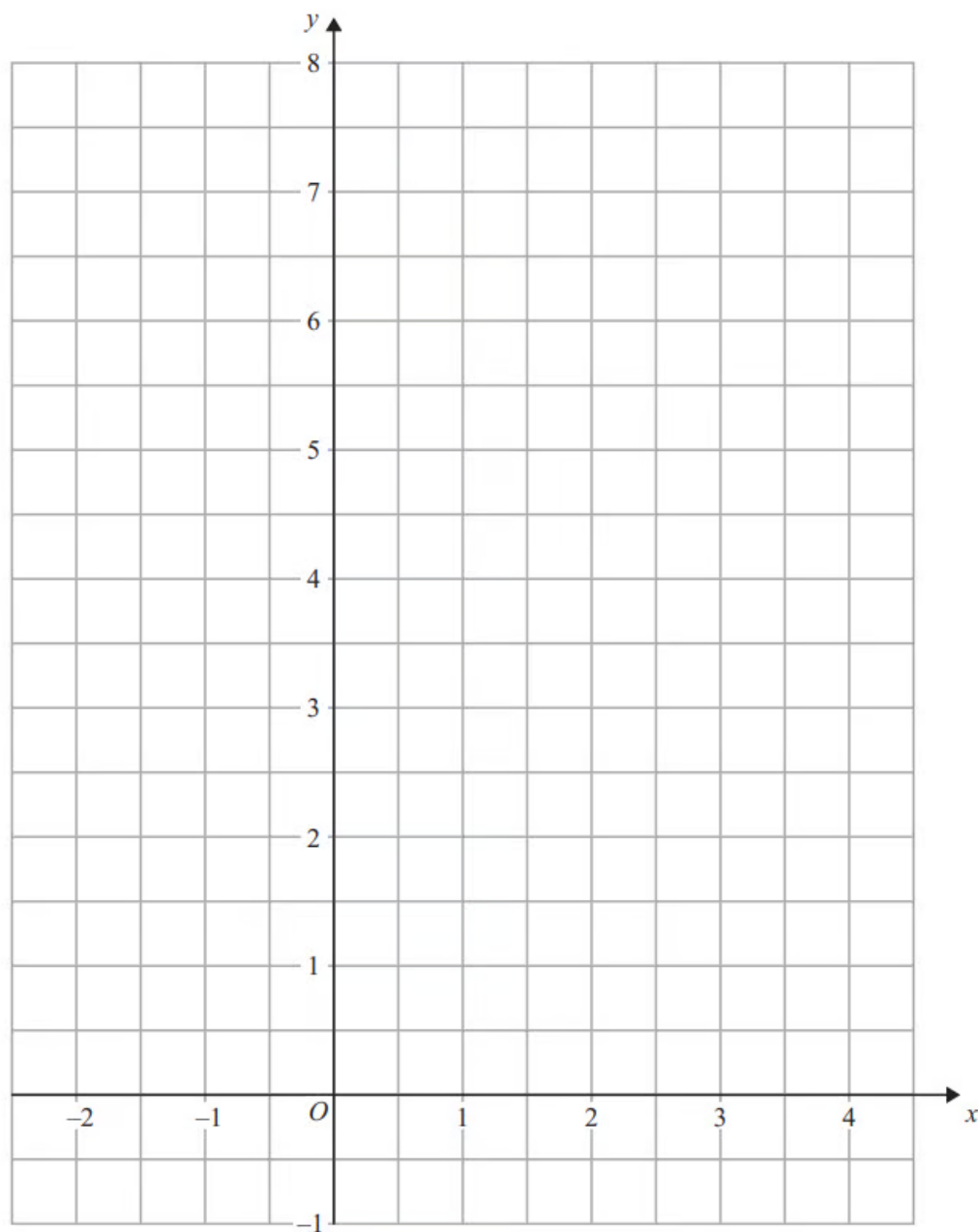
2 Line **L** is drawn on the grid below.



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

(3 marks)

- 3 On the grid, draw the graph of $y = \frac{1}{2}x + 5$ for values of x from -2 to 4



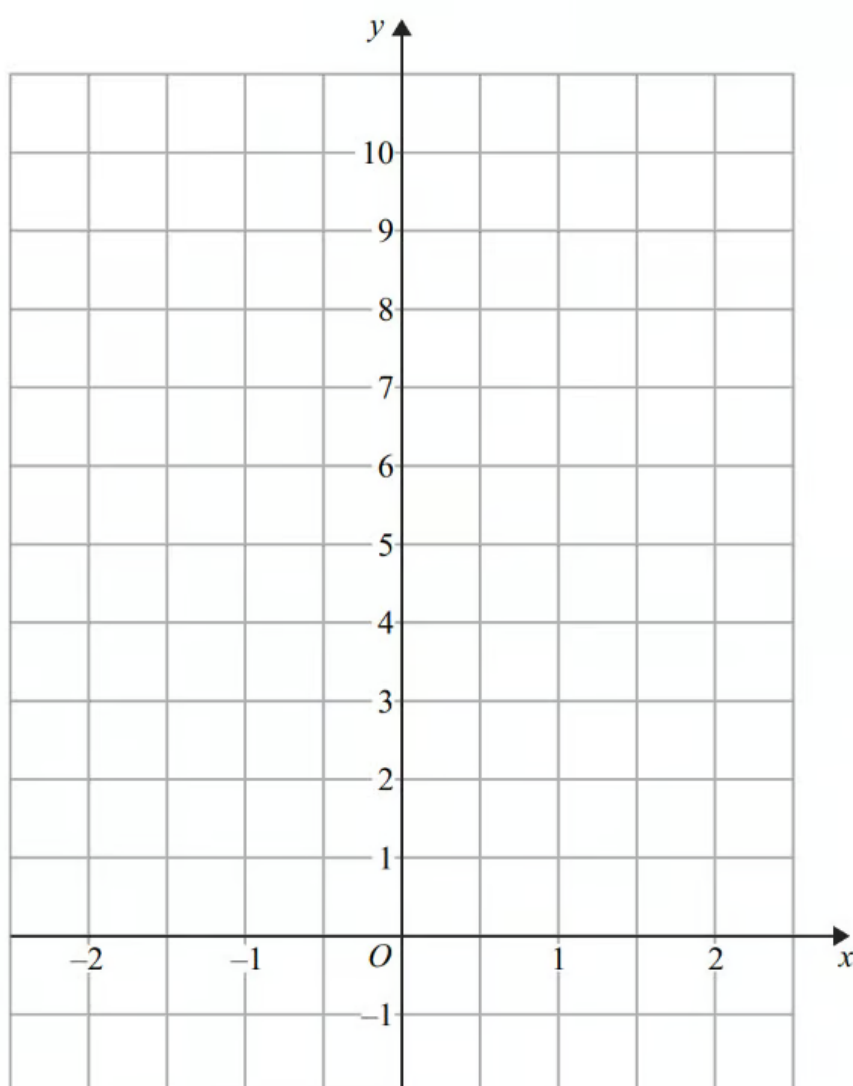
(3 marks)

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

x	-2	-1	0	1	2
y	1		5		

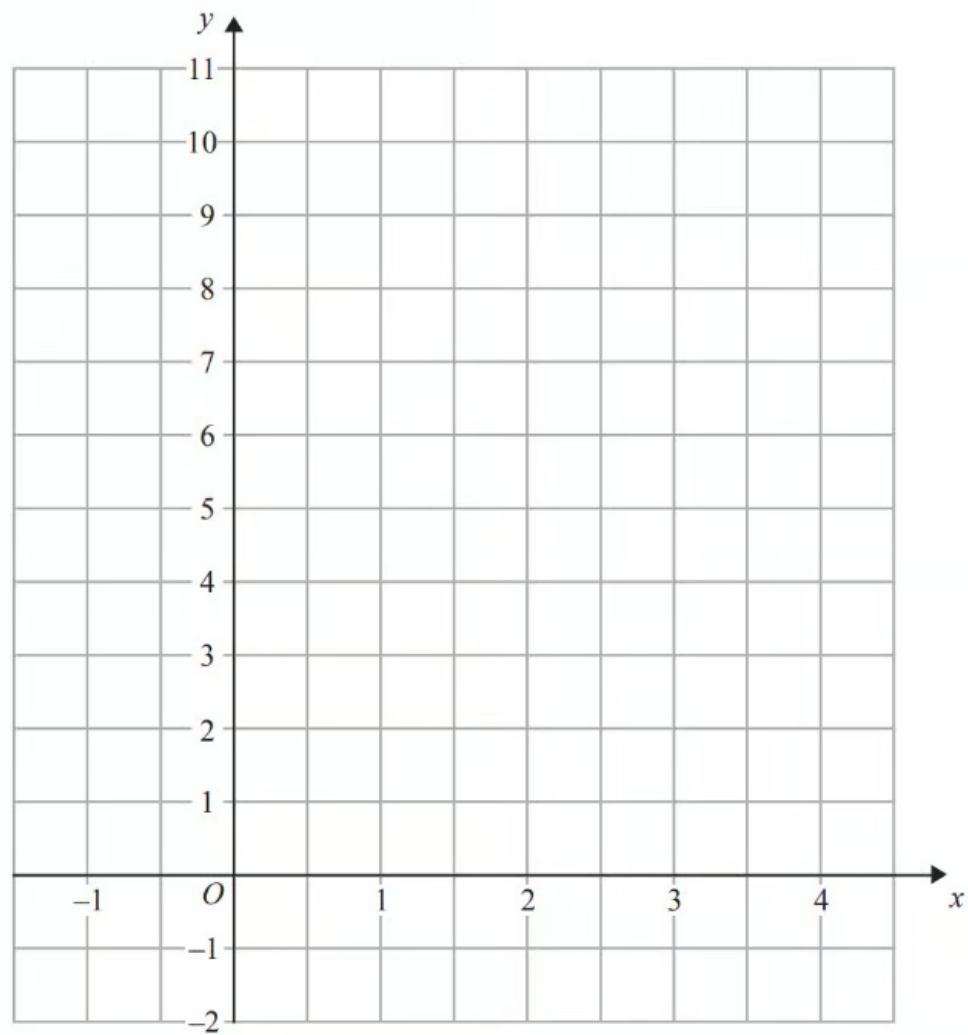
(2 marks)

(b) On the grid, draw the graph of $y = 2x + 5$ for values of x from $x = -2$ to $x = 2$



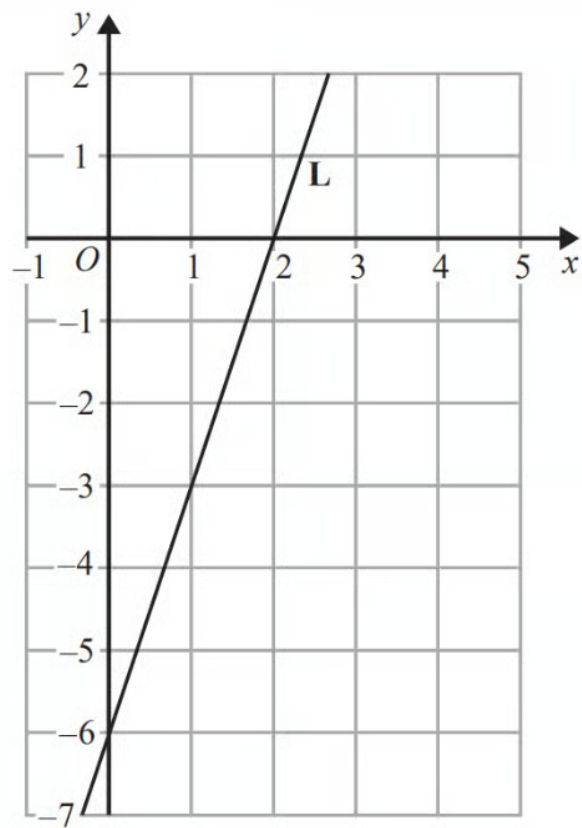
(2 marks)

- 5 On the grid, draw the graph of $y = 8 - 2x$ for values of x from -1 to 4



(3 marks)

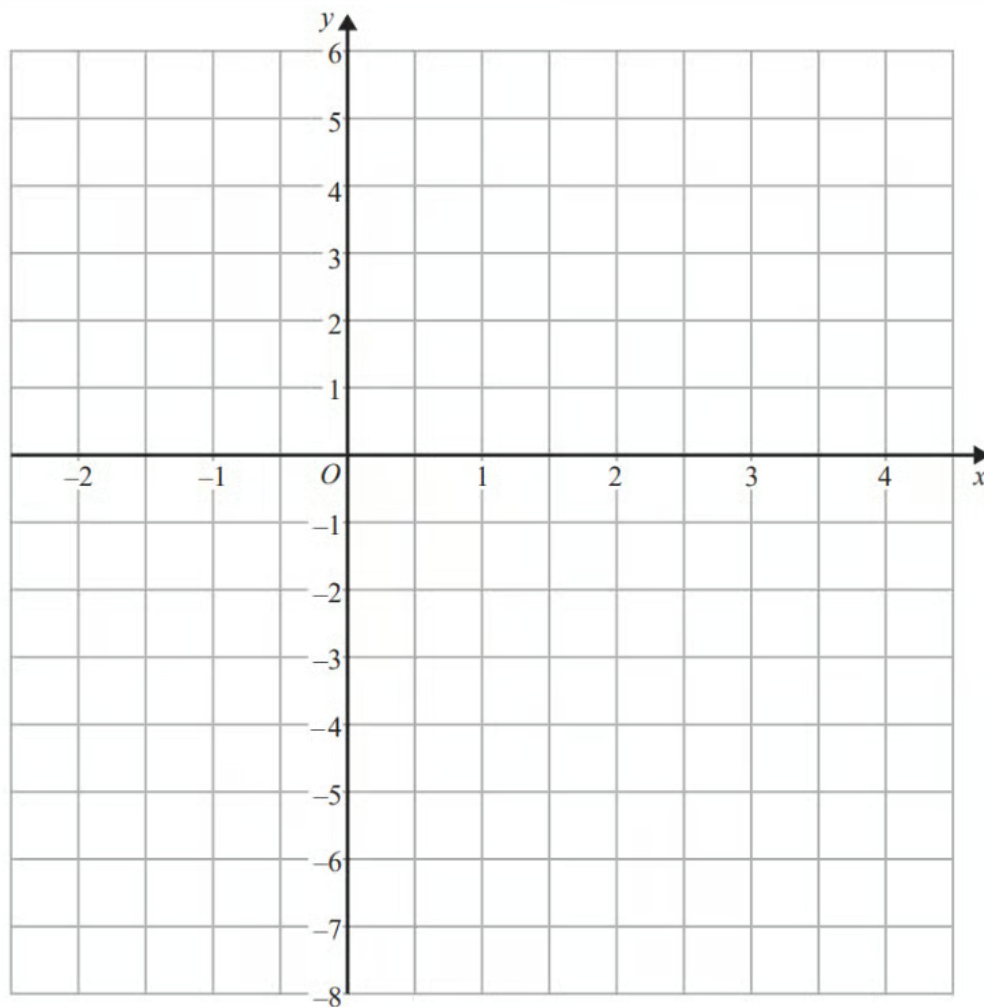
6 The line **L** is shown on the grid.



Find an equation for **L**.

(3 marks)

- 7 On the grid below, draw the graph of $y = 2x - 3$ for values of x from -2 to 4



(3 marks)

- 8 The straight line **L** has equation $2y + 7x = 10$

Find the coordinates of the point where **L** crosses the y-axis.

(1 mark)

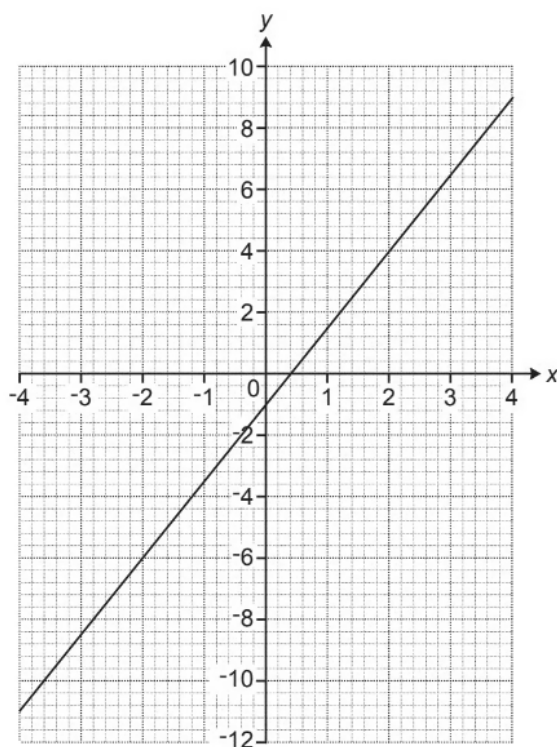
- 9 Write down an equation of the straight line with gradient -3 and which passes through the point with coordinates $(0, 5)$.

(2 marks)

10 Write down an equation of a line that is parallel to the line with equation $y = 7 - 4x$

(1 mark)

11 (a) This graph shows part of a straight line.



Show that the gradient of the line is 2.5.

(1 mark)

(b) Write down the equation of the line.

(2 marks)

12 A line has equation $3y = 3x - 2$

Choose the coordinates of the intercept of the line with the y -axis.

A. (0, 1)

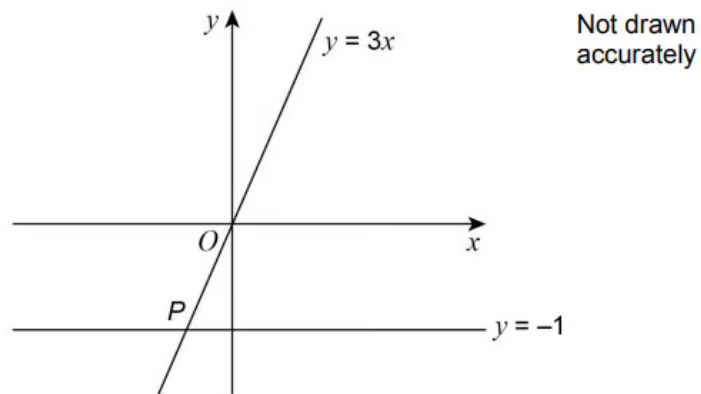
B. $(0, -1)$

C. $\left(0, \frac{2}{3}\right)$

D. $\left(0, -\frac{2}{3}\right)$

(1 mark)

13 Two straight lines intersect at point P .



Choose the coordinates of P .

A. $(-3, -1)$

B. $\left(-1, -\frac{1}{3}\right)$

C. $(-1, -3)$

D. $\left(-\frac{1}{3}, -1\right)$

(1 mark)

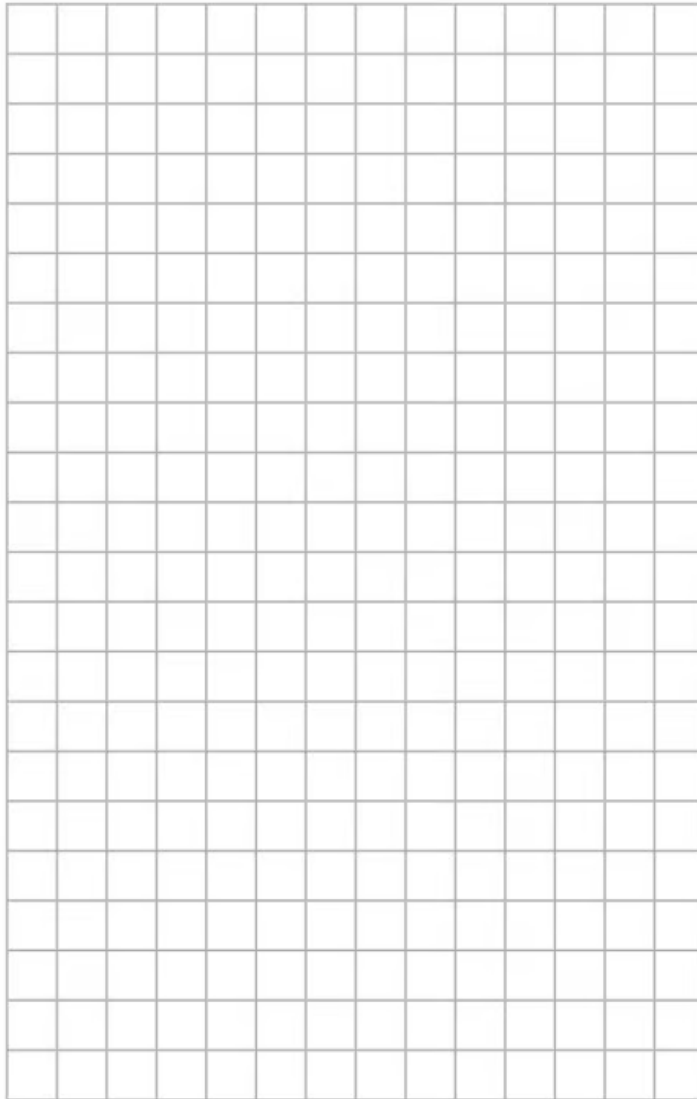
Medium Questions

- 1 On the grid, draw the graph of $y = 2x - 3$ for values of x from -2 to 3



(4 marks)

- 2 On the grid, draw the graph of $y = 3x + 2$ for values of x from -2 to 2



(4 marks)

- 3 The equation of the line L_1 is $y = 3x - 2$
The equation of the line L_2 is $3y - 9x + 5 = 0$

Show that these two lines are parallel.

(2 marks)

4 L_1 and L_2 are parallel lines.

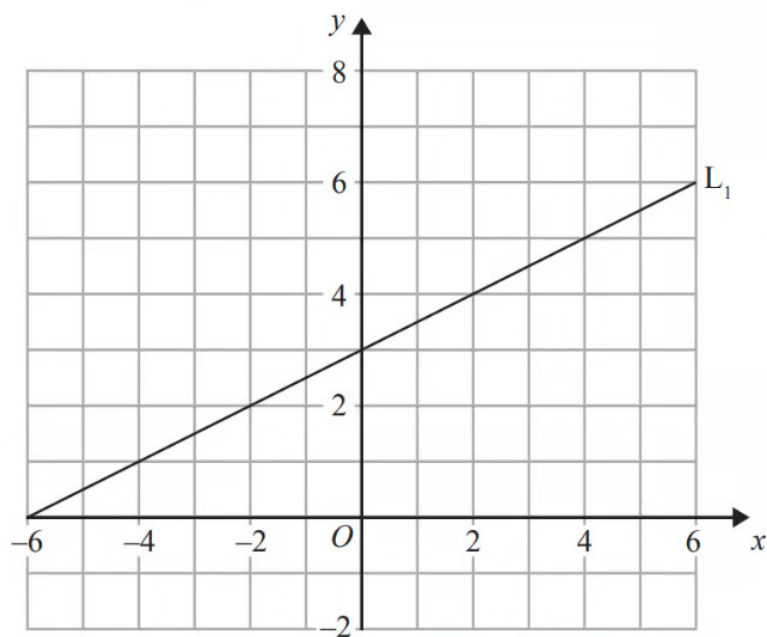
The equation of L_1 is $y = 3x + 2$

L_2 passes through the point $(3, 4)$.

Find an equation for L_2 .

(3 marks)

5 The diagram shows a straight line, L_1 , drawn on a grid.



A straight line, L_2 , is parallel to the straight line L_1 and passes through the point $(0, -5)$.

Find an equation of the straight line L_2 .

(3 marks)

- 6 Work out an equation of the straight line that passes through (9, 2) and (3, 5)

(3 marks)

- 7 (a) The line l_1 has equation $3x + 5y - 2 = 0$

Find the gradient of l_1 .

(2 marks)

- (b) The line l_2 is perpendicular to l_1 and passes through the point (3, 1).

Find the equation of l_2 in the form $y = mx + c$, where m and c are constants.

(3 marks)

- 8 The straight line L_1 has equation $x + 2y = 4$

The straight line L_2 passes through the points $(-1, -7)$ and $(7, 9)$

Michael says that the lines L_1 and L_2 are perpendicular.

Is Michael correct?

You must show clearly how you get your answer.

(3 marks)

9 The straight line L_1 has equation $2y = 6x - 5$

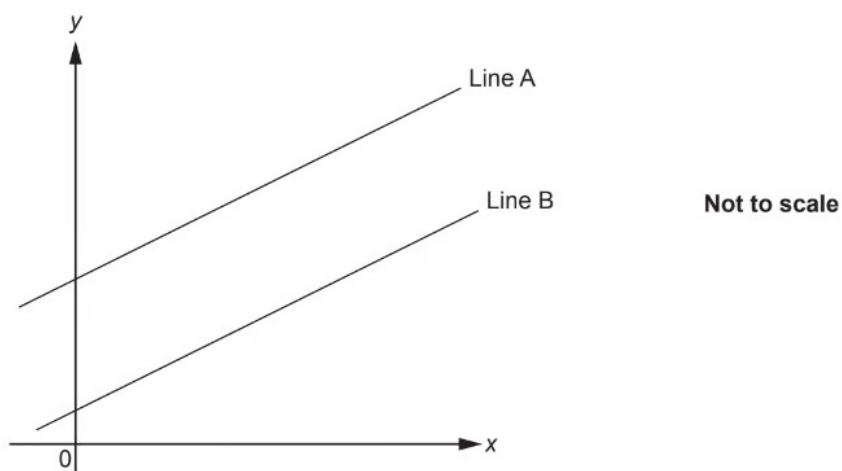
The straight line L_2 is perpendicular to L_1 and passes through the point $(9, -1)$

Find an equation for L_2

Give your answer in the form $ay + bx = c$

(4 marks)

10 The graph shows two parallel lines, Line A and Line B.



Line A has equation $y = 6x + 7$.

Line B passes through the point $(4, 26)$.

Find the equation of Line B.

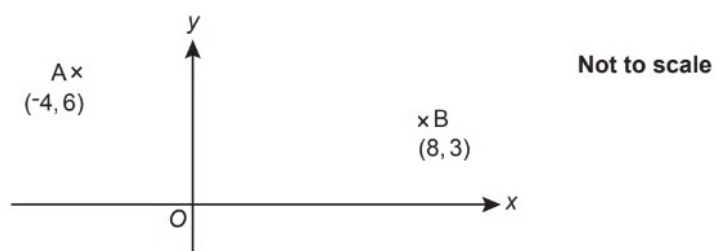
(4 marks)

- 11 A straight line passes through the point $(0, 6)$ and is perpendicular to $y = 4x - 5$.

Find the equation of this line, giving your answer in the form $y = mx + c$.

(3 marks)

- 12 (a) Point A has coordinates $(-4, 6)$ and point B has coordinates $(8, 3)$.



- i) Find the gradient of line AB.

[2]

- ii) Find the equation of line AB.

[2]

(4 marks)

- (b) Point P has coordinates (0, -2).

Write down the equation of the line parallel to line AB that passes through P.

(2 marks)

- 13 Show that line $3y = 4x - 14$ is perpendicular to line $4y = -3x + 48$.

(4 marks)

- 14 The equation of a straight line is $3x + 2y = 24$

Choose the point where the line crosses the x -axis.

- A. (0, 8)
- B. (12, 0)
- C. (0, 12)
- D. (8, 0)

(1 mark)

- 15 A straight line has gradient 6 and passes through the point (3, 19).

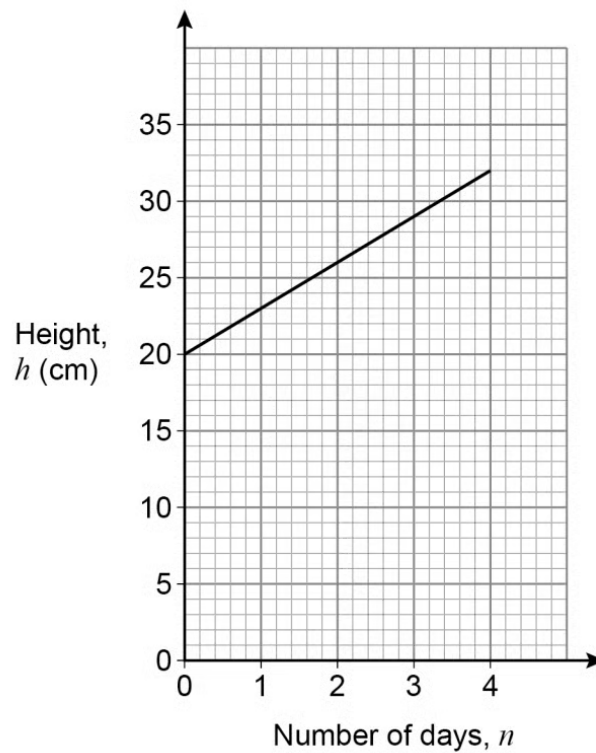
Work out the equation of the line.

Give your answer in the form $y = mx + c$

(3 marks)

16 Jim buys a plant of height 20 cm.

The graph shows how the height of the plant changes during the next 4 days.



Work out a formula for h in terms of n .

(3 marks)

17 The equation of the line L_1 is $y = 4x - 5$.

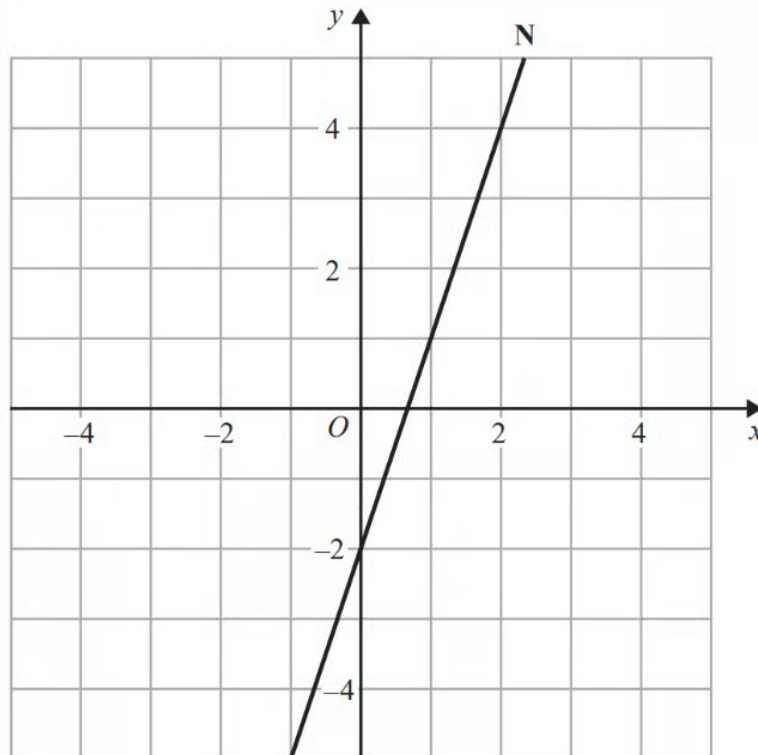
The equation of the line L_2 is $3y - 12x + 7 = 0$.

Show that these two lines are parallel.

(2 marks)

Hard Questions

- 1 The line **N** is drawn below.



Find an equation of the line perpendicular to line **N** that passes through the point (0, 1).

(3 marks)

- 2 The straight line **L** has equation $4x + y = 7$

Find an equation of the straight line perpendicular to **L** that passes through (-8, 3).

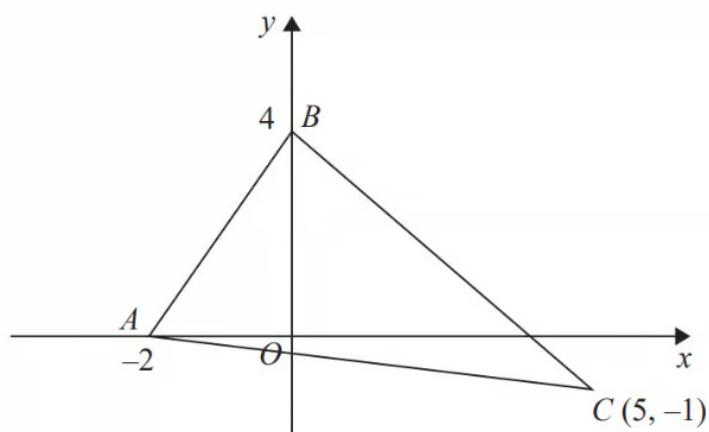
(4 marks)

- 3 The straight line **L** has the equation $3y = 4x + 7$ The point **A** has coordinates $(3, -5)$

Find an equation of the straight line that is perpendicular to **L** and passes through **A**.

(3 marks)

4



Find an equation of the line that passes through **C** and is perpendicular to **AB**.

(4 marks)

- 5 (a) The line **L** has equation $y = 5 - 2x$.

Show that the point $P(3, -1)$ lies on L .

(1 mark)

- (b)** Find an equation of the line perpendicular to L , which passes through P . Give your answer in the form $ax + by + c = 0$, where a , b and c are integers.

(4 marks)

6 (a) The line l_1 has equation $y = -2x + 3$

The line l_2 is perpendicular to l_1 and passes through the point $(5, 6)$.

Find an equation for l_2 in the form $ax + by + c = 0$, where a , b and c are integers.

(3 marks)

(b) The line l_2 crosses the x -axis at the point A and the y -axis at the point B .

Find the x -coordinate of A and the y -coordinate of B .

(2 marks)

(c) Given that O is the origin,

find the area of the triangle OAB .

(2 marks)

7 The points P and Q have coordinates $(-1, 6)$ and $(9, 0)$ respectively.

The line l is perpendicular to PQ and passes through the midpoint of PQ .

Find an equation for l .

(5 marks)

8 A is the point with coordinates $(1, 3)$

B is the point with coordinates $(4, -1)$

The straight line L goes through both A and B .

Is the line with equation $2y = 3x - 4$ perpendicular to line L ? You must show how you got your answer.

(4 marks)

9 The straight line L passes through the points $(4, -1)$ and $(6, 4)$

The straight line M is perpendicular to L and intersects the y -axis at the point $(0, 8)$

Find the coordinates of the point where M intersects the x -axis.

(4 marks)

10 $ABCD$ is a rhombus.

The diagonals, AC and BD , intersect at the point M .

The coordinates of M are $(6, -11)$

The points A and C both lie on the line with equation $2y + 7x = 20$

Find the exact coordinates of the point where the line through B and D intersects the y -axis.

(4 marks)

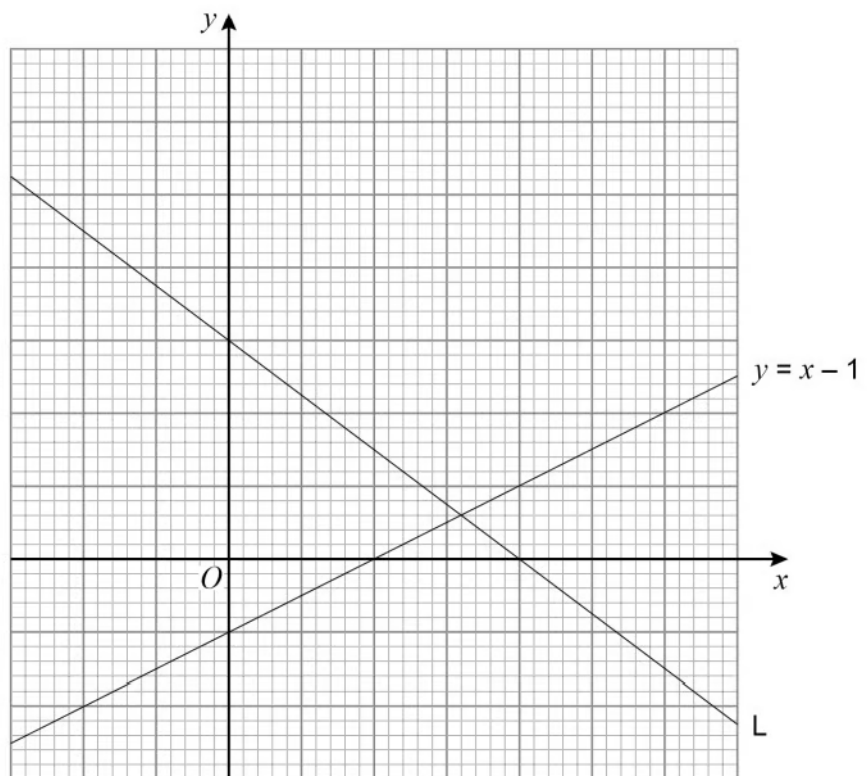
11 P is the point (0, -1) and Q is the point (5, 9).

Find the equation of the line through P that is perpendicular to the line PQ.

(5 marks)

12 Here is line L and the graph of $y = x - 1$

The scales of the axes are not shown.



Work out the equation of line L.

(4 marks)

13 (a) Show that the lines $y = 3x + 7$ and $2y - 6x = 8$ are parallel.

Do **not** use a graphical method.

(3 marks)

(b) Is the point $(-5, -6)$ above, below or on the line $y = 3x + 7$?

Tick **one** box.

☐ Above ☐ Below ☐ On the line

You **must** show your working.

Do **not** use a graphical method.

(2 marks)

14 The straight line **L** has equation $3y = 2x - 11$

Find an equation of the straight line perpendicular to **L** that passes through $(-3, 6)$

(3 marks)

Very Hard Questions

1 (a)

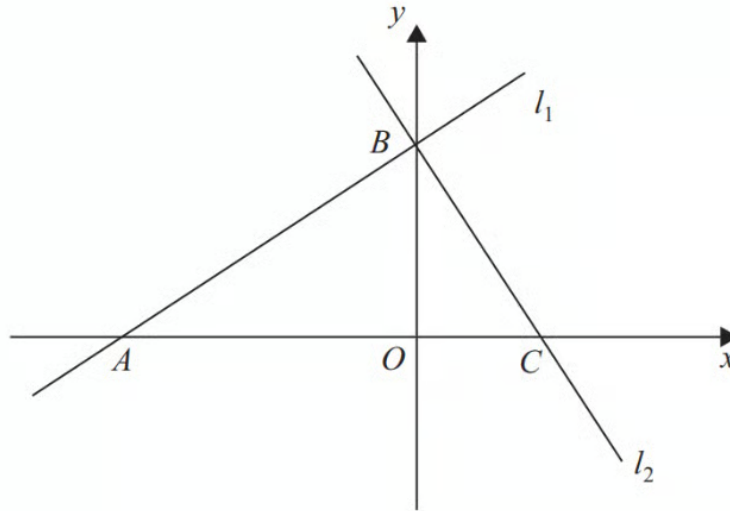


Figure 1

The line l_1 has equation $2x - 3y + 12 = 0$

Find the gradient of l_1 .

(1 mark)

- (b) The line l_1 crosses the x -axis at the point A and the y -axis at the point B , as shown in Figure 1.

The line l_2 is perpendicular to l_1 and passes through B .

Find an equation of l_2 .

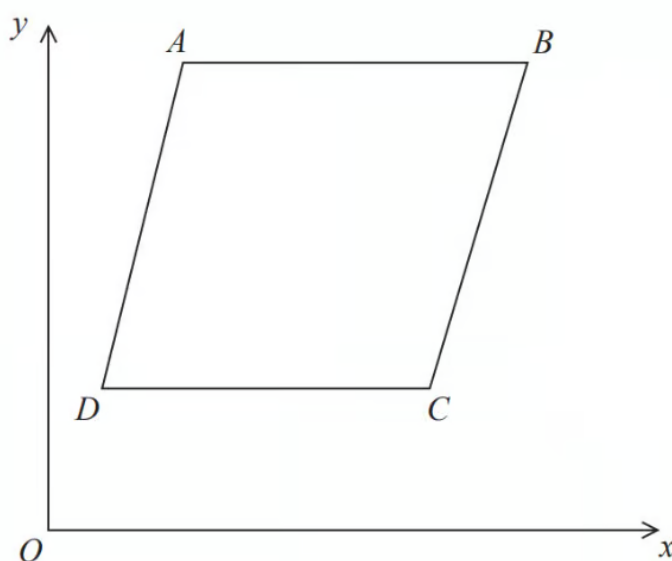
(3 marks)

(c) The line l_2 crosses the x -axis at the point C .

Find the area of triangle ABC .

(4 marks)

2



$ABCD$ is a rhombus.

The coordinates of A are $(5, 11)$

The equation of the diagonal DB is $y = \frac{1}{2}x + 6$

Find an equation of the diagonal AC .

(4 marks)

3 (a)

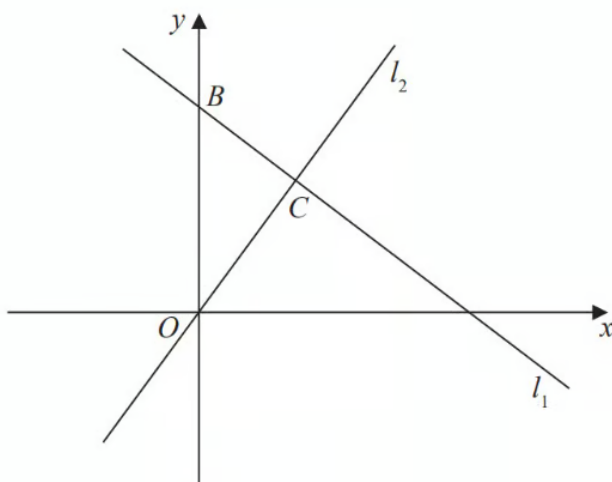


Figure 2

The line l_1 , shown in Figure 2 has equation $2x + 3y = 26$

The line l_2 passes through the origin O and is perpendicular to l_1

Find an equation for the line l_2

(4 marks)

- (b) The line l_2 intersects the line l_1 at the point C . Line l_1 crosses the y -axis at the point B as shown in Figure 2.

Find the area of triangle OBC .

Give your answer in the form $\frac{a}{b}$, where a and b are integers to be determined.

(6 marks)

- 4 The point P has coordinates $(3, 4)$
The point Q has coordinates (a, b)

A line perpendicular to PQ is given by the equation $3x + 2y = 7$

Find an expression for b in terms of a .

(5 marks)

5

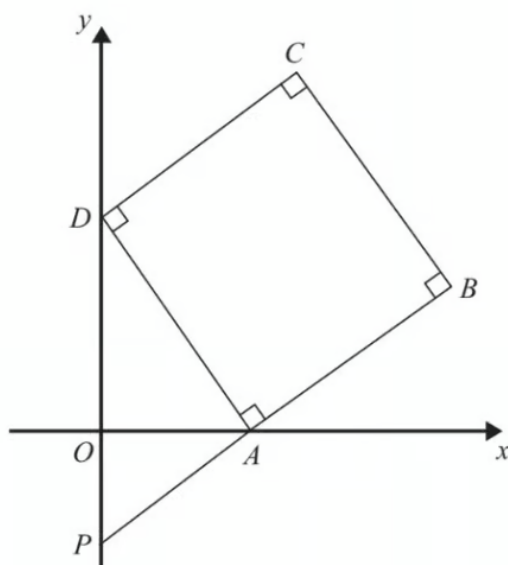


Diagram **NOT**
accurately drawn

$ABCD$ is a square.

P and D are points on the y -axis.

A is a point on the x -axis.

PAB is a straight line.

The equation of the line that passes through the points A and D is $y = -2x + 6$
Find the length of PD .

(4 marks)

- 6 $A(-2, 1)$, $B(6, 5)$ and $C(4, k)$ are the vertices of a right-angled triangle ABC .
Angle ABC is the right angle.

Find an equation of the line that passes through A and C .

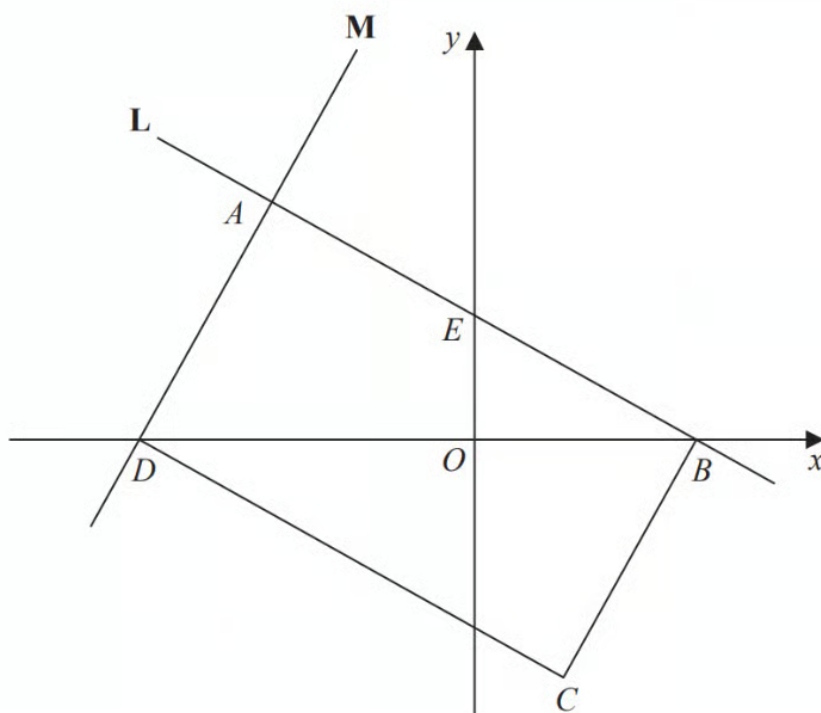
Give your answer in the form $ay + bx = c$ where a , b and c are integers.

(5 marks)

- 7 The points A and B have coordinates $(3, 4)$ and $(7, -6)$ respectively. The straight line l passes through A and is perpendicular to AB . Find an equation for l , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers.

(4 marks)

8



$ABCD$ is a rectangle.

A , E and B are points on the straight line L with equation $x + 2y = 12$. A and D are points on the straight line M .

$$AE = EB$$

Find an equation for **M**.

(4 marks)

9 ABC is an isosceles triangle with $AB = AC$.

B is the point with coordinates $(-1, 5)$

C is the point with coordinates $(2, 10)$

M is the midpoint of BC .

Find an equation of the line through the points A and M .

Give your answer in the form $py + qx = r$ where p , q and r are integers.

(5 marks)

10 L_1 and L_2 are two straight lines. The origin of the coordinate axes is O .

L_1 has equation $5x + 10y = 8$

L_2 is perpendicular to L_1 and passes through the point with coordinates $(8, 6)$

L_2 crosses the x -axis at the point A .

L_2 intersects the straight line with equation $x = -3$ at the point B .

Find the area of triangle AOB .
Show your working clearly.

(5 marks)

- 11** The straight line **L** passes through point $A(-6, 2)$ and point $B(5, 3)$
The straight line **M** is perpendicular to **L** and passes through the midpoint of A and B .
The line **M** intersects the line $x = -1$ at point C .

Calculate the area of triangle ABC .

(7 marks)

- 12** Line A has equation $y = 4x - 1$

Line B is perpendicular to line A and passes through the point $(8, 5)$

Work out the coordinates of the point where line B intersects the x -axis.

(4 marks)