

1. The straight line, L_1 , has equation $y = -\frac{1}{2}x - 2$.

(a) Write down the y intercept of L_1 .

(1)

(b) Write down the gradient of L_1 .

(1)

The line L_2 is perpendicular to L_1 and passes through the point (3, 7).

(c) Write down the gradient of the line L_2 .

(1)

(d) Find the equation of L_2 . Give your answer in the form $ax + by + d = 0$ where $a, b, d \in \mathbb{Z}$.

(3)

(Total 6 marks)

2. The straight line L passes through the points A(-1, 4) and B(5, 8).

(a) Calculate the gradient of L .

(2)

(b) Find the equation of L .

(2)

The line L also passes through the point P(8, y).

(c) Find the value of y .

(2)

(Total 6 marks)

3. The coordinates of the vertices of a triangle ABC are A (4, 3), B (7, -3) and C (0.5, p).

(a) Calculate the gradient of the line AB.

(2)

(b) Given that the line AC is perpendicular to the line AB

(i) write down the gradient of the line AC;

(ii) find the value of p .

(4)

(Total 6 marks)

4. The equation of the line R_1 is $2x + y - 8 = 0$. The line R_2 is perpendicular to R_1 .

(a) Calculate the gradient of R_2 .

(2)

The point of intersection of R_1 and R_2 is $(4, k)$.

(b) Find

(i) the value of k ;

(ii) the equation of R_2 .

(4)

(Total 6 marks)

5. The diagram below shows the line with equation $3x + 2y = 18$. The points A and B are the y and x-intercepts respectively. M is the midpoint of [AB].

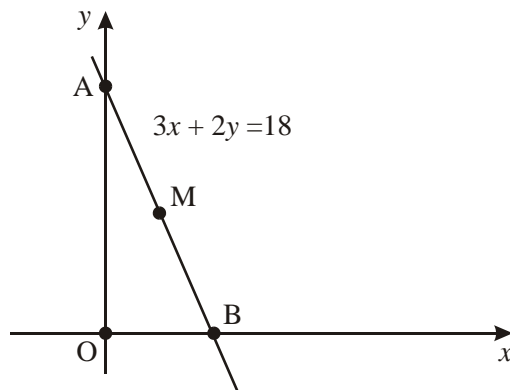


Diagram not to scale

Find the coordinates of

(a) the point A;

(b) the point B;

(c) the point M.

(Total 8 marks)

6. The mid-point, M, of the line joining $A(s, 8)$ to $B(-2, t)$ has coordinates $M(2, 3)$.

(a) Calculate the values of s and t .

(2)

(b) Find the equation of the straight line perpendicular to AB, passing through the point M.

(4)

(Total 6 marks)

7. A is the point (2, 3), and B is the point (4, 9).
- Find the gradient of the line segment [AB].
 - Find the gradient of a line perpendicular to the line segment [AB].
 - The line $2x + by - 12 = 0$ is perpendicular to the line segment [AB]. What is the value of b ?

(Total 4 marks)

8. Three points are given A(0, 4), B(6, 0) and C(8, 3).

- Calculate the gradient (slope) of line AB. (2)
- Find the coordinates of the midpoint, M, of the line AC. (2)
- Calculate the length of line AC. (2)
- Find the equation of the line BM giving your answer in the form $ax + by + d = 0$ where a , b and $d \in \mathbb{Z}$. (5)
- State whether the line AB is perpendicular to the line BC showing clearly your working and reasoning. (3)

(Total 14 marks)

9. A line joins the points A(2, 1) and B(4, 5).

- Find the gradient of the line AB. (2)

Let M be the midpoint of the line segment AB.

- Write down the coordinates of M. (1)
- Find the equation of the line perpendicular to AB and passing through M. (3)

(Total 6 marks)

10. (a) Write down the gradient of the line $y = 3x + 4$. (1)
- (b) Find the gradient of the line that is perpendicular to the line $y = 3x + 4$. (1)
- (c) Find the equation of the line that is perpendicular to $y = 3x + 4$ and that passes through the point $(6, 7)$. (2)
- (d) Find the coordinates of the point of intersection of these two lines. (2)
- (Total 6 marks)**

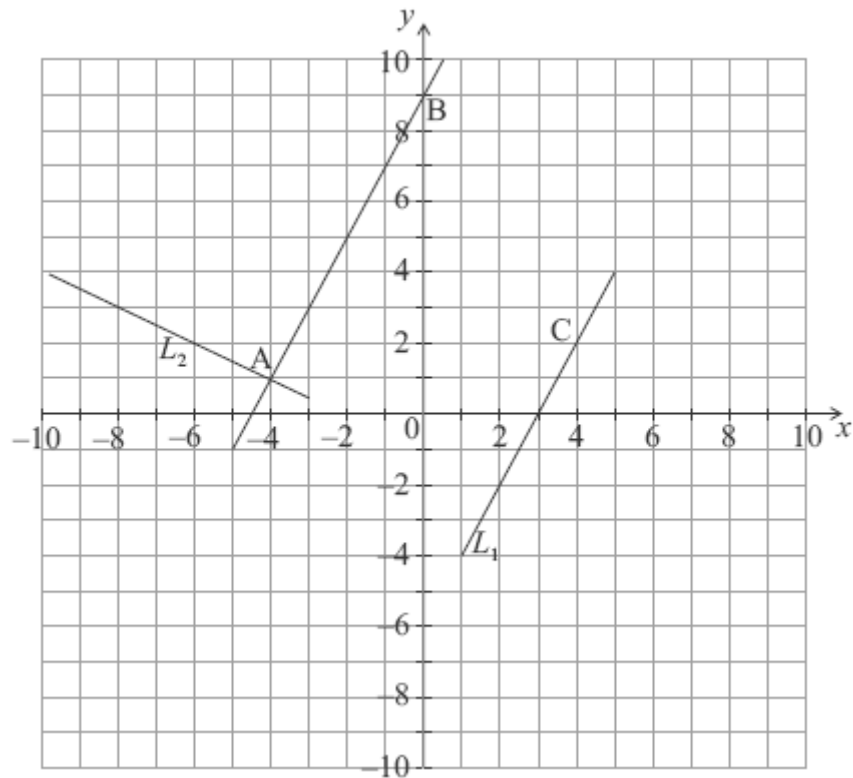
11. Two functions are defined as follows

$$f(x) = \begin{cases} 6 - x & \text{for } 0 \leq x < 6 \\ x - 6 & \text{for } x \geq 6 \end{cases}$$

$$g(x) = \frac{1}{2}x$$

- (a) Draw the graphs of the functions f and g in the interval $0 \leq x \leq 14$, $0 \leq y \leq 8$ using a scale of 1 cm to represent 1 unit on both axes. (5)
- (b) (i) Mark the intersection points A and B of $f(x)$ and $g(x)$ on the graph.
(ii) Write down the coordinates of A and B. (3)
- (c) Calculate the midpoint M of the line AB. (2)
- (d) Find the equation of the straight line which joins the points M and N. (4)
- (Total 14 marks)**

12. The points $A(-4, 1)$, $B(0, 9)$ and $C(4, 2)$ are plotted on the diagram below. The diagram also shows the lines AB , L_1 and L_2 .



- (a) Find the gradient of AB . (2)

L_1 passes through C and is parallel to AB .

- (b) Write down the y -intercept of L_1 . (1)

L_2 passes through A and is perpendicular to AB .

- (c) Write down the equation of L_2 . Give your answer in the form $ax + by + d = 0$ where a, b and $d \in \mathbb{Z}$. (3)

- (d) Write down the coordinates of the point D , the intersection of L_1 and L_2 . (1)

There is a point R on L_1 such that $ABRD$ is a rectangle.

- (e) Write down the coordinates of R . (2)

The distance between A and D is $\sqrt{45}$.

- (f) (i) Find the distance between D and R .
 (ii) Find the area of the triangle BDR . (4)

(Total 13 marks)