1. The diagram below shows the line PQ, whose equation is $x + 2y = 12$. The line intercepts the axes at P and Q respectively.

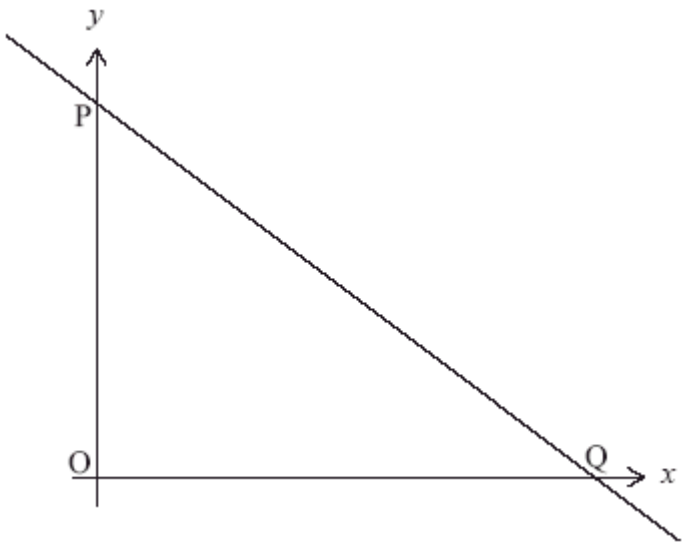


diagram not to scale

(a) Find the coordinates of P and of Q.

(3)

(b) A second line with equation $x - y = 3$ intersects the line PQ at the point A. Find the coordinates of A.

(3)
(Total 6 marks)

2. Two functions are defined as follows

$$f(x) = \begin{cases} 6 - x \text{ for } 0 \le x < 6 \\ x - 6 \text{ for } x \ge 6 \end{cases}$$

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

(a) Draw the graphs of the functions f and g in the interval $0 \le x \le 14$, $0 \le y \le 8$ 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.

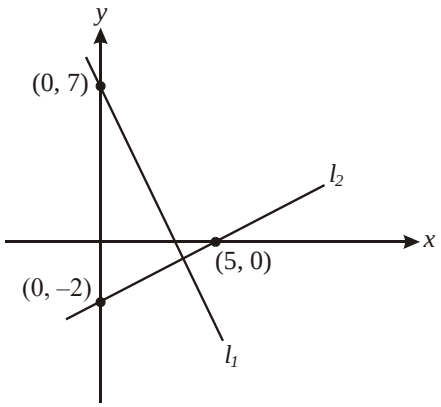
(2)

(d) Find the equation of the straight line which joins the points M and N.

(4)
(Total 14 marks)

3. The following diagram shows the lines l_1 and l_2, which are perpendicular to each other.

Diagram not to scale

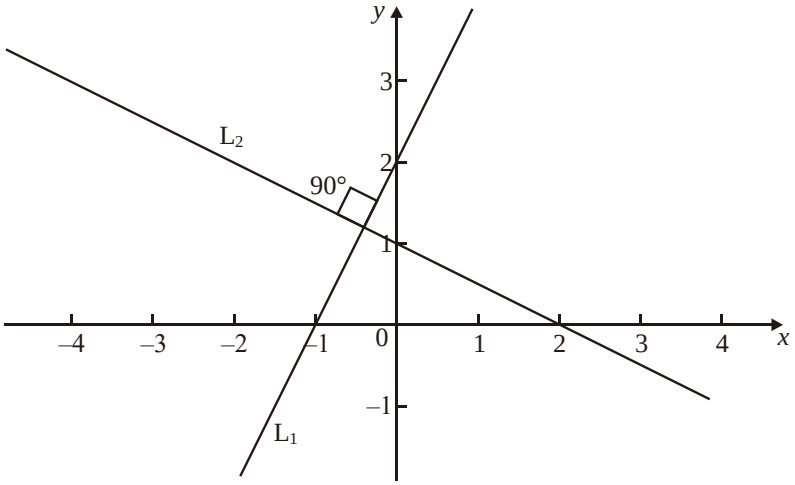


(a) Calculate the gradient of line l_1.

(b) Write the equation of line l_1 in the form $ax + by + d = 0$ where a, b and d are integers, and $a > 0$.

(Total 8 marks)

4. A student has drawn the two straight line graphs L_1 and L_2 and marked in the angle between them as a right angle, as shown below. The student has drawn one of the lines incorrectly.



Consider L_1 with equation $y = 2x + 2$ and L_2 with equation $y = -\frac{1}{4}x + 1$.

(a) Write down the gradients of L_1 and L_2 **using the given equations**.

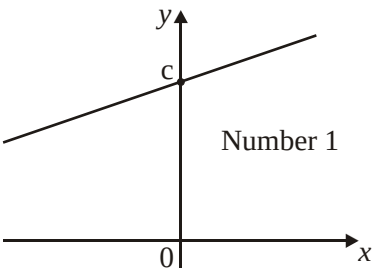
(b) Which of the two lines has the student drawn incorrectly?

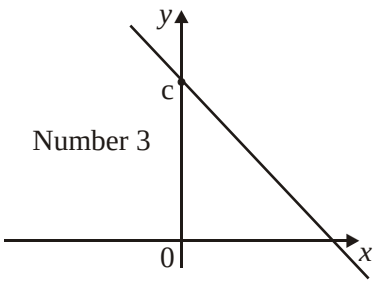
(c) How can you tell from the answer to part (a) that the angle between L_1 and L_2 should not be 90°?

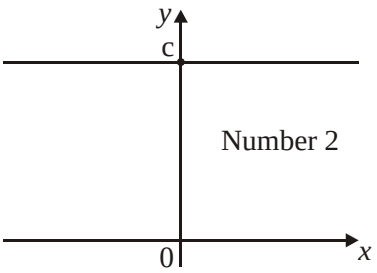
(d) Draw the correct version of the incorrectly drawn line on the diagram.

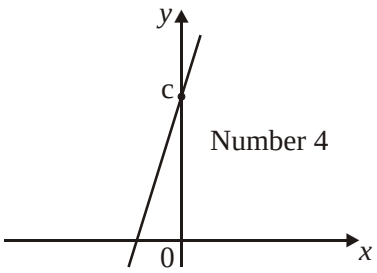
(Total 8 marks)

5. The four diagrams below show the graphs of four different straight lines, all drawn to the same scale. Each diagram is numbered and c is a positive constant.









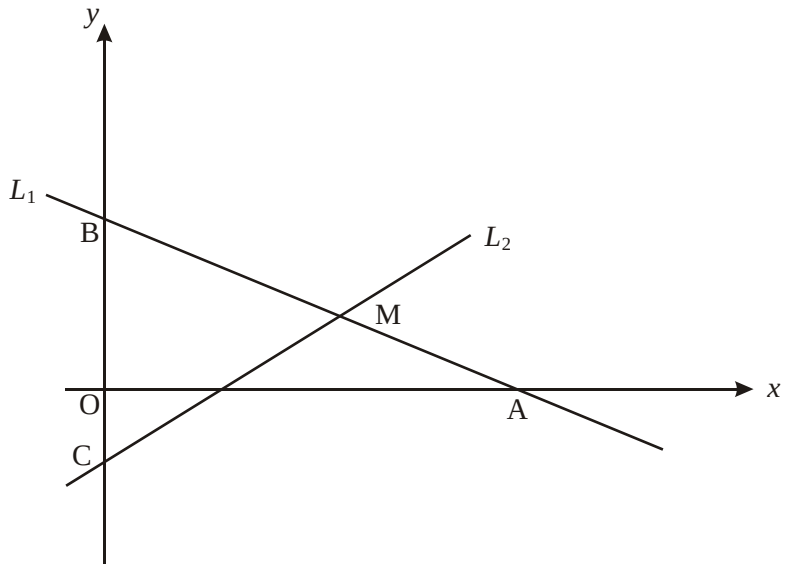
In the table below, write the number of the diagram whose straight line corresponds to the equation in the table.

Equation	Diagram number
$y = c$	
$y = -x + c$	
$y = 3x + c$	
$y = \frac{1}{3}x + c$	

(Total 8 marks)

6. The line L_1 shown on the set of axes below has equation $3x + 4y = 24$. L_1 cuts the x-axis at A and cuts the y-axis at B.

Diagram not drawn to scale



(a) Write down the coordinates of A and B.

(2)

M is the midpoint of the line segment [AB].

(b) Write down the coordinates of M.

(2)

The line L_2 passes through the point M and the point C (0, –2).

(c) Write down the equation of L_2.

(2)

(d) Find the length of

(i) MC;

(2)

(ii) AC.

(2)

(e) The length of AM is 5. Find

(i) the size of angle CMA;

(3)

(ii) the area of the triangle with vertices C, M and A.

(2)

(Total 15 marks)