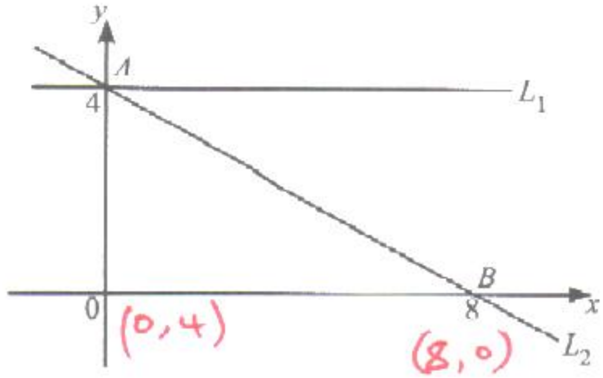
1. March/2023/Paper_0580/42/No.6



NOT TO SCALE

A is the point (0, 4) and B is the point (8, 0).
The line L_1 is parallel to the x-axis.
The line L_2 passes through A and B.

(a) Write down the equation of L_1.

Gradient = 0 -

$y = 4$ .... [1]

(b) Find the equation of L_2.
Give your answer in the form $y = mx + c$.

Gradient $= \dfrac{0-4}{8-0} = -4/8$

$= -\frac{1}{2}$

(0, 4)

$Y = mx + c$

$4 = -\frac{1}{2}(0) + c$

$c = 4$

$Y = -\frac{1}{2}x + 4$

$y =$ $-\frac{1}{2}x + 4$ .... [2]

(c) C is the point (2, 3).
The line L_3 passes through C and is perpendicular to L_2.

(i) Show that the equation of L_3 is $y = 2x - 1$.

$m_1 = -\frac{1}{2}$

For perpendicular Lines $m_1 \times m_2 = -1$

$-\frac{1}{2} \times m_2 = -1$

$m_2 = 2$

$y = mx + c$

$3 = 2(2) + c$

$3 = 4 + c$

$c = 3 - 4$

$c = -1$

$y = 2x - 1$

[3]

(ii) L_3 crosses the x-axis at D.

Find the length of CD.

When a line crosses x-axis $y = 0$

Line (L_3) $y = 2x - 1$

$C(2, 3)$

$y = 0$

$0 = 2x - 1$

$(2,3)\ (\frac{1}{2}, 0)$ $2x = 1$ $(\frac{1}{2}, 0)$

$x = \frac{1}{2}$

Length $|CD| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(0.5 - 2)^2 + (0 - 3)^2}$

$= \sqrt{(-1.5)^2 + (-3)^2}$

$= \sqrt{2.25 + 9}$

$= \sqrt{11.25}$

$= 3.354$

$\simeq 3.35$ Units

3.35 .... [5]

2. June/2023/Paper_0580/22/No.15

C is the point $(5, -1)$ and D is the point $(13, 15)$.

(a) Find the midpoint of CD.

Midpoint $= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= \left(\frac{5+13}{2}, \frac{-1+15}{2}\right)$

$= 9, 7$

(9 , 7) [2]

(b) Find the gradient of CD.

Gradient $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{15-(-1)}{13-5} = \frac{16}{8} = 2$

2 [2]

(c) Find the equation of the perpendicular bisector of CD.
Give your answer in the form $y = mx + c$.

For perpendicular bisector line passes through the Midpoint of the segment. $m_1 \times m_2 = -1$

$2 \times m_2 = -1$ $m_2 = -\frac{1}{2}$

$(9, 7)$ $y = mx + c$

$7 = -\frac{1}{2}(9) + c$

$7 + 4.5 = c$

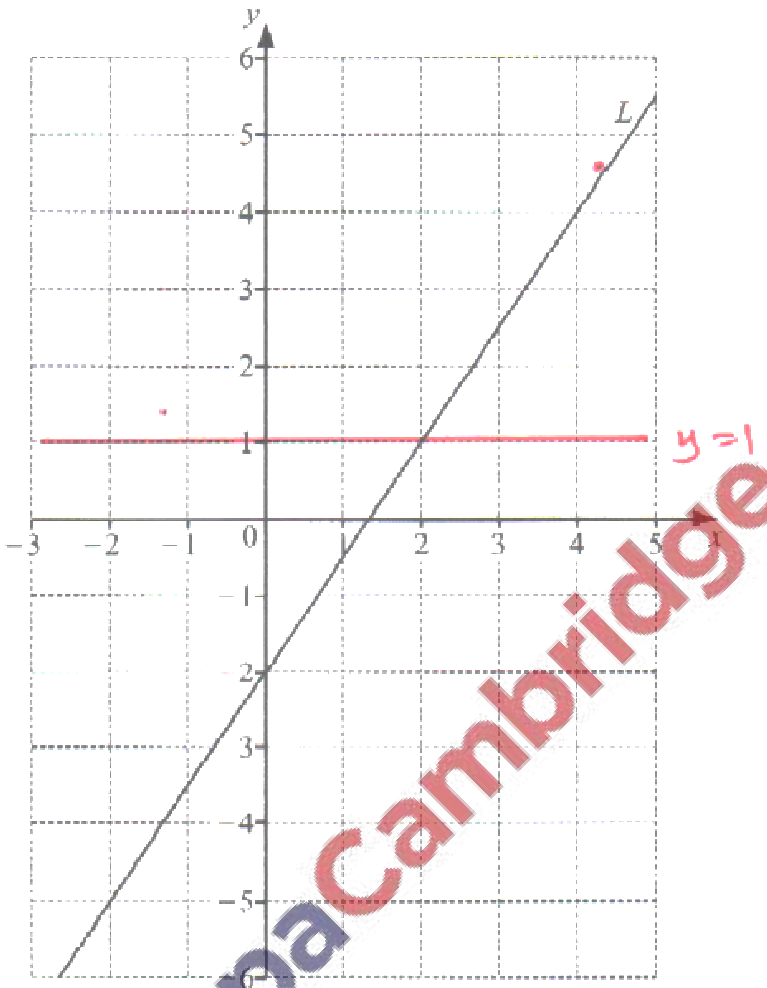
$11.5 = c$

$y = -\frac{1}{2}x + \frac{23}{2}$ or $y = -\frac{1}{2}x + 11.5$

$y =$ $-\frac{1}{2}x + \frac{23}{2}$ [3]

3. June/2023/Paper_0580/32/No.7

(a)



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

Take any two points in Line L (4, 4) (0, -2)

Gradient $= \frac{4-(-2)}{4-0} = 6/4 = 3/2$

$m = 1.5$

$y = mx + c$

$-2.0 = 1.5(0) + c$

$c = -2$

$y =$ $1.5x - 2$ [2]

(ii) On the grid, draw the line $y = 1$. [1]

(iii) Write down the coordinates of the point where the two lines intersect.

Intersection Point

(x, y)

$(2, 1)$

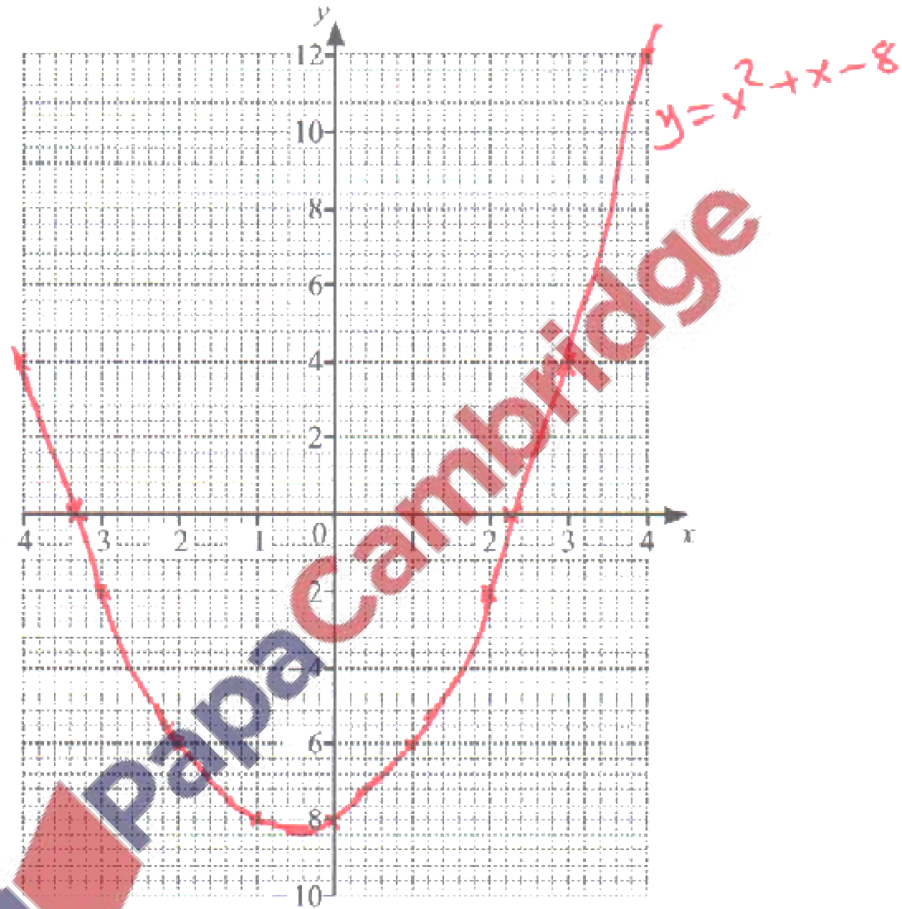
(2 , 1) [1]

(b) (i) Complete the table of values for $y = x^2 + x - 8$.

x	-4	-3	-2	-1	0	1	2	3	4
y	4	-2	-6	-8	-8	-6	-2	4	12

[2]

(ii) On the grid, draw the graph of $y = x^2 + x - 8$ for $-4 \leqslant x \leqslant 4$.



[4]

(iii) Write down the equation of the line of symmetry of the graph.

$x = -0.5$ [1]

(iv) Use your graph to solve the equation $x^2 + x - 8 = 0$.

$x^2+x-8=0$

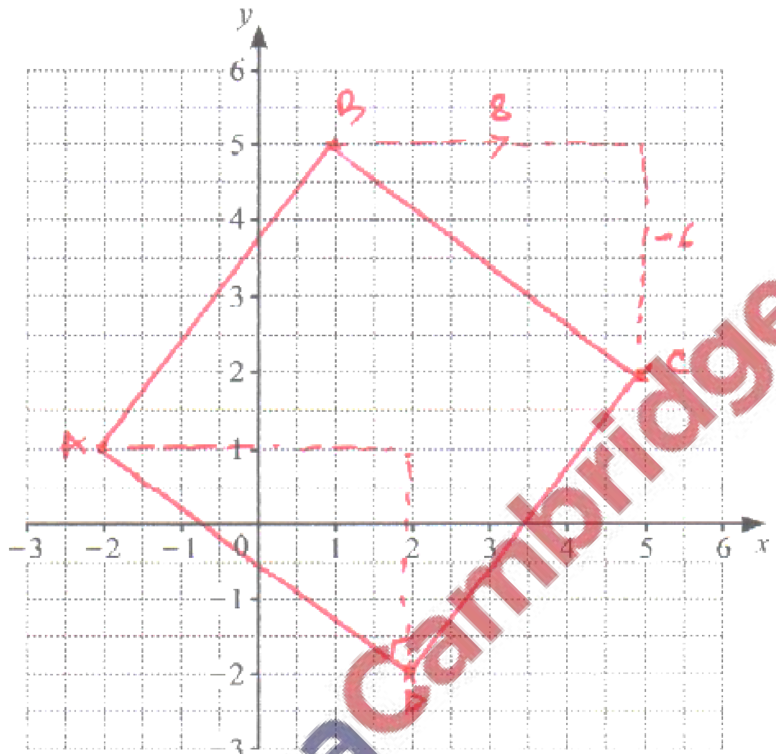
$y=0$

$x =$ -3.4 or $x =$ 2.2 [2]

4. June/2023/Paper_0580/41/No.6

(a) In the square $ABCD$, A has coordinates $(-2, 1)$ and B has coordinates $(1, 5)$.
C has coordinates (a, b), where a and b are both positive integers.

Find the coordinates of C and the coordinates of D.
You may use the grid to help you.



For a square ABCD

Gradient of AB = Gradient of AC

Gradient of AD = Gradient of BC.

AB is perpendicular to AD

Gradient (AB) $= \frac{8}{6} = \frac{4}{3}$

For Perpendicular Lines

$M_1 \times M_2 = -1$

Gradient AD $= \frac{-1}{8/6}$

$= \frac{-6}{8}$

C (5 , 2)

D (2 , −2) [4]

(b) P has coordinates $(-1, 3)$ and Q has coordinates $(6, 4)$.

(i) Find the coordinates of the midpoint of PQ.

$\text{Midpoint} = \left(\frac{-1+6}{2}, \frac{3+4}{2}\right)$

$= \left(\frac{5}{2}, \frac{7}{2}\right)$

(2.5 , 3.5) [2]

(ii) Find the length PQ.

$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$PQ = \sqrt{(6-(-1))^2 + (4-3)^2}$

$PQ = \sqrt{49+1}$ $PQ = \sqrt{50} = \cancel{7.07}$

7.07 [3]

(iii) Find the gradient of PQ.

$\text{Gradient} = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{4-3}{6-(-1)} = \frac{1}{7}$

$\frac{1}{7}$ [2]

(iv) Find the equation of the line parallel to PQ that crosses the x-axis at $x = 2$.

Parallel Lines have the same gradient.

On x-axis $y=0$ $(2, 0)$

$$\frac{y-0}{x-2} = \frac{1}{7}$$

$$7(y-0) = x-2$$

$$7y-0 = x-2$$

$$\frac{\cancel{7}y}{\cancel{7}} = \frac{1}{7}x - \frac{2}{7}$$

$$y = \frac{1}{7}x - \frac{2}{7}$$

$y = \frac{1}{7}x - \frac{2}{7}$ .... [3]

5. June/2023/Paper_0580/43/No.11

M has coordinates $(4, 1)$ and N has coordinates $(-2, -7)$.

(a) Find the length of MN.

$$\text{Length} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(4-(-2))^2 + (1-(-7))^2}$$
$$= \sqrt{6^2 + 8^2} = \sqrt{100}$$
$$= \sqrt{36+64} = 10 \text{ units}$$

10 .... [3]

(b) Find the gradient of MN.

$$\text{Gradient} = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{-7-1}{-2-4}$$
$$= \frac{-8}{-6} = 4/3$$

4/3 .... [2]

(c) Find the equation of the perpendicular bisector of MN.

For perpendicular bisector passes through the midpoint of a line segment.

$$\text{Midpoint of } MN = \left(\frac{4+-2}{2}, \frac{1+-7}{2}\right) = (1, -3)$$

For perpendicular lines $M_1 \times M_2 = -1$

$$4/3 \times m_2 = -1$$
$$m_2 = -3/4$$

$$\frac{y+3}{x-1} = -3/4$$

$y = -3/4 x - 9/4$ .... [4]

$$4(y+3) = -3(x-1)$$
$$4y + 12 = -3x + 3$$
$$4y = -3x + 3 - 12$$
$$\frac{4y}{4} = \frac{-3x}{4} - \frac{9}{4}$$

$$y = -3/4 x - 9/4$$