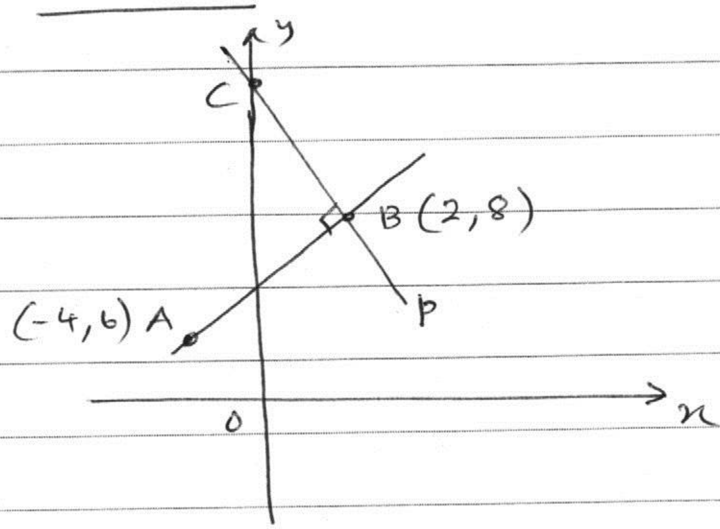
Straight Line Graphs – Answers

Ex F

(1)



(a) $m_{AB} = \dfrac{8-6}{2- -4}$

$= \dfrac{2}{6}$

$= \dfrac{1}{3}$

$m_p \times m_{AB} = -1$

$m_p \times \dfrac{1}{3} = -1$

$\therefore\ m_p = -3$

Equation of line p: $y = mx + c$

$y = -3x + c$

sub $x = 2$, $y = 8$

$8 = -3 \times 2 + c$

$c = 14$

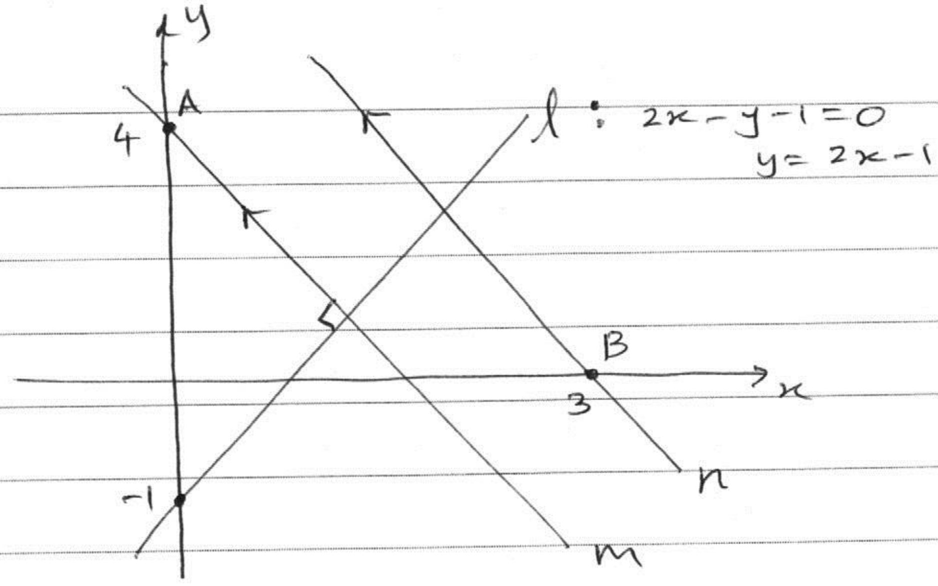
$\therefore$ Equation of line p is,

$\underline{\underline{y = -3x + 14}}$

(b) $y = -3x + 14$

C is the y-intercept $\therefore$ $\underline{\underline{C = (0, 14)}}$

(2)



(a) $m_l = 2$

$m_m \times m_l = -1$

$m_m \times 2 = -1$

$\therefore \quad m_m = -\frac{1}{2}$

<u>Equation of m:</u>

$y = mx + c$

$y = -\frac{1}{2}x + c$

~~So~~ y-intercept of line m is 4.

$\therefore$ Equation of line m is,

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

<u>Intersection of l and m:</u>

$l \Rightarrow \quad y = 2x - 1 \quad —— (1)$

$m \Rightarrow \quad y = -\frac{1}{2}x + 4 \quad —— (2)$

(Solve simultaneously)

sub $y = 2x-1$ into equation (2).

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

$2x + \frac{1}{2}x = 5$

$$\frac{5x}{2} = 5$$

$$5x = 10$$

$$x = 2$$

sub $x = 2$ into eq (1).

$$y = 2 \times 2 - 1$$

$$y = 3$$

$\therefore$ Lines l and m intersect at the point $(2, 3)$.

(b) Lines n and m are parallel. $\therefore$ They have equal gradients.

$$m_n = m_m$$

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

Equation of line n:

$$y = mx + c$$

$$y = -\frac{1}{2}x + c$$

sub $x = 3$, $y = 0$

$$0 = -\frac{1}{2} \times 3 + c$$

$$c = \frac{3}{2}$$

$\therefore$ Equation of line n is,

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

Intersection of lines n and l:

$l \Rightarrow \quad y = 2x - 1 \quad$ —— (3)

$n \Rightarrow \quad y = -\frac{1}{2}x + \frac{3}{2} \quad$ —— (4)

sub $y = 2x - 1$ into eq ④.

$$2x - 1 = -\frac{1}{2}x + \frac{3}{2}$$

$(\times 2)$ $\qquad$ $(\times 2)$

$$4x - 2 = -x + 3$$

$$5x = 5$$

$$x = 1$$

sub $x = 1$ into eq ③.

$$y = 2 \times 1 - 1$$

$$y = 1$$

$$(1, 1)$$

$\therefore$ Lines l and n intersect at the point $(1, 1)$.

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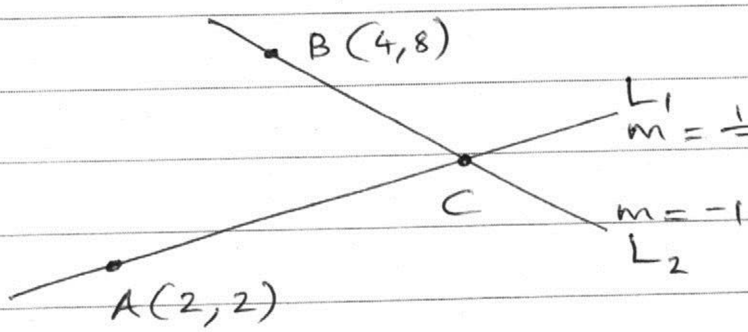
③



(a) Equation of L_1:

$$y = mx + c$$

$$y = \frac{1}{7}x + c$$

sub $x = 2$, $y = 2$

$$2 = \frac{1}{7} \times 2 + c$$

$$c = 2 - \frac{2}{7}$$

$$c = \frac{12}{7}$$

$\therefore$ Equation of line L_1 is, $\underline{\underline{y = \frac{1}{7}x + \frac{12}{7}}}$

Equation of Line L_2:

$$y = mx + c$$

$$y = -1x + c$$

sub $x = 4$, $y = 8$

$$8 = -1 \times 4 + c$$

$$c = 12$$

$\therefore$ Equation of line L_2 is,

$$y = -1x + 12$$

$$\underline{\underline{y = -x + 12}}$$

(b) $y = \frac{1}{7}x + \frac{12}{7}$ —— (1)

$y = -x + 12$ —— (2)

sub $y = \frac{1}{7}x + \frac{12}{7}$ into eq (2).

$$\frac{1}{7}x + \frac{12}{7} = -x + 12$$

$(\times 7)$ $(\times 7)$

$$x + 12 = -7x + 84$$

$$8x = 72$$

$$x = 9$$

sub $x = 9$ into eq (2).

$$y = -9 + 12$$

$$y = 3$$

$\therefore$ Coordinates of $C = \underline{\underline{(9, 3)}}$

4

(a) Equation of the line : $y = mx + c$

$$y = -\frac{5}{12}x + c$$

sub $x = 2$, $y = 1$

$$1 = -\frac{5}{12} \times 2 + c$$

$$c = 1 + \frac{5}{6}$$

$$c = \frac{11}{6}$$

$\therefore$ Equation of the line : $\underline{\underline{y = -\frac{5}{12}x + \frac{11}{6}}}$

(b)

$$y = -\frac{5}{12}x + \frac{11}{6}$$

sub $x = k$, $y = 11$

$$11 = -\frac{5}{12}k + \frac{11}{6}$$

$(\times 12)$ $(\times 12)$

$$132 = -5k + 22$$

$$-5k = 110$$

$$\therefore k = \frac{110}{-5}$$

$$\underline{\underline{k = -22}}$$

5

(a) $m_{AB} = \frac{6-0}{5-1}$

$m_{AB} = \frac{6}{4}$

$= \frac{3}{2}$

Equation of line l :-

$y = mx + c$

$y = \frac{3}{2}x + c$

sub $x = 1$, $y = 0$

$0 = \frac{3}{2} \times 1 + c$

$c = -\frac{3}{2}$

$\therefore$ Equation of the line is,

$y = \frac{3}{2}x - \frac{3}{2}$

(b) $y = \frac{3}{2}x - \frac{3}{2}$ —— 1

$2x + 3y = 15$ —— 2

~~1 × 2 ⟹ 2y = 3x − 3~~

sub $y = \frac{3}{2}x - \frac{3}{2}$ into eq 2.

$2x + 3\left(\frac{3}{2}x - \frac{3}{2}\right) = 15$

$2x + \frac{9}{2}x - \frac{9}{2} = 15$

(×2) (×2)

$4x + 9x - 9 = 30$

$13x = 39$

$\therefore x = 3$

sub $x = 3$ into eq 2.

$$6 + 3y = 15$$

$$3y = 9$$

$$\therefore y = 3$$

$\therefore$ Coordinates of $C = \underline{\underline{(3,3)}}$