

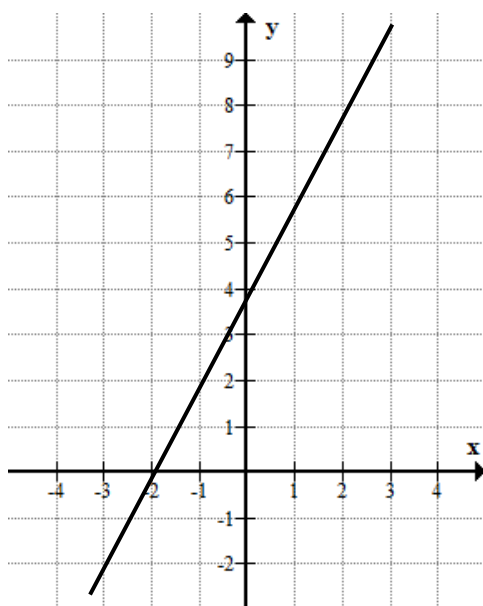
EXERCISES [MAI 2.1]

LINES

SOLUTIONS

A. Paper 1 questions (SHORT)

1. (a) $m_{AB} = \frac{4}{3}$
 (b) $m_{AB} = -\frac{3}{4}$
 (c) $M(\frac{7}{2}, 9)$
 (d) $d = 5$
 (e) $C(8, 15)$
2. (a) $a = 1$ (b) $a = 11$ (c) $a = 5$ (d) $a = 0$ or $a = 6$
3. (a) (i) $m = 2$ (ii) $y = 4$ (iii) $x = -2$
 (b)



(c) A does not lie on the line since $2 \times 7 + 4 = 18 \neq 19$ while B lies on the line since $2 \times 8 + 4 = 20$

4. (a) (i) $m = -2$ (ii) $y = 5$ (iii) $x = 2.5$ ($= \frac{5}{2}$)
 (b) $y = -2x + 5$
 (c) $y = 3$, $x = 2$ (d) $a = 5$, $b = 15$
5. (a) $m_{AB} = \frac{3}{2}$, $y - 4 = \frac{3}{2}(x - 3)$ (b) $y = \frac{3}{2}x - \frac{1}{2}$ (c) $3x - 2y = 1$
6. (i) $3x + 2y = 18$, For $x=0$ $2y = 18 \Rightarrow y = 9$ therefore A (0,9)
 (ii) For $y = 0$, $3x = 18 \Rightarrow x = 6$ therefore B (6,0)
 (iii) midpoint between (0, 9) and (6, 0): $\left(\frac{0+6}{2}, \frac{9+0}{2} \right) = (3, 4.5)$

7. (a) $y = -2x + 3$ gradient of line $L_1 = -2$

(b) **METHOD 1**

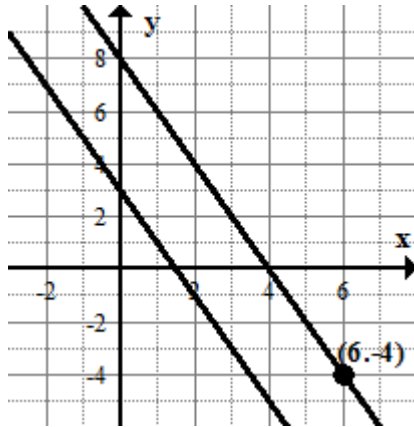
$$(y - y_1) = m(x - x_1) \Rightarrow (y - (-4)) = -2(x - 6)$$

$$y + 4 = -2x + 12 \Rightarrow y = -2x + 8$$

METHOD 2

Substituting the point $(6, -4)$ in $y = mx + c \Rightarrow c = 8$ so $y = -2x + 8$

- (c) when line L_1 cuts the x -axis, $y = 0 \Rightarrow y = -2x + 8 \Rightarrow x = 4$

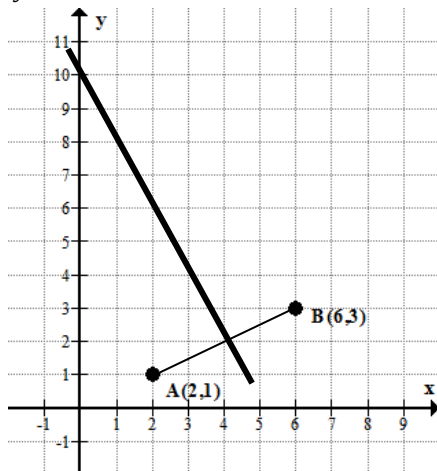


8. (a) $x = 2$ (b) $y = 5$ (c) $P(2, 5)$

9. (a) $y = 3$ (b) $x = 2$ (c) $y = \frac{3}{2}x$

10. (a) $m_{AB} = \frac{2}{4} = \frac{1}{2}$, $m_{\perp} = -2$, Midpoint $(4, 2)$, $y - 2 = -2(x - 4)$ or $y = -2x + 10$

- (b) $y = 10$

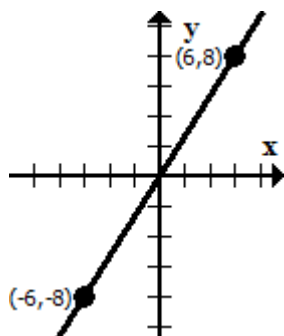


11. (a) For $x = 3k$, we obtain $y = 4k$

- (b) $\sqrt{(3k)^2 + (4k)^2} = 10 \Leftrightarrow 25k^2 = 100 \Leftrightarrow k^2 = 4 \Leftrightarrow k = \pm 2$ (or by GDC)

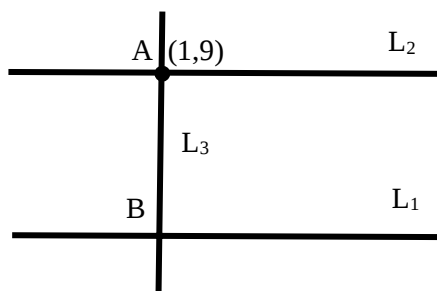
- (c) $(6, 8)$ and $(-6, -8)$

- (d)

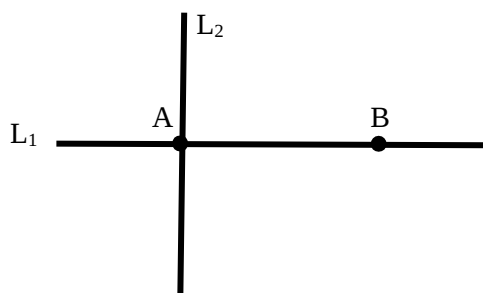


B. Paper 2 questions (LONG)

12. (a) $L_2: y = 2x + 7$
 (b) $L_2: y = -\frac{1}{2}x + \frac{19}{2}$
 (c) $B(5,7)$
 (d) $d = \sqrt{20} = 2\sqrt{5}$
 (e) In fact the distance from A to the line L_1 is $2\sqrt{5}$



13. (a) $m_{AB} = 3$
 (b) (i) $L_1: y = 3x - 1 \Rightarrow 3x - y = 1$
 (ii) $L_2: y = -\frac{1}{3}x + \frac{17}{3} \Rightarrow x + 3y = 17$
 (c) The solution is $(2,5)$
 (d) The solution is in fact the point of intersection which is A as expected.



14. (a) $m_{AB} = \frac{2}{3}$
 (b) $M(1,7)$
 (c) $y = -\frac{1}{2}x + \frac{17}{2}$
 (d) $d = \sqrt{52} = 2\sqrt{13}$
 (e) $\sqrt{13}$
15. (a) $x = 5$ (b) $y = 5$ (c) $P(5,5)$ $\frac{3+7}{2} = 5$ $\frac{2+8}{2} = 5$
 (d) (i) 12 (ii) 6 (iii) 6
 (e) $m_{BC} = -\frac{3}{2}$, $m_{\perp} = \frac{2}{3}$, Midpoint $(5,5)$, $y - 5 = \frac{2}{3}(x - 5) \Rightarrow 2x - 3y = -5$
 (f) For $x = 3$, $y = \frac{11}{3} \neq 2$
16. (a) $A(6,-1)$ (b) $B(-2,7)$ (c) $C(-2,-5)$ (d) Area = $\frac{12 \times 8}{2} = 48$