Exercise 15E Exam Practice

1 The line l_1 has gradient $\frac{2}{3}$ and passes through the point A (1, 4).

a Find the equation of the line l_1 in the form $ax + by + c = 0$. **(2 marks)**

The line l_2 passes through the points B (6, 0) and C (8, 4).

b Find an equation of the line l_2. **(3 marks)**

The line l_3 is perpendicular to l_1 and passes through the point A.
The lines l_2 and l_3 intersect at the point D.

c Find the coordinates of the point D. **(5 marks)**

2 The line l has equation $2x + 8y = 17$ and intersects the x-axis at the point A.

a Find the coordinates of the point A. **(2 marks)**

The line m passes through the origin O and is perpendicular to the line l. The lines l and m intersect at the point B.

b Find the coordinates of the point B. **(5 marks)**

c Find the area of triangle OAB. **(3 marks)**

3 The line l passes through the points A (3, 16) and B (11, 12).

a Find the equation of the line l in the form $ax + by + c = 0$. **(3 marks)**

b Find the coordinates of the point C, the mid-point of AB. **(2 marks)**

c Show that the perpendicular bisector of AB passes through the origin. **(4 marks)**

4 The line l passes through the points A ($^-2$, 3) and B (6, 9).

a Find the equation of the line l in the form $ax + by + c = 0$. **(3 marks)**

The line l intersects the coordinate axes at the points C and D.

b Find the perimeter of triangle OCD, where O is the origin. **(6 marks)**

5 The line l_1 has a gradient of 3 and passes through the point A (1, 12).

a Find the equation of the line l_1 in the form $y = mx + c$. **(2 marks)**

The line l_2 is parallel to l_1 and intersects the y-axis at the point A (0, $\frac{21}{2}$).

b Find an equation of the line l_2 in the form $ax + by + c = 0$. **(2 marks)**

c Show that the area of the trapezium bounded by the lines l_1, l_2 and the coordinate axes is $\frac{39}{8}$. **(6 marks)**

Exercise 15E Exam Practice

1 **a** $2x - 3y + 10 = 0$ **b** $y = 2x - 12$
c (5, -2)

2 **a** ($^{17}/_2$, 0) **b** ($^1/_2$, 2) **c** $^{17}/_2$

3 **a** $x + 2y - 35 = 0$ **b** (7, 14)

4 **a** $3x - 4y + 18 = 0$ **b** 18

5 **a** $y = 3x + 9$ **b** $6x - 2y + 21 = 0$

Exercise 15E Exam Practice — Angelina Tjok.

Qu1 (a) $y - 4 = \frac{2}{3}(x - 1)$ ✓

$3y - 12 = 2x - 2$

$\therefore 2x - 3y + 10 = 0$ ✓

(b) $m_{l_2} = \frac{4}{2} = 2$ ✓

$\therefore y - 0 = 2(x - 6)$

$y = 2x - 12$ ✓

(c) $m_{l_3} = -3/2$ ✓

$\therefore y - 4 = -3/2(x - 1)$

$2y - 8 = -3x + 3$

$3x + 2y - 11 = 0$ is ✓

equation of l_3.

$\therefore 3x + 2y = 11$ (1) ✓

$2x - y = 12$ (2)

$2\times(2)$: $4x - 2y = 24$ (3)

$(1)+(3)$: $7x = 35$

$x = 5$ sub in (2)

$10 - y = 12$

$y = -2$ $(5, -2)$

$\therefore$ ~~(7, 2)~~

Qu2 (a) when $y = 0$,

$2x = 17$

$\therefore (17/2, 0)$ ✓

(b) $m_l = -1/4$

$\therefore$ gradient of m is 4

$\therefore y = 4x$

$8y + 2x = 17$ (1)

$y - 4x = 0$ (2)

$2\times(1)$: $16y + 4x = 34$ (3)

$(3)+(2)$: $17y = 34$ ✓

$y = 2$ sub in (2)

$2 = 4x$

$x = 1/2$ ✓

$\therefore (1/2, 2)$

(C) $A = 1/2 \times 17/2 \times 2$ ✓

$= 17/2$ units^2 ✓

Qu3 (a) $m_{AB} = \frac{-4}{8} = -1/2$

$\therefore y - 12 = -1/2(x - 11)$ ✓

$2y - 24 = -x + 11$

$\therefore x + 2y - 35 = 0$ ✓

(b) $mid_{AB} = \left(\frac{14}{2}, \frac{28}{2}\right)$

$\therefore C\ (7, 14)$ ✓

(c) ⊥ bisector:

$m\perp AB: 2$

$\therefore y - 14 = 2(x - 7)$ ✓

$= 2x - 14$

$\therefore 2x - y = 0$

$y = 2x$

Sub $(0, 0)$ in ✓

$0 = 0$

$\therefore$ perpendicular bisector passes through origin.

Qu4 (a) $m_{AB} = 6/8 = 3/4$

$\therefore y - 9 = 3/4(x - 6)$ ✓

$4y - 36 = 3x - 18$

$\therefore 3x - 4y + 18 = 0$ ✓

(b) when $x = 0, y = 9/2$

$y = 0, x = -6$

$\therefore C\ (0, 9/2)\ D(-6, 0)$

$\therefore$ perimeter $= 9/2 + 6 + CD$.

$CD = \sqrt{36 + \frac{81}{4}} = \sqrt{\frac{225}{4}}$

$= 7\frac{1}{2}$ ✓

$\therefore$ perimeter $= 18$ units.

Qu5 (a) $y - 12 = 3(x - 1)$ ✓

$y = 3x - 3 + 12$

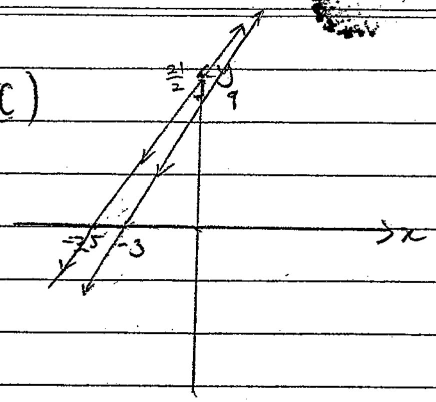
$= 3x + 9$ ✓

(b) $y = 3x + \frac{21}{2}$ ✓

$2y = 6x + 21$

$\therefore 6x - 2y + 21 = 0$ ✓

(c)



$y = 3x + 9.$

when $x = 0,\ y = 9 \Rightarrow (0, 9)$ A

$y = 0,\ x = -3 \Rightarrow (-3, 0)$ B ✓

$y = 3x + \frac{21}{2}$

when $x = 0,\ y = 21/2 \Rightarrow (0, 21/2)$ D

$y = 0,\ x = -3½ \Rightarrow (-3½, 0)$ C ✓

$d_{AB} = \cancel{\sqrt{12^2}} \quad \sqrt{81+9}$

$\cancel{= 12 \text{ units}} = \sqrt{90} = 3\sqrt{10}$ units.

$d_{CD} = \cancel{\sqrt{14^2}} = \sqrt{(10.5)^2 + (3.5)^2} = \sqrt{\frac{245}{2}}.$

$\cancel{= 14 \text{ units}}$

⊥ d of $(0, 9)$ and $6x - 2y + 21 = 0$

$d = \frac{|-18 + 21|}{\sqrt{36+4}}$

$= \frac{3}{2\sqrt{10}}$ ✓

$\cancel{\therefore A = \frac{3}{2\sqrt{10}} \times \frac{1}{2}[14 + 12]}$

$\therefore A = \frac{1}{2} \times \frac{3}{2\sqrt{10}}\left[\frac{\sqrt{245}}{\sqrt{2}} + 3\sqrt{10}\right].$

$= \frac{3}{4\sqrt{10}} \times \frac{\sqrt{245} + 3\sqrt{20}}{\sqrt{2}}$ ✓

$= \frac{3}{4\sqrt{10}} \times \frac{7\sqrt{5} + 6\sqrt{5}}{\sqrt{2}}$

$= \frac{3(13\sqrt{5})}{4\sqrt{20}} = \frac{39\cancel{\sqrt{5}}}{8\cancel{\sqrt{5}}}$

$= \left(\frac{39}{8}\right)$ units^2