

# C1 Coordinate Geometry

1)  $(2, 5) \quad m = -\frac{1}{2}$

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

$$5 = -\frac{1}{2}(2) + c$$

$$5 = -1 + c$$

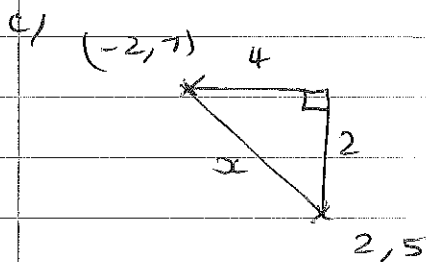
$$c = 6$$

$$y = -\frac{1}{2}x + 6$$

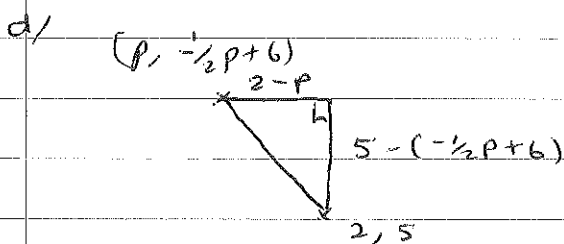
b)  $7 = -\frac{1}{2}(-2) + 6$

$$7 = 1 + 6$$

$$7 = 7$$



$$\begin{aligned} AB &= \sqrt{4^2 + 2^2} \\ &= \sqrt{20} \\ &= \underline{2\sqrt{5}} \end{aligned}$$



$$\begin{aligned} 5 - (-\frac{1}{2}p + 6) \\ 5 + \frac{1}{2}p - 6 \\ \frac{1}{2}p - 1 \end{aligned}$$

$$5^2 = (2-p)^2 + (\frac{1}{2}p - 1)^2$$

$$5^2 = 4 - 4p^2 + p^2 + \frac{1}{4}p^2 - p + 1$$

$$25 = \frac{5}{4}p^2 - 5p + 5$$

$$0 = \frac{5}{4}p^2 - 5p - 20$$

$$0 = p^2 - 4p - 16$$

2)  $(-6, 4) \quad (8, -3)$   
 $x_1 \quad y_1 \quad x_2 \quad y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-3 - 4}{8 - -6} = \frac{-7}{14} = -\frac{1}{2}$$

$$y = -\frac{1}{2}x + c \quad (-6, 4)$$

$$4 = -\frac{1}{2}(-6) + c$$

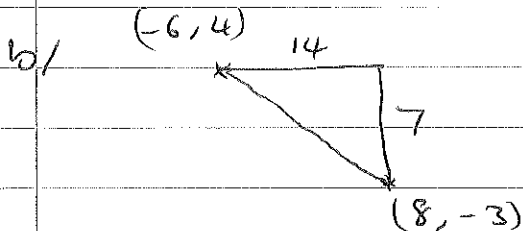
$$4 = 3 + c$$

$$c = 1$$

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

$$2y = -x + 2$$

$$0 = x + 2y - 2$$



$$\begin{aligned} AB &= \sqrt{14^2 + 7^2} \\ &= \sqrt{196 + 49} \\ &= \sqrt{245} \\ &= \sqrt{49} \sqrt{5} \\ &= \underline{7\sqrt{5}} \end{aligned}$$

3a/

$$\begin{array}{cc} (6, 7) & (8, 2) \\ x_1, y_1 & x_2, y_2 \end{array}$$

$$m = \frac{2-7}{8-6} = \frac{-5}{2}$$

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

$$y = \frac{2}{5}x + c \quad (6, 7)$$

$$7 = \frac{2}{5}(6) + c$$

$$7 = \frac{12}{5} + c$$

$$\frac{35}{5} - \frac{12}{5} = c$$

$$c = \frac{23}{5}$$

$$y = \frac{2}{5}x + \frac{23}{5}$$

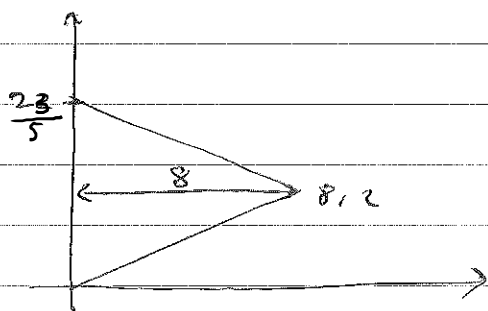
$$5y = 2x + 23$$

$$\underline{\underline{2x - 5y + 23 = 0}}$$

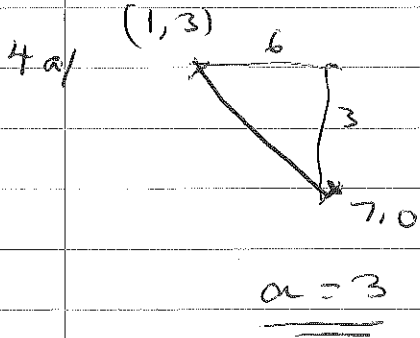
b/

$$\boxed{\left(0, \frac{23}{5}\right)}$$

c/



$$\begin{aligned} \text{Area} &= \frac{1}{2} \cdot \frac{23}{5} \cdot 8 \\ &= \frac{92}{5} \text{ units}^2 \end{aligned}$$



$$\begin{aligned}
 QR &= \sqrt{6^2 + 3^2} \\
 &= \sqrt{45} \\
 &= \sqrt{9} \sqrt{5} \\
 &= \underline{\underline{3\sqrt{5}}}
 \end{aligned}$$

b/  $M_{e_1} = \frac{0 - 3}{7 - 1} = \frac{-3}{6} = -\frac{1}{2}$

$\therefore M_{e_2} = 2$

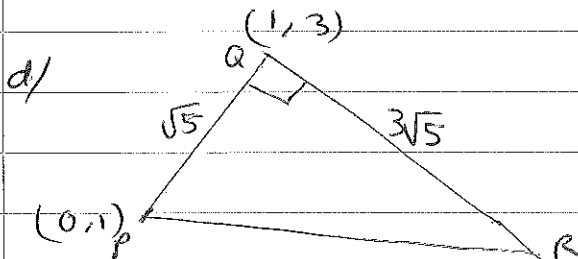
$$y = 2x + c \quad (1, 3)$$

$$3 = 2(1) + c$$

$$c = 1$$

$$\underline{\underline{y = 2x + 1}}$$

c/  $(0, 1)$



$$\begin{aligned}
 PQ &= \sqrt{1^2 + 2^2} \\
 &= \sqrt{5}
 \end{aligned}$$

$$\begin{aligned}
 \text{Area} &= \frac{1}{2} \times \sqrt{5} \times 3\sqrt{5} \\
 &= \underline{\underline{15/2 \text{ units}^2}}
 \end{aligned}$$

6 a/

$$3x + 2y - 8 = 0$$

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

$$y = -\frac{3}{2}x + 4$$

$$\underline{\underline{m = -3/2}}$$

$$5a) \quad y = 5 - 2x$$

$$(3, -1)$$

$$-1 = 5 - 2(3)$$

$$-1 = 5 - 6$$

$$\underline{-1 = -1}$$

b) perp. gradient =  $\frac{1}{2}$

$$y = \frac{1}{2}x + c \quad (3, -1)$$

$$-1 = \frac{1}{2}(3) + c$$

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

$$\underline{-\frac{5}{2} = c}$$

$$y = \frac{1}{2}x - \frac{5}{2}$$

$$2y = x - 5$$

$$\underline{x - 2y - 5 = 0}$$

$$6a) \quad 3x + 2y - 8 = 0$$

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

$$y = -\frac{3}{2}x + 4$$

$$\underline{m = -\frac{3}{2}}$$

6b)

$$y = 3x + 2$$

$$y = -\frac{3}{2}x + 4$$

$$3x + 2 = -\frac{3}{2}x + 4$$

$$\frac{9}{2}x = 2$$

$$x = \frac{4}{9}$$

$$y = 3\left(\frac{4}{9}\right) + 2$$

$$= \frac{4\cancel{2}}{3\cancel{2}} + 2$$

$$= \frac{10}{3}$$

$$\left(\frac{4}{9}, \frac{10}{3}\right)$$

e/

$$A: 1 = 3x + 2$$

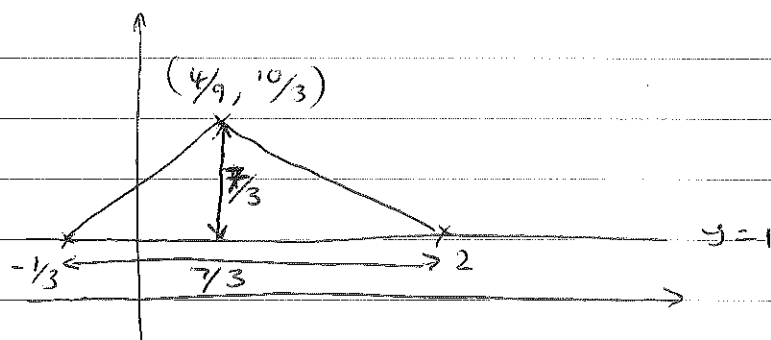
$$-1 = 3x$$

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

$$B: 1 = -\frac{3}{2}x + 4$$

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

$$x = 2$$



$$\text{Area} = \frac{1}{2} \times \frac{7}{3} \times \frac{7}{3} = \frac{49}{18} \text{ units}^2$$

7a/

$$(-1, 2) \quad (1, 8)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{8 - 2}{1 - (-1)} = \frac{1}{2}$$

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

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

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

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

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

b/ perp. gradient = -2

$$y = -2x + c$$

$$0 = -2(10) + c$$

$$c = 20$$

$$y = -2x + 20$$

$$-2x + 20 = \frac{1}{2}x + \frac{5}{2}$$

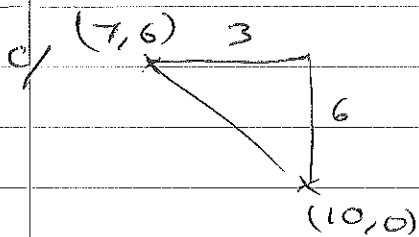
$$\frac{35}{2} = \frac{5}{2}x$$

$$x = 7$$

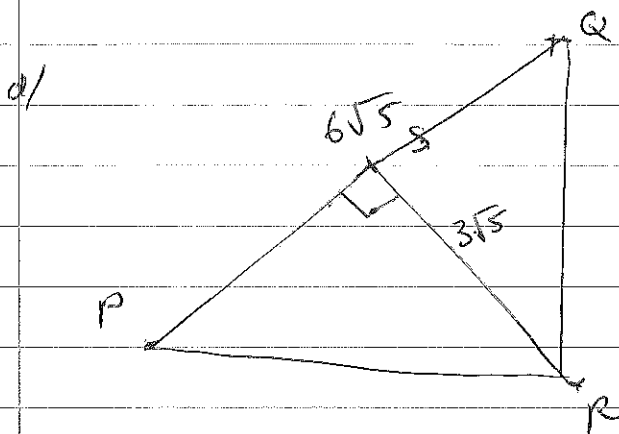
$$y = -2(7) + 20$$

$$= 6$$

(7, 6)



$$\begin{aligned}RS &= \sqrt{3^2 + 6^2} \\ &= \sqrt{45} \\ &= 3\sqrt{5}\end{aligned}$$



$$\begin{aligned}PQ &= \sqrt{12^2 + 6^2} \\ &= \sqrt{180} \\ &= \sqrt{36} \sqrt{5} \\ &= 6\sqrt{5}\end{aligned}$$

$$\begin{aligned}\text{Area} &= \frac{1}{2} \times 6\sqrt{5} \times 3\sqrt{5} \\ &= \underline{45} \text{ units}^2\end{aligned}$$

8a/ C: (15, -3)

$$p = 15$$

$$q = -3$$

$$b/ \text{ gradient of } l = \frac{2-7}{8-1} = -\frac{5}{7}$$

$$\text{perp gradient} = \frac{7}{5}$$

$$y = \frac{7}{5}x + c \quad (8, 2)$$

$$2 = \frac{7}{5}(8) + c$$

$$2 = \frac{56}{5} + c$$

$$-\frac{46}{5} = c$$

$$y = \frac{7}{5}x - \frac{46}{5}$$

$$5y = 7x - 46$$

$$\underline{0 = 7x - 5y - 46}$$

$$c/ \text{ E is where } y = 7$$

$$0 = 7x - 5(7) - 46$$

$$0 = 7x - 35 - 46$$

$$81 = 7x$$

$$x = 81/7$$

$$9a/ \quad m = 1/3 \quad (9, -4)$$

$$y = \frac{1}{3}x + c$$

$$-4 = \frac{1}{3}(9) + c$$

$$-4 = 3 + c$$

$$c = -7$$

$$y = \frac{1}{3}x - 7$$

$$3y = x - 21$$

$$\underline{x - 3y - 21 = 0}$$

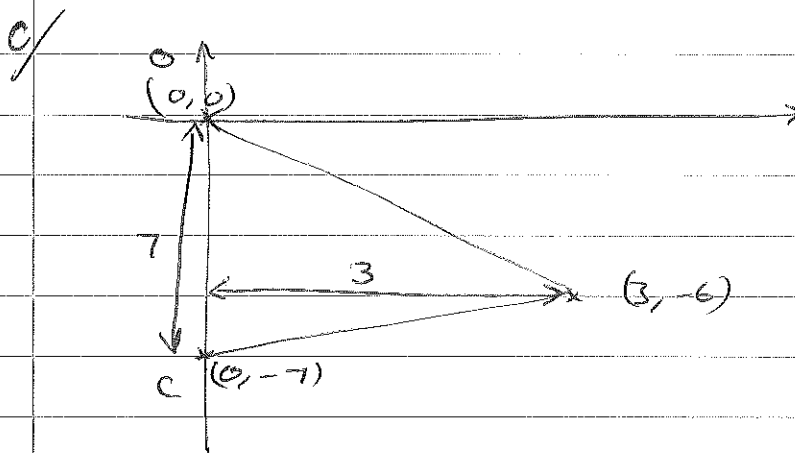
$$b/ \quad y = -2x \quad y = \frac{1}{3}x - 7$$

$$-2x = \frac{1}{3}x - 7$$

$$7 = \frac{7}{3}x$$

$$\underline{x = 3} \quad y = -2(3) = \underline{-6}$$

$$(3, -6)$$



$$\text{Area} = \frac{1}{2} \times 7 \times 3 = \frac{21}{2} \text{ units}^2$$