

# Higher Homework - Gradient

Total = 28 marks

Q1 (i) A(-3, 4) B(2, -1)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 4}{2 - (-3)} = \frac{-5}{5} = -1$$

(ii) C(1, 8) D(3, -9)

$$m = \frac{-9 - 8}{3 - 1} = \frac{-17}{2}$$

(iii) E(-3, -7) F(2, 0)

$$m = \frac{0 - (-7)}{2 - (-3)} = \frac{7}{5}$$

(iv) G(0, -2) H(2, 0)

$$m = \frac{0 - (-2)}{2 - 0} = \frac{2}{2} = 1$$

(8)

Q2. (i)  $y = -x$   $m = -1$

(ii)  $2x + 3y = 1$

$$\begin{aligned} -2x & \quad -2x \\ 3y & = -2x + 1 \\ \div 3 & \quad \div 3 \\ y & = -\frac{2}{3}x + \frac{1}{3} \quad m = -\frac{2}{3} \end{aligned}$$

(iii)  $0.25x + 5y - 4 = 0$

$$\begin{aligned} -0.25x & \quad +4 \quad -0.25x + 4 \\ 5y & = -0.25x + 4 \\ \div 5 & \quad \div 5 \\ y & = -0.05x + 0.8 \\ m & = -0.05 \end{aligned}$$

(iv)  $x = 5$  vertical line

$\Rightarrow$  undefined gradient.

(6)

Q3.  $L_1 \Rightarrow 2x + y = -3$   $L_2 \parallel$  to  $L_1 \Rightarrow$  equal gradients

$$\begin{aligned} -2x & \quad -2x \\ y & = -2x - 3 \\ m & = -2 \end{aligned}$$

(0, -4)

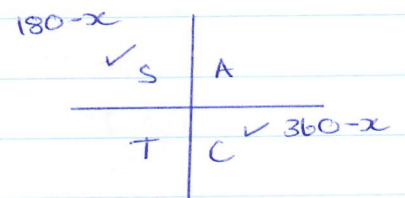
$$\begin{aligned} y - b & = m(x - a) \\ y - (-4) & = -2(x - 0) \\ y + 4 & = -2x \\ +2x & \quad +2x \\ 2x + y + 4 & = 0 \end{aligned}$$

(2)

Q4.  $y + x - 4 = 0$

$$\begin{aligned} -x + 4 & \quad -x + 4 \\ y & = -x + 4 \\ m & = -1 \end{aligned}$$

$$\begin{aligned} \tan \theta & = m \\ -1 & = \tan \theta \\ \theta & = \tan^{-1} 1 \\ \theta & = 45^\circ \text{ (ref.)} \end{aligned}$$



$$\theta = 180^\circ - 45^\circ = 135^\circ$$

$$\alpha \theta = 360 - 45^\circ = 315^\circ$$

$\theta = 135^\circ$  because it is an obtuse angle so  $< 180^\circ$

(4)

$(-3, k)$   $(1, 4)$

Q5.  $m = \tan \theta$

$m = \tan 56.3^\circ$  ✓

$m = 1.5$  or  $3/2$  ✓

$$m = \frac{y_2 - y_1}{x_2 - x_1} \Rightarrow \frac{4 - k}{1 - (-3)} = \frac{4 - k}{4}$$

$$\begin{array}{l} \frac{4 - k}{4} \\ \times 4 \quad 4 = 1.5 \times 4 \end{array}$$

$$4 - k = 6$$

$$-4 \quad -4$$

$$-k = 2$$

$$\div -1 \quad \div -1$$

$$\underline{k = -2}$$
 ✓

(5)

Q6.  $L_1: x + 0.5y = 4$

$$\begin{array}{r} -x \\ -x \end{array}$$

$$0.5y = -x + 4$$

$$\begin{array}{r} \times 2 \\ \times 2 \end{array}$$

$$y = -2x + 8$$

$$m = -\frac{2}{1}$$
 ✓

$L_2 \perp L_1$  point  $(0, 2)$

$$\perp m = \frac{1}{2}$$
 ✓

$$y - b = m(x - a)$$

$$y - 2 = \frac{1}{2}(x - 0)$$
 ✓

$$\begin{array}{r} \times 2 \\ \times 2 \end{array} \quad y - 2 = \frac{1}{2}x$$

$$2y - 4 = x$$

$$\underline{x - 2y + 4 = 0}$$

(3)