

Revision Sheet Solutions

Q1. i) $A = (0, 0)$ $B = (12, 5)$
 $\quad \quad \quad x_1, y_1$ x_2, y_2

$$\begin{aligned} |AB| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(12 - 0)^2 + (5 - 0)^2} \\ &= \sqrt{144 + 25} \\ &= \sqrt{169} \\ &= \boxed{13} \end{aligned}$$

ii) $A = (0, 0)$ $C = (17, -7)$
 $\quad \quad \quad x_1, y_1$ x_2, y_2

$$\begin{aligned} |AC| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(17 - 0)^2 + (-7 - 0)^2} \\ &= \sqrt{289 + 49} \\ &= \boxed{\sqrt{338}} \end{aligned}$$

iii) $B = (12, 5)$ $D = (5, -12)$
 $\quad \quad \quad x_1, y_1$ x_2, y_2

$$\begin{aligned} |BD| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(5 - 12)^2 + (-12 - 5)^2} \\ &= \sqrt{49 + 289} \\ &= \sqrt{338} = |AC| \\ &\Rightarrow \text{YES.} \end{aligned}$$

Q2. i) $A(11, -2)$ $C(-3, 14)$
 $\quad \quad \quad x_1, y_1$ x_2, y_2

$$\begin{aligned} \text{Midpoint} &= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \\ &= \left(\frac{11 - 3}{2}, \frac{-2 + 14}{2} \right) \\ &= \left(\frac{8}{2}, \frac{12}{2} \right) \\ &= \boxed{(4, 6)} \end{aligned}$$

ii) $\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
 $(-1, -4) = \left(\frac{x_1 + 6}{2}, \frac{y_1 + 7}{2} \right)$

$$\Rightarrow -1 = \frac{x_1 + 6}{2} \quad \text{and} \quad -4 = \frac{y_1 + 7}{2}$$

$$-2 = x_1 + 6 \quad \quad \quad -8 = y_1 + 7$$

$$\Rightarrow x_1 = -8 \quad \quad \quad \Rightarrow y_1 = -15$$

$$\Rightarrow B(x_1, y_1) = \boxed{(-8, -15)}$$

Q3. i) $P(2, -4)$ $Q(0, 0)$
 x_1, y_1 x_2, y_2

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - (-4)}{0 - 2} = \frac{4}{-2} = \boxed{-2}$$

ii) Slope = $\frac{\text{Rise}}{\text{Run}}$

\Rightarrow Slope $q = -1$, Slope $r = \frac{-3}{2}$, Slope $s = \frac{3}{2}$, Slope $t = \frac{-2}{5}$
 Slope $u = \frac{5}{2}$, Slope $v = 0$ as it's horizontal

iii) "Flip & Change" for \perp slope $\Rightarrow \boxed{-\frac{8}{5}}$

iv) Same slopes for \parallel lines $\Rightarrow \boxed{4}$

Q4. a) i) EQN $\begin{cases} \text{PT. ON LINE } (-2, 4) \\ \text{SLOPE } (-3) \end{cases}$

$$y - y_1 = m(x - x_1)$$

$$y - 4 = -3(x - (-2))$$

$$y - 4 = -3(x + 2)$$

$$y - 4 = -3x - 6$$

$$3x + y - 4 + 6 = 0$$

$$\boxed{3x + y + 2 = 0}$$

ii) $(-1, 1)$ on line $3x + y + 2 = 0$?

$$3(-1) + (1) + 2 \stackrel{?}{=} 0$$

$$-3 + 1 + 2 \stackrel{?}{=} 0$$

$$-3 + 3 \stackrel{?}{=} 0$$

$$0 = 0 \Rightarrow \boxed{\text{YES, it's on line}}$$

b) EQN $\begin{cases} \rightarrow \text{PT. } (6, 5) \\ \rightarrow \text{SLOPE?} \end{cases}$

To find slope $(-3, -1)$ $(6, 5)$
 x_1, y_1 x_2, y_2

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-1)}{6 - (-3)} = \frac{5 + 1}{6 + 3} = \frac{6}{9} = \frac{2}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 5 = \frac{2}{3}(x - 6)$$

$$3(y - 5) = 2(x - 6)$$

$$3y - 15 = 2x - 12$$

$$\boxed{2x - 3y + 3 = 0}$$

Q5. a) L: $2x + 5y - 3 = 0$
Slope = $\frac{-x \text{ number}}{y \text{ number}} = \frac{-2}{5}$

K: $5x - 2y + 4 = 0$
Slope = $\frac{-x \text{ number}}{y \text{ number}} = \frac{-5}{-2} = \frac{5}{2}$

Now check

$$\boxed{-\frac{2}{5} \times \frac{5}{2} = \frac{-10}{10} = -1 \Rightarrow L \perp K}$$

b) S: $3x - 4y + 8 = 0$
Slope = $\frac{-x \text{ number}}{y \text{ number}} = \frac{-3}{-4} = \frac{3}{4}$

i) EQN $\begin{cases} \rightarrow \text{PT. } (4, 2) \\ \rightarrow \text{Slope } (\frac{3}{4}) \end{cases}$

CAN STOP HERE $y - y_1 = m(x - x_1)$

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

$$4(y - 2) = 3(x - 4)$$

$$4y - 8 = 3x - 12$$

$$\boxed{3x - 4y - 4 = 0}$$

ii) EQN $\begin{cases} \rightarrow \text{PT. } (4, 2) \\ \rightarrow \text{Slope } -\frac{4}{3} \end{cases}$

CAN STOP HERE $y - y_1 = m(x - x_1)$

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

$$3(y - 2) = -4(x - 4)$$

$$3y - 6 = -4x + 16$$

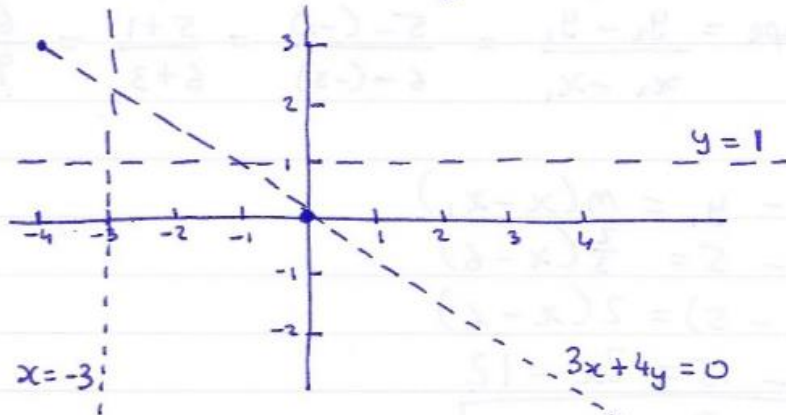
$$\boxed{4x + 3y - 22 = 0}$$

Q6. a) S: $3x + 4y = 0$

$$\Rightarrow 4y = -3x$$

$$y = -\frac{3}{4}x + 0$$

$$\Rightarrow \text{Slope} = -\frac{3}{4} \text{ and } y\text{-intercept} = 0$$



Q7. a) $P(0,0)$ $Q(1,3)$ $R(-3,3)$
 x_1, y_1 x_2, y_2

$$\begin{aligned} \text{Area} &= \frac{1}{2} |x_1 y_2 - x_2 y_1| \\ &= \frac{1}{2} |(1)(3) - (-3)(-3)| \\ &= \frac{1}{2} |3 + 9| \\ &= \frac{1}{2} (12) \\ &= \boxed{6 \text{ sq units}} \end{aligned}$$

b) $A(-2,-1) \xrightarrow[+1]{+2} (0,0)$
 $B(4,1) \xrightarrow[+1]{+2} (6,2) = (x_1, y_1)$
 $C(2,6) \xrightarrow[+1]{+2} (4,7) = (x_2, y_2)$

$$\begin{aligned} \text{Area} &= \frac{1}{2} |x_1 y_2 - x_2 y_1| \\ &= \frac{1}{2} |(6)(7) - (2)(4)| \\ &= \frac{1}{2} |42 - 8| \\ &= \frac{1}{2} (34) \\ &= \boxed{17 \text{ sq units}} \end{aligned}$$

Past Exam Questions

Q8.

a) $P(x_1, y_1) = P(4, 2)$ $Q(x_2, y_2) = Q(8, 5)$

$$\begin{aligned} \text{Slope} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{5 - 2}{8 - 4} \\ &= \boxed{\frac{3}{4}} \end{aligned}$$

b) EQN $\begin{cases} \nearrow \text{PT. ON LINE } (4, 2) \\ \rightarrow \text{SLOPE } 3/4 \end{cases}$

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - 2 &= \frac{3}{4}(x - 4) \\ 4(y - 2) &= 3(x - 4) \\ 4y - 8 &= 3x - 12 \\ \boxed{3x - 4y - 4} &= 0 \end{aligned}$$

c) Slope PQ = $3/4$

\Rightarrow Slope \perp line = $\boxed{-4/3}$

FLIP + CHANGE

d) $P(4, 2) \xrightarrow{-4/-2} (0, 0)$

$Q(8, 5) \xrightarrow{-4/-2} (4, 3) \quad (x_1, y_1)$

$R(2, 11) \xrightarrow{-4/-2} (-2, 9) \quad (x_2, y_2)$

$$\begin{aligned} \text{Area} &= \frac{1}{2} |x_1 y_2 - x_2 y_1| \\ &= \frac{1}{2} |(4)(9) - (-2)(3)| \\ &= \frac{1}{2} |36 + 6| \\ &= \frac{1}{2} |42| \\ &= \boxed{21} \end{aligned}$$

Q9.

a) $P(x_1, y_1) (7, 10)$ $R(x_2, y_2) (11, 4)$

$$mp = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$= \left(\frac{7+11}{2}, \frac{10+4}{2} \right)$$

$$= \boxed{(9, 7)}$$

b) Slope UV $u(x_1, y_1) (4, 6)$ $v(x_2, y_2) (9, 7)$

$$\text{Slope} = \frac{7-6}{9-4}$$

$$= \frac{1}{5}$$

Slope QR $Q(x_1, y_1) (1, 2)$ $R(x_2, y_2) (11, 4)$

$$\text{Slope} = \frac{4-2}{11-1}$$

$$= \frac{2}{10} = \frac{1}{5}$$

Slopes equal \Rightarrow Parallel

c) $P(7, 10) \xrightarrow{-7, -10} (0, 0)$

$$Q(1, 2) \xrightarrow{-7, -10} (-6, -8) (x_1, y_1)$$

$$R(11, 4) \xrightarrow{-7, -10} (4, -6) (x_2, y_2)$$

$$\text{Area} = \frac{1}{2} |x_1 y_2 - x_2 y_1|$$

$$= \frac{1}{2} |(-6)(-6) - (4)(-8)|$$

$$= \frac{1}{2} |36 + 32|$$

$$= \frac{1}{2} |68|$$

$$= \boxed{34}$$

Q10. $A(x_1, y_1)$ $D(x_2, y_2)$
 $A(2, 1)$ $D(1, 3)$

$$\begin{aligned} \text{i) } |AD| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(1 - 2)^2 + (3 - 1)^2} \\ &= \sqrt{(-1)^2 + (2)^2} \\ &= \sqrt{1 + 4} \\ &= \sqrt{5} \end{aligned}$$

ii) Need to find $|CD|$ or $|AB|$

$$\begin{aligned} |CD| &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(5 - 1)^2 + (5 - 3)^2} \\ &= \sqrt{(4)^2 + (2)^2} \\ &= \sqrt{16 + 4} \\ &= \sqrt{20} \end{aligned}$$

$$\begin{aligned} \Rightarrow \text{Area } ABCD &= L \times W \\ &= \sqrt{5} \times \sqrt{20} \\ &= \boxed{10} \end{aligned}$$

b) PT. ON LINE (6, 3)
EQN \rightarrow SLOPE ?

Slope BC $B(x_1, y_1)$ $C(x_2, y_2)$
 $B(6, 3)$ $C(5, 5)$

$$\begin{aligned} \text{Slope} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{5 - 3}{5 - 6} \\ &= -2 \end{aligned}$$

Eqn

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -2(x - 6)$$

$$y - 3 = -2x + 12$$

$$2x + y - 3 - 12 = 0$$

$$\boxed{2x + y - 15 = 0}$$

Q11. a) EQN \rightarrow PT. ON LINE (2,0)
 \rightarrow SLOPE ?

$$A(4,5) \quad B(2,0)$$

$x_1, y_1 \qquad x_2, y_2$

$$\begin{aligned} \text{Slope} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{0 - 5}{2 - 4} \\ &= \frac{5}{2} \end{aligned}$$

$$\text{EQN: } y - y_1 = m(x - x_1)$$

$$y - 0 = \frac{5}{2}(x - 2)$$

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

$$2y = 5x - 10$$

$$\boxed{5x - 2y - 10 = 0}$$

b) Cuts x-axis Cuts y-axis

$$x + 2(0) = 8$$

$$x = 8$$

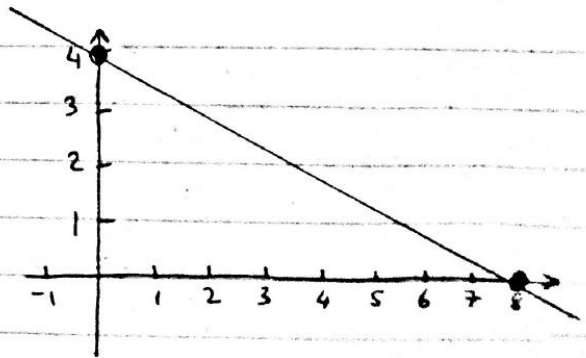
$$(8, 0)$$

$$0 + 2y = 8$$

$$2y = 8$$

$$y = 4$$

$$(0, 4)$$



c) L: $5x - 2y = 10$

k: $x + 2y = 8$

$$6x = 18$$

$$x = 3$$

Put x into k:

$$x + 2y = 8$$

$$3 + 2y = 8$$

$$2y = 5$$

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

$$\Rightarrow L \cap k = \boxed{\left(3, \frac{5}{2}\right)}$$