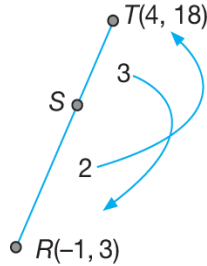


Tingkatan 4 Bab 7
Geometri Koordinat
Penyelesaian Lengkap

Praktis Formatif 7.1

1 (a)

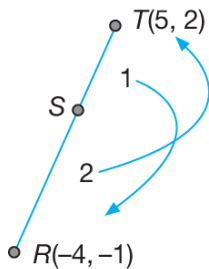


$$S = \left(\frac{3(-1) + 2(4)}{2+3}, \frac{3(3) + 2(18)}{2+3} \right)$$

$$S = \left(\frac{5}{5}, \frac{45}{5} \right)$$

$$S = (1, 9)$$

(b)



$$S = \left(\frac{1(-4) + 2(5)}{2+1}, \frac{1(-1) + 2(2)}{2+1} \right)$$

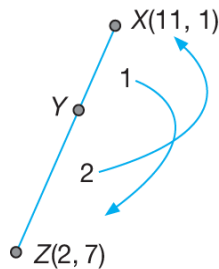
$$S = \left(\frac{6}{3}, \frac{3}{3} \right)$$

$$S = (2, 1)$$

2 (a) $2XY = YZ$

$$\frac{XY}{YZ} = \frac{1}{2}$$

$$XY : YZ = 1 : 2$$



$$Y = \left(\frac{2(11) + 1(2)}{1+2}, \frac{2(1) + 1(7)}{2+1} \right)$$

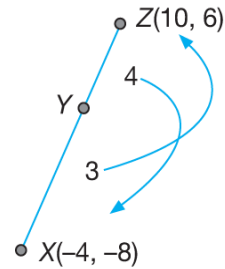
$$Y = \left(\frac{24}{3}, \frac{9}{3} \right)$$

$$Y = (8, 3)$$

(b) $4XY = 3YZ$

$$\frac{XY}{YZ} = \frac{3}{4}$$

$$XY : YZ = 3 : 4$$

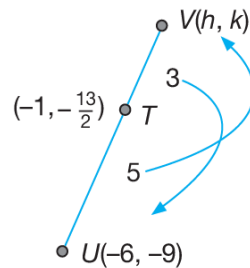


$$Y = \left(\frac{4(-4) + 3(10)}{3+4}, \frac{4(-8) + 3(6)}{3+4} \right)$$

$$Y = \left(\frac{14}{7}, \frac{-14}{7} \right)$$

$$Y = (2, -2)$$

3



Katakan $V = (h, k)$

$$T = \left(\frac{3(-6) + 5h}{5+3}, \frac{3(-9) + 5k}{5+3} \right)$$

$$T = \left(\frac{5h-18}{8}, \frac{5k-27}{8} \right)$$

Tetapi diberi bahawa $T = \left(-1, -\frac{13}{2} \right)$.

Menyamakan koordinat-x:

$$\frac{5h-18}{8} = -1$$

$$5h-18 = -8$$

$$5h = 10$$

$$h = 2$$

Menyamakan koordinat-y:

$$\frac{5k-27}{8} = -\frac{13}{2}$$

$$5k - 27 = -\frac{13}{2} \times 8$$

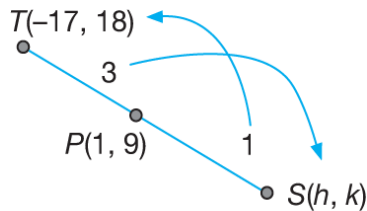
$$5k = -52 + 27$$

$$5k = -25$$

$$k = -5$$

Maka, koordinat titik V ialah $(2, -5)$.

4



$$P = \left(\frac{3h + 1(-17)}{1 + 3}, \frac{3k + 1(18)}{1 + 3} \right)$$

$$P = \left(\frac{3h - 17}{4}, \frac{3k + 18}{4} \right)$$

Tetapi diberi bahawa koordinat titik P ialah $(1, 9)$.

Menyamakan koordinat- x :

$$\frac{3h - 17}{4} = 1$$

$$3h - 17 = 4$$

$$3h = 21$$

$$h = 7$$

Menyamakan koordinat- y :

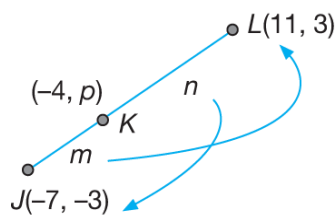
$$\frac{3k + 18}{4} = 9$$

$$3k = 18$$

$$k = 6$$

Maka, koordinat titik S ialah $(7, 6)$.

5



(a) Menyamakan koordinat- x :

$$\frac{n(-7) + m(11)}{m + n} = -4$$

$$-7n + 11m = -4m - 4n$$

$$15m = 3n$$

$$\frac{m}{n} = \frac{3}{15}$$

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

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

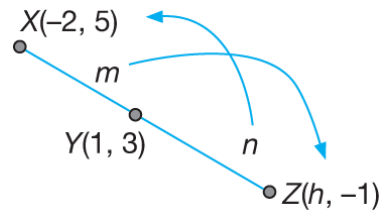
$$m : n = 1 : 5$$

$$JK : KL = 1 : 5$$

(b) Menyamakan koordinat- y :

$$p = \frac{5(-3) + 1(3)}{1 + 5} = -\frac{12}{6} = -2$$

6



(a) Menyamakan koordinat- y :

$$\frac{n(5) + m(-1)}{m + n} = 3$$

$$5n - m = 3m + 3n$$

$$4m = 2n$$

$$\frac{m}{n} = \frac{1}{2}$$

$$m : n = 1 : 2$$

$$XY : YZ = 1 : 2$$

(b) Menyamakan koordinat- x :

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

$$-4 + h = 3$$

$$h = 7$$

Praktis Formatif 7.2a

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

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

$$y - 2 = -2x + 10$$

$$y = -2x + 12$$

(b) $y - 3 = \frac{3}{4}(x + 8)$

$$4(y - 3) = 3(x + 8)$$

$$4y - 12 = 3x + 24$$

$$4y = 3x + 36$$

2 (a) $\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$

$$\frac{y + 1}{x - 2} = \frac{0 + 1}{3 - 2}$$

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

$$y + 1 = x - 2$$

$$y = x - 2 - 1$$

$$y = x - 3$$

$$\begin{aligned}
 \text{(b)} \quad \frac{y-3}{x+4} &= \frac{-5-3}{2+4} \\
 \frac{y-3}{x+4} &= \frac{-5-3}{2+4} \\
 \frac{y-3}{x+4} &= \frac{-4}{3} \\
 3(y-3) &= -4(x+4) \\
 3y-9 &= -4x-16 \\
 3y &= -4x-7
 \end{aligned}$$

$$3 \text{ (a)} \quad \frac{x}{3} + \frac{y}{(-5)} = 1$$

$$\text{(b)} \quad \frac{x}{(-8)} + \frac{y}{(-6)} = 1$$

$$\text{(c)} \quad \frac{x}{\left(-\frac{1}{2}\right)} + \frac{y}{\left(\frac{3}{4}\right)} = 1$$

$$4 \text{ (a)} \quad \frac{y-3}{x+1} = \frac{15-3}{5+1}$$

$$\begin{aligned}
 \frac{y-3}{x+1} &= 2 \\
 y-3 &= 2x+2 \\
 y &= 2x+5
 \end{aligned}$$

$$\text{(b)} \quad 2x - y + 5 = 0$$

$$\begin{aligned}
 \text{(c)} \quad -\frac{2x}{5} + \frac{y}{5} &= \frac{5}{5} \\
 \frac{x}{5} + \frac{y}{5} &= 1 \\
 \frac{x}{2} &
 \end{aligned}$$

$$\text{Pintasan-}x = -\frac{5}{2}$$

$$\text{Pintasan-}y = 5$$

$$\text{Kecerunan} = 2$$

5 Persamaan PQ ialah

$$y - 8 = 3(x - 2)$$

$$y - 8 = 3x - 6$$

$$y = 3x + 2 \dots (1)$$

Persamaan RS ialah

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

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

$$y+2 = x+6$$

$$y = x + 4 \dots (2)$$

$$y = 3x + 2 \dots (1)$$

$$y = x + 4 \dots (2)$$

Gantikan (2) ke dalam (1) :

$$x + 4 = 3x + 2$$

$$2x = 2$$

$$x = 1$$

Daripada (2) :

$$y = 1 + 4$$

$$y = 5$$

Maka, koordinat titik persilangan ialah (1, 5).

6 Titik P

$$\text{Persamaan } PQ: 3y = x + 7 \dots (1)$$

$$\text{Persamaan } PR: 7y = -3x - 5 \dots (2)$$

$$(1) \times 3: 9y = 3x + 21 \dots (3)$$

$$(2) + (3): 16y = 16$$

$$y = 1$$

$$\text{Daripada (1): } 3(1) = x + 7$$

$$x = -4$$

Koordinat titik P ialah (-4, 1).

Point Q

$$\text{Persamaan } PQ: 3y = x + 7 \dots (1)$$

$$\text{Persamaan } QR: y = -5x + 13 \dots (2)$$

$$(2) \times 3: 3y = -15x + 39 \dots (3)$$

$$(1) - (3): 16x - 32 = 0$$

$$x = 2$$

$$\text{Daripada (2): } y = -5(2) + 13 = 3$$

Koordinat titik Q ialah (2, 3).

Titik R

$$\text{Persamaan } PR: 7y = -3x - 5 \dots (1)$$

$$\text{Persamaan } QR: y = -5x + 13 \dots (2)$$

$$(2) \times 7: 7y = -35x + 91 \dots (3)$$

$$(1) - (3): 0 = 32x - 96$$

$$x = 3$$

$$\text{Daripada (2): } y = -5(3) + 13 = -2$$

Koordinat titik R ialah (3, -2).

7 Persamaan garis lurus CD ialah

$$\frac{y-2}{x-4} = \frac{-4-2}{-5-4}$$

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

$$3y - 6 = 2x - 8$$

$$3y = 2x - 2$$

$$3y = 2x - 2 \dots (1)$$

$$\text{Persamaan } CD: 3y = 2x - 2 \dots (1)$$

$$\text{Persamaan } ST: 2y = 7x + 10 \dots (2)$$

$$(1) \times 2 : 6y = 4x - 4 \quad \dots (3)$$

$$(2) \times 3 : 6y = 21x + 30 \quad \dots (4)$$

$$(3) - (4) : 0 = -17x - 34$$

$$x = -2$$

$$\text{Daripada (1) : } 3y = 2(-2) - 2$$

$$y = -2$$

Koordinat titik P ialah $(-2, -2)$.

Persamaan garis lurus HK ialah

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

$$y = -2x - 6$$

Praktis Formatif 7.2b

$$1 \text{ Kecerunan } PQ = \frac{8-18}{5-1} = -\frac{5}{2}$$

$$\text{Kecerunan } TU = \frac{8+2}{-5+1} = -\frac{5}{2}$$

Maka, PQ adalah selari dengan TU .

$$2 \text{ } 3x + 2y - 1 = 0$$

$$2y = -3x + 1$$

$$y = -\frac{3}{2}x + \frac{1}{2}$$

$$m_1 = -\frac{3}{2}$$

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

$$m_2 = -\frac{\text{pintasan } -y}{\text{pintasan } -x}$$

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

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

Maka, kedua-dua garis lurus adalah selari.

$$3 \text{ } 5x - 2y + 4 = 0$$

$$-2y = -5x - 4$$

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

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

$$y - 4 = \frac{5}{2}(x - 5)$$

$$2y - 8 = 5x - 25$$

$$2y = 5x - 17$$

Praktis Formatif 7.2c

$$1 \text{ } m_1 = \text{Kecerunan } PQ = \frac{4-3}{8-4} = \frac{1}{4}$$

$$m_2 = \text{Kecerunan } TU = \frac{5-1}{6-7} = -4$$

$$m_1 m_2 = \frac{1}{4} \times (-4) = -1$$

Maka, PQ berserenjang dengan TU .

$$2 \text{ } m_1 = \text{Kecerunan } KL = \frac{5-4}{9-1} = \frac{1}{8}$$

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

$$8x + y = 12$$

$$y = -8x + 12$$

$$m_2 = \text{Kecerunan } MN = -8$$

$$m_1 m_2 = \frac{1}{8} \times (-8) = -1$$

Maka, MN berserenjang dengan TU .

$$3 \text{ } 4x - 3y + 8 = 0$$

$$3y = 4x + 8$$

$$y = \frac{4}{3}x + \frac{8}{3}$$

$$m_1 = \frac{4}{3}$$

$$\frac{x}{8} + \frac{y}{6} = 1$$

$$m_2 = -\frac{6}{8} = -\frac{3}{4}$$

$$m_1 m_2 = \frac{4}{3} \times \left(-\frac{3}{4}\right) = -1$$

Maka, garis lurus $4x - 3y + 8 = 0$ adalah

berserenjang dengan garis lurus $\frac{x}{8} + \frac{y}{6} = 1$.

$$4 \text{ } 4x + 3y + 2 = 0$$

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

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

$$m = -\frac{4}{3}$$

Kecerunan garis seranjang

$$= \frac{3}{4}$$

Persamaan garis lurus seranjang ialah

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

$$4y - 12 = 3x + 6$$

$$4y = 3x + 18$$

$$5 \quad N = \text{Titik tengah} = \left(\frac{3-3}{2}, \frac{-1+6}{2} \right) = \left(0, \frac{5}{2} \right)$$

$$m_{PS} = \frac{-4-2}{1+5} = -1$$

Oleh itu, kecerunan garis lurus seranjang ialah 1.

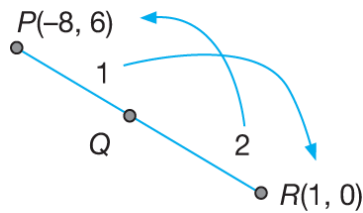
Persamaan garis lurus seranjang ialah

$$y - \frac{5}{2} = (1)(x - 0)$$

$$2y - 5 = 2x$$

$$2y = 2x + 5$$

6 (a)



$$Q = \left(\frac{2(-8) + 1(1)}{1+2}, \frac{1(6) + 2(0)}{1+2} \right)$$

$$Q = (-5, 4)$$

$$m_{PQR} = \frac{0-6}{1+8} = -\frac{2}{3}$$

Kecerunan garis seranjang ialah $\frac{3}{2}$.

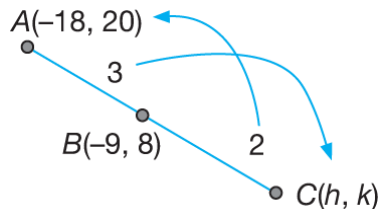
Persamaan garis lurus seranjang ialah

$$y - 4 = \frac{3}{2}(x + 5)$$

$$2y - 8 = 3x + 15$$

$$2y = 3x + 23$$

(b) Katakan C ialah titik (h, k) .



$$\left(\frac{2(-18) + 3h}{3+2}, \frac{2(20) + 3k}{3+2} \right) = (-9, 8)$$

$$\left(\frac{3h - 36}{5}, \frac{40 + 3k}{5} \right) = (-9, 8)$$

Menyamakan koordinat-x,

$$\frac{3h - 36}{5} = -9$$

$$3h - 36 = -45$$

$$3h = -9$$

$$h = -3$$

Menyamakan koordinat-y,

$$\frac{40 + 3k}{5} = 8$$

$$40 + 3k = 40$$

$$3k = 0$$

$$k = 0$$

Maka, koordinat titik C ialah $(-3, 0)$.

$$m_{ABC} = \frac{0 - 20}{-3 + 18} = -\frac{4}{3}$$

Kecerunan garis seranjang ialah

$$\frac{3}{4}$$

Persamaan garis seranjang ialah

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

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

$$4y = 3x + 9$$

7 Titik tengah KL ialah

$$\left(\frac{-2+3}{2}, \frac{3+6}{2} \right) = \left(\frac{1}{2}, \frac{9}{2} \right)$$

$$m_{KL} = \frac{6-3}{3+2} = \frac{3}{5}$$

Kecerunan garis seranjang = $-\frac{5}{3}$

Persamaan pembahagi dua sama seranjang ialah

$$y - \frac{9}{2} = -\frac{5}{3}\left(x - \frac{1}{2}\right)$$

$$6y - 27 = -10\left(x - \frac{1}{2}\right)$$

$$6y - 27 = -10x + 5$$

$$6y = -10x + 32$$

$$3y = -5x + 16$$

8 (a) Titik tengah BC

$$= \left(\frac{5-1}{2}, \frac{3+5}{2} \right)$$

$$= (2, 4)$$

$$m_{BC} = \frac{5-3}{-1-5} = -\frac{1}{3}$$

Kecerunan garis seranjang = 3

Persamaan pembahagi dua sama ialah

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

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

$$y = 3x - 2 \dots (1)$$

(b) Persamaan garis lurus AB ialah

$$\frac{y+4}{x+2} = \frac{3+4}{5+2}$$

$$\frac{y+4}{x+2} = 1$$

$$y+4 = x+2$$

$$y = x - 2 \quad \dots (2)$$

Gantikan (1) ke dalam (2) :

$$3x - 2 = x - 2$$

$$2x = 0$$

$$x = 0$$

Daripada (2) :

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

Maka, titik persilangan yang dikehendaki ialah $(0, -2)$.

9 (a) $x + y = 8$

$$y = -x + 8$$

$$m_1 = -1$$

$$m_{PR} = 1$$

Persamaan PR ialah

$$y - 1 = 1(x - 2)$$

$$y = x - 1$$

(b) $m_{SQ} = -1$

Persamaan SQ ialah

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

$$y = -x + 5 + 2$$

$$y = -x + 7$$

(c) Persamaan PT : $y = x - 1 \quad \dots (1)$

Persamaan STQ : $y = -x + 7 \quad \dots (2)$

Gantikan (1) ke dalam (2) :

$$x - 1 = -x + 7$$

$$2x = 8$$

$$x = 4$$

Gantikan $x = 4$ ke dalam (1) :

$$y = 4 - 1 = 3$$

Maka, T ialah titik $(4, 3)$.

Katakan R ialah titik (h, k) .

T ialah titik tengah PR .

$$\frac{2+h}{2} = 4 \quad \frac{1+k}{2} = 3$$

$$h = 6 \quad k = 5$$

Maka, R ialah titik $(6, 5)$.

Katakan S ialah titik (a, b) .

T ialah titik tengah SQ .

$$\frac{5+a}{2} = 4 \quad \frac{2+b}{2} = 3$$

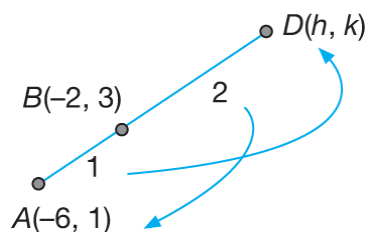
$$a = 3 \quad b = 4$$

Maka, S ialah titik $(3, 4)$.

$$10 (a) \quad AB = \frac{1}{2}BD$$

$$\frac{AB}{BD} = \frac{1}{2}$$

$$AB : BD = 1 : 2$$



$$\left(\frac{2(-6) + h}{1 + 2}, \frac{2(1) + k}{1 + 2} \right) = (-2, 3)$$

$$\left(\frac{h - 12}{3}, \frac{k + 2}{3} \right) = (-2, 3)$$

Menyamakan koordinat-x:

$$\frac{h - 12}{3} = -2$$

$$h = 6$$

Menyamakan koordinat-y:

$$\frac{k + 2}{3} = 3$$

$$k + 2 = 9$$

$$k = 7$$

Maka, D ialah titik $(6, 7)$.

$$(b) \quad m_{ABD} = \frac{3 - 1}{-2 + 6} = \frac{1}{2}$$

Oleh itu, $m_{CE} = -2$

Maka, persamaan CE ialah

$$y - 0 = -2(x - 7)$$

$$y = -2x + 14 \quad \dots (1)$$

(c) Persamaan $ABCD$:

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

$$2y - 2 = x + 6$$

$$2y = x + 8 \quad \dots (2)$$

Gantikan (1) ke dalam (2) :

$$2(-2x + 14) = x + 8$$

$$-4x + 28 = x + 8$$

$$5x = 20$$

$$x = 4$$

Gantikan $x = 4$ ke dalam (1) :

$$y = -2(4) + 14$$

$$y = 6$$

Maka, C ialah titik $(4, 6)$.

Praktis Formatif 7.3

1 (a) Luas segi tiga PQR

$$\begin{aligned} &= \frac{1}{2} \begin{vmatrix} -4 & 1 & 3 & -4 \\ 1 & 2 & 5 & 1 \end{vmatrix} \\ &= \frac{1}{2} |-8 + 5 + 3 - (1 + 6 - 20)| \\ &= \frac{1}{2} |0 - (-13)| \\ &= \frac{13}{2} \text{ unit}^2 \end{aligned}$$

(b) Luas segi tiga KLM

$$\begin{aligned} &= \frac{1}{2} \begin{vmatrix} 2 & 9 & 5 & 2 \\ 3 & 4 & 1 & 3 \end{vmatrix} \\ &= \frac{1}{2} |8 + 9 + 15 - (27 + 20 + 2)| \\ &= \frac{1}{2} |32 - 49| \\ &= \frac{1}{2} |-17| \\ &= \frac{17}{2} \text{ unit}^2 \end{aligned}$$

(c) Luas segi tiga ABC

$$\begin{aligned} &= \frac{1}{2} \begin{vmatrix} -2 & 4 & 1 & -2 \\ 1 & 2 & -3 & 1 \end{vmatrix} \\ &= \frac{1}{2} |-4 - 12 + 1 - (4 + 2 + 6)| \\ &= \frac{1}{2} |-15 - 12| \\ &= \frac{1}{2} |-27| \\ &= \frac{27}{2} \text{ unit}^2 \end{aligned}$$

2 (a) Luas sisi empat $EFGH$

$$\begin{aligned} &= \frac{1}{2} \begin{vmatrix} 2 & -3 & -2 & 4 & 2 \\ -2 & -1 & 5 & 0 & -2 \end{vmatrix} \\ &= \frac{1}{2} |-2 - 15 - 8 - (6 + 2 + 20)| \\ &= \frac{1}{2} |-25 - 28| \\ &= \frac{1}{2} |-53| \end{aligned}$$

$$= \frac{53}{2} \text{ unit}^2$$

(b) Luas sisi empat $ABCD$

$$\begin{aligned} &= \frac{1}{2} \begin{vmatrix} -5 & 0 & 6 & 0 & -5 \\ 0 & 10 & 4 & 0 & 0 \end{vmatrix} \\ &= \frac{1}{2} |-50 - (60)| \\ &= \frac{1}{2} |-110| \\ &= \frac{1}{2} (110) \\ &= 55 \text{ unit}^2 \end{aligned}$$

3 Luas $\triangle ABC = 12 \text{ unit}^2$

$$\begin{aligned} \frac{1}{2} \begin{vmatrix} 1 & 7 & h & 1 \\ 2 & 8 & -10 & 2 \end{vmatrix} &= 12 \\ \begin{vmatrix} 1 & 7 & h & 1 \\ 2 & 8 & -10 & 2 \end{vmatrix} &= 24 \\ |8 - 70 + 2h - (14 + 8h - 10)| &= 24 \\ |-66 - 6h| &= 24 \\ |-11 - h| &= 4 \\ -11 - h &= \pm 4 \\ -11 - h = 4 \text{ atau } -11 - h = -4 \\ -h = 15 & \qquad \qquad h = -7 \\ h = -15 & \end{aligned}$$

4 Luas sisi empat $TUVW = 18 \text{ unit}^2$

$$\begin{aligned} \frac{1}{2} \begin{vmatrix} -1 & p & 3 & 4 & -1 \\ 3 & -1 & 1 & 5 & 3 \end{vmatrix} &= 18 \\ |1 + p + 15 + 12 - (3p - 3 + 4 - 5)| &= 18 \\ |32 - 2p| &= 36 \\ 32 - 2p &= \pm 36 \\ 32 - 2p = 36 \text{ atau } 32 - 2p = -36 \\ -2p = 4 & \qquad \qquad -2p = -68 \\ p = -2 & \qquad \qquad p = 34 \end{aligned}$$

5 Luas $\triangle LMN = 0$

$$\begin{aligned} \frac{1}{2} \begin{vmatrix} -2 & 1 & 4 & -2 \\ 4 & h & 4h & 4 \end{vmatrix} &= 0 \\ -2h + 4h + 16 - (4 + 4h - 8h) &= 0 \\ 6h + 12 &= 0 \\ h &= -2 \end{aligned}$$

6 (a)(i) Luas $\triangle ABC$

$$\begin{aligned} &= \frac{1}{2} \begin{vmatrix} -8 & 6 & -1 & -8 \\ -4 & -6 & 2 & -4 \end{vmatrix} \\ &= \frac{1}{2} |48 + 12 + 4 - (-24 + 6 - 16)| \end{aligned}$$

$$= \frac{1}{2}|98|$$

$$= 49 \text{ unit}^2$$

$$(ii) AC = \sqrt{(6+8)^2 + (-6+4)^2}$$

$$AC = \sqrt{196+4}$$

$$AC = \sqrt{200}$$

$$AC = 14.1421 \text{ unit}$$

(b) Katakan jarak tegak lurus dari titik B ke garis AC ialah h unit.

$$\text{Luas } \triangle ABC = 49$$

$$\frac{1}{2} \times \text{Tapak} \times \text{Tinggi} = 49$$

$$\frac{1}{2} \times 14.1421 \times h = 49$$

$$h = 6.930$$

Maka, jarak terdekat dari B ke AC ialah 6.930 unit.

Praktis Formatif 7.4

1 $PA = 5$

$$\sqrt{(x-4)^2 + (y-6)^2} = 5$$

$$(x-4)^2 + (y-6)^2 = 5^2$$

$$x^2 - 8x + 16 + y^2 - 12y + 36 - 25 = 0$$

$$x^2 - 8x + y^2 - 12y + 27 = 0$$

2 $BQ = CQ$

$$BQ^2 = CQ^2$$

$$(x-5)^2 + (y-1)^2 = (x+4)^2 + (y-2)^2$$

$$x^2 - 10x + 25 + y^2 - 2y + 1 =$$

$$x^2 + 8x + 16 + y^2 - 4y + 4$$

$$-18x + 2y + 6 = 0$$

$$-9x + y + 3 = 0$$

$$y = 9x - 3$$

3 $\frac{HJ}{HK} = \frac{2}{1}$

$$HJ = 2HK$$

$$HJ^2 = 2^2 HK^2$$

$$(x-3)^2 + (y-0)^2 = 4[(x-0)^2 + (y+2)^2]$$

$$x^2 - 6x + 9 + y^2 = 4(x^2 + y^2 + 4y + 4)$$

$$x^2 - 6x + 9 + y^2 = 4x^2 + 4y^2 + 16y + 16$$

$$3x^2 + 3y^2 + 6x + 16y + 7 = 0$$

4 $\frac{KP}{KQ} = \frac{3}{2}$

$$2KP = 3KQ$$

$$4KP^2 = 9KQ^2$$

$$4[(x-2)^2 + (y-1)^2] = 9[(x+1)^2 + (y+2)^2]$$

$$4(x^2 - 4x + 4 + y^2 - 2y + 1) =$$

$$9(x^2 + 2x + 1 + y^2 + 4y + 4)$$

$$4x^2 - 16x + 4y^2 - 8y + 20 =$$

$$9x^2 + 18x + 9y^2 + 36y + 45$$

$$5x^2 + 5y^2 + 34x + 44y + 25 = 0$$

5 $JM = 2JN$

$$JM^2 = 2^2 JN^2$$

$$(x-0)^2 + (y+1)^2 = 4[(x-2)^2 + (y-0)^2]$$

$$x^2 + y^2 + 2y + 1 = 4(x^2 - 4x + 4 + y^2)$$

$$x^2 + y^2 + 2y + 1 = 4x^2 - 16x + 16 + 4y^2$$

$$3x^2 + 3y^2 - 16x - 2y + 15 = 0$$

(a) Pada paksi- y , $x = 0$

$$3y^2 - 2y + 15 = 0$$

$$b^2 - 4ac = (-2)^2 - 4(3)(15) = -176$$

Oleh sebab $b^2 - 4ac < 0$, lokus J tidak bersilang dengan paksi- y .

(b) Pada paksi- x , $y = 0$

$$3x^2 - 16x + 15 = 0$$

$$b^2 - 4ac = (-16)^2 - 4(3)(15) = 76$$

Oleh sebab $b^2 - 4ac > 0$, lokus J akan bersilang dengan paksi- x .

6 Oleh sebab $\angle APB = 90^\circ$

$$m_{AP} \times m_{PB} = -1$$

$$\left(\frac{y+2}{x-3}\right)\left(\frac{y-0}{x-6}\right) = -1$$

$$\frac{y^2 + 2y}{x^2 - 9x + 18} = -1$$

$$y^2 + 2y = -x^2 + 9x - 18$$

$$x^2 + y^2 - 9x + 2y + 18 = 0$$

7 Oleh sebab $\angle APB = 90^\circ$

$$m_{AP} \times m_{PB} = -1$$

$$\left(\frac{y-2}{x-0}\right)\left(\frac{y+2}{x-2}\right) = -1$$

$$\frac{y^2-4}{x^2-2x} = -1$$

$$y^2-4 = -x^2+2x$$

$$x^2+y^2-2x-4=0$$

8 Oleh sebab $\angle MQN = 90^\circ$

$$m_{MQ} \times m_{QN} = -1$$

$$\left(\frac{y-4}{x-1}\right)\left(\frac{y-0}{x-3}\right) = -1$$

$$\frac{y^2-4y}{x^2-4x+3} = -1$$

$$y^2-4y = -x^2+4x-3$$

$$x^2+y^2-4x-4y+3=0$$

Praktis Sumatif 7

1 (a) $m_{AB} = m_{DC} = 2$

Persamaan AB ialah

$$y-7 = 2(x-2)$$

$$y-7 = 2x-4$$

$$y = 2x+3$$

(b) $m_{AD} = -\frac{1}{m_{DC}} = -\frac{1}{2}$

Persamaan AD ialah

$$y-(-1) = -\frac{1}{2}(x-3)$$

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

$$2y = -x+1$$

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

$$2y = -x+1 \dots (2)$$

Gantikan (1) ke dalam (2) :

$$2(2x+3) = -x+1$$

$$4x+6 = -x+1$$

$$5x = -5$$

$$x = -1$$

Daripada (1) :

$$y = 2(-1)+3 = 1$$

Maka, koordinat titik A ialah $(-1, 1)$.

(d) Luas $\triangle BAD$

$$= \frac{1}{2} \begin{vmatrix} 2 & -1 & 3 & 2 \\ 7 & 1 & -1 & 7 \end{vmatrix}$$

$$= \frac{1}{2} |2+1+21-(-7+3-2)|$$

$$= 15 \text{ unit}^2$$

Maka, luas segi empat tepat $ABCD$

$$= 2 \times 15 = 30 \text{ unit}^2$$

2 (a) $m_{PQ} = \frac{9-7}{6-2} = \frac{1}{2}$

$$m_{PS} = -2$$

Persamaan PS ialah

$$y-7 = -2(x-2)$$

$$y-7 = -2x+4$$

$$y = -2x+11$$

(b) Gantikan $y = -2x+11$ ke dalam

$$7x-2y = 44,$$

$$7x-2(-2x+11) = 44$$

$$7x+4x-22 = 44$$

$$11x = 66$$

$$x = 6$$

Apabila $x = 6$, $y = -2(6) + 11 = -1$
Maka, S ialah titik $(6, -1)$.

$$(c) T = \left(\frac{3(2) + 1(6)}{1+3}, \frac{3(7) + 1(-1)}{1+3} \right)$$

$$= (3, 5)$$

(d) Luas $PQRS = 30 \text{ unit}^2$

$$\frac{1}{2} \begin{vmatrix} 2 & 6 & k & 6 & 2 \\ 7 & -1 & 7k-44 & 9 & 7 \end{vmatrix} = 30$$

Apabila $x = k$,
 $7x - 2y = 44$
 $7k - 2y = 44$
 $y = \frac{7k - 44}{2}$

$$-2 + 3(7k - 44) + 9k + 42$$

$$- [42 - k + 3(7k - 44) + 18] = 60$$

$$-2 + 3(7k - 44) + 9k + 42$$

$$-42 + k - 3(7k - 44) - 18 = 60$$

$$-20 + 10k = 60$$

$$k = 8$$

Apabila $k = 8$, $y = \frac{7(8) - 44}{2} = 6$

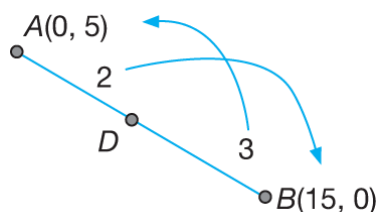
Maka, R ialah titik $(8, 6)$.

3 (a) Persamaan AB ialah $\frac{x}{15} + \frac{y}{5} = 1$.

(b) $3AD = 2DB$

$$\frac{AD}{DB} = \frac{2}{3}$$

$AD : DB = 2 : 3$



$$D = \left(\frac{3(0) + 2(15)}{2+3}, \frac{3(5) + 2(0)}{2+3} \right)$$

$D = (6, 3)$

(c) $m_{AB} = \frac{0-5}{15-0} = -\frac{1}{3}$

$m_{CD} = 3$

Persamaan CD ialah

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

$$y - 3 = 3x - 18$$

$$y = 3x - 15$$

Maka, pintasan- y ialah -15 .

4 (a) Persamaan AB : $y = 6x - 8 \dots (1)$

Persamaan AN : $5y = 2x + 16 \dots (2)$

Gantikan (1) ke dalam (2) :

$$5(6x - 8) = 2x + 16$$

$$30x - 40 = 2x + 16$$

$$28x = 56$$

$$x = 2$$

Apabila $x = 2$,

$$y = 6(2) - 8 = 4$$

Maka, koordinat titik A ialah $(2, 4)$.

(b) M ialah titik tengah AC .

Katakan C ialah titik (h, k) .

$$\left(\frac{2+h}{2}, \frac{4+k}{2} \right) = (5, 8)$$

Menyamakan koordinat- x :

$$\frac{2+h}{2} = 5$$

$$h = 8$$

Menyamakan koordinat- y :

$$\frac{4+k}{2} = 8$$

$$k = 12$$

Maka, koordinat titik C ialah $(8, 12)$.

(c) Persamaan AN ialah

$$5y = 2x + 16 \Rightarrow y = \frac{2}{5}x + \frac{16}{5}$$

$$m_{AN} = \frac{2}{5}$$

Oleh itu, $m_{CN} = -\frac{5}{2}$

Persamaan CN ialah

$$y - 12 = -\frac{5}{2}(x - 8)$$

$$2y - 24 = -5x + 40$$

$$2y = -5x + 64$$

(d) $m_{CD} = m_{AB} = 6$

Persamaan CD ialah

$$y - 12 = 6(x - 8)$$

$$y - 12 = 6x - 48$$

$$y = 6x - 36$$

(e) Persamaan CD : $y = 6x - 36 \dots (1)$

Persamaan AD : $5y = 2x + 16 \dots (2)$

Gantikan (1) ke dalam (2) :

$$5(6x - 36) = 2x + 16$$

$$30x - 180 = 2x + 16$$

$$28x = 196$$

$$x = 7$$

Daripada (1):

$$y = 6x - 36$$

$$y = 6(7) - 36 = 6$$

Maka, koordinat titik D ialah (7, 6).

(f) Luas segi tiga ADC

$$= \frac{1}{2} \begin{vmatrix} 2 & 7 & 8 & 2 \\ 4 & 6 & 12 & 4 \end{vmatrix}$$

$$= \frac{1}{2} |12 + 84 + 32 - (28 + 48 + 24)|$$

$$= \frac{1}{2} (28)$$

$$= 14 \text{ unit}^2$$

Maka, luas segi empat selari $ABCD$

$$= 14 \times 2$$

$$= 28 \text{ unit}^2$$

5 (a) $OT = 2OV$
 $OT^2 = 4OV^2$

$$(10 - 0)^2 + (p - 0)^2 = 4[(-5 - 0)^2 + (-10 - 0)^2]$$

$$100 + p^2 = 4(25 + 100)$$

$$p^2 = 100 + 400 - 100$$

$$p^2 = 400$$

$$p = 20$$

(b) $m_{UT} = m_{VO} = \frac{0 + 10}{0 + 5} = 2$

Persamaan UT ialah

$$y - 10 = 2(x - 20)$$

$$y - 10 = 2x - 40$$

$$y = 2x - 30$$

(c) $m_{UV} = -\frac{1}{m_{VO}} = -\frac{1}{2}$

Persamaan UV ialah

$$y + 10 = -\frac{1}{2}(x + 5)$$

$$2y + 20 = -x - 5$$

$$2y = -x - 5 - 20$$

$$2y = -x - 25$$

(d) Persamaan UT : $y = 2x - 30$... (1)

Persamaan UV : $2y = -x - 25$... (2)

Gantikan (1) ke dalam (2):

$$2y = -x - 25$$

$$2(2x - 30) = -x - 25$$

$$4x - 60 = -x - 25$$

$$5x = 35$$

$$x = 7$$

Daripada (1):

$$y = 2x - 30$$

$$y = 2(7) - 30$$

$$y = -16$$

Maka, U ialah titik (7, -16).

(d) $O(0, 0)$, $T(20, 10)$, $U(7, -16)$, $V(-5, -10)$

Luas $OTUV$

$$= \frac{1}{2} \begin{vmatrix} 0 & 20 & 7 & -5 & 0 \\ 0 & 10 & -16 & -10 & 0 \end{vmatrix}$$

$$= \frac{1}{2} |20(-16) + 7(-10) - (70 + 80)|$$

$$= \frac{1}{2} |-320 - 70 - 150|$$

$$= \frac{1}{2} |-540|$$

$$= 270 \text{ unit}^2$$

6 (a) Persamaan SQ ialah

$$x + 2y - 4 = 0$$

$$2y = -x + 4$$

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

$$m_{SQ} = -\frac{1}{2}$$

$$m_{PR} = 2$$

Persamaan PR ialah

$$y - 5 = 2(x + 1)$$

$$y = 2x + 2 + 5$$

$$y = 2x + 7$$

(b) Pada titik Q , (paksi- x), $y = 0$:

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

$$0 = -\frac{1}{2}x + 2$$

$$0 = -x + 4$$

$$x = 4$$

Q ialah titik (4, 0).

Persamaan PTR : $y = 2x + 7$... (1)

Persamaan STQ : $y = -\frac{1}{2}x + 2$... (2)

Gantikan (1) ke dalam (2) :

$$\begin{aligned} 2x+7 &= -\frac{1}{2}x+2 \\ 4x+14 &= -x+4 \\ 5x &= -10 \\ x &= -2 \end{aligned}$$

Daripada (1):

$$\begin{aligned} y &= 2x+7 \\ y &= 2(-2)+7 \\ y &= 3 \end{aligned}$$

Maka, T ialah titik $(-2, 3)$.

Katakan R ialah titik (h, k) .

$$\begin{aligned} \left(\frac{h-1}{2}, \frac{k+5}{2}\right) &= (-2, 3) \\ \frac{h-1}{2} &= -2 & \frac{k+5}{2} &= 3 \\ h &= -3 & k &= 1 \end{aligned}$$

Maka, R ialah titik $(-3, 1)$.

Katakan S ialah titik (a, b) .

$$\begin{aligned} \left(\frac{a+4}{2}, \frac{b+0}{2}\right) &= (-2, 3) \\ \frac{a+4}{2} &= -2 & \frac{b}{2} &= 3 \\ a &= -8 & b &= 6 \end{aligned}$$

Maka, S ialah titik $(-8, 6)$.

(c) $P(-1, 5), Q(4, 0), R(-3, 1), S(-8, 6)$

Luas $PQRS$

$$\begin{aligned} &= \frac{1}{2} \begin{vmatrix} -1 & 4 & -3 & -8 & -1 \\ 5 & 0 & 1 & 6 & 5 \end{vmatrix} \\ &= \frac{1}{2} |4-18-40-(20-8-6)| \\ &= \frac{1}{2} |-60| \\ &= 30 \text{ unit}^2 \end{aligned}$$

7 (a) Titik tengah PR

$$\begin{aligned} &= \left(\frac{-1+5}{2}, \frac{5+1}{2}\right) \\ &= (2, 3) \end{aligned}$$

(b) $5x+y-2=0$

$$y = -5x+2$$

$$\therefore m_{QS} = -5$$

Persamaan QS ialah

$$\begin{aligned} y-3 &= -5(x-2) \\ y &= -5x+10+3 \\ y &= -5x+13 \end{aligned}$$

$$(c) m_{PR} = \frac{1-5}{5-(-1)} = -\frac{2}{3}$$

$$m_{QR} = \frac{3}{2}$$

Persamaan QR ialah

$$y-1 = \frac{3}{2}(x-5)$$

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

$$2y = 3x-13$$

(d) Persamaan QS : $y = -5x+13 \dots (1)$

Persamaan QR : $2y = 3x-13 \dots (2)$

Gantikan (1) ke dalam (2) :

$$2y = 3x-13$$

$$2(-5x+13) = 3x-13$$

$$-10x+26 = 3x-13$$

$$13x = 39$$

$$x = 3$$

Daripada (1) :

$$y = -5x+13$$

$$y = -5(3)+13 = -2$$

Maka, Q ialah titik $(3, -2)$.

Katakan S ialah titik (h, k) .

$$\left(\frac{h+3}{2}, \frac{k-2}{2}\right) = (2, 3)$$

$$\frac{h+3}{2} = 2 \quad \frac{k-2}{2} = 3$$

$$h+3 = 4 \quad k-2 = 6$$

$$h = 1 \quad k = 8$$

Maka, S ialah titik $(1, 8)$.

(ii) $P(-1, 5), Q(3, -2), R(5, 1), S(1, 8)$

Luas segi empat selari $PQRS$

$$\begin{aligned} &= \frac{1}{2} \begin{vmatrix} -1 & 3 & 5 & 1 & -1 \\ 5 & -2 & 1 & 8 & 5 \end{vmatrix} \\ &= \frac{1}{2} |2+3+40+5-(15-10+1-8)| \\ &= \frac{1}{2} |52| \\ &= 26 \text{ unit}^2 \end{aligned}$$

$$8 (a) m_{QP} = \frac{2-8}{4-2} = -3$$

$$m_{QR} = \frac{1}{3}$$

Persamaan QR ialah

$$y-8 = \frac{1}{3}(x-2)$$

$$3y-24 = x-2$$

$$3y = x+22$$

(b) Persamaan QR : $3y = x + 22 \dots (1)$

Persamaan PR : $y = x - 2 \dots (2)$

Gantikan (2) ke dalam (1) :

$$3y = x + 22$$

$$3(x - 2) = x + 22$$

$$3x - 6 = x + 22$$

$$2x = 28$$

$$x = 14$$

Daripada (2) :

$$y = x - 2$$

$$y = 14 - 2 = 12$$

Maka, R ialah titik $(14, 12)$.

(c) Katakan S ialah titik (h, k) .

Titik tengah QS = Titik tengah PR

$$\left(\frac{h+2}{2}, \frac{k+8}{2} \right) = \left(\frac{4+14}{2}, \frac{2+12}{2} \right)$$

Menyamakan koordinat- x ,

$$h + 2 = 18$$

$$h = 16$$

Menyamakan koordinat- y ,

$$k + 8 = 14$$

$$k = 6$$

Maka, S ialah titik $(16, 6)$.

(d) $P(4, 2)$, $Q(2, 8)$, $R(14, 12)$, $S(16, 6)$

Luas $PQRS$

$$= \frac{1}{2} \begin{vmatrix} 4 & 2 & 14 & 16 & 4 \\ 2 & 8 & 12 & 6 & 2 \end{vmatrix}$$

$$= \frac{1}{2} | 32 + 24 + 84 + 32 - (4 + 112 + 192 + 24) |$$

$$= \frac{1}{2} | 172 - 332 |$$

$$= \frac{1}{2} | -160 |$$

$$= 80 \text{ unit}^2$$

9 (a) Persamaan PQ : $3y = x + 12 \dots (1)$

Persamaan RQ : $3y = 5x - 12 \dots (2)$

Gantikan (2) ke dalam (1) :

$$5x - 12 = x + 12$$

$$4x = 24$$

$$x = 6$$

Daripada (1) : $3y = 6 + 12$

$$y = 6$$

Maka, Q ialah titik $(6, 6)$.

(b) $m_{OR} = m_{PQ} = \frac{1}{3}$

Persamaan OR ialah

$$y = \frac{1}{3}x \dots (1)$$

Persamaan QR : $3y = 5x - 12 \dots (2)$

Gantikan (1) ke dalam (2) :

$$3\left(\frac{1}{3}x\right) = 5x - 12$$

$$x = 5x - 12$$

$$4x = 12$$

$$x = 3$$

Daripada (1) :

$$y = \frac{1}{3}(3) = 1$$

Maka, R ialah titik $(3, 1)$.

(c) $m_{PQ} = \frac{1}{3}$

Oleh itu, kecerunan garis serenjang ialah -3 .

Persamaan garis lurus yang melalui titik R dan berserenjang dengan PQ ialah

$$y - 1 = -3(x - 3)$$

$$y = -3x + 10$$

10 (a) Katakan R ialah titik (x, y) dengan keadaan ia bergerak di sepanjang PQ .

$$AR = BR$$

$$AR^2 = BR^2$$

$$[x - (-1)]^2 + (y - 4)^2 = (x - 1)^2 + [y - (-2)]^2$$

$$(x + 1)^2 + (y - 4)^2 = (x - 1)^2 + (y + 2)^2$$

$$x^2 + 2x + 1 + y^2 - 8y + 16 = x^2 - 2x + 1 + y^2 + 4y + 4$$

$$4x - 12y + 12 = 0$$

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

Maka, persamaan PQ ialah $x - 3y + 3 = 0$.

(b) (i) $x - 3y + 3 = 0 \dots (1)$

$x + 2y - 7 = 0 \dots (2)$

(1) - (2) : $-5y + 10 = 0$

$$y = 2$$

Daripada (1) : $x - 3(2) + 3 = 0$

$$x = 3$$

Maka, koordinat lampu lalu lintas ialah $(3, 2)$.

(ii) Apabila $C\left(1, \frac{4}{3}\right)$ digantikan ke

dalam $x - 3y + 3 = 0$, maka

$$1 - 3\left(\frac{4}{3}\right) + 3$$

$$= 0$$

Apabila $C\left(1, \frac{4}{3}\right)$ digantikan ke

dalam $x + 2y - 7 = 0$, maka

$$1 + 2\left(\frac{4}{3}\right) - 7$$

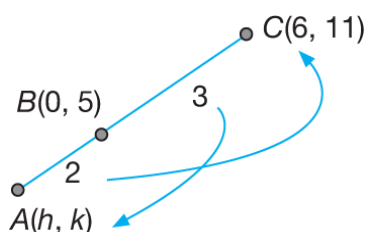
$$= -\frac{10}{3} (\neq 0)$$

Maka, jalan raya PQ melalui bandar

$C\left(1, \frac{4}{3}\right)$ dan jalan ST tidak melalui

bandar $C\left(1, \frac{4}{3}\right)$.

11 (a) (i)



Katakan A ialah titik (h, k) .

$$\left(\frac{3h + 2(6)}{2 + 3}, \frac{3k + 2(11)}{2 + 3}\right) = (0, 5)$$

$$\left(\frac{3h + 12}{5}, \frac{3k + 22}{5}\right) = (0, 5)$$

Menyamakan koordinat- x ,

$$\frac{3h + 12}{5} = 0$$

$$3h + 12 = 0$$

$$3h = -12$$

$$h = -4$$

Menyamakan koordinat- y ,

$$\frac{3k + 22}{5} = 5$$

$$3h + 22 = 25$$

$$3h = 3$$

$$h = 1$$

Maka, koordinat titik A ialah

$(-4, 1)$.

(ii) Persamaan garis lurus AD ialah

$$\frac{y - 1}{x - (-4)} = \frac{-7 - 1}{2 - (-4)}$$

$$\frac{y - 1}{x + 4} = -\frac{4}{3}$$

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

$$3y = -4x - 13$$

(iii) Luas $\triangle ACD$

$$= \frac{1}{2} \begin{vmatrix} -4 & 6 & 2 & -4 \\ 1 & 11 & -7 & 1 \end{vmatrix}$$

$$= \frac{1}{2} |-44 - 42 + 2 - (6 + 22 + 28)|$$

$$= \frac{1}{2} |-140|$$

$$= 70 \text{ unit}^2$$

(b) Katakan P ialah titik (x, y) .

$$PC = 2PD$$

$$\sqrt{(x - 6)^2 + (y - 11)^2} =$$

$$2\sqrt{(x - 2)^2 + [y - (-7)]^2}$$

$$(x - 6)^2 + (y - 11)^2 =$$

$$2^2[(x - 2)^2 + [y - (-7)]^2]$$

$$x^2 - 12x + 36 + y^2 - 22y + 121 =$$

$$4[x^2 - 4x + 4 + y^2 + 14y + 49]$$

$$x^2 - 12x + y^2 - 22y + 157 =$$

$$4x^2 - 16x + 4y^2 + 56y + 212$$

$$3x^2 + 3y^2 - 4x + 78y + 55 = 0$$

12 (a) (i) Luas $PQRS$

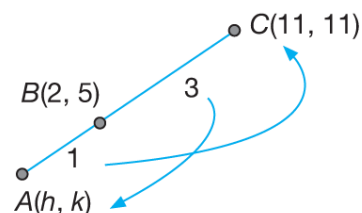
$$= \frac{1}{2} \begin{vmatrix} -5 & 14 & 15 & 0 & -5 \\ 4 & 19 & 2 & 1 & 4 \end{vmatrix}$$

$$= \frac{1}{2} |-95 + 28 + 15 - (56 + 285 - 5)|$$

$$= \frac{1}{2} |-388|$$

$$= 194 \text{ unit}^2$$

(ii)



Katakan A ialah titik (h, k)

$$CB : BA = 3 : 1$$

$$\left(\frac{1(11) + 3h}{3 + 1}, \frac{1(11) + 3k}{3 + 1}\right) = (2, 5)$$

$$\left(\frac{11 + 3h}{4}, \frac{11 + 3k}{4}\right) = (2, 5)$$

Menyamakan koordinat- x ,

$$\frac{11 + 3h}{4} = 2$$

$$11 + 3h = 8$$

$$3h = -3$$

$$h = -1$$

Menyamakan koordinat-y,

$$\frac{11+3k}{4} = 5$$

$$11+3k = 20$$

$$3k = 9$$

$$k = 3$$

Maka, A ialah titik $(-1, 3)$.

(b) Katakan T ialah titik (x, y) .

$$TC = 3$$

$$\sqrt{(x-11)^2 + (y-11)^2} = 3$$

$$(x-11)^2 + (y-11)^2 = 9$$

$$x^2 - 22x + 121 + y^2 - 22y + 121 = 9$$

$$x^2 + y^2 - 22x - 22y + 233 = 0$$

13 (a) (i) Persamaan PS ialah

$$2y = 5x - 23$$

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

$$m_{PS} = \frac{5}{2}$$

$$m_{PQ} = -\frac{1}{m_{PS}} = -\frac{1}{\left(\frac{5}{2}\right)} = -\frac{2}{5}$$

Persamaan PQ ialah

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

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

$$5y+10 = -2x-4$$

$$5y = -2x-14$$

(ii) Persamaan PS: $2y = 5x - 23 \dots (1)$

Persamaan PQ: $5y = -2x - 14 \dots (2)$

$$10y = 25x - 115 \dots (1) \times 5$$

$$(-) 10y = -4x - 28 \dots (2) \times 2$$

$$0 = 29x - 87$$

$$x = 3$$

Apabila $x = 3$,

$$2y = 5(3) - 23$$

$$y = -4$$

Maka, P ialah titik $(3, -4)$.

(b) Persamaan PS ialah $2y = 5x - 23$.

Apabila $y = 1$, $2(1) = 5x - 23$

$$5x = 25$$

$$x = 5$$

Maka, S ialah titik $(5, 1)$.

Katakan T ialah titik (x, y) .

$$TS = 5$$

$$\sqrt{(x-5)^2 + (y-1)^2} = 5$$

$$(x-5)^2 + (y-1)^2 = 5^2$$

$$x^2 - 10x + 25 + y^2 - 2y + 1 = 25$$

$$x^2 - 10x + y^2 - 2y + 1 = 0$$

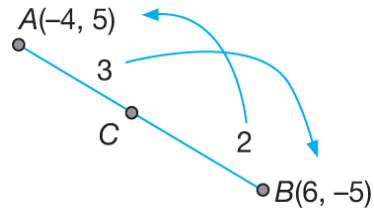
14 (a) Luas ΔAOB

$$= \frac{1}{2} \begin{vmatrix} -4 & 0 & 6 & -4 \\ 5 & 0 & -5 & 5 \end{vmatrix}$$

$$= \frac{1}{2} |30 - 20|$$

$$= 5 \text{ unit}^2$$

(b)



$$C = \left(\frac{2(-4) + 3(6)}{3+2}, \frac{2(5) + 3(-5)}{3+2} \right)$$

$$= (2, -1)$$

(c) Katakan Q ialah titik (x, y) .

$$QB = QA$$

$$\sqrt{(x-6)^2 + [y-(-5)]^2} =$$

$$2\sqrt{[x-(-4)]^2 + (y-5)^2}$$

$$(x-6)^2 + (y+5)^2 =$$

$$2^2[(x+4)^2 + (y-5)^2]$$

$$x^2 - 12x + 36 + y^2 + 10y + 25 =$$

$$4(x^2 + 8x + 16 + y^2 - 10y + 25)$$

$$x^2 - 12x + 36 + y^2 + 10y + 25 =$$

$$4x^2 + 32x + 64 + 4y^2 - 40y + 100$$

$$3x^2 + 3y^2 + 44x - 50y + 103 = 0$$

15 (a) (i) $y = -\frac{4}{3}x$

$$m_{OA} = -\frac{4}{3}$$

$$m_{AB} = -\frac{1}{\left(-\frac{4}{3}\right)} = \frac{3}{4}$$

$$4y = kx + 25$$

$$y = \frac{k}{4}x + \frac{25}{4}$$

$$m_{AB} = \frac{k}{4}$$

$$\therefore \frac{k}{4} = \frac{3}{4} \Rightarrow k = 3$$

(ii) $4y = 3x + 25 \dots (1)$

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

Gantikan (2) ke dalam (1) :

$$4\left(-\frac{4}{3}x\right) = 3x + 25$$

$$-16x = 9x + 75$$

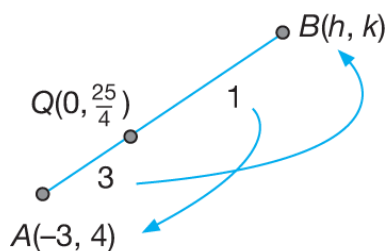
$$25x = -75$$

$$x = -3$$

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

Maka, A ialah titik $(-3, 4)$.

(b) (i)



Menyamakan koordinat-x,

$$\frac{1(-3) + 3h}{3+1} = 0$$

$$h = 1$$

Menyamakan koordinat-y,

$$\frac{1(4) + 3k}{3+1} = \frac{25}{4}$$

$$4 + 3k = 25$$

$$k = 7$$

Maka, B ialah titik $(1, 7)$

(ii) $m_{CB} = m_{OA} = -\frac{4}{3}$

Persamaan BC ialah

$$y - 7 = -\frac{4}{3}(x - 1)$$

$$3y - 21 = -4x + 4$$

$$3y = -4x + 25$$

(c) $PA = 2PB$

$$PA^2 = 2^2 PB^2$$

$$(x+3)^2 + (y-4)^2 = 2^2[(x-1)^2 + (y-7)^2]$$

$$x^2 + 6x + 9 + y^2 - 8y + 16 =$$

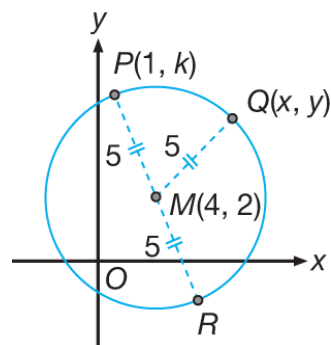
$$4(x^2 - 2x + 1 + y^2 - 14y + 49)$$

$$x^2 + 6x + y^2 - 8y + 25 =$$

$$4x^2 - 8x + 4y^2 - 56y + 200$$

$$3x^2 - 14x + 3y^2 - 48y + 175 = 0$$

16



(a) Katakan Q ialah titik (x, y) .

$$QM = 5$$

$$\sqrt{(x-4)^2 + (y-2)^2} = 5$$

$$(x-4)^2 + (y-2)^2 = 5^2$$

$$x^2 - 8x + 16 + y^2 - 4y + 4 = 25$$

$$x^2 - 8x + y^2 - 4y - 5 = 0$$

(b) (i) Oleh sebab $P(1, k)$ terletak pada lokus Q,

$$1^2 - 8(1) + k^2 - 4k - 5 = 0$$

$$k^2 - 4k - 12 = 0$$

$$(k+2)(k-6) = 0$$

$$k = -2 \text{ atau } 6$$

$$k = -2 \text{ tidak diterima}$$

$$\therefore k = 6$$

(ii) Oleh sebab titik P dan titik R terletak pada titik Q, jarak titik-titik itu dari titik M adalah sama. Ini

bermakna bahawa M ialah titik tengah PR .

Katakan R ialah titik (a, b) .

$$\left(\frac{1+a}{2}, \frac{6+b}{2}\right) = (4, 2)$$

Dengan perbandingan,

$$\frac{1+a}{2} = 4 \quad \text{dan} \quad \frac{6+b}{2} = 2$$

$$a = 7$$

$$b = -2$$

Maka, R ialah titik $(7, -2)$.

(c) $O(0, 0)$, $P(1, 6)$, $R(7, -2)$

Luas $\triangle OPR$

$$= \frac{1}{2} \begin{vmatrix} 0 & 1 & 7 & 0 \\ 0 & 6 & -2 & 0 \end{vmatrix}$$

$$= \frac{1}{2} |-2 - 42|$$

$$= \frac{1}{2} |-44|$$

$$= |-22|$$

$$= 22 \text{ unit}^2$$

17 (a) (i) Luas $\triangle OAB$

$$= \frac{1}{2} \begin{vmatrix} 0 & -3 & 6 & 0 \\ 0 & -5 & 1 & 0 \end{vmatrix}$$

$$= \frac{1}{2} |-3 - (-30)|$$

$$= \frac{1}{2} |27|$$

$$= 13.5 \text{ unit}^2$$

$$(ii) AB = \sqrt{(6 - (-3))^2 + (1 - (-5))^2}$$

$$= \sqrt{9^2 + 6^2}$$

$$= \sqrt{117}$$

$$= 10.82 \text{ unit}$$

(b) (i) Biar $P = (x, y)$

$$PA = 2PB$$

$$(PA)^2 = (2PB)^2$$

$$PA^2 = 4PB^2$$

$$(x - (-3))^2 + (y - (-5))^2 =$$

$$4((x - 6)^2 + (y - 1)^2)$$

$$(x + 3)^2 + (y + 5)^2 = 4((x - 6)^2 + (y - 1)^2)$$

$$x^2 + 6x + 9 + y^2 + 10y + 25 =$$

$$4(x^2 - 12x + 36 + y^2 - 2y + 1)$$

$$x^2 + 6x + 9 + y^2 + 10y + 25 =$$

$$4x^2 - 48x + 144 + 4y^2 - 8y + 4$$

$$0 = 3x^2 - 54x + 3y^2 - 18y + 114$$

$$x^2 - 18x + y^2 - 6y + 38 = 0$$

(ii) Pada paksi- y , $x = 0$.

$$\therefore 0^2 - 18(0) + y^2 - 6y + 38 = 0$$

$$y^2 - 6y + 38 = 0$$

$$b^2 - 4ac$$

$$= (-6)^2 - 4(1)(38)$$

$$= 36 - 152$$

$$= -116$$

Oleh sebab $b^2 - 4ac < 0$, persamaan kuadratik itu tidak mempunyai punca nyata. Maka, lokus itu tidak akan bersilang dengan paksi- y .

18 (a) (i) Kecerunan garis lurus

$$2x - y - 5 = 0 \Rightarrow y = 2x - 5 \text{ ialah } 2.$$

$$\therefore m_{BC} = 2$$

$$\therefore m_{AB} = -\frac{1}{m_{BC}} = -\frac{1}{2}$$

Maka, persamaan garis lurus AB ialah:

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

$$y - (-5) = -\frac{1}{2}[x - (-10)]$$

Pada titik $A(-10, -5)$,
 $x_1 = -10, y_1 = -5$.

$$2(y + 5) = -(x + 10)$$

$$2y + 10 = -x - 10$$

$$2y = -x - 20$$

(ii) Persamaan BC : $2x - y - 5 = 0 \dots (1)$

Persamaan AB : $x + 2y + 20 = 0 \dots (2)$

$$4x - 2y - 10 = 0 \dots (1) \times 2$$

$$(+)\frac{x + 2y + 20 = 0 \dots (2)}{5x \quad + 10 = 0}$$

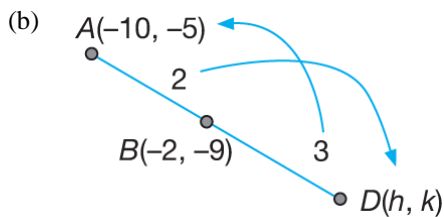
$$\therefore x = -2$$

Daripada (1):

$$2(-2) - y - 5 = 0$$

$$\therefore y = -9$$

Maka, B ialah titik $(-2, -9)$.



$$B = (-2, -9)$$

$$\left(\frac{3(-10) + 2h}{2+3}, \frac{3(-5) + 2k}{2+3} \right) = (-2, -9)$$

$$\left(\frac{-30 + 2h}{5}, \frac{-15 + 2k}{5} \right) = (-2, -9)$$

Menyamakan koordinat-x:

$$\frac{-30 + 2h}{5} = -2$$

$$2h = 20$$

$$h = 10$$

Menyamakan koordinat-y:

$$\frac{-15 + 2k}{5} = -9$$

$$2k = -30$$

$$k = -15$$

Maka, D ialah titik $(10, -15)$.

Luas $\triangle ADO$

$$= \frac{1}{2} \begin{vmatrix} -10 & 10 & 0 & -10 \\ -5 & -15 & 0 & -5 \end{vmatrix}$$

$$= \frac{1}{2} |150 - (-50)|$$

$$= \frac{1}{2} |200|$$

$$= 100 \text{ unit}^2$$

(c) Katakan P ialah titik (x, y) .

Oleh sebab $\angle APB = 90^\circ$, AP adalah berserenjang dengan PB .

Oleh itu, $(m_{AP})(m_{PB}) = -1$

$$\left(\frac{y - (-5)}{x - (-10)} \right) \left(\frac{y - (-9)}{x - (-2)} \right) = -1$$

$$\frac{(y+5)(y+9)}{(x+10)(x+2)} = -1$$

$$(y+5)(y+9) = -(x+10)(x+2)$$

$$y^2 + 14y + 45 = -(x^2 + 12x + 20)$$

$$x^2 + y^2 + 12x + 14y + 65 = 0$$

19 (a) (i) Jejari bulatan,

$$MA = \sqrt{(1+3)^2 + (3-0)^2}$$

$$MA = \sqrt{25}$$

$$MA = 5$$

$$MR = 5$$

$$\sqrt{(x-1)^2 + (y-3)^2} = 5$$

$$x^2 - 2x + 1 + y^2 - 6y + 9 = 5^2$$

$$x^2 + y^2 - 2x - 6y - 15 = 0$$

$$(ii) 4^2 + k^2 - 2(4) - 6k - 15 = 0$$

$$16 + k^2 - 8 - 6k - 15 = 0$$

$$k^2 - 6k - 7 = 0$$

$$(k+1)(k-7) = 0$$

$$k = -1 \text{ atau } k = 7$$

$k = -1$ tidak diterima kerana soalan menyatakan bahawa $k > 0$.

$$\therefore k = 7$$

$$(b) \text{Kecerunan } MA = \frac{3-0}{1+3} = \frac{3}{4}$$

$$\text{Maka, kecerunan } MC = -\frac{4}{3}$$

Persamaan MC ialah

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

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

Pada C , $x = 0$

$$3y = -4(0) - 12$$

$$y = -4$$

Maka, C ialah titik $(0, -4)$.

Luas OAC

$$= \frac{1}{2} \begin{vmatrix} 0 & -3 & 0 & 0 \\ 0 & 0 & -4 & 0 \end{vmatrix}$$

$$= \frac{1}{2} |12|$$

$$= 6 \text{ unit}^2$$