

**Tingkatan 4 Bab 8**  
**Vektor**  
**Penyelesaian Lengkap**

**Praktis Formatif 8.1a**

1  $\left| \vec{AB} \right| = \sqrt{3^2 + 3^2} = \sqrt{18} = 2\sqrt{2} = 4.243$  unit  
Arah  $\vec{AB}$  ialah barat daya.

**Praktis Formatif 8.1b**

1 (i)  $\vec{AB} = \underline{a}$   
(ii)  $\vec{RS} = -\underline{a}$   
(iii)  $\vec{XY} = \underline{b}$   
(iv)  $\vec{KL} = \underline{c}$   
(v)  $\vec{PQ} = \underline{d}$   
(vi)  $\vec{MN} = -\underline{b}$   
(vii)  $\vec{VW} = -\underline{c}$   
(viii)  $\vec{CD} = -\underline{d}$

(b) (i)  $\left| \vec{RS} \right| = \sqrt{3^2 + 4^2} = 5$  unit  
(ii)  $\left| \vec{XY} \right| = 3$  unit  
(iii)  $\left| \vec{KL} \right| = 4$  unit  
(iv)  $\left| \vec{PQ} \right| = \sqrt{2^2 + 3^2} = \sqrt{13} = 3.606$  unit

**Praktis Formatif 8.1c**

1 (a)  $\vec{CD} = \frac{1}{2}\underline{b}$  (b)  $\vec{EF} = 2\underline{b}$   
(c)  $\vec{GH} = -\frac{3}{2}\underline{b}$

2 (a)  $(h-4)\underline{v} = (5h-k)\underline{w}$   
 $h-4=0 \Rightarrow h=4$   
 $5h-k=0$   
 $5(4)-k=0 \Rightarrow k=20$

(b)  $(2h-4)\underline{v} = (k-6h+3)\underline{w}$   
 $2h-4=0 \Rightarrow h=2$   
 $k-6h+3=0$   
 $k-6(2)+3=0$   
 $k=9$

**Praktis Formatif 8.2a**

1 (a)  $\underline{a} + \underline{b} = \vec{PR}$   
(b)  $\underline{b} + \underline{c} = \vec{QS}$   
(c)  $\vec{PQ} + \vec{QS} = \vec{PS}$

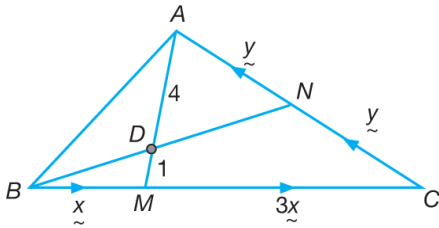
2 (a)  $\vec{EH} + \vec{EF} = \vec{EG}$   
(b)  $\vec{EH} + \vec{EF} = \vec{FH}$

3 (a)  $\vec{PQ} + \vec{QR} + \vec{RS} = \vec{PS}$   
(b)  $\vec{PR} + \vec{RS} + \vec{ST} = \vec{PT}$   
(c)  $\vec{PQ} + \vec{QR} + \vec{RS} + \vec{ST} = \vec{PT}$

4 (a)  $\vec{ON} - \vec{MN} - \vec{LM}$   
 $= \vec{ON} + \vec{NM} + \vec{ML}$   
 $= \vec{OL}$   
(b)  $\vec{NJ} - \vec{KJ} - \vec{MK}$   
 $= \vec{NJ} + \vec{JK} + \vec{KM}$   
 $= \vec{NM}$

**Praktis Formatif 8.2b**

1



(a)  $\vec{MA} = \vec{MC} + \vec{CA} = 3\underline{x} + 2\underline{y}$

(b)  $\vec{MD} = \frac{1}{5}\vec{MA} = \frac{1}{5}(3\underline{x} + 2\underline{y}) = \frac{3}{5}\underline{x} + \frac{2}{5}\underline{y}$

(c)  $\vec{BD} = \vec{BM} + \vec{MD}$   
 $= \underline{x} + \frac{3}{5}\underline{x} + \frac{2}{5}\underline{y}$   
 $= \frac{8}{5}\underline{x} + \frac{2}{5}\underline{y}$

(d)  $\vec{BN} = \vec{BC} + \vec{CN} = 4\underline{x} + \underline{y}$

$$= \frac{1}{2}\underline{c} + \frac{1}{2}\underline{b}$$

$$= \frac{1}{2}(\underline{c} + \underline{b}) \dots (1)$$

(ii)  $\frac{NB}{DB} = \frac{3}{4}$   
 $\vec{DB} = \frac{4}{3}\vec{NB}$   
 $= \frac{4}{3}(\vec{NO} + \vec{OB})$   
 $= \frac{4}{3}\left(-\frac{1}{2}\underline{c} + \underline{b}\right)$   
 $= -\frac{2}{3}\underline{c} + \frac{4}{3}\underline{b}$

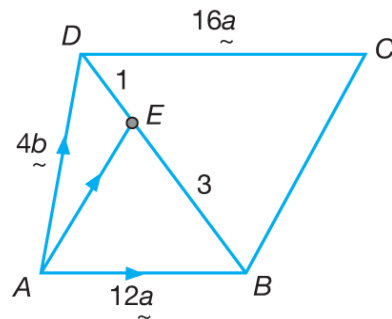
$\vec{DC} = \vec{DB} + \vec{BC}$   
 $= -\frac{2}{3}\underline{c} + \frac{4}{3}\underline{b} + (-\underline{b} + \underline{c})$   
 $= \frac{1}{3}\underline{c} + \frac{1}{3}\underline{b}$   
 $= \frac{1}{3}(\underline{c} + \underline{b})$   
 $= \frac{1}{3}(2\vec{OM})$   
 $= \frac{2}{3}\vec{OM}$

Daripada (1):  
 $\underline{c} + \underline{b} = 2\vec{OM}$

Oleh sebab  $\vec{DC} = \frac{2}{3}\vec{OM}$ , maka

$\vec{DC}$  dapat diungkapkan sebagai gandaan skalar  $\vec{OM}$ . Oleh itu,  $DC$  adalah selari dengan  $OM$ .

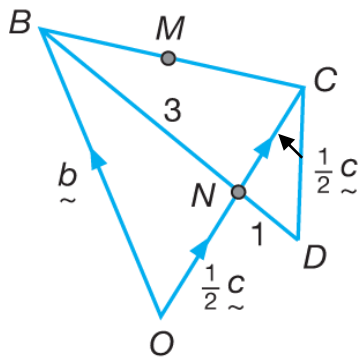
2



(a) (i)  $\vec{DB} = -4\underline{b} + 12\underline{a}$

**Praktis Formatif 8.2c**

1



(a) (i)  $\vec{OM} = \vec{OC} + \vec{CM}$   
 $= \underline{c} + \frac{1}{2}\vec{CB}$   
 $= \underline{c} + \frac{1}{2}(\vec{CO} + \vec{OB})$   
 $= \underline{c} + \frac{1}{2}(-\underline{c} + \underline{b})$

$$\begin{aligned}
 \text{(ii) } \vec{AE} &= \vec{AD} + \frac{1}{4} \vec{DB} \\
 &= 4\vec{b} + \frac{1}{4}(-4\vec{b} + 12\vec{a}) \\
 &= 4\vec{b} - \vec{b} + 3\vec{a} \\
 &= 3\vec{b} + 3\vec{a} \\
 &= 3(\vec{b} + \vec{a}) \dots (1)
 \end{aligned}$$

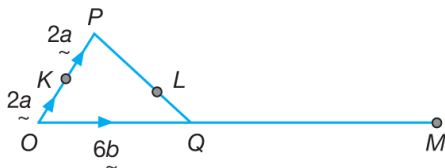
$$\begin{aligned}
 \text{(b) } \vec{BC} &= \vec{BD} + \vec{DC} \\
 &= 4\vec{b} - 12\vec{a} + \frac{4}{3} \left( \vec{AB} \right) \\
 &= 4\vec{b} - 12\vec{a} + \frac{4}{3}(12\vec{a}) \\
 &= 4\vec{b} + 4\vec{a} \\
 &= 4(\vec{b} + \vec{a}) \\
 &= 4 \left( \frac{1}{3} \vec{AE} \right) \\
 &= \frac{4}{3} \vec{AE}
 \end{aligned}$$

Daripada (1):  
 $\vec{b} + \vec{a} = \frac{1}{3} \vec{AE}$

Oleh sebab  $\vec{BC} = \frac{4}{3} \vec{AE}$ , maka  $\vec{BC}$  dapat diungkapkan sebagai gandaan skalar  $\vec{AE}$ . Oleh itu,  $BC$  adalah selari dengan  $AE$ .

**Praktis Formatif 8.2d**

1



$$\begin{aligned}
 \text{(a) } \vec{PQ} &= \vec{PO} + \vec{OQ} \\
 &= -4\vec{a} + 6\vec{b} \\
 \text{(b) } \vec{PL} &= \frac{3}{5} \vec{PQ} \\
 &= \frac{3}{5}(-4\vec{a} + 6\vec{b}) \\
 &= -\frac{12}{5}\vec{a} + \frac{18}{5}\vec{b} \\
 \text{(c) } \vec{OM} &= 3\vec{OQ} \\
 &= 3(6\vec{b})
 \end{aligned}$$

$$= 18\vec{b}$$

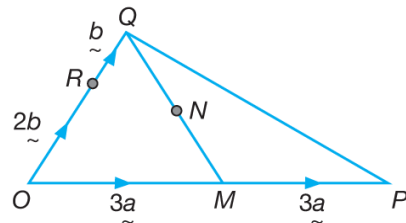
$$\begin{aligned}
 \text{(d) } \vec{KL} &= \vec{KP} + \vec{PL} \\
 &= 2\vec{a} - \frac{12}{5}\vec{a} + \frac{18}{5}\vec{b} \\
 &= -\frac{2}{5}\vec{a} + \frac{18}{5}\vec{b}
 \end{aligned}$$

$$\begin{aligned}
 \text{(e) } \vec{KM} &= \vec{KO} + \vec{OM} \\
 &= -2\vec{a} + 18\vec{b}
 \end{aligned}$$

$$\begin{aligned}
 \vec{KL} &= -\frac{2}{5}\vec{a} + \frac{18}{5}\vec{b} \\
 &= \frac{1}{5}(-2\vec{a} + 18\vec{b}) \\
 &= \frac{1}{5} \vec{KM}
 \end{aligned}$$

Oleh sebab  $\vec{KL} = \frac{1}{5} \vec{KM}$ ,  $\vec{KL}$  dapat diungkapkan sebagai gandaan skalar  $\vec{KM}$  dan  $K$  ialah titik sepunya. Maka, titik-titik  $K, L$  dan  $M$  adalah segaris.

2



$$\begin{aligned}
 \text{(a) } \vec{PQ} &= \vec{PO} + \vec{OQ} \\
 &= -6\vec{a} + 3\vec{b} \\
 \text{(b) } \vec{QM} &= \vec{QO} + \vec{OM} \\
 &= -3\vec{b} + 3\vec{a} \\
 \text{(c) } \vec{ON} &= \vec{OQ} + \vec{QN} \\
 &= 3\vec{b} + \frac{1}{2} \vec{QM} \\
 &= 3\vec{b} + \frac{1}{2}(-3\vec{b} + 3\vec{a}) \\
 &= 3\vec{b} - \frac{3}{2}\vec{b} + \frac{3}{2}\vec{a} \\
 &= \frac{3}{2}\vec{b} + \frac{3}{2}\vec{a}
 \end{aligned}$$

$$\begin{aligned}
 \text{(d) } \vec{RN} &= \vec{RQ} + \vec{QN} \\
 &= \underline{b} - \frac{3}{2}\underline{b} + \frac{3}{2}\underline{a} \\
 &= -\frac{1}{2}\underline{b} + \frac{3}{2}\underline{a}
 \end{aligned}$$

$$\begin{aligned}
 \text{(e) } \vec{RP} &= \vec{RO} + \vec{OP} \\
 &= -2\underline{b} + 6\underline{a} \\
 &= 2(-\underline{b} + 3\underline{a}) \dots (1)
 \end{aligned}$$

$$\begin{aligned}
 \vec{RN} &= -\frac{1}{2}\underline{b} + \frac{3}{2}\underline{a} \\
 &= \frac{1}{2}(-\underline{b} + 3\underline{a}) \\
 &= \frac{1}{2}\left(\frac{1}{2}\vec{RP}\right) \\
 &= \frac{1}{4}\vec{RP}
 \end{aligned}$$

Daripada (1) :

$$-\underline{b} + 2\underline{a} = \frac{1}{2}\vec{RP}$$

Oleh sebab  $\vec{RN} = \frac{1}{4}\vec{RP}$ ,  $\vec{RN}$  dapat

diungkapkan sebagai gandaan skalar  $\vec{RP}$  dan  $R$  ialah titik sepunya. Maka, titik-titik  $R, N$  dan  $P$  adalah segaris.

$$RN : RP = 1 : 4$$

$$\begin{aligned}
 &= 3\underline{y} + \frac{1}{4}\vec{RX} \\
 &= 3\underline{y} + \frac{1}{4}(-3\underline{y} + 15\underline{x}) \\
 &= \frac{9}{4}\underline{y} + \frac{15}{4}\underline{x}
 \end{aligned}$$

$$\begin{aligned}
 \text{(e) } \vec{ST} &= \vec{SO} + \vec{OT} \\
 &= -5\underline{x} + \frac{9}{4}\underline{y} + \frac{15}{4}\underline{x} \\
 &= -\frac{5}{4}\underline{x} + \frac{9}{4}\underline{y} \\
 &= \frac{1}{4}(-5\underline{x} + 9\underline{y}) \\
 &= \frac{1}{4}\vec{SY}
 \end{aligned}$$

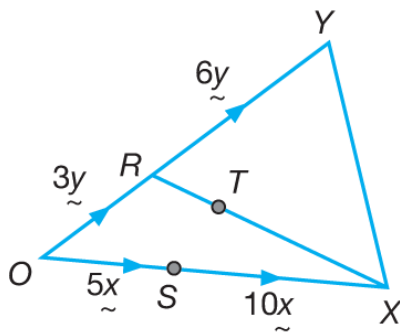
Daripada (1) :

$$-5\underline{x} + 9\underline{y} = \vec{SY}$$

Oleh sebab  $\vec{ST} = \frac{1}{4}\vec{SY}$ ,  $\vec{ST}$  dapat

diungkapkan sebagai gandaan skalar  $\vec{SY}$  dan  $S$  ialah titik sepunya. Maka, titik-titik  $S, T$  dan  $Y$  adalah segaris.

3



$$\begin{aligned}
 \text{(a) } \vec{RS} &= \vec{RO} + \vec{OS} \\
 &= -3\underline{y} + 5\underline{x}
 \end{aligned}$$

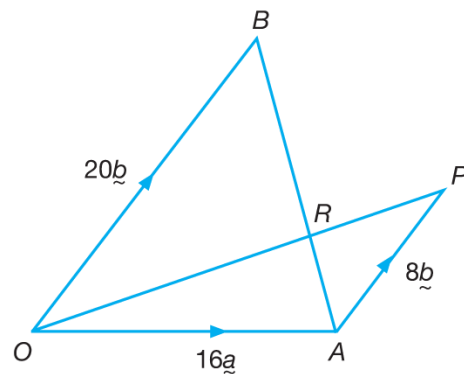
$$\begin{aligned}
 \text{(b) } \vec{RX} &= \vec{RO} + \vec{OX} \\
 &= -3\underline{y} + 15\underline{x}
 \end{aligned}$$

$$\begin{aligned}
 \text{(c) } \vec{SY} &= \vec{SO} + \vec{OY} \\
 &= -5\underline{x} + 9\underline{y} \dots (1)
 \end{aligned}$$

$$\text{(d) } \vec{OT} = \vec{OR} + \vec{RT}$$

### Praktis Formatif 8.2e

1



$$\begin{aligned}
 \text{(a) (i) } \vec{OP} &= \vec{OA} + \vec{AP} \\
 &= 16\underline{a} + \frac{2}{5}\vec{OB} \\
 &= 16\underline{a} + \frac{2}{5}(20\underline{b}) \\
 &= 16\underline{a} + 8\underline{b}
 \end{aligned}$$

$$\text{(ii) } \vec{BA} = -20\underline{b} + 16\underline{a}$$

$$\begin{aligned} \text{(b) (i) } \vec{OR} &= m\vec{OP} \\ &= m(16\vec{a} + 8\vec{b}) \\ &= 16m\vec{a} + 8m\vec{b} \end{aligned}$$

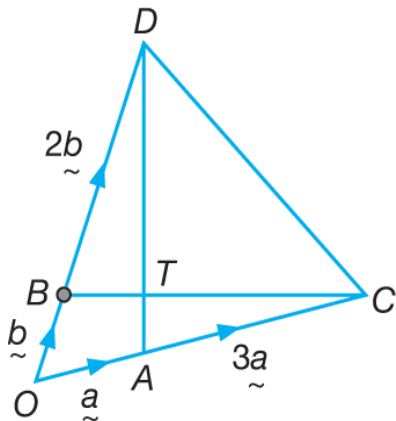
$$\begin{aligned} \text{(ii) } \vec{OR} &= \vec{OB} + \vec{BR} \\ &= 20\vec{b} + n\vec{BA} \\ &= 20\vec{b} + n(-20\vec{b} + 16\vec{a}) \\ &= 20\vec{b} - 20n\vec{b} + 16n\vec{a} \\ &= (20 - 20n)\vec{b} + 16n\vec{a} \end{aligned}$$

$$\begin{aligned} \text{(c) } 16m\vec{a} + 8m\vec{b} &= (20 - 20n)\vec{b} + 16n\vec{a} \\ \text{Menyamakan pekali } \vec{a}, \\ 16m &= 16n \\ m &= n \dots (1) \end{aligned}$$

$$\begin{aligned} \text{Menyamakan pekali } \vec{b}, \\ 8m &= 20 - 20n \\ 8m &= 20 - 20m \\ 28m &= 20 \\ m &= \frac{5}{7} \end{aligned}$$

$$\text{Daripada (1) : } n = m = \frac{5}{7}$$

2



$$\vec{AD} = -\vec{a} + 3\vec{b}$$

$$\vec{BC} = -\vec{b} + 4\vec{a}$$

$$\begin{aligned} \text{(a) } \vec{OT} &= \vec{OA} + \vec{AT} \\ &= \vec{a} + k\vec{AD} \\ &= \vec{a} + k(-\vec{a} + 3\vec{b}) \\ &= (1 - k)\vec{a} + 3k\vec{b} \end{aligned}$$

$$\begin{aligned} \text{(b) } \vec{OT} &= \vec{OB} + \vec{BT} \\ &= \vec{b} + t\vec{BC} \\ &= \vec{b} + t(-\vec{b} + 4\vec{a}) \\ &= (1 - t)\vec{b} + 4t\vec{a} \end{aligned}$$

$$(1 - k)\vec{a} + 3k\vec{b} = (1 - t)\vec{b} + 4t\vec{a}$$

$$\begin{aligned} \text{Menyamakan pekali } \vec{a}, \\ 1 - k &= 4t \\ k &= 1 - 4t \dots (1) \end{aligned}$$

$$\begin{aligned} \text{Menyamakan pekali } \vec{b}, \\ 3k &= 1 - t \dots (2) \end{aligned}$$

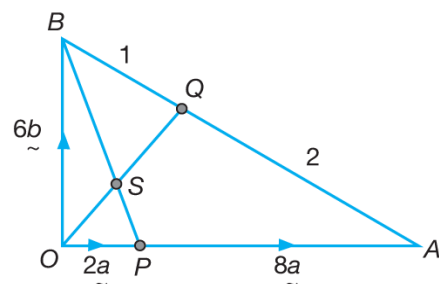
$$\begin{aligned} \text{Gantikan (1) ke dalam (2) :} \\ 3(1 - 4t) &= 1 - t \\ 3 - 12t &= 1 - t \\ 11t &= 2 \\ t &= \frac{2}{11} \end{aligned}$$

Daripada (1) :

$$k = 1 - 4\left(\frac{2}{11}\right) = \frac{3}{11}$$

$$\begin{aligned} \vec{OT} &= (1 - k)\vec{a} + 3k\vec{b} \\ \vec{OT} &= \left(1 - \frac{3}{11}\right)\vec{a} + 3\left(\frac{3}{11}\right)\vec{b} \\ \vec{OT} &= \frac{8}{11}\vec{a} + \frac{9}{11}\vec{b} \end{aligned}$$

3



$$\text{(a) (i) } \vec{BP} = -6\vec{b} + 2\vec{a}$$

$$\begin{aligned} \text{(ii) } \vec{OQ} &= \vec{OB} + \vec{BQ} \\ &= 6\vec{b} + \frac{1}{3}\vec{BA} \\ &= 6\vec{b} + \frac{1}{3}(-6\vec{b} + 10\vec{a}) \end{aligned}$$

$$= 4\underline{b} + \frac{10}{3}\underline{a}$$

$$\begin{aligned} \text{(b)} \quad \vec{OS} &= \vec{OB} + \vec{BS} \\ h\vec{OQ} &= 6\underline{b} + k\underline{BP} \\ h\left(4\underline{b} + \frac{10}{3}\underline{a}\right) &= 6\underline{b} + k(-6\underline{b} + 2\underline{a}) \\ 4h\underline{b} + \frac{10}{3}h\underline{a} &= 6\underline{b} - 6k\underline{b} + 2k\underline{a} \\ 4h\underline{b} + \frac{10}{3}h\underline{a} &= (6 - 6k)\underline{b} + 2k\underline{a} \end{aligned}$$

Menyamakan pekali  $\underline{b}$ ,

$$4h = 6 - 6k \dots (1)$$

Menyamakan pekali  $\underline{a}$ ,

$$\frac{10}{3}h = 2k$$

$$10h = 6k$$

$$5h = 3k$$

$$6k = 10h \dots (2)$$

Gantikan (2) ke dalam (1) :

$$4h = 6 - 10h$$

$$14h = 6$$

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

Daripada (2) :

$$6k = 10\left(\frac{3}{7}\right)$$

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

### Praktis Formatif 8.3a

$$\text{1 (a)} \quad \vec{AB} = 5\underline{i}$$

$$\left| \vec{AB} \right| = 5$$

$$\text{(b)} \quad \vec{CD} = 4\underline{i} + 3\underline{j}$$

$$\left| \vec{CD} \right| = \sqrt{4^2 + 3^2} = 5$$

$$\text{(c)} \quad \vec{EF} = 5\underline{i} - 3\underline{j}$$

$$\left| \vec{EF} \right| = \sqrt{5^2 + (-3)^2} = \sqrt{34} = 5.831$$

$$\text{(d)} \quad \vec{PQ} = -11\underline{i} - 5\underline{j}$$

$$\left| \vec{PQ} \right| = \sqrt{(-11)^2 + (-5)^2} = \sqrt{146} = 12.08$$

### Praktis Formatif 8.3b

$$\text{1 (a)} \quad \left| \underline{r} \right| = \sqrt{(-8)^2 + (-6)^2} = 10$$

$$\hat{\underline{r}} = \frac{1}{10}(-8\underline{i} - 6\underline{j}) = -\frac{4}{5}\underline{i} + \frac{3}{5}\underline{j}$$

$$\text{(b)} \quad \left| \underline{s} \right| = \sqrt{(-8)^2 + 15^2} = 17$$

$$\hat{\underline{s}} = \frac{1}{17} \begin{pmatrix} -8 \\ 15 \end{pmatrix} = \begin{pmatrix} -\frac{8}{17} \\ \frac{15}{17} \end{pmatrix}$$

### Praktis Formatif 8.3c

$$\text{1 (a)} \quad 2\underline{a} = 2(-3\underline{i} + 4\underline{j}) = -6\underline{i} + 8\underline{j}$$

$$\left| 2\underline{a} \right| = \sqrt{(-6)^2 + 8^2} = 10$$

$$\text{(b)} \quad -3\underline{b} = -3(\underline{i} + 3\underline{j}) = -3\underline{i} - 9\underline{j}$$

$$\left| -3\underline{b} \right| = \sqrt{(-3)^2 + (-9)^2} = 3\sqrt{10} = 9.487$$

$$\text{2 (a)} \quad 2\underline{a} + 3\underline{b} = 2 \begin{pmatrix} 3 \\ 4 \end{pmatrix} + 3 \begin{pmatrix} 1 \\ -3 \end{pmatrix} = \begin{pmatrix} 9 \\ -1 \end{pmatrix}$$

$$\text{(b)} \quad 3\underline{a} + 2\underline{c} = 3 \begin{pmatrix} 3 \\ 4 \end{pmatrix} + 2 \begin{pmatrix} -2 \\ 4 \end{pmatrix} = \begin{pmatrix} 5 \\ 20 \end{pmatrix}$$

$$\text{(c)} \quad \underline{a} - \underline{b} + \underline{c} = \begin{pmatrix} 3 \\ 4 \end{pmatrix} - \begin{pmatrix} 1 \\ -3 \end{pmatrix} + \begin{pmatrix} -2 \\ 4 \end{pmatrix} = \begin{pmatrix} 0 \\ 11 \end{pmatrix}$$

$$\begin{aligned} \text{(d)} \quad 2\underline{a} - 3\underline{b} + 3\underline{c} &= 2 \begin{pmatrix} 3 \\ 4 \end{pmatrix} - 3 \begin{pmatrix} 1 \\ -3 \end{pmatrix} + 3 \begin{pmatrix} -2 \\ 4 \end{pmatrix} \\ &= \begin{pmatrix} -3 \\ 29 \end{pmatrix} \end{aligned}$$

$$\text{3} \quad t\underline{b} - k\underline{a} = \underline{c}$$

$$t(\underline{i} + 2\underline{j}) - k(3\underline{i} + 4\underline{j}) = 3\underline{i} - 2\underline{j}$$

$$(t - 3k)\underline{i} + (2t - 4k)\underline{j} = 3\underline{i} - 2\underline{j}$$

Dengan menyamakan pekali  $\underline{i}$ ,

$$t - 3k = 3$$

$$2t - 6k = 6 \dots (1)$$

Dengan menyamakan pekali  $\underline{j}$ ,

$$2t - 4k = -2 \dots (2)$$

$$(1) - (2): \quad -2k = 8$$

$$k = -4$$

Daripada (1) :

$$t - 3(-4) = 3$$

$$t = -9$$

4  $p\mathbf{a} + k\mathbf{b} = \mathbf{c}$

$$p\begin{pmatrix} 2 \\ 1 \end{pmatrix} + k\begin{pmatrix} 3 \\ -2 \end{pmatrix} = \begin{pmatrix} 13 \\ -4 \end{pmatrix}$$

$$2p + 3k = 13 \dots (1)$$

$$p - 2k = -4 \dots (2)$$

$$p = 2k - 4 \dots (3)$$

Gantikan (3) ke dalam (1) :

$$2(2k - 4) + 3k = 13$$

$$4k - 8 + 3k = 13$$

$$7k = 21$$

$$k = 3$$

Daripada (3) :

$$p = 2(3) - 4 = 2$$

5 (a)  $\vec{OP} = h\mathbf{a} + k\mathbf{b}$

$$\begin{pmatrix} 5 \\ -3 \end{pmatrix} = h\begin{pmatrix} 3 \\ 0 \end{pmatrix} + k\begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

$$3h + k = 5 \dots (1)$$

$$3k = -3 \dots (2)$$

Daripada (2) :  $k = -1$

Daripada (1) :  $3h - 1 = 5$

$$h = 2$$

$$\therefore \vec{OP} = 2\mathbf{a} - \mathbf{b}$$

(b)  $\vec{PQ} = p\mathbf{a} + q\mathbf{b}$

$$\begin{pmatrix} -1 \\ 6 \end{pmatrix} = p\begin{pmatrix} 3 \\ 0 \end{pmatrix} + q\begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

$$3p + q = -1 \dots (1)$$

$$3q = 6 \dots (2)$$

Daripada (2) :  $q = 2$

Daripada (1) :  $3p + 2 = -1$

$$p = -1$$

$$\therefore \vec{PQ} = -\mathbf{a} + 2\mathbf{b}$$

6 Oleh sebab  $\mathbf{u}$  dan  $\mathbf{v}$  adalah selari, maka

$$\mathbf{u} = m\mathbf{v} \quad [m \text{ ialah pemalar.}]$$

$$3\mathbf{i} + 6\mathbf{j} = m(k\mathbf{i} - 2\mathbf{j})$$

$$3\mathbf{i} + 6\mathbf{j} = mk\mathbf{i} - 2m\mathbf{j}$$

Menyamakan pekali  $\mathbf{j}$ ,

$$-2m = 6$$

$$m = -3$$

Menyamakan pekali  $\mathbf{i}$ ,

$$mk = 3$$

$$-3k = 3$$

$$k = -1$$

7  $\mathbf{r} = k\mathbf{s}$

$$2\mathbf{i} + (p+3)\mathbf{j} = k[(p-5)\mathbf{i} - 8\mathbf{j}]$$

$$2\mathbf{i} + (p+3)\mathbf{j} = k(p-5)\mathbf{i} - 8k\mathbf{j}$$

Menyamakan pekali  $\mathbf{i}$ ,

$$2 = k(p-5)$$

$$2 = kp - 5k \dots (1)$$

Menyamakan pekali  $\mathbf{j}$ ,

$$p + 3 = -8k$$

$$p = -8k - 3 \dots (2)$$

Gantikan (2) ke dalam (1) :

$$2 = k(-8k - 3) - 5k$$

$$8k^2 + 8k + 2 = 0$$

$$4k^2 + 4k + 1 = 0$$

$$(2k+1)(2k+1) = 0$$

$$k = -\frac{1}{2}$$

Daripada (2) :

Apabila  $k = -\frac{1}{2}$ ,

$$p = -8\left(-\frac{1}{2}\right) - 3 = 1$$

8  $\vec{PQ} = m\vec{PR}$

$$\vec{OQ} - \vec{OP} = m(\vec{OR} - \vec{OP})$$

$$5\mathbf{i} - 2\mathbf{j} - (3\mathbf{i} + \mathbf{j}) = m[k\mathbf{i} - 6\mathbf{j} - (3\mathbf{i} + \mathbf{j})]$$

$$2\mathbf{i} - 3\mathbf{j} = m[(k-3)\mathbf{i} - 7\mathbf{j}]$$

$$2\mathbf{i} - 3\mathbf{j} = m(k-3)\mathbf{i} - 7m\mathbf{j}$$

Menyamakan pekali-  $\mathbf{j}$ ,

$$-7m = -3$$

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

Menyamakan pekali-  $\mathbf{i}$ ,

$$m(k-3) = 2$$

$$\frac{3}{7}(k-3) = 2$$

$$3(k-3) = 14$$

$$3k - 9 = 14$$

$$3k = 23$$

$$k = \frac{23}{3}$$

$$9 \quad |u| = |v|$$

$$\sqrt{(k-2)^2 + 4^2} = \sqrt{(k-1)^2 + 3^2}$$

$$(k-2)^2 + 16 = (k-1)^2 + 9$$

$$k^2 - 4k + 4 + 16 = k^2 - 2k + 1 + 9$$

$$20 - 4k = 10 - 2k$$

$$2k = 10$$

$$k = 5$$

$$10 \quad \underline{x} - \underline{y} = 3\underline{i} + k\underline{j} - (4\underline{i} - 3\underline{j})$$

$$= -\underline{i} + (k+3)\underline{j}$$

$$|\underline{x} - \underline{y}| = \sqrt{5}$$

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

$$1 + k^2 + 6k + 9 = 5$$

$$k^2 + 6k + 5 = 0$$

$$(k+1)(k+5) = 0$$

$$k = -1 \text{ atau } k = -5$$

### Praktis Formatif 8.3d

1 (a) Vektor paduan

$$= (16\underline{i} + 12\underline{j}) + (6\underline{i} - 8\underline{j})$$

$$= 22\underline{i} + 4\underline{j}$$

(b) Magnitud

$$= \sqrt{22^2 + 4^2}$$

$$= \sqrt{500}$$

$$= 22.36 \text{ km h}^{-1}$$

2 (a) Vektor paduan

$$= 500\underline{i} - 300\underline{j} + (-60\underline{i} - 80\underline{j})$$

$$= 440\underline{i} - 380\underline{j}$$

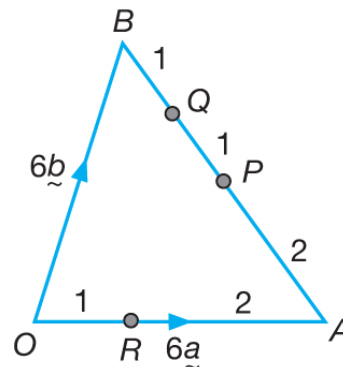
(b) Magnitud

$$= \sqrt{440^2 + (-380)^2}$$

$$= 581.38 \text{ km j}^{-1}$$

### Praktis Sumatif 8

1



$$(a) \vec{OQ} = \vec{OB} + \vec{BQ}$$

$$= 6\underline{b} + \frac{1}{4}\vec{BA}$$

$$= 6\underline{b} + \frac{1}{4}(-6\underline{b} + 6\underline{a})$$

$$= 6\underline{b} - \frac{3}{2}\underline{b} + \frac{3}{2}\underline{a}$$

$$= \frac{9}{2}\underline{b} + \frac{3}{2}\underline{a}$$

$$= \frac{3}{2}(3\underline{b} + \underline{a}) \quad \dots (1)$$

$$(b) \vec{RP} = \vec{RA} + \vec{AP}$$

$$= \frac{2}{3}\vec{OA} + \frac{1}{2}\vec{AB}$$

$$= \frac{2}{3}(6\underline{a}) + \frac{1}{2}(\vec{AO} + \vec{OB})$$

$$= 4\underline{a} + \frac{1}{2}(-6\underline{a} + 6\underline{b})$$

$$= \underline{a} + 3\underline{b}$$

Oleh sebab  $\vec{OQ} = \frac{3}{2}\vec{RP}$ ,  $\vec{OQ}$  dapat

diungkapkan sebagai gandaan skalar

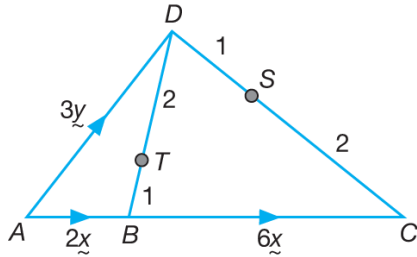
$\vec{RP}$ . Maka,  $\vec{OQ}$  adalah selari dengan

$\vec{RP}$ .



2

(i)

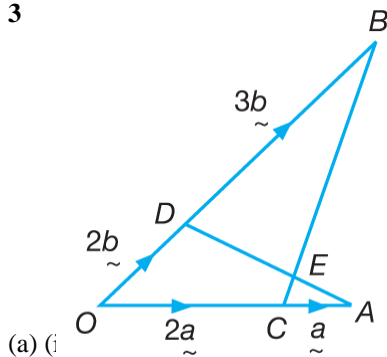


$$\begin{aligned}
 \text{(ii) } \vec{TC} &= \vec{TD} + \vec{DC} \\
 &= \frac{2}{3}(\vec{BD}) + \vec{DA} + \vec{AC} \\
 &= \frac{2}{3}(-2\underline{x} + 3\underline{y}) + (-3\underline{y} + 8\underline{x}) \\
 &= -\frac{4}{3}\underline{x} + 2\underline{y} - 3\underline{y} + 8\underline{x} \\
 &= \frac{20}{3}\underline{x} - \underline{y}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) } \vec{AT} &= \vec{AB} + \vec{BT} \\
 &= 2\underline{x} + \frac{1}{3}\vec{BD} \\
 &= 2\underline{x} + \frac{1}{3}(-2\underline{x} + 3\underline{y}) \\
 &= \frac{4}{3}\underline{x} + \underline{y} \\
 &= \frac{1}{2}\vec{AS}
 \end{aligned}$$

Oleh itu,  $\vec{AT}$  dapat diungkapkan sebagai gandaan skalar  $\vec{AS}$  dan A ialah titik sepunya. Maka, titik-titik A, T dan S adalah segaris.

3



$$\begin{aligned}
 &= s\underline{a} + n\vec{AD} \\
 &= 3\underline{a} + h(-3\underline{a} + 2\underline{b}) \\
 &= (3-3h)\underline{a} + 2h\underline{b} \dots (1)
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) } \vec{OE} &= \vec{OB} + \vec{BE} \\
 &= 5\underline{b} + k\vec{BC} \\
 &= 5\underline{b} + k(-5\underline{b} + 2\underline{a}) \\
 &= (5-5k)\underline{b} + 2k\underline{a} \dots (2)
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) } (3-3h)\underline{a} + 2h\underline{b} &= (5-5k)\underline{b} + 2k\underline{a} \\
 \text{Menyamakan pekali } \underline{a}, \\
 3-3h &= 2k \dots (1)
 \end{aligned}$$

$$\begin{aligned}
 \text{Menyamakan pekali } \underline{b}, \\
 2h &= 5-5k \\
 h &= \frac{5-5k}{2} \dots (2)
 \end{aligned}$$

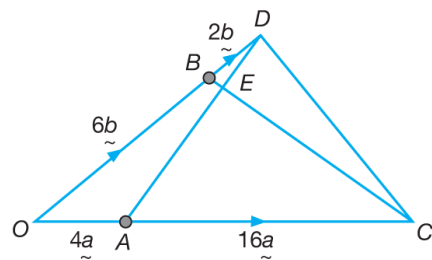
Gantikan (2) ke dalam (1) :

$$\begin{aligned}
 3-3\left(\frac{5-5k}{2}\right) &= 2k \\
 6-3(5-5k) &= 4k \\
 6-15+15k &= 4k \\
 11k &= 9 \\
 k &= \frac{9}{11}
 \end{aligned}$$

Daripada (2) :

$$h = \frac{5-5\left(\frac{9}{11}\right)}{2} = \frac{5}{11}$$

4



$$\text{(a) (i) } \vec{AD} = -4\underline{a} + 8\underline{b}$$

$$\text{(ii) } \vec{BC} = -6\underline{b} + 20\underline{a}$$

$$\text{(b) } \vec{AE} = \vec{AB} + \vec{BE}$$

$$\begin{aligned}
 h\vec{AD} &= -4\underline{a} + 6\underline{b} + k\vec{BC} \\
 h(-4\underline{a} + 8\underline{b}) &= -4\underline{a} + 6\underline{b} + k(-6\underline{b} + 20\underline{a}) \\
 -4h\underline{a} + 8h\underline{b} &= -4\underline{a} + 6\underline{b} - 6k\underline{b} + 20k\underline{a} \\
 -4h\underline{a} + 8h\underline{b} &= (-4+20k)\underline{a} + (6\underline{b} - 6k)\underline{b} \\
 \text{Menyamakan pekali } \underline{a},
 \end{aligned}$$

$$-4h = -4 + 20k \dots (1)$$

Menyamakan pekali  $\underline{b}$ ,

$$8h = 6 - 6k$$

$$h = \frac{6-6k}{8} \dots (2)$$

Gantikan (2) ke dalam (1) :

$$-4\left(\frac{6-6k}{8}\right) = -4 + 20k$$

$$-\left(\frac{6-6k}{2}\right) = -4 + 20k$$

$$-(3-3k) = -4 + 20k$$

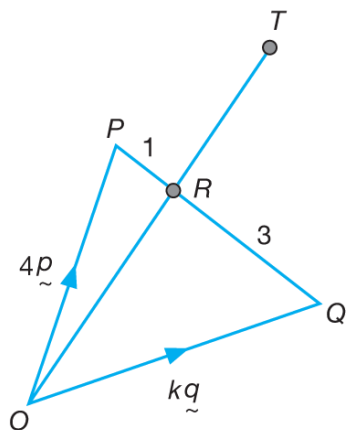
$$-3 + 3k = -4 + 20k$$

$$17k = 1$$

$$k = \frac{1}{17}$$

Daripada (2) :

$$h = \frac{6-6\left(\frac{1}{17}\right)}{8} = \frac{12}{17}$$



$$(a) \vec{OR} = \vec{OP} + \vec{PR}$$

$$= 4\underline{p} + \frac{1}{4}\vec{PQ}$$

$$= 4\underline{p} + \frac{1}{4}\left(\vec{PO} + \vec{OQ}\right)$$

$$= 4\underline{p} + \frac{1}{4}\left(-4\underline{p} + k\underline{q}\right)$$

$$= 4\underline{p} - \underline{p} + \frac{k}{4}\underline{q}$$

$$= 3\underline{p} + \frac{k}{4}\underline{q}$$

$$(b) \vec{OR} = m\vec{RT}$$

$$3\underline{p} + \frac{k}{4}\underline{q} = m\left(2\underline{p} + \frac{5}{3}\underline{q}\right)$$

$$3\underline{p} + \frac{k}{4}\underline{q} = 2m\underline{p} + \frac{5}{3}m\underline{q}$$

Menyamakan pekali  $\underline{p}$ ,

$$2m = 3$$

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

Menyamakan pekali  $\underline{q}$ ,

$$\frac{k}{4} = \frac{5}{3}m$$

$$\frac{k}{4} = \frac{5}{3}\left(\frac{3}{2}\right)$$

$$k = 10$$

$$6 (a) \vec{PR} = \vec{PQ} + \vec{QR}$$

$$= 4\underline{u} + \frac{3}{2}\vec{PS}$$

$$= 4\underline{u} + \frac{3}{2}(12\underline{v})$$

$$= 4\underline{u} + 18\underline{v}$$

Diberi

$$\vec{PS} = \frac{2}{3}\vec{QR},$$

maka

$$\vec{QR} = \frac{3}{2}\vec{PS}.$$

$$(b) (i) \vec{TX} = m\vec{PQ}$$

$$= m(4\underline{u})$$

$$= 4m\underline{u}$$

(ii)  $P, X$  dan  $R$  adalah segaris.

$$\vec{PX} = k\vec{PR}$$

$$\vec{PT} + \vec{TX} = k(4\underline{u} + 18\underline{v})$$

$$\frac{4}{3}\vec{PS} + 4m\underline{u} = 4k\underline{u} + 18k\underline{v}$$

↑

Diberi

Daripada (b) (i)

$$\frac{3}{4}(12\underline{v}) + 4m\underline{u} = 4k\underline{u} + 18k\underline{v}$$

$$9\underline{v} + 4m\underline{u} = 4k\underline{u} + 18k\underline{v}$$

Menyamakan pekali  $\underline{v}$ ,

$$9 = 18k$$

$$k = \frac{1}{2}$$

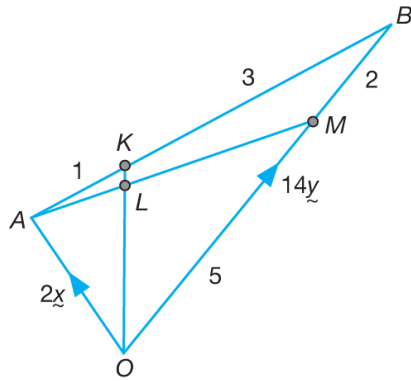
Menyamakan pekali  $\underline{u}$ ,

$$4m = 4k$$

$$4m = 4\left(\frac{1}{2}\right)$$

7

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



$$\begin{aligned} \text{(a) (i) } \vec{OM} &= \frac{5}{7} \vec{OB} \\ &= \frac{5}{7} (14\underline{y}) \\ &= 10\underline{y} \end{aligned}$$

$$\begin{aligned} \text{(ii) } \vec{AK} &= \frac{1}{4} \vec{AB} \\ &= \frac{1}{4} (-2\underline{x} + 10\underline{y}) \\ &= -\frac{1}{2} \underline{x} + \frac{7}{2} \underline{y} \end{aligned}$$

$$\begin{aligned} \text{(b) (i) } \vec{AL} &= p \vec{AM} \\ &= p (-2\underline{x} + 10\underline{y}) \\ &= -2p\underline{x} + 10p\underline{y} \end{aligned}$$

$$\begin{aligned} \text{(ii) } \vec{KL} &= q \vec{KO} \\ &= q (\vec{KA} + \vec{AO}) \\ &= q \left( \frac{1}{4} \vec{BA} - 2\underline{x} \right) \\ &= q \left[ \frac{1}{4} (-14\underline{y} + 2\underline{x}) - 2\underline{x} \right] \\ &= q \left( -\frac{7}{2} \underline{y} + \frac{1}{2} \underline{x} - 2\underline{x} \right) \\ &= q \left( -\frac{7}{2} \underline{y} - \frac{3}{2} \underline{x} \right) \\ &= -\frac{7}{2} q \underline{y} - \frac{3}{2} q \underline{x} \end{aligned}$$

$$\begin{aligned} \text{(c) } \vec{AK} &= \vec{AL} + \vec{LK} \\ \frac{7}{2} \underline{y} - \frac{1}{2} \underline{x} &= -2p\underline{x} + 10p\underline{y} + \frac{7}{2} q \underline{y} + \frac{3}{2} q \underline{x} \\ \frac{7}{2} \underline{y} - \frac{1}{2} \underline{x} &= \left( 10p + \frac{7}{2} q \right) \underline{y} + \left( -2p + \frac{3}{2} q \right) \underline{x} \end{aligned}$$

Menyamakan pekali  $\underline{x}$ :

$$\begin{aligned} -\frac{1}{2} &= -2p + \frac{3}{2} q \\ -4p + 3q &= -1 \quad \dots (1) \end{aligned}$$

Menyamakan pekali  $\underline{y}$ :

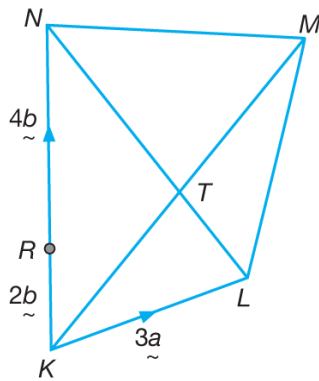
$$\begin{aligned} 10p + \frac{7}{2} q &= \frac{7}{2} \\ 20p + 7q &= 7 \quad \dots (2) \end{aligned}$$

$$\begin{aligned} -20p + 15q &= -5 \quad \dots (1) \times 5 \\ (+) \quad 20p + 7q &= 7 \quad \dots (2) \\ \hline 22q &= 2 \\ q &= \frac{1}{11} \end{aligned}$$

Daripada (1) :

$$\begin{aligned} -4p + 3 \left( \frac{1}{11} \right) &= -1 \\ -4p &= -\frac{14}{11} \\ p &= \frac{7}{22} \end{aligned}$$

8



$$\begin{aligned} \text{(a) (i) } \vec{KR} &= \frac{1}{3} \vec{KN} \\ \vec{KN} &= 3\vec{KR} \\ \vec{KN} &= 3(2\underline{b}) \\ \vec{KN} &= 6\underline{b} \end{aligned}$$

$$\begin{aligned} \vec{NL} &= \vec{NK} + \vec{KL} \\ &= -6\underline{b} + 3\underline{a} \end{aligned}$$

$$\begin{aligned} \text{(ii) } \vec{KT} &= \vec{KL} + \vec{LT} \\ &= \vec{KL} + \frac{1}{3} \vec{LN} \\ &= 3\underline{a} + \frac{1}{3}(6\underline{b} - 3\underline{a}) \\ &= 3\underline{a} + 2\underline{b} - \underline{a} \\ &= 2\underline{a} + 2\underline{b} \end{aligned}$$

$$\begin{aligned} \text{(b) (i) } \vec{NM} &= \vec{NK} + \vec{KM} \\ &= \vec{NK} + \frac{1}{q} \vec{KT} \\ &= -6\underline{b} + \frac{1}{q}(2\underline{a} + 2\underline{b}) \\ &= -6\underline{b} + \frac{2}{q}\underline{a} + \frac{2}{q}\underline{b} \\ &= \left(\frac{2}{q} - 6\right)\underline{b} + \frac{2}{q}\underline{a} \end{aligned}$$

$$\text{(ii) Tetapi diberi bahawa } \vec{NM} = 3p\underline{a} - 2\underline{b}.$$

Dengan perbandingan,

$$\frac{2}{q} - 6 = -2$$

$$\frac{2}{q} = 4$$

$$q = \frac{1}{2}$$

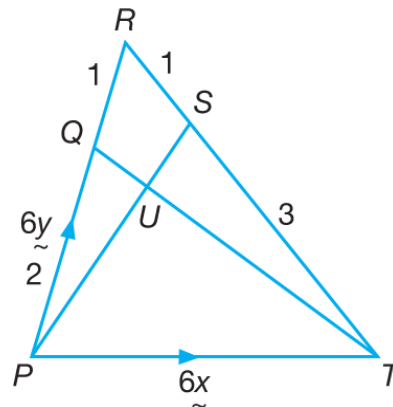
$$3p = \frac{2}{q}$$

$$p = \frac{2}{3q}$$

$$p = \frac{2}{3\left(\frac{1}{2}\right)}$$

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

9



$$\text{(a) (i) } \vec{TR} = \vec{TP} + \vec{PR} = -6\underline{x} + 6\underline{y}$$

$$\begin{aligned} \text{(ii) } \vec{PS} &= \vec{PT} + \vec{TS} \\ &= \vec{PT} + \frac{3}{4} \vec{TR} \\ &= 6\underline{x} + \frac{3}{4}(-6\underline{x} + 6\underline{y}) \\ &= 6\underline{x} - \frac{9}{2}\underline{x} + \frac{9}{2}\underline{y} \\ &= \frac{3}{2}\underline{x} + \frac{9}{2}\underline{y} \end{aligned}$$

$$\begin{aligned} \text{(b) } \vec{PU} &= h \vec{PS} \\ &= h\left(\frac{3}{2}\underline{x} + \frac{9}{2}\underline{y}\right) \\ &= \frac{3}{2}h\underline{x} + \frac{9}{2}h\underline{y} \end{aligned}$$

$$\begin{aligned} \vec{PU} &= \vec{PT} + k \vec{TQ} \\ &= 6\underline{x} + k(-6\underline{x} + 4\underline{y}) \\ &= (6 - 6k)\underline{x} + 4k\underline{y} \end{aligned}$$

Menyamakan pekali  $\underline{x}$ ,

$$\begin{aligned}\frac{3}{2}h &= 6 - 6k \\ 3h &= 12 - 12k \\ h &= 4 - 4k \dots (1)\end{aligned}$$

Menyamakan pekali  $\underline{y}$ ,

$$\begin{aligned}4k &= \frac{9}{2}h \\ 8k &= 9h \dots (2)\end{aligned}$$

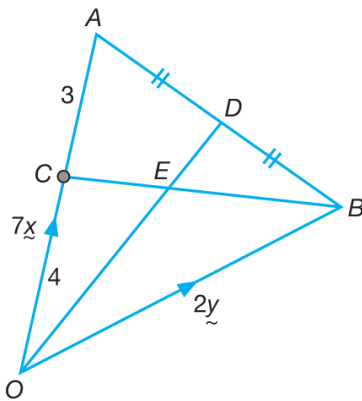
Gantikan (1) ke dalam (2) :

$$\begin{aligned}8k &= 9(4 - 4k) \\ 8k &= 36 - 36k \\ 44k &= 36 \\ k &= \frac{9}{11}\end{aligned}$$

Daripada (1) :

$$h = 4 - 4\left(\frac{9}{11}\right) = \frac{8}{11}$$

10



(a) (i)  $\vec{BC} = \vec{BO} + \vec{OC}$

$$\begin{aligned}&= -2\underline{y} + \frac{4}{7}\vec{OA} \\ &= -2\underline{y} + \frac{4}{7}(7\underline{x}) \\ &= -2\underline{y} + 4\underline{x}\end{aligned}$$

(ii)  $\vec{OD} = \vec{OB} + \vec{BD}$

$$\begin{aligned}&= 2\underline{y} + \frac{1}{2}\vec{BA} \\ &= 2\underline{y} + \frac{1}{2}(-2\underline{y} + 7\underline{x}) \\ &= 2\underline{y} - \underline{y} + \frac{7}{2}\underline{x} \\ &= \underline{y} + \frac{7}{2}\underline{x}\end{aligned}$$

(b) (i)  $\vec{OE} = p\vec{OD}$

$$\begin{aligned}&= p\left(\underline{y} + \frac{7}{2}\underline{x}\right) \\ &= p\underline{y} + \frac{7}{2}p\underline{x} \dots (1)\end{aligned}$$

(ii)  $\vec{OE} = \vec{OB} + \vec{BE}$

$$\begin{aligned}&= \vec{OB} + q\vec{BC} \\ &= 2\underline{y} + q(-2\underline{y} + 4\underline{x}) \\ &= (2 - 2q)\underline{y} + 4q\underline{x} \dots (2)\end{aligned}$$

(c) Menyamakan (1) dan (2) ,

$$p\underline{y} + \frac{7}{2}p\underline{x} = (2 - 2q)\underline{y} + 4q\underline{x}$$

Menyamakan pekali  $\underline{y}$ ,

$$p = 2 - 2q \dots (3)$$

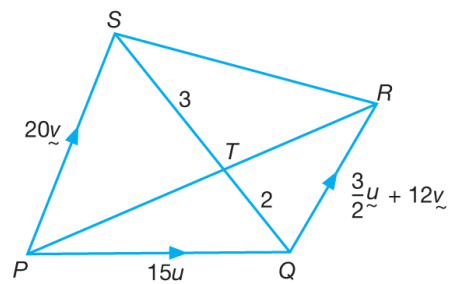
Menyamakan pekali  $\underline{x}$ ,

$$\begin{aligned}\frac{7}{2}p &= 4q \\ 7p &= 8q \\ 7(2 - 2q) &= 8q \\ 14 - 14q &= 8q \\ 14 &= 22q \\ q &= \frac{7}{11}\end{aligned}$$

Daripada (3) ,

$$p = 2 - 2\left(\frac{7}{11}\right) = \frac{8}{11}$$

11



(a) (i)  $\vec{QS} = \vec{QP} + \vec{PS}$

$$= -15\underline{u} + 20\underline{v}$$

(ii)  $\vec{PT} = \vec{PQ} + \vec{QT}$

$$\begin{aligned}
 &= 15\underline{u} + \frac{2}{5}\underline{\vec{QS}} \\
 &= 15\underline{u} + \frac{2}{5}(-15\underline{u} + 20\underline{v}) \\
 &= 15\underline{u} - 6\underline{u} + 8\underline{v} \\
 &= 9\underline{u} + 8\underline{v}
 \end{aligned}$$

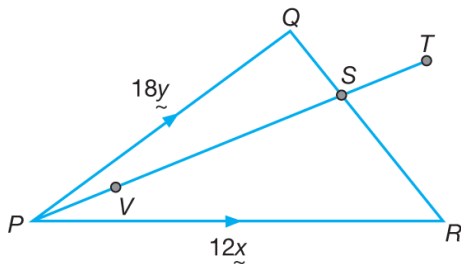
(b)  $\underline{\vec{PT}} = k\underline{\vec{TR}}$

$$\begin{aligned}
 9\underline{u} + 8\underline{v} &= k(\underline{\vec{TQ}} + \underline{\vec{QR}}) \\
 &= k\left(6\underline{u} - 8\underline{v} - \frac{3}{2}\underline{u} + 12\underline{v}\right) \\
 &= k\left(\frac{9}{2}\underline{u} + 4\underline{v}\right) \\
 &= \frac{9}{2}k\underline{u} + 4k\underline{v}
 \end{aligned}$$

Menyamakan pekali  $\underline{u}$ ,

$$\begin{aligned}
 9 &= \frac{9}{2}k \\
 k &= 2 \quad \therefore PT : TR = 2 : 1
 \end{aligned}$$

12



(a) (i)  $\underline{\vec{QR}} = \underline{\vec{QP}} + \underline{\vec{PR}}$

$$\begin{aligned}
 &= -18\underline{y} + 12\underline{x} \\
 \text{(ii) } \underline{\vec{PS}} &= \underline{\vec{PQ}} + \underline{\vec{QS}} \\
 &= \underline{\vec{PQ}} + \frac{1}{3}\underline{\vec{QR}} \\
 &= 18\underline{y} + \frac{1}{3}(-18\underline{y} + 12\underline{x}) \\
 &= 18\underline{y} - 6\underline{y} + 4\underline{x} \\
 &= 12\underline{y} + 4\underline{x}
 \end{aligned}$$

(b) Dengan menggunakan hukum hasil tambah segi tiga,

$$\begin{aligned}
 \underline{\vec{PV}} + \underline{\vec{VQ}} &= \underline{\vec{PQ}} \\
 m\underline{\vec{PS}} - n(2\underline{x} - 18\underline{y}) &= 18\underline{y} \\
 m(12\underline{y} + 4\underline{x}) - n(2\underline{x} - 18\underline{y}) &= 18\underline{y} \quad \boxed{\underline{\vec{VQ}} = -\underline{\vec{QV}}}
 \end{aligned}$$

$$\begin{aligned}
 12m\underline{y} + 4m\underline{x} - 2n\underline{x} + 18n\underline{y} &= 18\underline{y} \\
 (12m + 18n)\underline{y} + (4m - 2n)\underline{x} &= 18\underline{y} \\
 \text{Menyamakan pekali } \underline{y}, \\
 12m + 18n &= 18 \\
 2m + 3n &= 3 \quad \dots (1)
 \end{aligned}$$

Menyamakan pekali  $\underline{x}$ ,

$$\begin{aligned}
 4m - 2n &= 0 \\
 2m - n &= 0 \quad \dots (2)
 \end{aligned}$$

$$\begin{aligned}
 (1) - (2) : \quad 4n &= 3 \\
 n &= \frac{3}{4}
 \end{aligned}$$

Daripada (2),  $2m - \frac{3}{4} = 0$

$$m = \frac{3}{8}$$

(c) Oleh sebab titik-titik P, S dan T adalah segaris,

$$\underline{\vec{PS}} = k\underline{\vec{PT}} \quad (k \text{ ialah pemalar.})$$

$$12\underline{y} + 4\underline{x} = k(h\underline{x} + 18\underline{y})$$

$$12\underline{y} + 4\underline{x} = hk\underline{x} + 18k\underline{y}$$

Menyamakan pekali  $\underline{y}$ ,

$$18k = 12$$

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

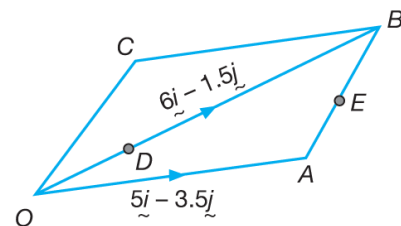
Menyamakan pekali  $\underline{x}$ ,

$$hk = 4$$

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

$$h = 6$$

13 (a)



(i)  $\underline{\vec{OD}} = \frac{1}{3}\underline{\vec{OB}}$

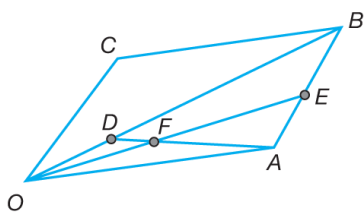
$$= \frac{1}{3}(6\underline{i} - 1.5\underline{j})$$

$$= 2\underline{i} - 0.5\underline{j}$$

(ii)  $\underline{\vec{OE}} = \underline{\vec{OA}} + \underline{\vec{AE}}$

$$\begin{aligned}
&= \vec{OA} + \frac{1}{4}\vec{AB} \\
&= 5\vec{i} + 3.5\vec{j} + \frac{1}{4}(\vec{AO} + \vec{OB}) \\
&= 5\vec{i} + 3.5\vec{j} + \frac{1}{4}(-5\vec{i} - 3.5\vec{j} + 6\vec{i} - 1.5\vec{j}) \\
&= 5\vec{i} + 3.5\vec{j} + \frac{1}{4}(\vec{i} - 5\vec{j}) \\
&= \frac{21}{4}\vec{i} + \frac{9}{4}\vec{j}
\end{aligned}$$

(b)



$$\begin{aligned}
\text{(i) } \vec{OF} &= k\vec{OE} \\
&= k\left(\frac{21}{4}\vec{i} + \frac{9}{4}\vec{j}\right) \\
&= \frac{21}{4}k\vec{i} + \frac{9}{4}k\vec{j} \dots (1)
\end{aligned}$$

$$\begin{aligned}
\text{(ii) } \vec{OF} &= \vec{OD} + \vec{DF} \\
&= 2\vec{i} - 0.5\vec{j} + t\vec{DA} \\
&= 2\vec{i} - 0.5\vec{j} + t(\vec{DO} + \vec{OA}) \\
&= 2\vec{i} - 0.5\vec{j} + t(-2\vec{i} + 0.5\vec{j} + 5\vec{i} + 3.5\vec{j}) \\
&= 2\vec{i} - 0.5\vec{j} + t(3\vec{i} + 4\vec{j}) \\
&= (2+3t)\vec{i} + (4t-0.5)\vec{j} \dots (2)
\end{aligned}$$

(c) Menyamakan (1) dan (2) :

$$\frac{21}{4}k\vec{i} + \frac{9}{4}k\vec{j} = (2+3t)\vec{i} + (4t-0.5)\vec{j}$$

Menyamakan pekali  $\vec{i}$ ,

$$\frac{21}{4}k = 2+3t$$

$$21k = 8+12t \dots (3)$$

Menyamakan pekali  $\vec{j}$ ,

$$\frac{9}{4}k = 4t-0.5$$

$$9k = 16t-2 \dots (4)$$

$$(3) \times 9 : 189k = 72+108t \dots (5)$$

$$(4) \times 21 : 189k = -42+336t \dots (6)$$

$$(5) - (6) : 0 = 114 - 228t$$

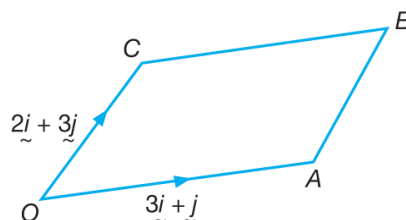
$$t = \frac{1}{2}$$

Daripada (5) :

$$189k = 72+108 \times \frac{1}{2}$$

$$k = \frac{126}{189} = \frac{2}{3}$$

14



$$\begin{aligned}
\text{(a) (i) } \vec{OB} &= \vec{OA} + \vec{AB} \\
&= 3\vec{i} + \vec{j} + 2\vec{i} + 3\vec{j} \\
&= 5\vec{i} + 4\vec{j}
\end{aligned}$$

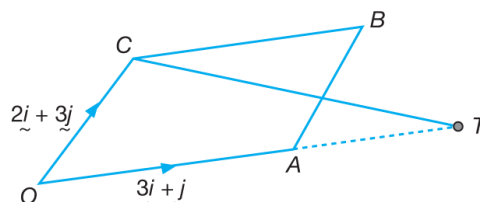
$$\text{(ii) } \left| \vec{OB} \right| = \sqrt{5^2 + 4^2} = \sqrt{41}$$

Vektor unit dalam arah  $\vec{AB}$

$$= \frac{1}{\sqrt{41}} \begin{pmatrix} 5 \\ 4 \end{pmatrix}$$

$$= \begin{pmatrix} \frac{5}{\sqrt{41}} \\ \frac{4}{\sqrt{41}} \end{pmatrix}$$

(b)

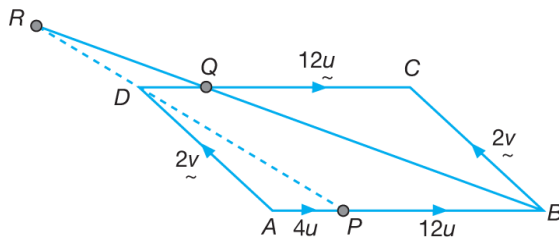


$$\begin{aligned}
\text{(i) } \vec{AT} &= \vec{AC} + \vec{CT} \\
&= \vec{AO} + \vec{OC} + \vec{CT} \\
&= -3\vec{i} - \vec{j} + 2\vec{i} + 3\vec{j} + 16\vec{i} + 3\vec{j} \\
&= 15\vec{i} + 5\vec{j}
\end{aligned}$$

$$\text{(ii) } \vec{AT} = 5(3\vec{i} + \vec{j}) = 5\vec{OA}$$

Oleh sebab  $\vec{AT}$  dapat diungkapkan sebagai gandaan skalar  $\vec{OA}$  dan  $A$  ialah titik sepunya, maka titik-titik  $O, A$  dan  $T$  adalah segaris.

15



$$(a) (i) \vec{BQ} = \vec{BC} + \vec{CQ} \\ = 2\vec{v} - 12\vec{u}$$

$$(ii) \vec{PD} = \vec{PA} + \vec{AD} \\ = -4\vec{u} + 2\vec{v} \quad \dots (1)$$

$$\vec{PR} = \vec{PB} + \vec{BR} \\ = \vec{PB} + \frac{3}{2}\vec{BQ} \\ = 12\vec{u} + \frac{3}{2}(2\vec{v} - 12\vec{u}) \\ = -6\vec{u} + 3\vec{v} \\ = 3(-2\vec{u} + \vec{v}) \quad \dots (2)$$

$$\text{Daripada (1) : } \vec{PD} = -4\vec{u} + 2\vec{v}, \\ = 2(-2\vec{u} + \vec{v}) \\ -2\vec{u} + \vec{v} = \frac{1}{2}\vec{PD}$$

Oleh itu, daripada (2) :

$$\vec{PR} = 3(-2\vec{u} + \vec{v}) = 3\left(\frac{1}{2}\vec{PD}\right)$$

$$\vec{PR} = \frac{3}{2}\vec{PD}$$

Oleh sebab  $\vec{PR}$  dapat diungkapkan sebagai gandaan skalar  $\vec{PD}$  dan  $P$  ialah titik sepunya, maka titik-titik  $P, D$  dan  $R$  adalah segaris.

$$(b) (i) \vec{PD} = -4\vec{u} + 2\vec{v} \\ = -4(3\vec{i}) + 2(-\vec{i} + 6\vec{j}) \\ = -14\vec{i} + 12\vec{j}$$

$$(ii) \left| \vec{PD} \right| = \sqrt{(-14)^2 + 12^2} = \sqrt{340}$$

$$\text{Vektor unit dalam arah } \vec{PD} \\ = \frac{1}{\sqrt{340}}(-14\vec{i} + 12\vec{j}) \\ = \frac{2}{\sqrt{4 \times 85}}(-7\vec{i} + 6\vec{j}) \\ = \frac{2}{2\sqrt{85}}(-7\vec{i} + 6\vec{j}) \\ = -\frac{7}{\sqrt{85}}\vec{i} + \frac{6}{\sqrt{85}}\vec{j}$$

$$16 (a) (i) \vec{BC} = \vec{BA} + \vec{AC} \\ = 2\vec{i} - 3\vec{j} - 6\vec{i} + 6\vec{j} \\ = -4\vec{i} + 3\vec{j}$$

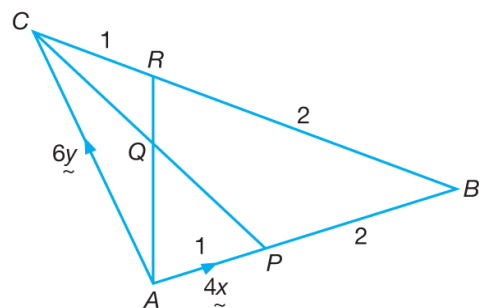
$$(ii) \left| \vec{BC} \right| = \sqrt{(-4)^2 + 3^2} = 5$$

Vektor unit dalam arah  $\vec{BC}$

$$= \frac{1}{5}(-4\vec{i} + 3\vec{j}) \\ = -\frac{4}{5}\vec{i} + \frac{3}{5}\vec{j}$$

$$(b) \vec{AD} = k\vec{BC} \\ p\vec{i} - 12\vec{j} = k(-4\vec{i} + 3\vec{j}) \\ p\vec{i} - 12\vec{j} = -4k\vec{i} + 3k\vec{j} \\ 3k = -12 \quad p = -4k \\ k = -4 \quad = -4(-4) \\ = 16$$

17



$$(a) (i) \vec{CP} = \vec{CA} + \vec{AP} \\ = -6\vec{y} + 4\vec{x}$$



$$\begin{aligned}
 \text{(ii) } \vec{CR} &= \frac{1}{3} \vec{CB} \\
 &= \frac{1}{3} (\vec{CA} + \vec{AB}) \\
 &= \frac{1}{3} (-6\underline{y} + 12\underline{x}) \\
 &= -2\underline{y} + 4\underline{x}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) } \vec{CR} &= -2\underline{y} + 4\underline{x} \\
 \vec{CR} &= -2(-3\underline{i} + 4\underline{j}) + 4(2\underline{i} + \underline{j}) \\
 \vec{CR} &= 14\underline{i} - 4\underline{j} \\
 \left| \vec{CR} \right| &= \sqrt{14^2 + (-4)^2} = \sqrt{212} = 14.56
 \end{aligned}$$

(c) Dengan menggunakan hasil tambah segi tiga,

$$\begin{aligned}
 \vec{CQ} + \vec{QR} &= \vec{CR} \\
 m\vec{CP} + n\vec{AR} &= \vec{CR} \\
 m(-6\underline{y} + 4\underline{x}) + n(\vec{AC} + \vec{CR}) &= \vec{CR} \\
 m(-6\underline{y} + 4\underline{x}) + n[6\underline{y} + (-2\underline{y} + 4\underline{x})] &= -2\underline{y} + 4\underline{x} \\
 (4m + 4n)\underline{x} + (-6m + 4n)\underline{y} &= -2\underline{y} + 4\underline{x}
 \end{aligned}$$

Menyamakan pekali  $\underline{x}$ ,

$$\begin{aligned}
 4m + 4n &= 4 \\
 2m + 2n &= 2 \dots (1)
 \end{aligned}$$

Menyamakan pekali  $\underline{y}$ ,

$$\begin{aligned}
 -6m + 4n &= -2 \\
 -3m + 2n &= -1 \dots (2)
 \end{aligned}$$

$$(1) - (2): \quad 5m = 3$$

$$m = \frac{3}{5}$$

Daripada (2):

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

$$2n = \frac{4}{5}$$

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