

Jawapan

Praktis 8

Praktis Formatif

1 $2m + 3 = 0$

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

$$5 - n = 0$$

$$n = 5$$

2 $\vec{RS} = \frac{15}{40}\vec{RT}$

$$\vec{RS} = \frac{3}{8}\vec{RT}$$

$$\vec{RS} = \frac{3}{5}\vec{ST}$$

3 $\vec{EF} = \lambda\vec{GH}$

$$(p - 4)\underline{a} + 6q\underline{b} = \lambda(\underline{a} + 2\underline{b})$$

Bandungkan/Compare \underline{a} : $p - 4 = \lambda \dots$ ①

Bandungkan/Compare \underline{b} : $6q = 2\lambda$
 $\lambda = 3q \dots$ ②

Gantikan ② ke dalam ①/Substitute ② into ①,

$$p - 4 = 3q$$

$$p = 3q + 4$$

4 (a) $\vec{AB} = \lambda\vec{BC}$

$$9\underline{p} - 12\underline{q} = \lambda[6\underline{p} + (5 - m)\underline{q}]$$

$$9\underline{p} - 12\underline{q} = 6\lambda\underline{p} + \lambda(5 - m)\underline{q}$$

Bandungkan/Compare \underline{p} : $6\lambda = 9$

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

Bandungkan/Compare \underline{q} : $\frac{3}{2}(5 - m) = -12$

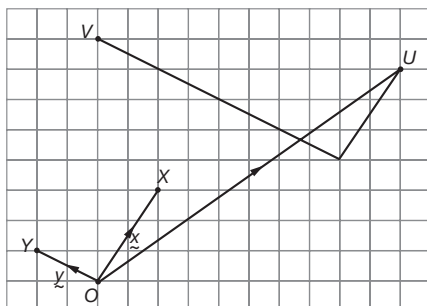
$$5 - m = -8$$

$$m = 13$$

(b) $\vec{AB} = \frac{3}{2}\vec{BC}$

$$AB : BC = 3 : 2$$

5 (a) & (b)



6 $\underline{c} = 4\underline{a} - 2\underline{b}$
 $= 4(3\underline{p} + 4\underline{q}) - 2(2\underline{p} - \underline{q})$
 $= 8\underline{p} + 18\underline{q}$
 $= m\underline{p} + (m - n)\underline{q}$

Bandungkan/Compare \underline{p} : $m = 8$

Bandungkan/Compare \underline{q} : $8 - n = 18$
 $n = -10$

7 (a) $\vec{PR} = 4\underline{r} - \underline{p}$

(b) $\vec{RQ} = -4\underline{r} + \underline{p} + 3\underline{r}$

$$\vec{RQ} = \underline{p} - \underline{r}$$

8 (a) $\vec{RQ} = -\underline{r} + \underline{q}$

(b) $\vec{OS} = \vec{OR} + \vec{RT} + \vec{TS}$

$$= \underline{r} - \underline{q} + \frac{1}{2}\underline{r}$$

$$= \frac{3}{2}\underline{r} - \underline{q}$$

9 $\vec{RQ} = \vec{RS} + \vec{SP} + \vec{PQ}$

$$= k\underline{a} + h\underline{b} + h\underline{a}$$

$$= (k + h)\underline{a} + h\underline{b}$$

$$= 2\underline{a} + (k + 8)\underline{b}$$

Bandungkan/Compare \underline{a} : $k + h = 2 \dots$ ①

Bandungkan/Compare \underline{b} : $h = k + 8 \dots$ ②

Gantikan ② ke dalam ①/Substitute ② into ①,

$$k + k + 8 = 2$$

$$2k = -6$$

$$k = -3$$

Gantikan ke dalam ②/Substitute into ②,

$$h = -3 + 8$$

$$= 5$$

10 $\vec{OQ} = \vec{OP} + \vec{PQ}$

$$= 2\underline{a} + \frac{1}{3}\vec{PR}$$

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

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

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

11 (a) $\vec{BD} = 6\underline{q} - 10\underline{p}$

(b) $\vec{ED} = \frac{1}{4}(6\underline{q} - 10\underline{p})$

$$= \frac{3}{2}\underline{q} - \frac{5}{2}\underline{p}$$

$$\vec{EC} = \vec{ED} + \vec{DC}$$

$$= \frac{3}{2}\underline{q} - \frac{5}{2}\underline{p} + 10\underline{p} = \frac{3}{2}\underline{q} + \frac{15}{2}\underline{p}$$

$$\begin{aligned}
 12 \text{ (a)} \quad \vec{OD} &= \vec{OB} + \vec{BD} \\
 &= \vec{OB} + \frac{1}{2}\vec{BA} \\
 &= \underline{b} + \frac{1}{2}(\underline{a} - \underline{b}) \\
 &= \frac{1}{2}\underline{a} + \frac{1}{2}\underline{b}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad \vec{CE} &= \vec{CO} + \vec{OE} \\
 \vec{CE} &= -\frac{1}{3}\underline{a} + \frac{2}{3}\vec{OD} \\
 \vec{CE} &= -\frac{1}{3}\underline{a} + \frac{2}{3}\left(\frac{1}{2}\underline{a} + \frac{1}{2}\underline{b}\right) \\
 &= -\frac{1}{3}\underline{a} + \frac{1}{3}\underline{a} + \frac{1}{3}\underline{b} \\
 &= \frac{1}{3}\underline{b} \\
 \vec{CE} &= \frac{1}{3}\vec{OB}
 \end{aligned}$$

$$\begin{aligned}
 \frac{CE}{OB} &= \frac{1}{3} \\
 CE : OB &= 1 : 3
 \end{aligned}$$

$$\begin{aligned}
 13 \text{ (a)} \text{ (i)} \quad \vec{PQ} &= \vec{OQ} - \vec{OP} \\
 &= 5\underline{x} + 8\underline{y} - (-5\underline{x} + 10\underline{y}) \\
 &= 10\underline{x} - 2\underline{y}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii)} \quad \vec{PR} &= \vec{OR} - \vec{OP} \\
 &= (m-1)\underline{x} + 7\underline{y} - (-5\underline{y} + 10\underline{y}) \\
 &= (m-1+5)\underline{x} - 3\underline{y} \\
 &= (m+4)\underline{x} - 3\underline{y}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad \vec{PQ} &= \lambda\vec{PR} \\
 10\underline{x} - 2\underline{y} &= \lambda[(m+4)\underline{x} - 3\underline{y}] \\
 &= \lambda(m+4)\underline{x} - 3\lambda\underline{y} \\
 \text{Bandingkan/Compare } \underline{x}: \quad 10 &= \lambda(m+4) \dots \textcircled{1} \\
 \text{Bandingkan/Compare } \underline{y}: \quad -2 &= -3\lambda \\
 \lambda &= \frac{2}{3}
 \end{aligned}$$

Gantikan ke dalam ①/Substitute into ①,

$$\begin{aligned}
 10 &= \frac{2}{3}(m+4) \\
 30 &= 2m+8 \\
 2m &= 22 \\
 m &= 11
 \end{aligned}$$

$$\begin{aligned}
 14 \quad \vec{QP} &= \vec{QO} + \vec{OP} \\
 &= -6\underline{i} - 4\underline{j} - 2\underline{i} - 5\underline{j} \\
 &= -8\underline{i} - 9\underline{j} \\
 &= m\underline{i} + n\underline{j} \\
 \therefore m &= -8, n = -9
 \end{aligned}$$

$$\begin{aligned}
 15 \text{ (a)} \quad \vec{BD} &= \vec{BA} + \vec{AD} \text{ atau/or } \vec{BC} - \vec{DC} \\
 &= -(3\underline{i} + 2\underline{j}) + 7\underline{i} - 6\underline{j} \\
 \vec{BD} &= 4\underline{i} - 8\underline{j} \\
 \vec{ED} &= \frac{1}{2}(4\underline{i} - 8\underline{j}) \\
 \vec{ED} &= 2\underline{i} - 4\underline{j}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad \vec{EC} &= 2\underline{i} - 4\underline{j} + 3\underline{i} + 2\underline{j} \\
 \vec{EC} &= 5\underline{i} - 2\underline{j}
 \end{aligned}$$

$$\begin{aligned}
 |\vec{EC}| &= \sqrt{5^2 + (-2)^2} \\
 &= \sqrt{29} \text{ unit/units}
 \end{aligned}$$

$$\begin{aligned}
 16 \text{ (a)} \quad \vec{AB} &= \vec{OB} - \vec{OA} \\
 &= \begin{pmatrix} 5 \\ 3 \end{pmatrix} - \begin{pmatrix} 2 \\ -1 \end{pmatrix} \text{ atau/or } \begin{pmatrix} -2 \\ 1 \end{pmatrix} + \begin{pmatrix} 5 \\ 3 \end{pmatrix} \\
 \vec{AB} &= \begin{pmatrix} 3 \\ 4 \end{pmatrix}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad |\vec{AB}| &= \sqrt{3^2 + 4^2} \\
 &= 5
 \end{aligned}$$

$$\text{Vektor unit/Unit vector } \vec{AB} = \frac{1}{5}\begin{pmatrix} 3 \\ 4 \end{pmatrix}$$

$$\begin{aligned}
 17 \quad \vec{MN} &= \begin{pmatrix} 3 \\ 4 \end{pmatrix} - \begin{pmatrix} -5 \\ k \end{pmatrix} \\
 &= \begin{pmatrix} 8 \\ 4-k \end{pmatrix}
 \end{aligned}$$

$$\sqrt{8^2 + (4-k)^2} = 10$$

$$(4-k)^2 = 36$$

$$4-k = -6,$$

$$k = 10$$

$$4-k = 6$$

$$k = -2$$

$$\begin{aligned}
 18 \quad \underline{a} - \underline{b} &= -7\underline{i} - m\underline{j} - (8\underline{i} - \underline{j}) \\
 &= -15\underline{i} + (1-m)\underline{j} \\
 \underline{a} - \underline{b} &= \lambda\underline{c}
 \end{aligned}$$

$$-15\underline{i} + (1-m)\underline{j} = \lambda(-10\underline{i} + 6\underline{j})$$

$$-15\underline{i} + (1-m)\underline{j} = -10\lambda\underline{i} + 6\lambda\underline{j}$$

$$\text{Bandingkan/Compare } \underline{i}: -15 = -10\lambda$$

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

$$\text{Bandingkan/Compare } \underline{j}: 1-m = 6\lambda$$

$$1-m = 6\left(\frac{3}{2}\right)$$

$$1-m = 9$$

$$m = -8$$

$$19 \quad \vec{OB} - \vec{OA} - 2[\vec{OC} - \vec{OD}] = \begin{pmatrix} 9 \\ -5 \end{pmatrix}$$

$$\begin{pmatrix} 3 \\ 4 \end{pmatrix} - \begin{pmatrix} 2 \\ -5 \end{pmatrix} - 2\left[\begin{pmatrix} p \\ q \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \end{pmatrix}\right] = \begin{pmatrix} 9 \\ -5 \end{pmatrix}$$

$$\begin{pmatrix} 1 \\ 9 \end{pmatrix} - 2\begin{pmatrix} p-3 \\ q-4 \end{pmatrix} = \begin{pmatrix} 9 \\ -5 \end{pmatrix}$$

$$\begin{pmatrix} 2p-6 \\ 2q-8 \end{pmatrix} = \begin{pmatrix} -8 \\ 14 \end{pmatrix}$$

$$2p-6 = -8,$$

$$2p = -2$$

$$p = -1$$

$$2q-8 = 14$$

$$q = 11$$

$$\begin{aligned}
 20 \text{ (a)} \quad \vec{QR} &= \begin{pmatrix} -3 \\ -5 \end{pmatrix} + \begin{pmatrix} 2 \\ 7 \end{pmatrix} \\
 &= \begin{pmatrix} -1 \\ 2 \end{pmatrix}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad \vec{PS} &= \begin{pmatrix} -1 \\ 6 \end{pmatrix} + \begin{pmatrix} m \\ 2 \end{pmatrix} \\
 &= \begin{pmatrix} m-1 \\ 8 \end{pmatrix}
 \end{aligned}$$

$$\begin{pmatrix} m-1 \\ 8 \end{pmatrix} + \lambda\begin{pmatrix} -1 \\ 2 \end{pmatrix}$$

$$m-1 = -\lambda \dots \textcircled{1}$$

$$8 = 2\lambda$$

$$\lambda = 4$$

$$\begin{aligned}
 m - 1 &= -4 \\
 m &= -3 \\
 \text{(c) } \sqrt{m^2 + 2^2} &= 2\sqrt{(-1)^2 + 2^2} \\
 m^2 + 4 &= 4(5) \\
 m^2 &= 16 \\
 m &= \pm 4
 \end{aligned}$$

Praktis Sumatif

Kertas 1

$$\begin{aligned}
 \text{1 (a) (i) } \vec{OP} &= 2\vec{a} - 3\vec{b} \\
 \text{(ii) } \vec{PQ} &= \vec{a} + 4\vec{b} \\
 \text{(b) } |\underline{x}| &= 1 \\
 \sqrt{(\sqrt{m})^2 + (1-n)^2} &= 1 \\
 m + 1 - 2n + n^2 &= 1 \\
 m &= 2n - n^2
 \end{aligned}$$

$$\begin{aligned}
 \text{2 (a) } \vec{PR} &= 6\vec{x} + \frac{4}{3}(3\vec{y}) \\
 \vec{PR} &= 6\vec{x} + 4\vec{y} \\
 \text{(b) } \vec{PT} &= \frac{1}{2}(6\vec{x} + 4\vec{y}) \\
 \vec{PT} &= 3\vec{x} + 2\vec{y} \\
 \vec{TU} &= \vec{TP} + \vec{PU} \\
 &= -(3\vec{x} + 2\vec{y}) + \frac{2}{3}(6\vec{x}) \\
 &= \vec{x} - 2\vec{y}
 \end{aligned}$$

$$\begin{aligned}
 \text{3 (a) (i) } \vec{JM} &= 2(4\vec{x}) - 7\vec{y} \\
 \vec{JM} &= 8\vec{x} - 7\vec{y} \\
 \text{(ii) } |\vec{JM}| &= \sqrt{8^2 + 7^2} \\
 &= 15 \text{ unit/units}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) } \underline{p} &= \lambda(24\vec{i} - 7\vec{j}) \\
 \lambda\sqrt{24^2 + (-7)^2} &= 100 \\
 25\lambda &= 100 \\
 \lambda &= 4
 \end{aligned}$$

$$\begin{aligned}
 \underline{p} &= 4(24\vec{i} - 7\vec{j}) \\
 &= 96\vec{i} - 28\vec{j}
 \end{aligned}$$

$$\begin{aligned}
 \text{4 (a) } \vec{JK} &= \lambda\vec{KL} \\
 5\vec{p} - 2k\vec{q} &= \lambda[(h+1)\vec{p} - 6\vec{q}] \\
 \vec{p} : 5 &= \lambda(h+1) \dots \textcircled{1} \\
 \vec{q} : -2k &= -6\lambda \\
 \lambda &= \frac{1}{3}k \dots \textcircled{2}
 \end{aligned}$$

Gantikan $\textcircled{2}$ ke dalam $\textcircled{1}$ /Substitute $\textcircled{2}$ into $\textcircled{1}$,

$$\begin{aligned}
 5 &= \frac{1}{3}k(h+1) \\
 h+1 &= \frac{15}{k} \\
 h &= \frac{15}{k} - 1
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) (i) } \underline{v} &= \frac{1}{45}(225\vec{i} + 135\vec{j}) \\
 &= 5\vec{i} + 3\vec{j} \text{ m s}^{-1} \\
 \text{(ii) } \underline{v} + 2\vec{i} - \vec{j} &= 5\vec{i} + 3\vec{j} \\
 \underline{v} &= 3\vec{i} + 4\vec{j}
 \end{aligned}$$

$$\begin{aligned}
 |\underline{v}| &= \sqrt{3^2 + 4^2} \\
 &= 5 \text{ m s}^{-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{5 (a) } \vec{PQ} &= \lambda\vec{RS} \\
 5\vec{x} + (k-3)\vec{y} &= \lambda[k\vec{x} + 8\vec{y}] \\
 5\vec{x} + (k-3)\vec{y} &= k\lambda\vec{x} + 8\lambda\vec{y} \\
 \text{Bandingkan/Compare } \underline{x} : k\lambda &= 5 \dots \textcircled{1} \\
 \text{Bandingkan/Compare } \underline{y} : 8\lambda &= k-3 \dots \textcircled{2} \\
 \frac{\textcircled{1}}{\textcircled{2}}, \frac{k\lambda}{8\lambda} &= \frac{5}{k-3}
 \end{aligned}$$

$$k^2 - 3k = 40$$

$$k^2 - 3k - 40 = 0$$

$$(k-8)(k+5) = 0$$

$$k = -5, 8$$

$$\text{(b) } \vec{PQ} = 4\vec{i} + 4\vec{j} - (-2\vec{i} + \vec{j})$$

$$= 6\vec{i} + 3\vec{j}$$

$$\vec{OR} = \vec{OP} + \vec{PR}$$

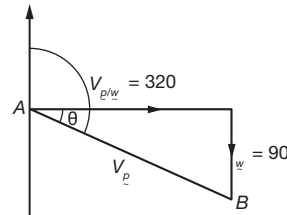
$$= -2\vec{i} + \vec{j} + \frac{2}{3}\vec{PQ}$$

$$= -2\vec{i} + \vec{j} + \frac{2}{3}(6\vec{i} + 3\vec{j})$$

$$= -2\vec{i} + \vec{j} + 4\vec{i} + 2\vec{j}$$

$$\vec{OR} = 2\vec{i} + 3\vec{j}$$

6 (a) (i)



$$\tan \theta = \frac{90}{320}$$

$$\theta = 15.71^\circ$$

$$\text{Bearing} = 90^\circ + 15.71^\circ$$

$$= 105.71^\circ$$

$$\text{(ii) } |v_p| = \sqrt{320^2 + 90^2}$$

$$|v_p| = 332.42 \text{ km h}^{-1}$$

$$332.42 = \frac{860}{t}$$

$$t = 2 \text{ jam/hours } 35 \text{ minit/minutes}$$

$$\begin{aligned}
 \text{(b) (i) } \underline{r} &= 3\vec{p} + m\vec{q} \\
 &= 3(-\vec{i} + 4\vec{j}) + m(5\vec{i} - 2\vec{j}) \\
 &= (-3 + 5m)\vec{i} + (12 - 2m)\vec{j} \\
 &= \lambda\vec{i} + 0\vec{j}
 \end{aligned}$$

$$\text{Bandingkan/Compare } \underline{j} : 12 - 2m = 0$$

$$m = 6$$

$$\text{(ii) } \underline{r} = (-3 + 5(6))\vec{i}$$

$$\underline{r} = 27\vec{i}$$

$$|\underline{r}| = 27 \text{ unit/units}$$

Kertas 2

$$\begin{aligned}
 \text{1 (a) } \vec{QR} &= -h\vec{q} + 2k\vec{s} + k\vec{q} \\
 &= 2k\vec{s} + (k-h)\vec{q} \\
 &= (h+1)\vec{s} - \vec{q}
 \end{aligned}$$

Bandungkan/Compare s : $2k = h + 1 \dots \textcircled{1}$

Bandungkan/Compare q : $k - h = -1$

$$k = h - 1 \dots \textcircled{2}$$

Gantikan $\textcircled{2}$ ke dalam $\textcircled{1}$ /Substitute $\textcircled{2}$ into $\textcircled{1}$,

$$2(h - 1) = h + 1$$

$$2h - 2 = h + 1$$

$$h = 3$$

Gantikan ke dalam $\textcircled{2}$ /Substitute into $\textcircled{2}$,

$$k = 3 - 1$$

$$k = 2$$

$$(b) \vec{OQ} = 3q, \vec{SR} = 2q,$$

$$\vec{OP} = q$$

$$\frac{\Delta OPS}{\Delta OQR} = \frac{\frac{1}{2}|q| \times h}{\frac{1}{2}|3q| \times h}$$

$$\frac{\Delta OPS}{15} = \frac{1}{3}$$

$$\Delta OPS = 5 \text{ unit}^2/\text{units}^2$$

$$2 (a) (i) \vec{PQ} = 12q - 8p$$

$$(ii) \vec{OT} = \vec{OP} + \frac{1}{4}\vec{PQ}$$

$$= 8p + \frac{1}{4}(12q - 8p)$$

$$= 6p + 3q$$

$$(b) \vec{OT} = h\vec{OS}$$

$$6p + 3q = h(\vec{OQ} + \vec{QS})$$

$$6p + 3q = h(12q + 8p - kq)$$

$$6p + 3q = 8hp + h(12 - k)q$$

Bandungkan/Compare p : $8h = 6$

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

Bandungkan/Compare q : $3 = \frac{3}{4}(12 - k)$

$$4 = 12 - k$$

$$k = 8$$

$$3 (a) (i) \vec{WV} = \vec{OV} - \frac{1}{2}\vec{OU}$$

$$= 3v - \frac{1}{2}(2u)$$

$$= 3v - u$$

$$(ii) \vec{OX} = \vec{OU} + \frac{1}{4}\vec{UV}$$

$$\vec{OX} = 2u + \frac{1}{4}(3v - 2u)$$

$$= 2u + \frac{3}{4}v - \frac{1}{2}u$$

$$= \frac{3}{2}u + \frac{3}{4}v$$

$$(b) \vec{OY} = \vec{OW} + k\vec{WV}$$

$$= u + k(3v - u)$$

$$= (1 - k)u + 3kv$$

$$(c) \vec{OY} = \frac{4}{7}\vec{OX}$$

$$(1 - k)u + 3kv = \frac{4}{7}\left(\frac{3}{2}u + \frac{3}{4}v\right)$$

$$(1 - k)u + 3kv = \frac{6}{7}u + \frac{3}{7}v$$

Bandungkan/Compare u :

$$1 - k = \frac{6}{7}$$

$$k = \frac{1}{7}$$

atau/or

Bandungkan/Compare v : $3k = \frac{3}{7}$

$$4 (a) (i) \vec{EF} = \vec{EA} + \vec{AF}$$

$$= -y + \frac{1}{2}\vec{AB}$$

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

$$(ii) \vec{AC} = \frac{4}{3}\vec{AD}$$

$$= \frac{4}{3}[\vec{AE} + \vec{ED}]$$

$$= \frac{4}{3}\left[y + \frac{1}{2}(x - y)\right]$$

$$= \frac{4}{3}\left[\frac{1}{2}x + \frac{1}{2}y\right]$$

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

$$(b) \vec{CB} = \vec{CA} + \vec{AB}$$

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

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

$$\vec{EF} = \lambda\vec{CB}$$

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

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

$$\frac{1}{2} = \frac{1}{3}\lambda$$

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

$$\vec{EF} = \frac{3}{2}\vec{CB}$$

$\therefore EF \parallel CB$: (tertunjuk/shown)

$$\frac{EF}{CB} = \frac{3}{2}\vec{CB}$$

$$EF : CB = 3 : 2$$

$$5 (a) v_p = \lambda(3i + 4j)$$

$$\lambda\sqrt{3^2 + 4^2} = 25$$

$$5\lambda = 25$$

$$\lambda = 5$$

$$v_p = 5(3i + 4j)$$

$$= 15i + 20j$$

$$(b) \vec{OP} = 2(15i + 20j)$$

$$= 30i + 40j$$

$$(c) \vec{OQ} = \vec{OQ} + tv_Q$$

$$\vec{OQ} = (78i + 13j) + t(-9i + 16j)$$

$$= (78 - 9t)i + (13 + 16t)j$$

(d) $\vec{OQ} = \vec{OQ}$
 $t(15\hat{i} + 20\hat{j}) = (78 - 9t)\hat{i} + (13 + 16t)\hat{j}$
 $15t\hat{i} + 20t\hat{j} = (78 - 9t)\hat{i} + (13 + 16t)\hat{j}$
 Bandingkan/Compare \hat{i} : $15t = 78 - 9t$
 $24t = 78$
 $t = 3.25$
 Bandingkan/Compare \hat{j} : $20t = 13 + 16t$
 $4t = 13$
 $t = 3.25$
 \therefore Kapal P dan kapal Q akan bertemu.
Ship P and ship Q will meet.

6 (a) (i) $\vec{RS} = -6\hat{x} + 5\hat{t} + 8\hat{z} + 4\hat{t}$
 $= 2\hat{x} + 9\hat{t}$
 (ii) $\vec{OV} = 5\hat{t} + \frac{1}{4}(8\hat{x} + 4\hat{t})$
 $= 5\hat{t} + 2\hat{x} + \hat{t}$
 $= 2\hat{x} + 6\hat{t}$
 (b) $\vec{UV} = -\frac{1}{2}(2\hat{x} + 9\hat{t}) - 6\hat{x} + 2\hat{x} + 6\hat{t}$
 $= -\hat{x} - \frac{9}{2}\hat{t} - 4\hat{x} + 6\hat{t}$
 $= \frac{3}{2}\hat{t} - 5\hat{x}$
 $\vec{WS} = \vec{WT} + \vec{TS}$
 $= -k\hat{x} - \hat{t} + 8\hat{x} + 4\hat{t}$
 $= (8 - k)\hat{x} + 3\hat{t}$
 $\vec{WS} = \lambda\vec{UV}$
 $(8 - k)\hat{x} + 3\hat{t} = \lambda\left(\frac{3}{2}\hat{t} - 5\hat{x}\right)$
 $(8 - k)\hat{x} + 3\hat{t} = -5\lambda\hat{x} + \frac{3}{2}\lambda\hat{t}$
 Bandingkan/Compare \hat{x} : $-k = -5\lambda \dots \textcircled{1}$
 Bandingkan/Compare \hat{t} : $\frac{3}{2}\lambda = 3$
 $\lambda = 2$
 Gantikan ke dalam $\textcircled{1}$ /Substitute into $\textcircled{1}$,
 $8 - k = -5(2)$
 $k = 18$

(c) $|\vec{OR}| = 6(2) = 12$
 $|\vec{OT}| = 5(1) = 5$
 $|\vec{RT}| = \sqrt{12^2 + 5^2}$
 $= 13 \text{ unit/units}$

7 (a) (i) $\vec{PQ} = \vec{PO} + \vec{OQ}$
 $= -6\hat{p} + 15\hat{q}$
 (ii) $\vec{OR} = \vec{OP} + \vec{PR}$
 $= 6\hat{p} + \frac{3}{5}(15\hat{q})$
 $= 6\hat{p} + 9\hat{q}$
 (b) $\vec{OS} = \vec{OP} + \vec{PS}$
 $= 6\hat{p} + n\vec{PQ}$
 $= 6\hat{p} + n(-6\hat{p} + 15\hat{q})$
 $= 6\hat{p} - 6n\hat{p} + 15n\hat{q}$
 $= (6 - 6n)\hat{p} + 15n\hat{q}$

(c) (i) $\vec{OS} = \lambda\vec{OR}$
 $(6 - 6n)\hat{p} + 15n\hat{q} = \lambda(6\hat{p} + 9\hat{q})$
 $= 6\lambda\hat{p} + 9\lambda\hat{q}$
 Bandingkan/Compare \hat{p} : $6\lambda = 6 - 6n$
 $\lambda = 1 - n \dots \textcircled{1}$
 Bandingkan/Compare \hat{q} : $9\lambda = 15n$
 $\lambda = \frac{5}{3}n \dots \textcircled{2}$

Gantikan $\textcircled{1}$ ke dalam $\textcircled{2}$ /Substitute $\textcircled{1}$ into $\textcircled{2}$,

$$\frac{5}{3}n = 1 - n$$

$$\frac{3}{8}n = 1$$

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

(ii) Gantikan ke dalam $\textcircled{2}$ /Substitute into $\textcircled{2}$,

$$\lambda = \frac{5}{3}\left(\frac{3}{8}\right)$$

$$= \frac{5}{8}$$

$$\vec{OS} = \frac{5}{8}\vec{OR}$$

$$\frac{OS}{OR} = \frac{5}{8}$$

$$OS : OR = 5 : 8$$

$$\therefore OS : SR = 5 : 3$$

8 (a) (i) $\vec{OP} = 10\hat{a} + \frac{1}{3}(6\hat{b})$
 $= 10\hat{a} + 2\hat{b}$
 (ii) $\vec{AQ} = 6\hat{b} - \frac{3}{5}(10\hat{a})$
 $= 6\hat{b} - 6\hat{a}$

(b) $\vec{AR} = h(6\hat{b} - 6\hat{a})$
 $= -6h\hat{a} + 6h\hat{b}$
 $\vec{AR} = \vec{AO} + k\vec{OP}$
 $= -10\hat{a} + k(10\hat{a} + 2\hat{b})$
 $= (10k - 10)\hat{a} + 2k\hat{b}$
 $-6h\hat{a} + 6h\hat{b} = (10k - 10)\hat{a} + 2k\hat{b}$

Bandingkan/Compare \hat{a} : $-6h = 10k - 10 \dots \textcircled{1}$

Bandingkan/Compare \hat{b} : $6h = 2k \dots \textcircled{2}$

Gantikan $\textcircled{2}$ ke dalam $\textcircled{1}$ /Substitute $\textcircled{2}$ into $\textcircled{1}$,

$$-2k = 10k - 10$$

$$k = \frac{5}{6}$$

Gantikan ke dalam $\textcircled{2}$ /Substitute into $\textcircled{2}$

$$6h = 2\left(\frac{5}{6}\right)$$

$$h = \frac{5}{18}$$

(c) $\vec{OP} = 10(\hat{i} - 2\hat{j}) + 2(3\hat{i} - 5\hat{j})$
 $= 10\hat{i} - 20\hat{j} + 6\hat{i} - 10\hat{j}$
 $= 16\hat{i} - 30\hat{j}$

$$|\vec{OP}| = \sqrt{16^2 + (-30)^2}$$

$$= 34 \text{ unit/units}$$