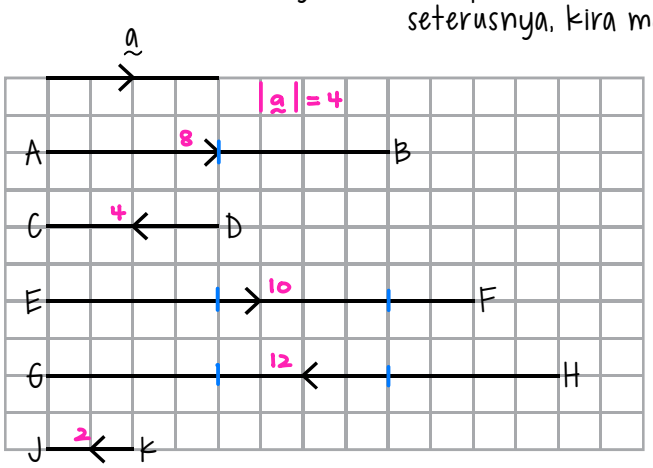
WORKSHEET 1: VEKTOR

nyatakan setiap vektor berikut dalam sebutan $\underset{\sim}{a}$, $\underset{\sim}{b}$, $\underset{\sim}{c}$, $\underset{\sim}{d}$, $\underset{\sim}{e}$ & $\underset{\sim}{f}$
seterusnya, kira magnitud bagi setiap vektor

1.

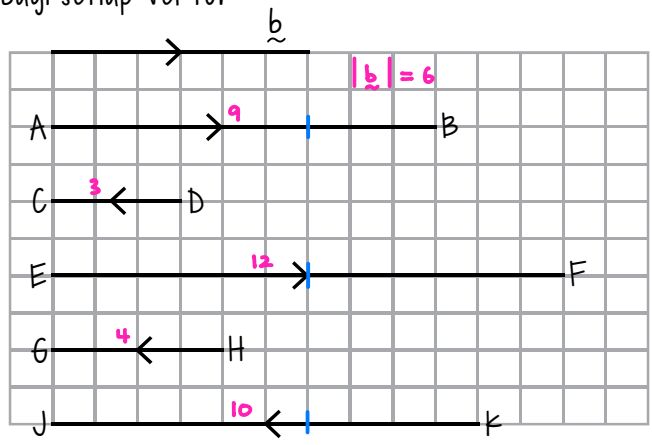


$\overrightarrow{AB} = 2\underset{\sim}{a}$ $\quad$ $\overrightarrow{CD} = -\underset{\sim}{a}$

$\overrightarrow{EF} = \frac{5}{2}\underset{\sim}{a}$ $\quad$ $\overrightarrow{GH} = -3\underset{\sim}{a}$

$\overrightarrow{JK} = -\frac{1}{2}\underset{\sim}{a}$

2.

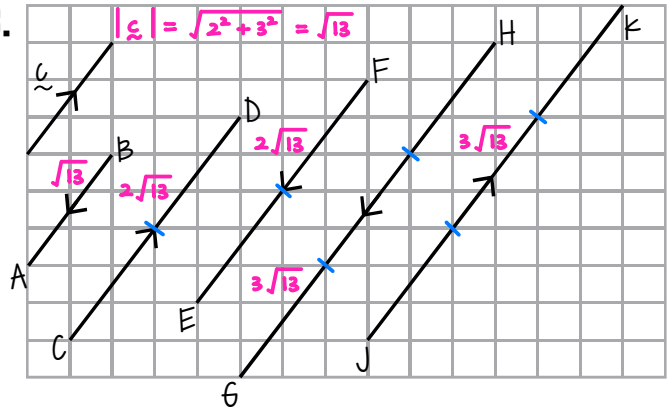


$\overrightarrow{AB} = \frac{3}{2}\underset{\sim}{b}$ $\quad$ $\overrightarrow{CD} = -\frac{1}{2}\underset{\sim}{b}$

$\overrightarrow{EF} = 2\underset{\sim}{b}$ $\quad$ $\overrightarrow{GH} = -\frac{2}{3}\underset{\sim}{b}$

$\overrightarrow{JK} = -\frac{5}{3}\underset{\sim}{b}$

3.

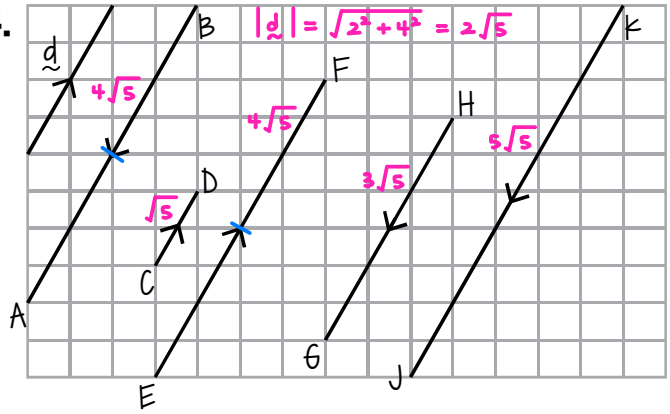


$\overrightarrow{AB} = -\underset{\sim}{c}$ $\quad$ $\overrightarrow{CD} = 2\underset{\sim}{c}$

$\overrightarrow{EF} = -2\underset{\sim}{c}$ $\quad$ $\overrightarrow{GH} = -3\underset{\sim}{c}$

$\overrightarrow{JK} = 3\underset{\sim}{c}$

4.

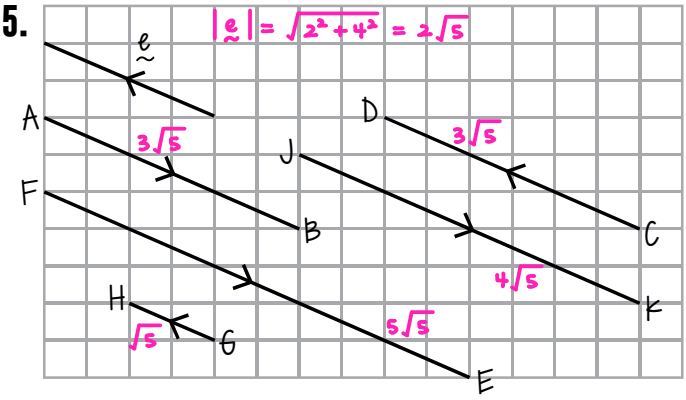


$\overrightarrow{AB} = -2\underset{\sim}{d}$ $\quad$ $\overrightarrow{CD} = \frac{1}{2}\underset{\sim}{d}$

$\overrightarrow{EF} = 2\underset{\sim}{d}$ $\quad$ $\overrightarrow{GH} = -\frac{3}{2}\underset{\sim}{d}$

$\overrightarrow{JK} = -\frac{5}{2}\underset{\sim}{d}$

5.

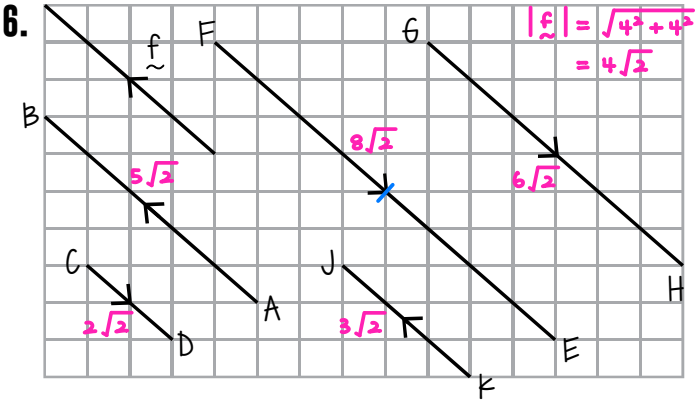


$\overrightarrow{AB} = -\frac{3}{2}\underset{\sim}{e}$ $\quad$ $\overrightarrow{CD} = \frac{3}{2}\underset{\sim}{e}$

$\overrightarrow{EF} = -\frac{5}{2}\underset{\sim}{e}$ $\quad$ $\overrightarrow{GH} = \frac{1}{2}\underset{\sim}{e}$

$\overrightarrow{JK} = -2\underset{\sim}{e}$

6.



$\overrightarrow{AB} = \frac{5}{4}\underset{\sim}{f}$ $\quad$ $\overrightarrow{CD} = -\frac{1}{2}\underset{\sim}{f}$

$\overrightarrow{EF} = -2\underset{\sim}{f}$ $\quad$ $\overrightarrow{GH} = -\frac{3}{2}\underset{\sim}{f}$

$\overrightarrow{JK} = \frac{3}{4}\underset{\sim}{f}$

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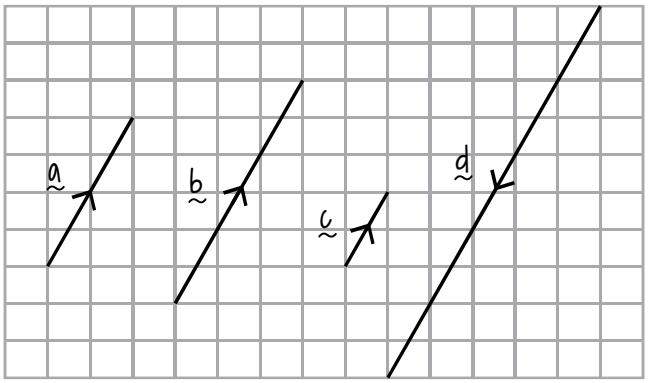
WORKSHEET 2: VEKTOR SELARI

nota



vektor $\underset{\sim}{a}$, $\underset{\sim}{b}$, $\underset{\sim}{c}$ dan $\underset{\sim}{d}$ adalah selari walaupun:
i) arah vektor $\underset{\sim}{d}$ adalah bertentangan
ii) panjang semua vektor berbeza

ungkapkan $\overrightarrow{PQ}$ dalam sebutan $\overrightarrow{RS}$, jika kedua-duanya adalah selari

1. $\overrightarrow{PQ} = 2\underset{\sim}{a}$ $\overrightarrow{RS} = 8\underset{\sim}{a}$

$\overrightarrow{PQ} = k\overrightarrow{RS}$
$2\underset{\sim}{a} = k(8\underset{\sim}{a})$
$2 = 8k$
$k = \frac{1}{4}$ $\therefore \overrightarrow{PQ} = \frac{1}{4}\overrightarrow{RS}$

2. $\overrightarrow{PQ} = 3\underset{\sim}{a}$ $\overrightarrow{RS} = 9\underset{\sim}{a}$

$\overrightarrow{PQ} = k\overrightarrow{RS}$
$3\underset{\sim}{a} = k(9\underset{\sim}{a})$
$3 = 9k$
$k = \frac{1}{3}$ $\therefore \overrightarrow{PQ} = \frac{1}{3}\overrightarrow{RS}$

3. $\overrightarrow{PQ} = 4\underset{\sim}{a}$ $\overrightarrow{RS} = -6\underset{\sim}{a}$

$\overrightarrow{PQ} = k\overrightarrow{RS}$
$4\underset{\sim}{a} = k(-6\underset{\sim}{a})$
$4 = -6k$
$k = -\frac{2}{3}$ $\therefore \overrightarrow{PQ} = -\frac{2}{3}\overrightarrow{RS}$

4. $\overrightarrow{PQ} = 6\underset{\sim}{a}$ $\overrightarrow{RS} = -8\underset{\sim}{a}$

$\overrightarrow{PQ} = k\overrightarrow{RS}$
$6\underset{\sim}{a} = k(-8\underset{\sim}{a})$
$6 = -8k$
$k = -\frac{3}{4}$ $\therefore \overrightarrow{PQ} = -\frac{3}{4}\overrightarrow{RS}$

cari nilai n jika $\underset{\sim}{p}$ adalah selari dengan $\underset{\sim}{q}$:

5. $\underset{\sim}{p} = 6\underset{\sim}{a} - 15\underset{\sim}{b}$
$\underset{\sim}{q} = 2\underset{\sim}{a} + n\underset{\sim}{b}$

① $\underset{\sim}{p} = k\underset{\sim}{q}$
$6\underset{\sim}{a} - 15\underset{\sim}{b} = k(2\underset{\sim}{a} + n\underset{\sim}{b})$
$6\underset{\sim}{a} - 15\underset{\sim}{b} = 2k\underset{\sim}{a} + nk\underset{\sim}{b}$

② $6 = 2k$, $k = 3$

③ $nk = -15$, $n(3) = -15$, $n = -5$

6. $\underset{\sim}{p} = 9\underset{\sim}{a} - 3\underset{\sim}{b}$
$\underset{\sim}{q} = 3\underset{\sim}{a} + n\underset{\sim}{b}$

① $\underset{\sim}{p} = k\underset{\sim}{q}$
$9\underset{\sim}{a} - 3\underset{\sim}{b} = k(3\underset{\sim}{a} + n\underset{\sim}{b})$
$9\underset{\sim}{a} - 3\underset{\sim}{b} = 3k\underset{\sim}{a} + nk\underset{\sim}{b}$

② $9 = 3k$, $k = 3$

③ $nk = -3$, $n(3) = -3$, $n = -1$

7. $\underset{\sim}{p} = -3\underset{\sim}{a} + 4\underset{\sim}{b}$
$\underset{\sim}{q} = 6\underset{\sim}{a} + n\underset{\sim}{b}$

① $\underset{\sim}{p} = k\underset{\sim}{q}$
$-3\underset{\sim}{a} + 4\underset{\sim}{b} = k(6\underset{\sim}{a} + n\underset{\sim}{b})$
$-3\underset{\sim}{a} + 4\underset{\sim}{b} = 6k\underset{\sim}{a} + nk\underset{\sim}{b}$

② $-3 = 6k$, $k = -\frac{1}{2}$

③ $nk = 4$, $n(-\frac{1}{2}) = 4$, $n = -8$

8. $\underset{\sim}{p} = -2\underset{\sim}{a} + \underset{\sim}{b}$
$\underset{\sim}{q} = 8\underset{\sim}{a} + n\underset{\sim}{b}$

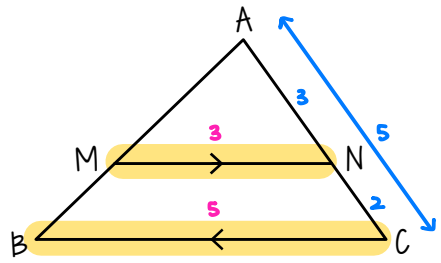
① $\underset{\sim}{p} = k\underset{\sim}{q}$
$-2\underset{\sim}{a} + \underset{\sim}{b} = k(8\underset{\sim}{a} + n\underset{\sim}{b})$
$-2\underset{\sim}{a} + \underset{\sim}{b} = 8k\underset{\sim}{a} + nk\underset{\sim}{b}$

② $-2 = 8k$, $k = -\frac{1}{4}$

③ $nk = 1$, $n(-\frac{1}{4}) = 1$, $n = -4$

WORKSHEET 2: VEKTOR SELARI

9.



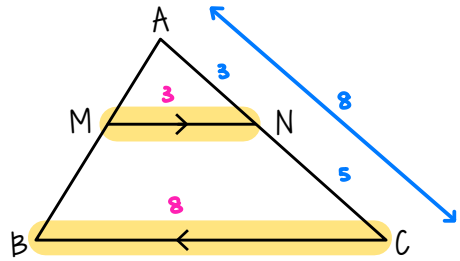
$\overrightarrow{MN}$ dan $\overrightarrow{BC}$ adalah selari. AN : NC = 3 : 2.
Ungkapkan $\overrightarrow{CB}$ dalam sebutan $\overrightarrow{MN}$.

$\frac{\overrightarrow{MN}}{\overrightarrow{BC}} = \frac{3}{5}$

$\overrightarrow{BC} = \frac{5}{3}\overrightarrow{MN}$

$\overrightarrow{CB} = -\frac{5}{3}\overrightarrow{MN}$

10.



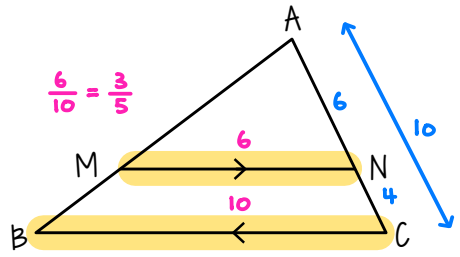
$\overrightarrow{MN}$ dan $\overrightarrow{BC}$ adalah selari. AN : NC = 3 : 5.
Ungkapkan $\overrightarrow{CB}$ dalam sebutan $\overrightarrow{MN}$.

$\frac{\overrightarrow{MN}}{\overrightarrow{BC}} = \frac{3}{8}$

$\overrightarrow{BC} = \frac{8}{3}\overrightarrow{MN}$

$\overrightarrow{CB} = -\frac{8}{3}\overrightarrow{MN}$

11.



$\frac{6}{10} = \frac{3}{5}$

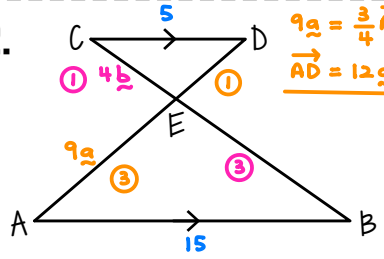
$\overrightarrow{MN}$ dan $\overrightarrow{BC}$ adalah selari. AN : NC = 6 : 4.
Ungkapkan $\overrightarrow{CB}$ dalam sebutan $\overrightarrow{MN}$.

$\frac{\overrightarrow{MN}}{\overrightarrow{BC}} = \frac{3}{5}$

$\overrightarrow{BC} = \frac{5}{3}\overrightarrow{MN}$

$\overrightarrow{CB} = -\frac{5}{3}\overrightarrow{MN}$

12.



$\overrightarrow{AB}$ dan $\overrightarrow{CD}$ adalah selari.
$\overrightarrow{CD} = \frac{1}{3}\overrightarrow{AB}$ dan $|\overrightarrow{CD}| = 5$ cm.

a) $|\overrightarrow{AB}| = ?$

b) Jika $\overrightarrow{AE} = 9\underset{\sim}{a}$ dan $\overrightarrow{EC} = 4\underset{\sim}{b}$, ungkapkan

i) $\overrightarrow{ED}$ dalam sebutan $\underset{\sim}{a}$ $12\underset{\sim}{a} - 9\underset{\sim}{a} = 3\underset{\sim}{a}$

ii) $\overrightarrow{BE}$ dalam sebutan $\underset{\sim}{b}$ $16\underset{\sim}{b} - 4\underset{\sim}{b} = 12\underset{\sim}{b}$

b) i) $\overrightarrow{AE} = \frac{3}{4}\overrightarrow{AD}$

$9\underset{\sim}{a} = \frac{3}{4}\overrightarrow{AD}$

$\overrightarrow{AD} = 12\underset{\sim}{a}$

a) $\overrightarrow{CD} = \frac{1}{3}\overrightarrow{AB}$

$\overrightarrow{AB} = 3\overrightarrow{CD}$

$|\overrightarrow{AB}| = 3|\overrightarrow{CD}|$

$|\overrightarrow{AB}| = 3(5)$

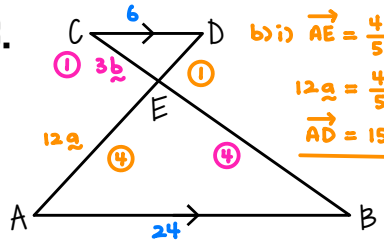
$|\overrightarrow{AB}| = 15$

b) ii) $\overrightarrow{EC} = \frac{1}{4}\overrightarrow{BC}$

$4\underset{\sim}{b} = \frac{1}{4}\overrightarrow{BC}$

$\overrightarrow{BC} = 16\underset{\sim}{b}$

13.



$\overrightarrow{AB}$ dan $\overrightarrow{CD}$ adalah selari.
$\overrightarrow{CD} = \frac{1}{4}\overrightarrow{AB}$ dan $|\overrightarrow{CD}| = 6$ cm.

a) $|\overrightarrow{AB}| = ?$

b) Jika $\overrightarrow{AE} = 12\underset{\sim}{a}$ dan $\overrightarrow{EC} = 3\underset{\sim}{b}$, ungkapkan

i) $\overrightarrow{ED}$ dalam sebutan $\underset{\sim}{a}$ $15\underset{\sim}{a} - 12\underset{\sim}{a} = 3\underset{\sim}{a}$

ii) $\overrightarrow{BE}$ dalam sebutan $\underset{\sim}{b}$ $15\underset{\sim}{b} - 3\underset{\sim}{b} = 12\underset{\sim}{b}$

b) i) $\overrightarrow{AE} = \frac{4}{5}\overrightarrow{AD}$

$12\underset{\sim}{a} = \frac{4}{5}\overrightarrow{AD}$

$\overrightarrow{AD} = 15\underset{\sim}{a}$

a) $\overrightarrow{CD} = \frac{1}{4}\overrightarrow{AB}$

$\overrightarrow{AB} = 4\overrightarrow{CD}$

$|\overrightarrow{AB}| = 4|\overrightarrow{CD}|$

$|\overrightarrow{AB}| = 4(6)$

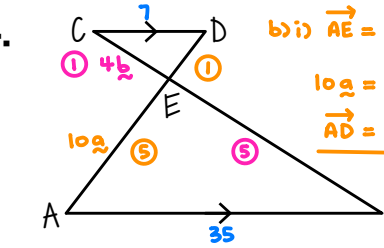
$|\overrightarrow{AB}| = 24$

b) ii) $\overrightarrow{EC} = \frac{1}{5}\overrightarrow{BC}$

$3\underset{\sim}{b} = \frac{1}{5}\overrightarrow{BC}$

$\overrightarrow{BC} = 15\underset{\sim}{b}$

14.



$\overrightarrow{AB}$ dan $\overrightarrow{CD}$ adalah selari.
$\overrightarrow{CD} = \frac{1}{5}\overrightarrow{AB}$ dan $|\overrightarrow{CD}| = 7$ cm.

a) $|\overrightarrow{AB}| = ?$

b) Jika $\overrightarrow{AE} = 10\underset{\sim}{a}$ dan $\overrightarrow{EC} = 4\underset{\sim}{b}$, ungkapkan

i) $\overrightarrow{ED}$ dalam sebutan $\underset{\sim}{a}$ $12\underset{\sim}{a} - 10\underset{\sim}{a} = 2\underset{\sim}{a}$

ii) $\overrightarrow{BE}$ dalam sebutan $\underset{\sim}{b}$ $24\underset{\sim}{b} - 4\underset{\sim}{b} = 20\underset{\sim}{b}$

b) i) $\overrightarrow{AE} = \frac{5}{6}\overrightarrow{AD}$

$10\underset{\sim}{a} = \frac{5}{6}\overrightarrow{AD}$

$\overrightarrow{AD} = 12\underset{\sim}{a}$

a) $\overrightarrow{CD} = \frac{1}{5}\overrightarrow{AB}$

$\overrightarrow{AB} = 5\overrightarrow{CD}$

$|\overrightarrow{AB}| = 5|\overrightarrow{CD}|$

$|\overrightarrow{AB}| = 5(7)$

$|\overrightarrow{AB}| = 35$

b) ii) $\overrightarrow{EC} = \frac{1}{6}\overrightarrow{BC}$

$4\underset{\sim}{b} = \frac{1}{6}\overrightarrow{BC}$

$\overrightarrow{BC} = 24\underset{\sim}{b}$

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WORKSHEET 3: VEKTOR BUKAN SIFAR DAN TIDAK SELARI

nota:
Jika vektor $\underset{\sim}{a}$ dan $\underset{\sim}{b}$ adalah **vektor bukan sifar dan tidak selari** dengan keadaan $h\underset{\sim}{a} = k\underset{\sim}{b}$ maka **$h = k = 0$**

1. Diberi $(2m - 4)\underset{\sim}{a} = (n + 5)\underset{\sim}{b}$ dengan keadaan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$ ialah **vektor bukan sifar dan tidak selari.** Cari nilai m dan n.

$2m - 4 = 0$
$2m = 4$
$m = 2$

$n + 5 = 0$
$n = -5$

2. Diberi $(-5m + 20)\underset{\sim}{a} = (3n - 9)\underset{\sim}{b}$ dengan keadaan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$ ialah **vektor bukan sifar dan tidak selari.** Cari nilai m dan n.

$-5m + 20 = 0$
$-5m = -20$
$m = 4$

$3n - 9 = 0$
$3n = 9$
$n = 3$

3. Diberi $(6 - 4m)\underset{\sim}{a} = (5 - 2n)\underset{\sim}{b}$ dengan keadaan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$ ialah **vektor bukan sifar dan tidak selari.** Cari nilai m dan n.

$6 - 4m = 0$
$-4m = -6$
$m = \frac{3}{2}$

$5 - 2n = 0$
$-2n = -5$
$n = \frac{5}{2}$

4. Diberi $(6 + 9m)\underset{\sim}{a} = (-4 + 10n)\underset{\sim}{b}$ dengan keadaan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$ ialah **vektor bukan sifar dan tidak selari.** Cari nilai m dan n.

$6 + 9m = 0$
$9m = -6$
$m = -\frac{2}{3}$

$-4 + 10n = 0$
$10n = 4$
$n = \frac{2}{5}$

5. Diberi $(m + 2n - 9)\underset{\sim}{a} = (m + n - 4)\underset{\sim}{b}$ dengan keadaan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$ ialah **vektor bukan sifar dan tidak selari.** Cari nilai m dan n.

① $m + 2n - 9 = 0$
$m + 2n = 9$

② $m + n - 4 = 0$
$m + n = 4$

③
$m + 2n = 9$
$m + n = 4$
$\therefore m = -1$
$n = 5$

6. Diberi $(2m + 3n - 8)\underset{\sim}{a} = (m + 3n - 11)\underset{\sim}{b}$ dengan keadaan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$ ialah **vektor bukan sifar dan tidak selari.** Cari nilai m dan n.

① $2m + 3n - 8 = 0$
$2m + 3n = 8$

② $m + 3n - 11 = 0$
$m + 3n = 11$

③
$2m + 3n = 8$
$m + 3n = 11$
$\therefore m = -3$
$n = \frac{14}{3}$

7. Diberi $(3m - 5n - 5)\underset{\sim}{a} = (-m + 3n - 5)\underset{\sim}{b}$ dengan keadaan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$ ialah **vektor bukan sifar dan tidak selari.** Cari nilai m dan n.

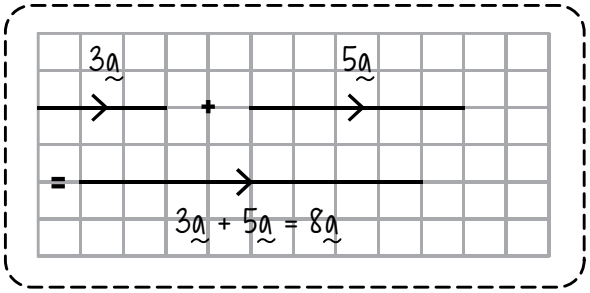
① $3m - 5n - 5 = 0$
$3m - 5n = 5$

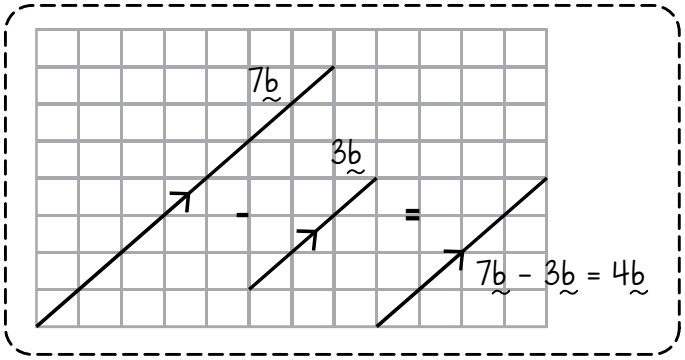
② $-m + 3n - 5 = 0$
$-m + 3n = 5$

③
$3m - 5n = 5$
$-m + 3n = 5$
$\therefore m = 10$
$n = 5$

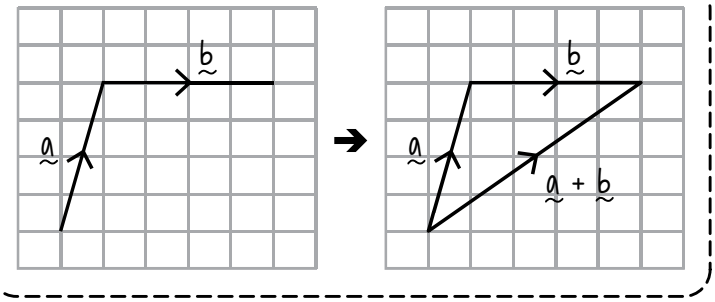
NOTA: PENAMBAHAN DAN PENOLAKAN VEKTOR

vektor selari dan vektor tak selari

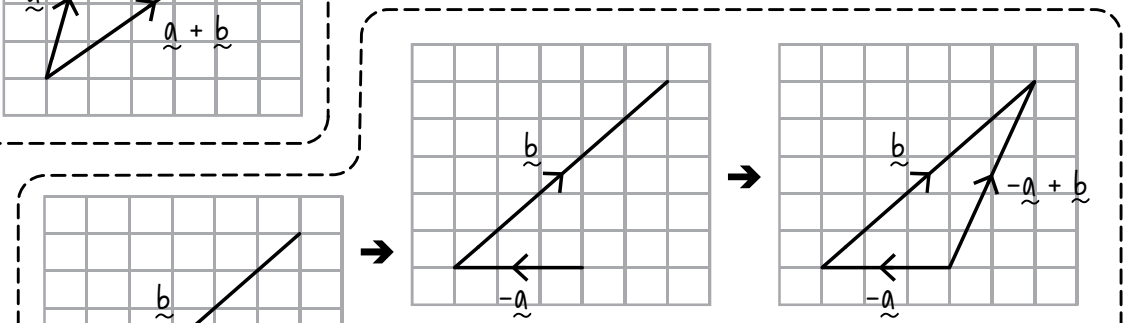




Penambahan dan Penolakan Vektor Selari

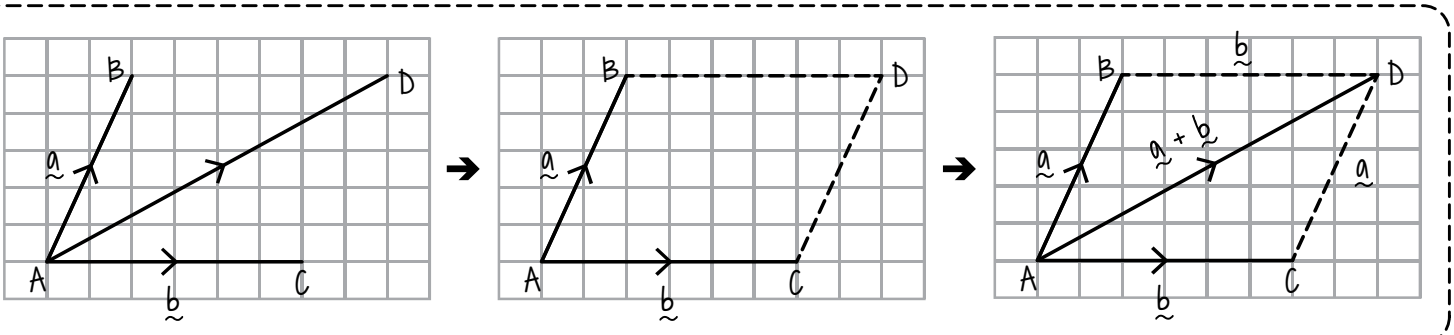


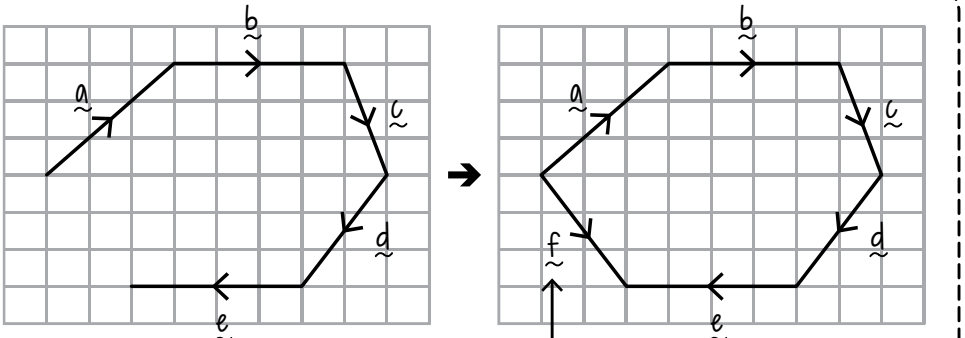
Hukum Segi Tiga



Penambahan dan Penolakan Vektor Tak Selari

Hukum Segi Empat Selari





$\overrightarrow{AB} = \overrightarrow{CD}$

$\overrightarrow{AC} = \overrightarrow{BD}$

Hukum Poligon

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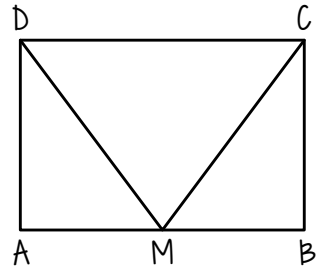
WORKSHEET 4: PENAMBAHAN DAN PENOLAKAN VEKTOR

1.



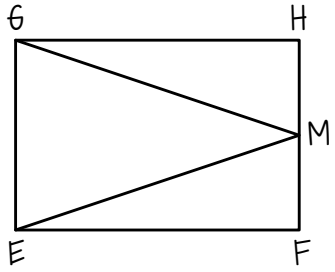
ungkapkan sebagai vektor tunggal

a) $\overrightarrow{AD} - \overrightarrow{MD} = \overrightarrow{AD} + \overrightarrow{DM} = \overrightarrow{AM}$

b) $\overrightarrow{MD} - \overrightarrow{MC} = \overrightarrow{MD} + \overrightarrow{CM} = \overrightarrow{CD}$

c) $\overrightarrow{BC} - \overrightarrow{MC} = \overrightarrow{BC} + \overrightarrow{CM} = \overrightarrow{BM}$

2.



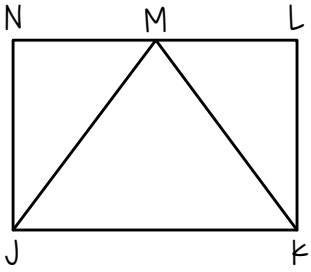
ungkapkan sebagai vektor tunggal

a) $\overrightarrow{EF} - \overrightarrow{MF} = \overrightarrow{EF} + \overrightarrow{FM} = \overrightarrow{EM}$

b) $\overrightarrow{GM} - \overrightarrow{EM} = \overrightarrow{GM} + \overrightarrow{ME} = \overrightarrow{GE}$

c) $\overrightarrow{HG} - \overrightarrow{MG} = \overrightarrow{HG} + \overrightarrow{GM} = \overrightarrow{HM}$

3.



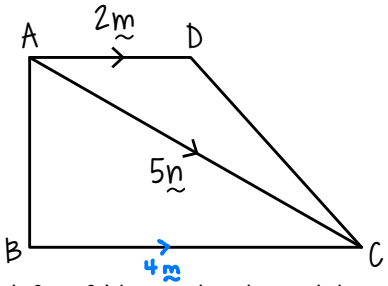
ungkapkan sebagai vektor tunggal

a) $\overrightarrow{MN} - \overrightarrow{JN} = \overrightarrow{MN} + \overrightarrow{NJ} = \overrightarrow{MJ}$

b) $\overrightarrow{JM} - \overrightarrow{KM} = \overrightarrow{JM} + \overrightarrow{MK} = \overrightarrow{JK}$

c) $\overrightarrow{LK} - \overrightarrow{MK} = \overrightarrow{LK} + \overrightarrow{KM} = \overrightarrow{LM}$

4.

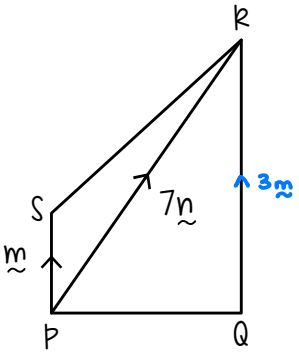


BC = 2AD. ungkapkan dalam sebutan $\underset{\sim}{m}$ dan/atau $\underset{\sim}{n}$

a) $\overrightarrow{DC} - \overrightarrow{AC} = \overrightarrow{DC} + \overrightarrow{CA} = \overrightarrow{DA} = -2\underset{\sim}{m}$

b) $\overrightarrow{BA} = \overrightarrow{BC} + \overrightarrow{CA}$
$= 4\underset{\sim}{m} - 5\underset{\sim}{n}$

5.

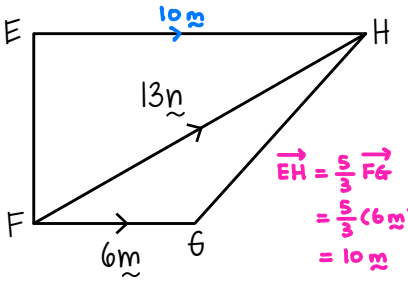


QR = 3PS. ungkapkan dalam sebutan $\underset{\sim}{m}$ dan/atau $\underset{\sim}{n}$

a) $\overrightarrow{SR} - \overrightarrow{PR} = \overrightarrow{SR} + \overrightarrow{RP} = \overrightarrow{SP} = -\underset{\sim}{m}$

b) $\overrightarrow{QP} = \overrightarrow{QR} + \overrightarrow{RP}$
$= 3\underset{\sim}{m} - 7\underset{\sim}{n}$

6.



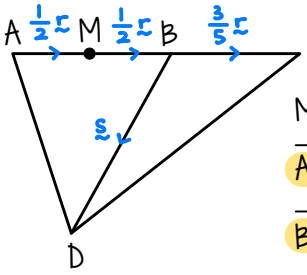
$\overrightarrow{EH} = \frac{5}{3}\overrightarrow{FG}$
$= \frac{5}{3}(6\underset{\sim}{m})$
$= 10\underset{\sim}{m}$

3EH = 5FG. ungkapkan dalam sebutan $\underset{\sim}{m}$ dan/atau $\underset{\sim}{n}$

a) $\overrightarrow{GH} - \overrightarrow{FH} = \overrightarrow{GH} + \overrightarrow{HF} = \overrightarrow{GF} = -6\underset{\sim}{m}$

b) $\overrightarrow{EF} = \overrightarrow{EH} + \overrightarrow{HF}$
$= 10\underset{\sim}{m} - 13\underset{\sim}{n}$

7.



M ialah titik tengah AB.

$\overrightarrow{AB} = \underset{\sim}{r}$ dan $\overrightarrow{BD} = \underset{\sim}{s}$

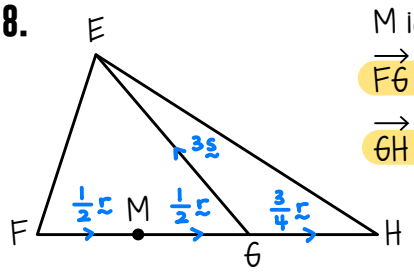
$\overrightarrow{BC} = \frac{3}{5}\overrightarrow{AB}$

ungkapkan dalam sebutan $\underset{\sim}{r}$ dan $\underset{\sim}{s}$:

a) $\overrightarrow{MD} = \overrightarrow{MB} + \overrightarrow{BD} = \frac{1}{2}\underset{\sim}{r} + \underset{\sim}{s}$

b) $\overrightarrow{DC} = \overrightarrow{DB} + \overrightarrow{BC} = -\underset{\sim}{s} + \frac{3}{5}\underset{\sim}{r}$

8.



M ialah titik tengah FG.

$\overrightarrow{FG} = \underset{\sim}{r}$ dan $\overrightarrow{GE} = 3\underset{\sim}{s}$

$\overrightarrow{GH} = \frac{3}{4}\overrightarrow{FG}$

ungkapkan dalam sebutan $\underset{\sim}{r}$ dan $\underset{\sim}{s}$:

a) $\overrightarrow{ME} = \overrightarrow{MG} + \overrightarrow{GE} = \frac{1}{2}\underset{\sim}{r} + 3\underset{\sim}{s}$

b) $\overrightarrow{EH} = \overrightarrow{EG} + \overrightarrow{GH} = -3\underset{\sim}{s} + \frac{3}{4}\underset{\sim}{r}$

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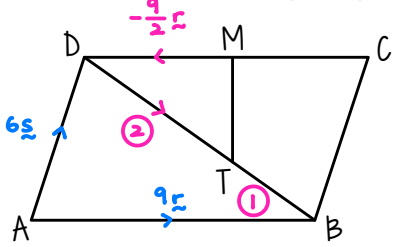
WORKSHEET 4: PENAMBAHAN DAN PENOLAKAN VEKTOR

9.



(i) $\overrightarrow{DT} = 2\overrightarrow{TB}$

$\frac{\overrightarrow{DT}}{\overrightarrow{TB}} = \frac{2}{1}$

$\overrightarrow{AB} = 9\underset{\sim}{r}$, $\overrightarrow{AD} = 6\underset{\sim}{s}$, $\overrightarrow{DT} = 2\overrightarrow{TB}$ dan M ialah titik tengah DC. Ungkapkan dalam sebutan $\underset{\sim}{r}$ dan $\underset{\sim}{s}$.

a) $\overrightarrow{DB} = \overrightarrow{DA} + \overrightarrow{AB} = -6\underset{\sim}{s} + 9\underset{\sim}{r}$

b) $\overrightarrow{MT}$

(ii) $\overrightarrow{DT} = \frac{2}{3}\overrightarrow{DB}$

$\overrightarrow{DT} = \frac{2}{3}(-6\underset{\sim}{s} + 9\underset{\sim}{r})$

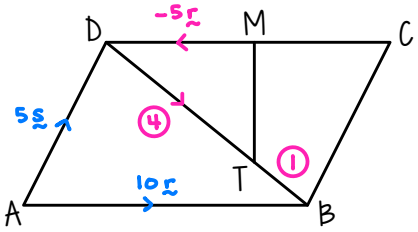
$\overrightarrow{DT} = -4\underset{\sim}{s} + 6\underset{\sim}{r}$

(iii) $\overrightarrow{MT} = \overrightarrow{MD} + \overrightarrow{DT}$

$\overrightarrow{MT} = -\frac{9}{2}\underset{\sim}{r} - 4\underset{\sim}{s} + 6\underset{\sim}{r}$

$\overrightarrow{MT} = \frac{3}{2}\underset{\sim}{r} - 4\underset{\sim}{s}$

10.



(i) $\overrightarrow{DT} = 4\overrightarrow{TB}$

$\frac{\overrightarrow{DT}}{\overrightarrow{TB}} = \frac{4}{1}$

$\overrightarrow{AB} = 10\underset{\sim}{r}$, $\overrightarrow{AD} = 5\underset{\sim}{s}$, $\overrightarrow{DT} = 4\overrightarrow{TB}$ dan M ialah titik tengah DC. Ungkapkan dalam sebutan $\underset{\sim}{r}$ dan $\underset{\sim}{s}$.

a) $\overrightarrow{DB} = \overrightarrow{DA} + \overrightarrow{AB} = -5\underset{\sim}{s} + 10\underset{\sim}{r}$

b) $\overrightarrow{MT}$

(ii) $\overrightarrow{DT} = \frac{4}{5}\overrightarrow{DB}$

$\overrightarrow{DT} = \frac{4}{5}(-5\underset{\sim}{s} + 10\underset{\sim}{r})$

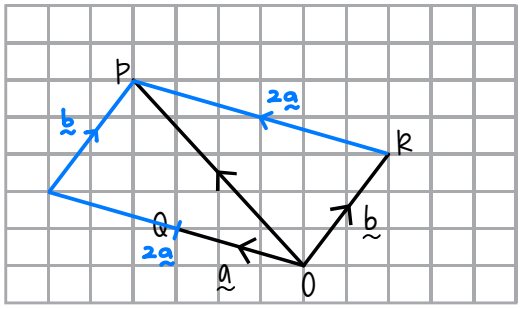
$\overrightarrow{DT} = -4\underset{\sim}{s} + 8\underset{\sim}{r}$

(iii) $\overrightarrow{MT} = \overrightarrow{MD} + \overrightarrow{DT}$

$\overrightarrow{MT} = -5\underset{\sim}{r} - 4\underset{\sim}{s} + 8\underset{\sim}{r}$

$\overrightarrow{MT} = 3\underset{\sim}{r} - 4\underset{\sim}{s}$

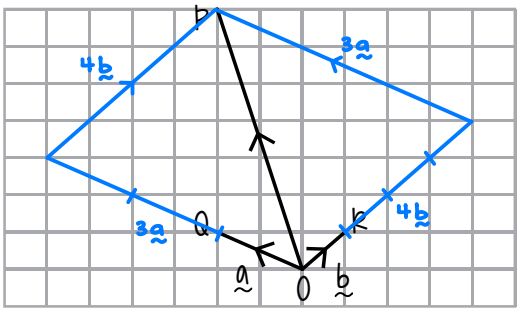
11.



ungkapkan $\overrightarrow{OP}$ dalam sebutan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$

$\overrightarrow{OP} = \underset{\sim}{b} + 2\underset{\sim}{a}$

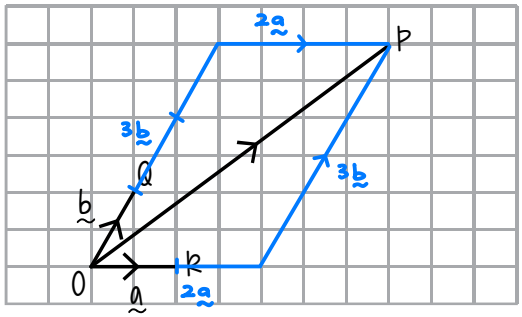
12.



ungkapkan $\overrightarrow{OP}$ dalam sebutan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$

$\overrightarrow{OP} = 4\underset{\sim}{b} + 3\underset{\sim}{a}$

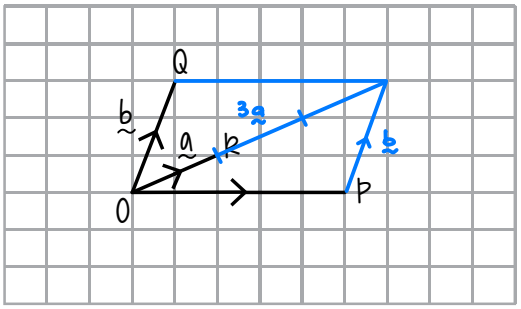
13.



ungkapkan $\overrightarrow{OP}$ dalam sebutan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$

$\overrightarrow{OP} = 2\underset{\sim}{a} + 3\underset{\sim}{b}$

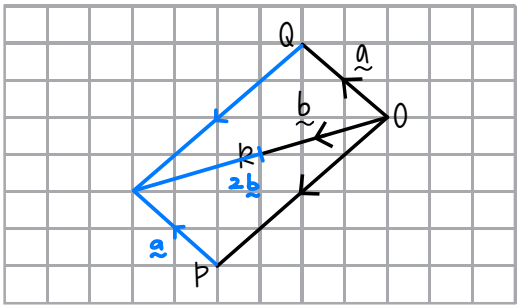
14.



ungkapkan $\overrightarrow{OP}$ dalam sebutan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$

$\overrightarrow{OP} = 3\underset{\sim}{a} - \underset{\sim}{b}$

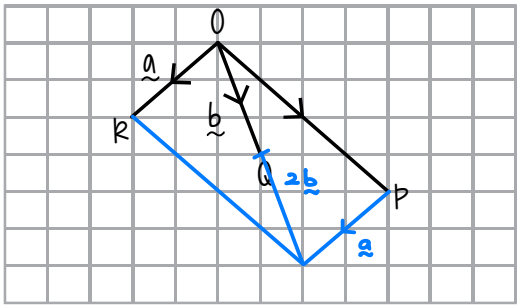
15.



ungkapkan $\overrightarrow{OP}$ dalam sebutan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$

$\overrightarrow{OP} = 2\underset{\sim}{b} - \underset{\sim}{a}$

16.



ungkapkan $\overrightarrow{OP}$ dalam sebutan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$

$\overrightarrow{OP} = 2\underset{\sim}{b} - \underset{\sim}{a}$

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WORKSHEET 5: PENYELESAIAN MASALAH MELIBATKAN VEKTOR

1. Titik A, B dan C adalah segaris.

$\overrightarrow{AB} = 6\underset{\sim}{a} - 2\underset{\sim}{b}$

$\overrightarrow{BC} = 3\underset{\sim}{a} + (1+h)\underset{\sim}{b}$

Cari:
a) nilai h
b) nisbah AB : BC

a) $\overrightarrow{AB} = k\overrightarrow{BC}$

$6\underset{\sim}{a} - 2\underset{\sim}{b} = k[3\underset{\sim}{a} + (1+h)\underset{\sim}{b}]$

$6\underset{\sim}{a} - 2\underset{\sim}{b} = 3k\underset{\sim}{a} + k(1+h)\underset{\sim}{b}$

① $6 = 3k$, $k = 2$

② $-2 = k(1+h)$, $-2 = 2(1+h)$, $-2 = 2+2h$, $-4 = 2h$, $-2 = h$

b) ① $\overrightarrow{AB} = 6\underset{\sim}{a} - 2\underset{\sim}{b}$

② $\overrightarrow{BC} = 3\underset{\sim}{a} + (1+h)\underset{\sim}{b}$
$= 3\underset{\sim}{a} + (1-2)\underset{\sim}{b}$
$= 3\underset{\sim}{a} - \underset{\sim}{b}$

③ $\dfrac{\overrightarrow{AB}}{\overrightarrow{BC}} = \dfrac{6\underset{\sim}{a} - 2\underset{\sim}{b}}{3\underset{\sim}{a} - \underset{\sim}{b}}$
$= \dfrac{2(3\underset{\sim}{a} - \underset{\sim}{b})}{3\underset{\sim}{a} - \underset{\sim}{b}}$
$= \dfrac{2}{1}$

$\therefore$ AB : BC = 2 : 1

2. Titik A, B dan C adalah segaris.

$\overrightarrow{AB} = 2\underset{\sim}{a} - \underset{\sim}{b}$

$\overrightarrow{BC} = 8\underset{\sim}{a} + (3-h)\underset{\sim}{b}$

Cari:
a) nilai h
b) nisbah AB : BC

a) $\overrightarrow{AB} = k\overrightarrow{BC}$

$2\underset{\sim}{a} - \underset{\sim}{b} = k[8\underset{\sim}{a} + (3-h)\underset{\sim}{b}]$

$2\underset{\sim}{a} - \underset{\sim}{b} = 8k\underset{\sim}{a} + k(3-h)\underset{\sim}{b}$

① $2 = 8k$, $k = \frac{1}{4}$

② $-1 = k(3-h)$, $-1 = \frac{1}{4}(3-h)$, $-4 = 3-h$, $h = 7$

b) ① $\overrightarrow{AB} = 2\underset{\sim}{a} - \underset{\sim}{b}$

② $\overrightarrow{BC} = 8\underset{\sim}{a} + (3-h)\underset{\sim}{b}$
$= 8\underset{\sim}{a} + (3-7)\underset{\sim}{b}$
$= 8\underset{\sim}{a} - 4\underset{\sim}{b}$

③ $\dfrac{\overrightarrow{AB}}{\overrightarrow{BC}} = \dfrac{2\underset{\sim}{a} - \underset{\sim}{b}}{8\underset{\sim}{a} - 4\underset{\sim}{b}}$
$= \dfrac{2\underset{\sim}{a} - \underset{\sim}{b}}{4(2\underset{\sim}{a} - \underset{\sim}{b})}$
$= \dfrac{1}{4}$

$\therefore$ AB : BC = 1 : 4

3. Titik A, B dan C adalah segaris.

$\overrightarrow{AB} = 15\underset{\sim}{a} - 9\underset{\sim}{b}$

$\overrightarrow{BC} = (-2-h)\underset{\sim}{a} - 3\underset{\sim}{b}$

Cari:
a) nilai h
b) nisbah AB : BC

a) $\overrightarrow{AB} = k\overrightarrow{BC}$

$15\underset{\sim}{a} - 9\underset{\sim}{b} = k[(-2-h)\underset{\sim}{a} - 3\underset{\sim}{b}]$

$15\underset{\sim}{a} - 9\underset{\sim}{b} = k(-2-h)\underset{\sim}{a} - 3k\underset{\sim}{b}$

① $-9 = -3k$, $k = 3$

② $15 = k(-2-h)$, $15 = 3(-2-h)$, $15 = -6-3h$, $3h = -21$, $h = -7$

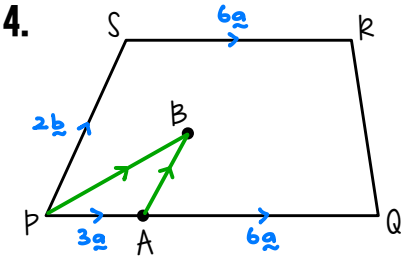
b) ① $\overrightarrow{AB} = 15\underset{\sim}{a} - 9\underset{\sim}{b}$

② $\overrightarrow{BC} = (-2-h)\underset{\sim}{a} - 3\underset{\sim}{b}$
$= (-2+7)\underset{\sim}{a} - 3\underset{\sim}{b}$
$= 5\underset{\sim}{a} - 3\underset{\sim}{b}$

③ $\dfrac{\overrightarrow{AB}}{\overrightarrow{BC}} = \dfrac{15\underset{\sim}{a} - 9\underset{\sim}{b}}{5\underset{\sim}{a} - 3\underset{\sim}{b}}$
$= \dfrac{3(5\underset{\sim}{a} - 3\underset{\sim}{b})}{5\underset{\sim}{a} - 3\underset{\sim}{b}}$
$= \dfrac{3}{1}$

$\therefore$ AB : BC = 3 : 1

4.



$\overrightarrow{PQ} = 9\underset{\sim}{a}$, $\overrightarrow{PS} = 2\underset{\sim}{b}$

$\overrightarrow{PA} = \frac{1}{3}\overrightarrow{PQ} = 3\underset{\sim}{a}$

$\overrightarrow{SR} = \frac{2}{3}\overrightarrow{PQ} = 6\underset{\sim}{a}$

a) ungkapkan $\overrightarrow{PR}$ dalam sebutan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$.

a) $\overrightarrow{PR} = \overrightarrow{PS} + \overrightarrow{SR}$
$= 2\underset{\sim}{b} + 6\underset{\sim}{a}$

b) $\overrightarrow{AB} = h\overrightarrow{PS}$ dan h ialah pemalar.
$= h(2\underset{\sim}{b}) = 2h\underset{\sim}{b}$

i) ungkapkan $\overrightarrow{PB}$ dalam sebutan h, $\underset{\sim}{a}$ dan $\underset{\sim}{b}$.

ii) jika titik P, B dan R adalah segaris, cari nilai h.

b) i) $\overrightarrow{PB} = \overrightarrow{PA} + \overrightarrow{AB}$
$= 3\underset{\sim}{a} + 2h\underset{\sim}{b}$

b) ii) $\overrightarrow{PB} = k\overrightarrow{PR}$

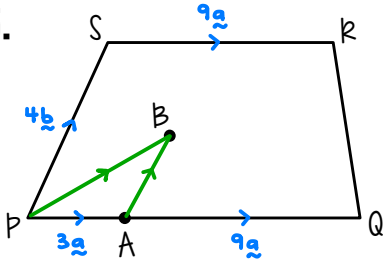
$3\underset{\sim}{a} + 2h\underset{\sim}{b} = k(6\underset{\sim}{a} + 2\underset{\sim}{b})$

$3\underset{\sim}{a} + 2h\underset{\sim}{b} = 6k\underset{\sim}{a} + 2k\underset{\sim}{b}$

$3 = 6k$, $k = \frac{1}{2}$

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

5.



$\overrightarrow{PQ} = 12\underset{\sim}{a}$, $\overrightarrow{PS} = 4\underset{\sim}{b}$

$\overrightarrow{PA} = \frac{1}{4}\overrightarrow{PQ} = 3\underset{\sim}{a}$

$\overrightarrow{SR} = \frac{3}{4}\overrightarrow{PQ} = 9\underset{\sim}{a}$

a) ungkapkan $\overrightarrow{PR}$ dalam sebutan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$.

a) $\overrightarrow{PR} = \overrightarrow{PS} + \overrightarrow{SR}$
$= 4\underset{\sim}{b} + 9\underset{\sim}{a}$

b) $\overrightarrow{AB} = h\overrightarrow{PS}$ dan h ialah pemalar.
$= h(4\underset{\sim}{b}) = 4h\underset{\sim}{b}$

i) ungkapkan $\overrightarrow{PB}$ dalam sebutan h, $\underset{\sim}{a}$ dan $\underset{\sim}{b}$.

ii) jika titik P, B dan R adalah segaris, cari nilai h.

b) i) $\overrightarrow{PB} = \overrightarrow{PA} + \overrightarrow{AB}$
$= 3\underset{\sim}{a} + 4h\underset{\sim}{b}$

b) ii) $\overrightarrow{PB} = k\overrightarrow{PR}$

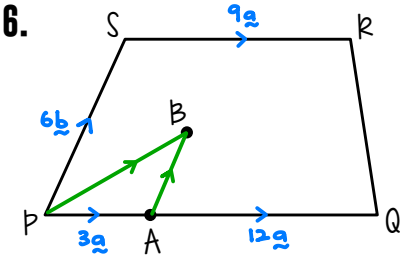
$3\underset{\sim}{a} + 4h\underset{\sim}{b} = k(9\underset{\sim}{a} + 4\underset{\sim}{b})$

$3\underset{\sim}{a} + 4h\underset{\sim}{b} = 9k\underset{\sim}{a} + 4k\underset{\sim}{b}$

$3 = 9k$, $k = \frac{1}{3}$

$4h = 4k$, $h = k$, $h = \frac{1}{3}$

6.



$\overrightarrow{PQ} = 15\underset{\sim}{a}$, $\overrightarrow{PS} = 6\underset{\sim}{b}$

$\overrightarrow{PA} = \frac{1}{5}\overrightarrow{PQ} = 3\underset{\sim}{a}$

$\overrightarrow{SR} = \frac{3}{5}\overrightarrow{PQ} = 9\underset{\sim}{a}$

a) ungkapkan $\overrightarrow{PR}$ dalam sebutan $\underset{\sim}{a}$ dan $\underset{\sim}{b}$.

a) $\overrightarrow{PR} = \overrightarrow{PS} + \overrightarrow{SR}$
$= 6\underset{\sim}{b} + 9\underset{\sim}{a}$

b) $\overrightarrow{AB} = h\overrightarrow{PS}$ dan h ialah pemalar.
$= h(6\underset{\sim}{b}) = 6h\underset{\sim}{b}$

i) ungkapkan $\overrightarrow{PB}$ dalam sebutan h, $\underset{\sim}{a}$ dan $\underset{\sim}{b}$.

ii) jika titik P, B dan R adalah segaris, cari nilai h.

b) i) $\overrightarrow{PB} = \overrightarrow{PA} + \overrightarrow{AB}$
$= 3\underset{\sim}{a} + 6h\underset{\sim}{b}$

b) ii) $\overrightarrow{PB} = k\overrightarrow{PR}$

$3\underset{\sim}{a} + 6h\underset{\sim}{b} = k(9\underset{\sim}{a} + 6\underset{\sim}{b})$

$3\underset{\sim}{a} + 6h\underset{\sim}{b} = 9k\underset{\sim}{a} + 6k\underset{\sim}{b}$

$3 = 9k$, $k = \frac{1}{3}$

$6h = 6k$, $h = k$, $h = \frac{1}{3}$

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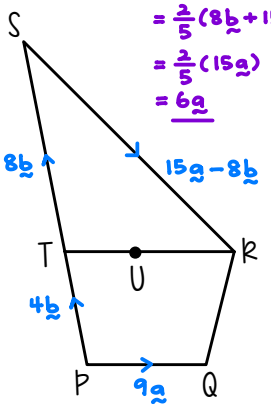
WORKSHEET 5: PENYELESAIAN MASALAH MELIBATKAN VEKTOR

7.

$\overrightarrow{TU} = \frac{2}{5}\overrightarrow{TR}$
$= \frac{2}{5}(8\underset{\sim}{b} + 15\underset{\sim}{a} - 8\underset{\sim}{b})$
$= \frac{2}{5}(15\underset{\sim}{a})$
$= 6\underset{\sim}{a}$



$\overrightarrow{PQ} = 9\underset{\sim}{a}$ $\overrightarrow{PT} = 4\underset{\sim}{b}$ $\overrightarrow{SR} = 15\underset{\sim}{a} - 8\underset{\sim}{b}$

$\overrightarrow{PT} = \frac{1}{3}\overrightarrow{PS}$ $\overrightarrow{TU} = \frac{2}{5}\overrightarrow{TR}$

$\overrightarrow{PS} = 3\overrightarrow{PT} = 3(4\underset{\sim}{b}) = 12\underset{\sim}{b}$

a) ungkapkan dalam sebutan $\underset{\sim}{a}$ dan/atau $\underset{\sim}{b}$.

i) $\overrightarrow{QS}$ ii) $\overrightarrow{TR}$ iii) $\overrightarrow{QR}$

b) tunjukkan bahawa titik Q, U dan S adalah segaris.

c) jika $|\underset{\sim}{a}| = 3$ unit, $|\underset{\sim}{b}| = 9$ unit dan $\angle QPS = 110^0$, cari $|\overrightarrow{QS}|$

a) i) $\overrightarrow{QS} = -9\underset{\sim}{a} + 12\underset{\sim}{b}$

ii) $\overrightarrow{TR} = 15\underset{\sim}{a}$

iii) $\overrightarrow{QR} = -9\underset{\sim}{a} + 4\underset{\sim}{b} + 15\underset{\sim}{a}$
$= 6\underset{\sim}{a} + 4\underset{\sim}{b}$

b)

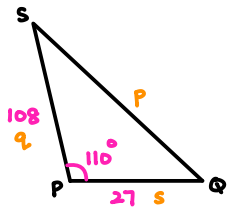
① $\overrightarrow{QU} = -9\underset{\sim}{a} + 4\underset{\sim}{b} + 6\underset{\sim}{a}$
$= -3\underset{\sim}{a} + 4\underset{\sim}{b}$

② $\overrightarrow{QS} = -9\underset{\sim}{a} + 12\underset{\sim}{b}$

③ $\overrightarrow{QU} = k\overrightarrow{QS}$
$-3\underset{\sim}{a} + 4\underset{\sim}{b} = k(-9\underset{\sim}{a} + 12\underset{\sim}{b})$
$-3\underset{\sim}{a} + 4\underset{\sim}{b} = -9k\underset{\sim}{a} + 12k\underset{\sim}{b}$

$-3 = -9k$ $k = \frac{1}{3}$
$4 = 12k$ $k = \frac{1}{3}$
$\therefore \overrightarrow{QU} = \frac{1}{3}\overrightarrow{QS}$

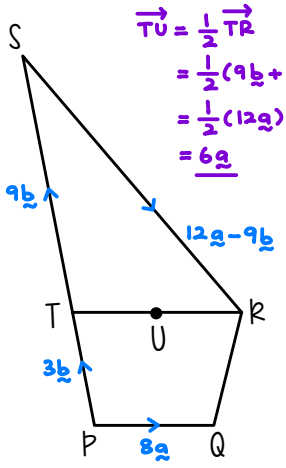
c)



$p^2 = q^2 + s^2 - 2qs\cos P$
$= (108)^2 + (27)^2 - 2(108)(27)\cos 110^0$
$p = 119.9486$

8.

$\overrightarrow{TU} = \frac{1}{2}\overrightarrow{TR}$
$= \frac{1}{2}(9\underset{\sim}{b} + 12\underset{\sim}{a} - 9\underset{\sim}{b})$
$= \frac{1}{2}(12\underset{\sim}{a})$
$= 6\underset{\sim}{a}$



$\overrightarrow{PQ} = 8\underset{\sim}{a}$ $\overrightarrow{PT} = 3\underset{\sim}{b}$ $\overrightarrow{SR} = 12\underset{\sim}{a} - 9\underset{\sim}{b}$

$\overrightarrow{PT} = \frac{1}{4}\overrightarrow{PS}$ $\overrightarrow{TU} = \frac{1}{2}\overrightarrow{TR}$

$\overrightarrow{PS} = 4\overrightarrow{PT} = 4(3\underset{\sim}{b}) = 12\underset{\sim}{b}$

a) ungkapkan dalam sebutan $\underset{\sim}{a}$ dan/atau $\underset{\sim}{b}$.

i) $\overrightarrow{QS}$ ii) $\overrightarrow{TR}$ iii) $\overrightarrow{QR}$

b) tunjukkan bahawa titik Q, U dan S adalah segaris.

c) jika $|\underset{\sim}{a}| = 6$ unit, $|\underset{\sim}{b}| = 10$ unit dan $\angle QPS = 105^0$, cari $|\overrightarrow{QS}|$

a) i) $\overrightarrow{QS} = -8\underset{\sim}{a} + 12\underset{\sim}{b}$

ii) $\overrightarrow{TR} = 12\underset{\sim}{a}$

iii) $\overrightarrow{QR} = -8\underset{\sim}{a} + 3\underset{\sim}{b} + 12\underset{\sim}{a}$
$= 4\underset{\sim}{a} + 3\underset{\sim}{b}$

b)

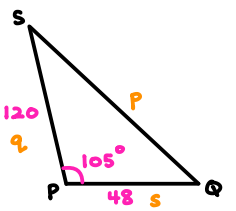
① $\overrightarrow{QU} = -8\underset{\sim}{a} + 3\underset{\sim}{b} + 6\underset{\sim}{a}$
$= -2\underset{\sim}{a} + 3\underset{\sim}{b}$

② $\overrightarrow{QS} = -8\underset{\sim}{a} + 12\underset{\sim}{b}$

③ $\overrightarrow{QU} = k\overrightarrow{QS}$
$-2\underset{\sim}{a} + 3\underset{\sim}{b} = k(-8\underset{\sim}{a} + 12\underset{\sim}{b})$
$-2\underset{\sim}{a} + 3\underset{\sim}{b} = -8k\underset{\sim}{a} + 12k\underset{\sim}{b}$

$-2 = -8k$ $k = \frac{1}{4}$
$3 = 12k$ $k = \frac{1}{4}$
$\therefore \overrightarrow{QU} = \frac{1}{4}\overrightarrow{QS}$

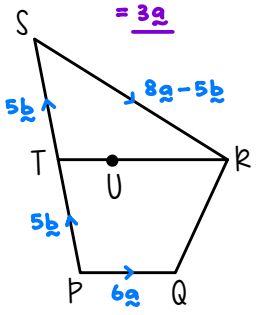
c)



$p^2 = q^2 + s^2 - 2qs\cos P$
$= (120)^2 + (48)^2 - 2(120)(48)\cos 105^0$
$p = 140.3054$

9.

$\overrightarrow{TU} = \frac{3}{8}\overrightarrow{TR}$
$= \frac{3}{8}(5\underset{\sim}{b} + 8\underset{\sim}{a} - 5\underset{\sim}{b})$
$= \frac{3}{8}(8\underset{\sim}{a})$
$= 3\underset{\sim}{a}$



$\overrightarrow{PQ} = 6\underset{\sim}{a}$ $\overrightarrow{PT} = 5\underset{\sim}{b}$ $\overrightarrow{SR} = 8\underset{\sim}{a} - 5\underset{\sim}{b}$

$\overrightarrow{PT} = \frac{1}{2}\overrightarrow{PS}$ $\overrightarrow{TU} = \frac{3}{8}\overrightarrow{TR}$

$\overrightarrow{PS} = 2\overrightarrow{PT} = 2(5\underset{\sim}{b}) = 10\underset{\sim}{b}$

a) ungkapkan dalam sebutan $\underset{\sim}{a}$ dan/atau $\underset{\sim}{b}$.

i) $\overrightarrow{QS}$ ii) $\overrightarrow{TR}$ iii) $\overrightarrow{QR}$

b) tunjukkan bahawa titik Q, U dan S adalah segaris.

c) jika $|\underset{\sim}{a}| = 4$ unit, $|\underset{\sim}{b}| = 7$ unit dan $\angle QPS = 96^0$, cari $|\overrightarrow{QS}|$

a) i) $\overrightarrow{QS} = -6\underset{\sim}{a} + 10\underset{\sim}{b}$

ii) $\overrightarrow{TR} = 8\underset{\sim}{a}$

iii) $\overrightarrow{QR} = -6\underset{\sim}{a} + 5\underset{\sim}{b} + 8\underset{\sim}{a}$
$= 2\underset{\sim}{a} + 5\underset{\sim}{b}$

b)

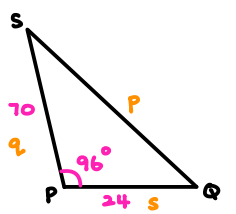
① $\overrightarrow{QU} = -6\underset{\sim}{a} + 5\underset{\sim}{b} + 3\underset{\sim}{a}$
$= -3\underset{\sim}{a} + 5\underset{\sim}{b}$

② $\overrightarrow{QS} = -6\underset{\sim}{a} + 10\underset{\sim}{b}$

③ $\overrightarrow{QU} = k\overrightarrow{QS}$
$-3\underset{\sim}{a} + 5\underset{\sim}{b} = k(-6\underset{\sim}{a} + 10\underset{\sim}{b})$
$-3\underset{\sim}{a} + 5\underset{\sim}{b} = -6k\underset{\sim}{a} + 10k\underset{\sim}{b}$

$-3 = -6k$ $k = \frac{1}{2}$
$5 = 10k$ $k = \frac{1}{2}$
$\therefore \overrightarrow{QU} = \frac{1}{2}\overrightarrow{QS}$

c)



$p^2 = q^2 + s^2 - 2qs\cos P$
$= (70)^2 + (24)^2 - 2(70)(24)\cos 96^0$
$p = 76.3362$

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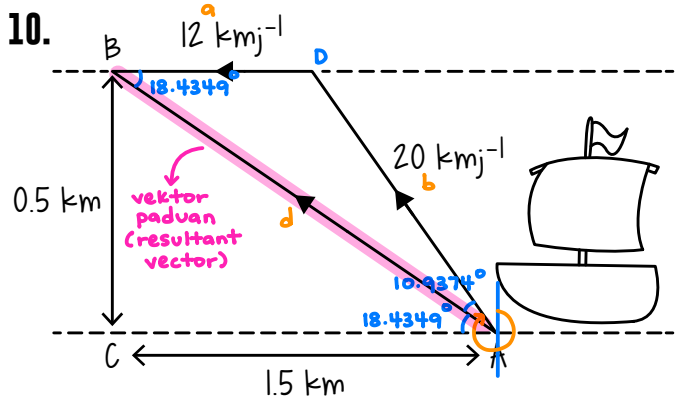
WORKSHEET 5: PENYELESAIAN MASALAH MELIBATKAN VEKTOR [10]

10.



Sebuah kapal menyeberangi sungai yang lebarnya 0.5 km dari titik B ke C. Titik A terletak 1.5 km dari titik C. Kapal itu bergerak dengan halaju 20 kmj^{-1} dan arus sungai mengalir ke barat dengan halaju 12 kmj^{-1}, tentukan:

a) arah kapal untuk menyeberangi sungai itu.
b) halaju baharu kapal itu kesan aliran arus tersebut.

a) ①

$\tan\theta = \frac{0.5}{1.5}$

$\theta = 18.4349°$

②

$\frac{a}{\sin A} = \frac{b}{\sin B}$

$\frac{12}{\sin A} = \frac{20}{\sin 18.4349°}$

$\sin A = 0.1897$

$A = 10.9374°$

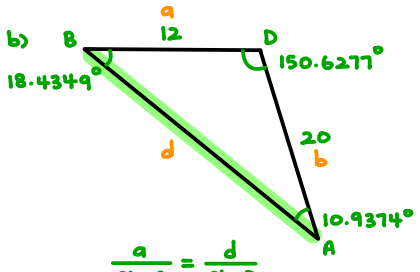
③

Bearing

$= 270° + 18.4349° + 10.9374°$

$= 299.3723°$

b)

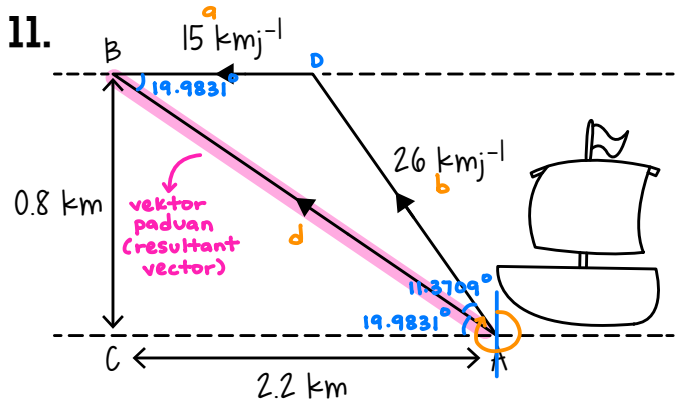


$\frac{a}{\sin A} = \frac{d}{\sin D}$

$\frac{12}{\sin 10.9374°} = \frac{d}{\sin 150.6277°}$

$d = 31.0209$

11.



Sebuah kapal menyeberangi sungai yang lebarnya 0.8 km dari titik B ke C. Titik A terletak 2.2 km dari titik C. Kapal itu bergerak dengan halaju 26 kmj^{-1} dan arus sungai mengalir ke barat dengan halaju 15 kmj^{-1}, tentukan:

a) arah kapal untuk menyeberangi sungai itu.
b) halaju baharu kapal itu kesan aliran arus tersebut.

a) ①

$\tan\theta = \frac{0.8}{2.2}$

$\theta = 19.9831°$

②

$\frac{a}{\sin A} = \frac{b}{\sin B}$

$\frac{15}{\sin A} = \frac{26}{\sin 19.9831°}$

$\sin A = 0.1972$

$A = 11.3709°$

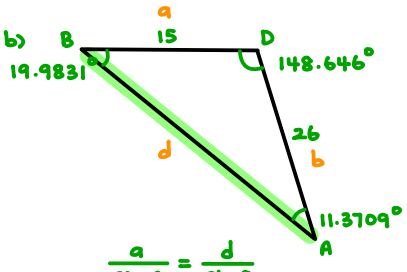
③

Bearing

$= 270° + 19.9831° + 11.3709°$

$= 301.354°$

b)

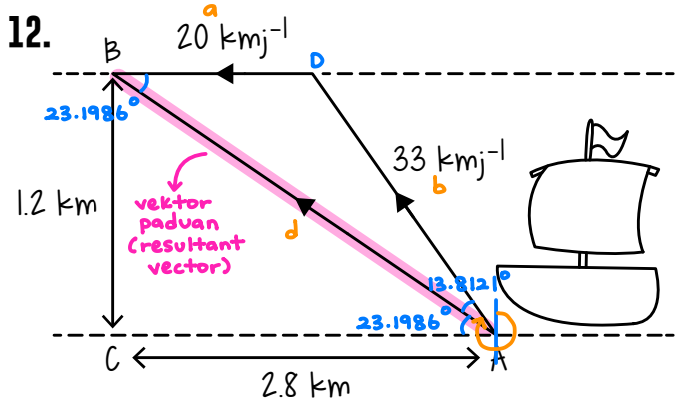


$\frac{a}{\sin A} = \frac{d}{\sin D}$

$\frac{15}{\sin 11.3709°} = \frac{d}{\sin 148.646°}$

$d = 39.5866$

12.



Sebuah kapal menyeberangi sungai yang lebarnya 1.2 km dari titik B ke C. Titik A terletak 2.8 km dari titik C. Kapal itu bergerak dengan halaju 33 kmj^{-1} dan arus sungai mengalir ke barat dengan halaju 20 kmj^{-1}, tentukan:

a) arah kapal untuk menyeberangi sungai itu.
b) halaju baharu kapal itu kesan aliran arus tersebut.

a) ①

$\tan\theta = \frac{1.2}{2.8}$

$\theta = 23.1986°$

②

$\frac{a}{\sin A} = \frac{b}{\sin B}$

$\frac{20}{\sin A} = \frac{33}{\sin 23.1986°}$

$\sin A = 0.2387$

$A = 13.8121°$

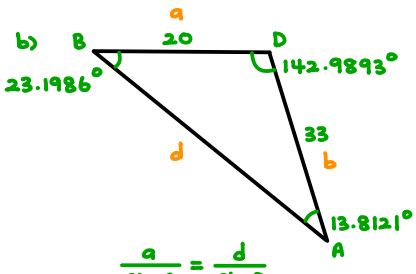
③

Bearing

$= 270° + 23.1986° + 13.8121°$

$= 307.0107°$

b)



$\frac{a}{\sin A} = \frac{d}{\sin D}$

$\frac{20}{\sin 13.8121°} = \frac{d}{\sin 142.9893°}$

$d = 50.4287$

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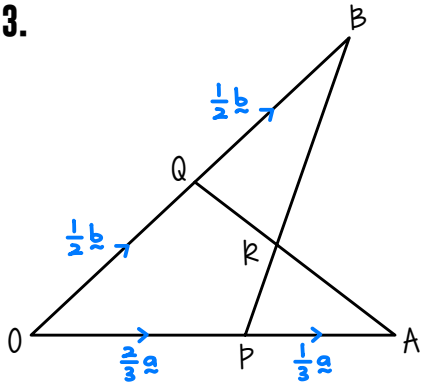
WORKSHEET 5: PENYELESAIAN MASALAH MELIBATKAN VEKTOR

13.



$\overrightarrow{OA} = a$

$\overrightarrow{OB} = b$

$\overrightarrow{OP} = \frac{2}{3}\overrightarrow{OA}$

$\overrightarrow{AR} = h\overrightarrow{AQ}$

$\overrightarrow{BR} = k\overrightarrow{BP}$

Q ialah titik tengah OB. AQ dan BP bersilang di titik R.

a) ungkapkan $\overrightarrow{OR}$ dalam sebutan

i) h , a dan b ii) k , a dan b

seterusnya, cari nilai h dan k.

b) jika $|a| = 5$ unit, $|b| = 8$ unit dan $\angle AOQ = 60^0$, cari

i) $|\overrightarrow{AQ}|$ ii) $\angle OAQ$

$\overrightarrow{AQ} = -a + \frac{1}{2}b$

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

$\overrightarrow{AR} = h\overrightarrow{AQ}$
$= h(-a + \frac{1}{2}b)$
$= -ha + \frac{1}{2}hb$

$\overrightarrow{BR} = k\overrightarrow{BP}$
$= k(-b + \frac{2}{3}a)$
$= -kb + \frac{2}{3}ka$

a) i) $\overrightarrow{OR} = \overrightarrow{OA} + \overrightarrow{AR}$
$= a - ha + \frac{1}{2}hb$
$= (1-h)a + \frac{1}{2}hb$

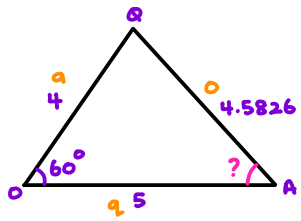
ii) $\overrightarrow{OR} = \overrightarrow{OB} + \overrightarrow{BR}$
$= b - kb + \frac{2}{3}ka$
$= \frac{2}{3}ka + (1-k)b$

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

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

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

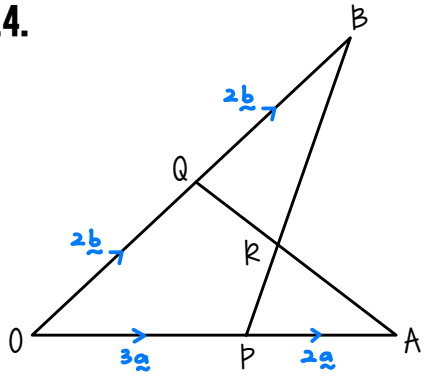
b)



i) $o^2 = a^2 + q^2 - 2aq\cos O$
$(AQ)^2 = 4^2 + 5^2 - 2(4)(5)\cos 60^0$
$AQ = 4.5826$

ii) $\frac{o}{\sin O} = \frac{a}{\sin A}$
$\frac{4.5826}{\sin 60^0} = \frac{4}{\sin A}$
$\sin A = 0.7559$
$A = 49.1041^0$

14.



$\overrightarrow{OA} = 5a$

$\overrightarrow{OB} = 4b$

$\overrightarrow{OP} = \frac{3}{5}\overrightarrow{OA}$

$\overrightarrow{AR} = h\overrightarrow{AQ}$

$\overrightarrow{BR} = k\overrightarrow{BP}$

Q ialah titik tengah OB. AQ dan BP bersilang di titik R.

a) ungkapkan $\overrightarrow{OR}$ dalam sebutan

i) h , a dan b ii) k , a dan b

seterusnya, cari nilai h dan k.

b) jika $|a| = 3$ unit, $|b| = 5$ unit dan $\angle AOQ = 54^0$, cari

i) $|\overrightarrow{AQ}|$ ii) $\angle OAQ$

$\overrightarrow{AQ} = -5a + 2b$

$\overrightarrow{BP} = -4b + 3a$

$\overrightarrow{AR} = h\overrightarrow{AQ}$
$= h(-5a + 2b)$
$= -5ha + 2hb$

$\overrightarrow{BR} = k\overrightarrow{BP}$
$= k(-4b + 3a)$
$= -4kb + 3ka$

a) i) $\overrightarrow{OR} = \overrightarrow{OA} + \overrightarrow{AR}$
$= 5a - 5ha + 2hb$
$= (5-5h)a + 2hb$

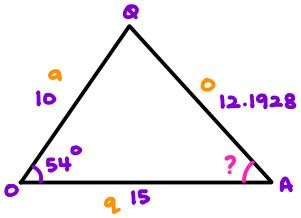
ii) $\overrightarrow{OR} = \overrightarrow{OB} + \overrightarrow{BR}$
$= 4b - 4kb + 3ka$
$= 3ka + (4-4k)b$

① $5 - 5h = 3k$
$-5h - 3k = -5$
$5h + 3k = 5$

② $2h = 4 - 4k$
$2h + 4k = 4$

③ $5h + 3k = 5$
$2h + 4k = 4$
$\therefore h = \frac{4}{7}$
$k = \frac{5}{7}$

b)



i) $o^2 = a^2 + q^2 - 2aq\cos O$
$(AQ)^2 = 10^2 + 15^2 - 2(10)(15)\cos 54^0$
$AQ = 12.1928$

ii) $\frac{o}{\sin O} = \frac{a}{\sin A}$
$\frac{12.1928}{\sin 54^0} = \frac{10}{\sin A}$
$\sin A = 0.6635$
$A = 41.5689^0$

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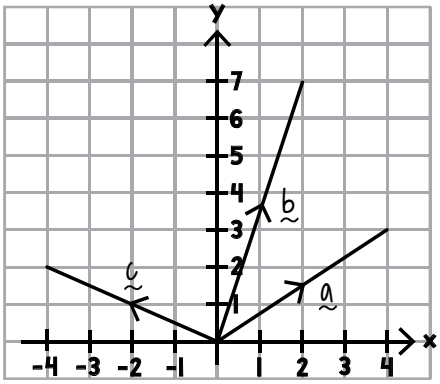
WORKSHEET 6: VEKTOR DALAM SATAH CARTES

$|\underset{\sim}{a}|$: magnitude

$\hat{\underset{\sim}{a}} = \frac{\underset{\sim}{a}}{|\underset{\sim}{a}|}$ → unit vector

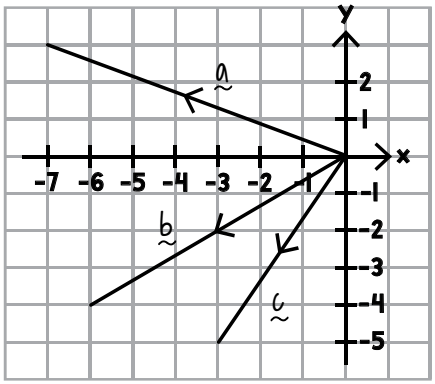
$\begin{pmatrix} x \\ y \end{pmatrix}$: column vector

1.



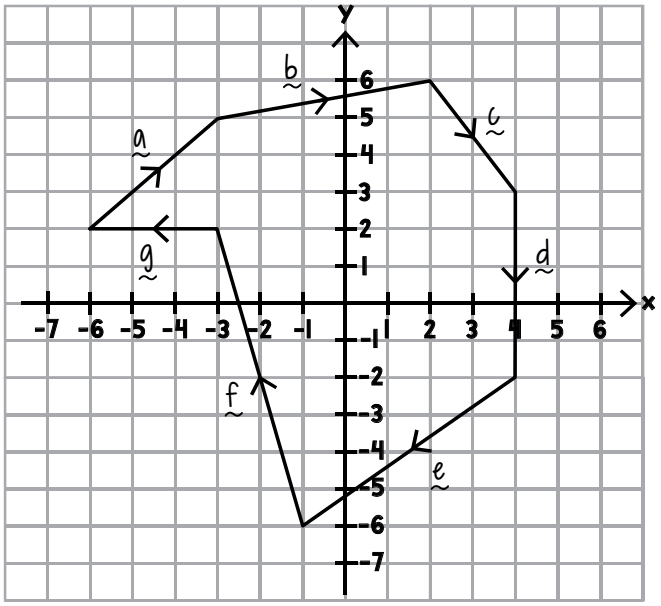
$\underset{\sim}{a} = 4\underset{\sim}{i} + 3\underset{\sim}{j}$	$\lvert\underset{\sim}{a}\rvert = 5$	$\hat{\underset{\sim}{a}} = \frac{4}{5}\underset{\sim}{i} + \frac{3}{5}\underset{\sim}{j}$
$\underset{\sim}{b} = 2\underset{\sim}{i} + 7\underset{\sim}{j}$	$\lvert\underset{\sim}{b}\rvert = \sqrt{53}$	$\hat{\underset{\sim}{b}} = \frac{2}{\sqrt{53}}\underset{\sim}{i} + \frac{7}{\sqrt{53}}\underset{\sim}{j}$
$\underset{\sim}{c} = -4\underset{\sim}{i} + 2\underset{\sim}{j}$	$\lvert\underset{\sim}{c}\rvert = 2\sqrt{5}$	$\hat{\underset{\sim}{c}} = -\frac{2}{\sqrt{5}}\underset{\sim}{i} + \frac{1}{\sqrt{5}}\underset{\sim}{j}$

2.



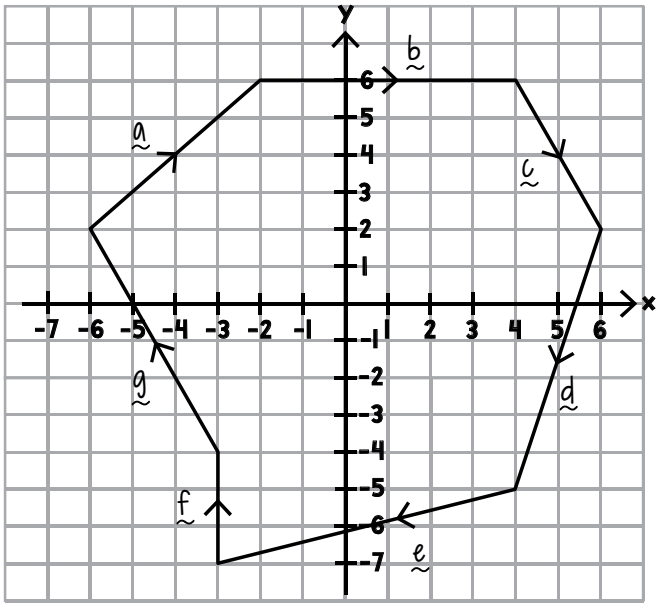
$\underset{\sim}{a} = -7\underset{\sim}{i} + 3\underset{\sim}{j}$	$\lvert\underset{\sim}{a}\rvert = \sqrt{58}$	$\hat{\underset{\sim}{a}} = \frac{-7}{\sqrt{58}}\underset{\sim}{i} + \frac{3}{\sqrt{58}}\underset{\sim}{j}$
$\underset{\sim}{b} = -6\underset{\sim}{i} - 4\underset{\sim}{j}$	$\lvert\underset{\sim}{b}\rvert = 2\sqrt{13}$	$\hat{\underset{\sim}{b}} = \frac{-3}{\sqrt{13}}\underset{\sim}{i} - \frac{2}{\sqrt{13}}\underset{\sim}{j}$
$\underset{\sim}{c} = -3\underset{\sim}{i} - 5\underset{\sim}{j}$	$\lvert\underset{\sim}{c}\rvert = \sqrt{34}$	$\hat{\underset{\sim}{c}} = \frac{-3}{\sqrt{34}}\underset{\sim}{i} - \frac{5}{\sqrt{34}}\underset{\sim}{j}$

3.



$\underset{\sim}{a} = 3\underset{\sim}{i} + 3\underset{\sim}{j}$	$\lvert\underset{\sim}{a}\rvert = 3\sqrt{2}$	$\hat{\underset{\sim}{a}} = \frac{1}{\sqrt{2}}\underset{\sim}{i} + \frac{1}{\sqrt{2}}\underset{\sim}{j}$
$\underset{\sim}{b} = 5\underset{\sim}{i} + \underset{\sim}{j}$	$\lvert\underset{\sim}{b}\rvert = \sqrt{26}$	$\hat{\underset{\sim}{b}} = \frac{5}{\sqrt{26}}\underset{\sim}{i} + \frac{1}{\sqrt{26}}\underset{\sim}{j}$
$\underset{\sim}{c} = 2\underset{\sim}{i} - 3\underset{\sim}{j}$	$\lvert\underset{\sim}{c}\rvert = \sqrt{13}$	$\hat{\underset{\sim}{c}} = \frac{2}{\sqrt{13}}\underset{\sim}{i} - \frac{3}{\sqrt{13}}\underset{\sim}{j}$
$\underset{\sim}{d} = -5\underset{\sim}{j}$	$\lvert\underset{\sim}{d}\rvert = 5$	$\hat{\underset{\sim}{d}} = -\underset{\sim}{j}$
$\underset{\sim}{e} = -5\underset{\sim}{i} - 4\underset{\sim}{j}$	$\lvert\underset{\sim}{e}\rvert = \sqrt{41}$	$\hat{\underset{\sim}{e}} = -\frac{5}{\sqrt{41}}\underset{\sim}{i} - \frac{4}{\sqrt{41}}\underset{\sim}{j}$
$\underset{\sim}{f} = -2\underset{\sim}{i} + 8\underset{\sim}{j}$	$\lvert\underset{\sim}{f}\rvert = 6\sqrt{2}$	$\hat{\underset{\sim}{f}} = -\frac{1}{3\sqrt{2}}\underset{\sim}{i} + \frac{4}{3\sqrt{2}}\underset{\sim}{j}$
$\underset{\sim}{g} = -3\underset{\sim}{i}$	$\lvert\underset{\sim}{g}\rvert = 3$	$\hat{\underset{\sim}{g}} = -\underset{\sim}{i}$

4.



$\underset{\sim}{a} = 4\underset{\sim}{i} + 4\underset{\sim}{j}$	$\lvert\underset{\sim}{a}\rvert = 4\sqrt{2}$	$\hat{\underset{\sim}{a}} = \frac{1}{\sqrt{2}}\underset{\sim}{i} + \frac{1}{\sqrt{2}}\underset{\sim}{j}$
$\underset{\sim}{b} = 6\underset{\sim}{i}$	$\lvert\underset{\sim}{b}\rvert = 6$	$\hat{\underset{\sim}{b}} = \underset{\sim}{i}$
$\underset{\sim}{c} = 2\underset{\sim}{i} - 4\underset{\sim}{j}$	$\lvert\underset{\sim}{c}\rvert = 2\sqrt{5}$	$\hat{\underset{\sim}{c}} = \frac{1}{\sqrt{5}}\underset{\sim}{i} - \frac{2}{\sqrt{5}}\underset{\sim}{j}$
$\underset{\sim}{d} = -2\underset{\sim}{i} - 7\underset{\sim}{j}$	$\lvert\underset{\sim}{d}\rvert = \sqrt{53}$	$\hat{\underset{\sim}{d}} = -\frac{2}{\sqrt{53}}\underset{\sim}{i} - \frac{7}{\sqrt{53}}\underset{\sim}{j}$
$\underset{\sim}{e} = -7\underset{\sim}{i} - 2\underset{\sim}{j}$	$\lvert\underset{\sim}{e}\rvert = \sqrt{53}$	$\hat{\underset{\sim}{e}} = -\frac{7}{\sqrt{53}}\underset{\sim}{i} - \frac{2}{\sqrt{53}}\underset{\sim}{j}$
$\underset{\sim}{f} = 3\underset{\sim}{j}$	$\lvert\underset{\sim}{f}\rvert = 3$	$\hat{\underset{\sim}{f}} = \underset{\sim}{j}$
$\underset{\sim}{g} = -3\underset{\sim}{i} + 6\underset{\sim}{j}$	$\lvert\underset{\sim}{g}\rvert = 3\sqrt{5}$	$\hat{\underset{\sim}{g}} = -\frac{1}{\sqrt{5}}\underset{\sim}{i} + \frac{2}{\sqrt{5}}\underset{\sim}{j}$

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WORKSHEET 6: VEKTOR DALAM SATAH CARTES

5. $\overrightarrow{AB} = 9\underset{\sim}{i} - k\underset{\sim}{j}$, $|\overrightarrow{AB}| = 15$ unit, $k = ?$

$\sqrt{9^2 + (-k)^2} = 15$
$9^2 + (-k)^2 = 15^2$
$81 + k^2 = 225$
$k^2 = 144$
$k = \pm 12$

6. $\overrightarrow{AB} = -12\underset{\sim}{i} - k\underset{\sim}{j}$, $|\overrightarrow{AB}| = 20$ unit, $k = ?$

$\sqrt{(-12)^2 + (-k)^2} = 20$
$(-12)^2 + (-k)^2 = 20^2$
$144 + k^2 = 400$
$k^2 = 256$
$k = \pm 16$

7. $\overrightarrow{AB} = -k\underset{\sim}{i} + 18\underset{\sim}{j}$, $|\overrightarrow{AB}| = 30$ unit, $k = ?$

$\sqrt{(-k)^2 + (18)^2} = 30$
$(-k)^2 + (18)^2 = 30^2$
$k^2 + 324 = 900$
$k^2 = 576$
$k = \pm 24$

8. $\overrightarrow{AB} = \begin{pmatrix} -17 \\ 0 \end{pmatrix}$ $\overrightarrow{FG} = \begin{pmatrix} 15 \\ h \end{pmatrix}$

jika $|\overrightarrow{AB}| = |\overrightarrow{FG}|$, cari nilai h.

$\sqrt{(-17)^2 + (0)^2} = \sqrt{(15)^2 + (h)^2}$
$(-17)^2 = (15)^2 + (h)^2$
$289 = 225 + h^2$
$h^2 = 64$
$h = \pm 8$

9. $\overrightarrow{AB} = \begin{pmatrix} 0 \\ -25 \end{pmatrix}$ $\overrightarrow{FG} = \begin{pmatrix} h \\ -15 \end{pmatrix}$

jika $|\overrightarrow{AB}| = |\overrightarrow{FG}|$, cari nilai h.

$\sqrt{(0)^2 + (-25)^2} = \sqrt{(h)^2 + (-15)^2}$
$(-25)^2 = (h)^2 + (-15)^2$
$625 = h^2 + 225$
$h^2 = 400$
$h = \pm 20$

10. $\overrightarrow{AB} = \begin{pmatrix} 0 \\ -34 \end{pmatrix}$ $\overrightarrow{FG} = \begin{pmatrix} -16 \\ h \end{pmatrix}$

jika $|\overrightarrow{AB}| = |\overrightarrow{FG}|$, cari nilai h.

$\sqrt{(0)^2 + (-34)^2} = \sqrt{(-16)^2 + (h)^2}$
$(-34)^2 = (-16)^2 + (h)^2$
$1156 = 256 + h^2$
$h^2 = 900$
$h = \pm 30$

11. $\hat{\underset{\sim}{a}} = \frac{1}{3}(2\underset{\sim}{i} - k\underset{\sim}{j})$ vektor unit $|\hat{\underset{\sim}{a}}| = 1$

cari nilai k.

$\sqrt{(\frac{2}{3})^2 + (-\frac{k}{3})^2} = 1$
$\frac{4}{9} + \frac{k^2}{9} = 1$
$4 + k^2 = 9$
$k^2 = 5$
$k = \pm\sqrt{5}$

12. $\hat{\underset{\sim}{a}} = \frac{1}{4}(-3\underset{\sim}{i} - k\underset{\sim}{j})$

cari nilai k.

$\sqrt{(-\frac{3}{4})^2 + (-\frac{k}{4})^2} = 1$
$\frac{9}{16} + \frac{k^2}{16} = 1$
$9 + k^2 = 16$
$k^2 = 7$
$k = \pm\sqrt{7}$

13. $\hat{\underset{\sim}{a}} = \frac{1}{6}(-k\underset{\sim}{i} - 4\underset{\sim}{j})$

cari nilai k.

$\sqrt{(-\frac{k}{6})^2 + (-\frac{4}{6})^2} = 1$
$\frac{k^2}{36} + \frac{16}{36} = 1$
$k^2 + 16 = 36$
$k^2 = 20$
$k = \pm\sqrt{20}$

14. panjang vektor $\underset{\sim}{v}$ ialah 10 unit dan arahnya bertentangan dengan vektor $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ $-3\underset{\sim}{i} + \underset{\sim}{j}$
cari vektor $\underset{\sim}{v}$.

① $\hat{\underset{\sim}{v}} = \frac{-3\underset{\sim}{i} + \underset{\sim}{j}}{\sqrt{(-3)^2 + (1)^2}}$
$\hat{\underset{\sim}{v}} = \frac{-3\underset{\sim}{i} + \underset{\sim}{j}}{\sqrt{10}}$

② $\underset{\sim}{v} = 10\left(\frac{-3\underset{\sim}{i} + \underset{\sim}{j}}{\sqrt{10}}\right)$
$\underset{\sim}{v} = -3\sqrt{10}\,\underset{\sim}{i} + \sqrt{10}\,\underset{\sim}{j}$

15. panjang vektor $\underset{\sim}{v}$ ialah 5 unit dan arahnya bertentangan dengan vektor $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$ $4\underset{\sim}{i} - 3\underset{\sim}{j}$
cari vektor $\underset{\sim}{v}$.

① $\hat{\underset{\sim}{v}} = \frac{4\underset{\sim}{i} - 3\underset{\sim}{j}}{\sqrt{(4)^2 + (-3)^2}}$
$\hat{\underset{\sim}{v}} = \frac{4\underset{\sim}{i} - 3\underset{\sim}{j}}{5}$

② $\underset{\sim}{v} = 5\left(\frac{4\underset{\sim}{i} - 3\underset{\sim}{j}}{5}\right)$
$\underset{\sim}{v} = 4\underset{\sim}{i} - 3\underset{\sim}{j}$

16. panjang vektor $\underset{\sim}{v}$ ialah 40 unit dan arahnya bertentangan dengan vektor $\begin{pmatrix} 2 \\ -6 \end{pmatrix}$ $-2\underset{\sim}{i} + 6\underset{\sim}{j}$
cari vektor $\underset{\sim}{v}$.

① $\hat{\underset{\sim}{v}} = \frac{-2\underset{\sim}{i} + 6\underset{\sim}{j}}{\sqrt{(-2)^2 + (6)^2}}$
$\hat{\underset{\sim}{v}} = \frac{-2\underset{\sim}{i} + 6\underset{\sim}{j}}{\sqrt{40}}$

② $\underset{\sim}{v} = 40\left(\frac{-2\underset{\sim}{i} + 6\underset{\sim}{j}}{\sqrt{40}}\right)$
$\underset{\sim}{v} = -4\sqrt{10}\,\underset{\sim}{i} + 12\sqrt{10}\,\underset{\sim}{j}$

17. $\underset{\sim}{p} = (m - 1)\underset{\sim}{i} + 2\underset{\sim}{j}$
$\underset{\sim}{q} = 8\underset{\sim}{i} + n\underset{\sim}{j}$
$\underset{\sim}{p}$ dan $\underset{\sim}{q}$ adalah berserenjang. $m_1 m_2 = -1$
Ungkapkan m dalam sebutan n.

$\frac{2}{m-1}(\frac{n}{8}) = -1$
$\frac{2n}{8m-8} = -1$
$2n = -8m + 8$
$8m = -2n + 8$
$m = \frac{-2n+8}{8}$
$m = \frac{-n+4}{4}$

18. $\underset{\sim}{p} = (m + 2)\underset{\sim}{i} + 6\underset{\sim}{j}$
$\underset{\sim}{q} = 4\underset{\sim}{i} + n\underset{\sim}{j}$
$\underset{\sim}{p}$ dan $\underset{\sim}{q}$ adalah berserenjang. $m_1 m_2 = -1$
Ungkapkan m dalam sebutan n.

$\frac{6}{m+2}(\frac{n}{4}) = -1$
$\frac{6n}{4m+8} = -1$
$6n = -4m - 8$
$4m = -6n - 8$
$m = \frac{-6n-8}{4}$
$m = \frac{-3n-4}{2}$

19. $\underset{\sim}{p} = (m - 4)\underset{\sim}{i} + 9\underset{\sim}{j}$
$\underset{\sim}{q} = 3\underset{\sim}{i} + n\underset{\sim}{j}$
$\underset{\sim}{p}$ dan $\underset{\sim}{q}$ adalah berserenjang. $m_1 m_2 = -1$
Ungkapkan m dalam sebutan n.

$\frac{9}{m-4}(\frac{n}{3}) = -1$
$\frac{9n}{3m-12} = -1$
$9n = -3m + 12$
$3m = -9n + 12$
$m = \frac{-9n+12}{3}$
$m = -3n + 4$

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WORKSHEET 7: OPERASI ARITMETIK VEKTOR

1. $\underset{\sim}{a} = 5\underset{\sim}{i} + 4\underset{\sim}{j}$

$\underset{\sim}{b} = 2\underset{\sim}{i} - \underset{\sim}{j}$

$2\underset{\sim}{a} + \underset{\sim}{b} = ?$

$2(5\underset{\sim}{i} + 4\underset{\sim}{j}) + 2\underset{\sim}{i} - \underset{\sim}{j}$

$= 10\underset{\sim}{i} + 8\underset{\sim}{j} + 2\underset{\sim}{i} - \underset{\sim}{j}$

$= 12\underset{\sim}{i} + 7\underset{\sim}{j}$

2. $\underset{\sim}{a} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ $\underset{\sim}{b} = \begin{pmatrix} -1 \\ -3 \end{pmatrix}$

$\underset{\sim}{a} + 4\underset{\sim}{b} = ?$

$\begin{pmatrix} 4 \\ -2 \end{pmatrix} + 4\begin{pmatrix} -1 \\ -3 \end{pmatrix}$

$= \begin{pmatrix} 4 \\ -2 \end{pmatrix} + \begin{pmatrix} -4 \\ -12 \end{pmatrix}$

$= \begin{pmatrix} 0 \\ -14 \end{pmatrix}$

3. $\underset{\sim}{a} = -2\underset{\sim}{i} + 7\underset{\sim}{j}$

$\underset{\sim}{b} = -5\underset{\sim}{i} + 8\underset{\sim}{j}$

$-2\underset{\sim}{a} - \underset{\sim}{b} = ?$

$-2(-2\underset{\sim}{i} + 7\underset{\sim}{j}) - (-5\underset{\sim}{i} + 8\underset{\sim}{j})$

$= 4\underset{\sim}{i} - 14\underset{\sim}{j} + 5\underset{\sim}{i} - 8\underset{\sim}{j}$

$= 9\underset{\sim}{i} - 22\underset{\sim}{j}$

4. $\underset{\sim}{a} = \begin{pmatrix} -1 \\ -9 \end{pmatrix}$ $\underset{\sim}{b} = \begin{pmatrix} 3 \\ -7 \end{pmatrix}$

$-\underset{\sim}{a} - 3\underset{\sim}{b} = ?$

$-\begin{pmatrix} -1 \\ -9 \end{pmatrix} - 3\begin{pmatrix} 3 \\ -7 \end{pmatrix}$

$= \begin{pmatrix} 1 \\ 9 \end{pmatrix} - \begin{pmatrix} 9 \\ -21 \end{pmatrix}$

$= \begin{pmatrix} -8 \\ 30 \end{pmatrix}$

5. $\underset{\sim}{a} = 3\underset{\sim}{i} - 2\underset{\sim}{j}$

$\underset{\sim}{b} = -\underset{\sim}{i} + \underset{\sim}{j}$

$\underset{\sim}{c} = -2\underset{\sim}{i} + 4\underset{\sim}{j}$

$2\underset{\sim}{a} - \underset{\sim}{b} + 3\underset{\sim}{c} = ?$

$2(3\underset{\sim}{i} - 2\underset{\sim}{j}) - (-\underset{\sim}{i} + \underset{\sim}{j}) + 3(-2\underset{\sim}{i} + 4\underset{\sim}{j})$

$= 6\underset{\sim}{i} - 4\underset{\sim}{j} + \underset{\sim}{i} - \underset{\sim}{j} - 6\underset{\sim}{i} + 12\underset{\sim}{j}$

$= \underset{\sim}{i} + 7\underset{\sim}{j}$

6. $\underset{\sim}{a} = -2\underset{\sim}{i} + 5\underset{\sim}{j}$

$\underset{\sim}{b} = 3\underset{\sim}{i} - 2\underset{\sim}{j}$

$\underset{\sim}{c} = -\underset{\sim}{i} + 4\underset{\sim}{j}$

$-\underset{\sim}{a} + 3\underset{\sim}{b} - 2\underset{\sim}{c} = ?$

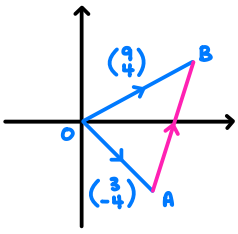
$-(-2\underset{\sim}{i} + 5\underset{\sim}{j}) + 3(3\underset{\sim}{i} - 2\underset{\sim}{j}) - 2(-\underset{\sim}{i} + 4\underset{\sim}{j})$

$= 2\underset{\sim}{i} - 5\underset{\sim}{j} + 9\underset{\sim}{i} - 6\underset{\sim}{j} + 2\underset{\sim}{i} - 8\underset{\sim}{j}$

$= 13\underset{\sim}{i} - 19\underset{\sim}{j}$

7. O(0,0) A(3,−4) B(9,4)

$\overrightarrow{AB} = ?$ $|\overrightarrow{AB}| = ?$



$\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$

$= \begin{pmatrix} -3 \\ 4 \end{pmatrix} + \begin{pmatrix} 9 \\ 4 \end{pmatrix}$

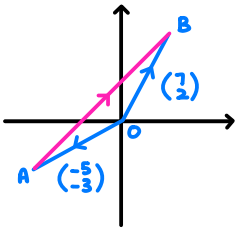
$= \begin{pmatrix} 6 \\ 8 \end{pmatrix}$

$|\overrightarrow{AB}| = \sqrt{6^2 + 8^2}$

$= 10$

8. O(0,0) A(−5,−3) B(7,2)

$\overrightarrow{AB} = ?$ $|\overrightarrow{AB}| = ?$



$\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$

$= \begin{pmatrix} 5 \\ 3 \end{pmatrix} + \begin{pmatrix} 7 \\ 2 \end{pmatrix}$

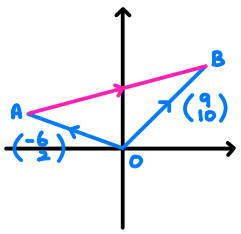
$= \begin{pmatrix} 12 \\ 5 \end{pmatrix}$

$|\overrightarrow{AB}| = \sqrt{12^2 + 5^2}$

$= 13$

9. O(0,0) A(−6,2) B(9,10)

$\overrightarrow{AB} = ?$ $|\overrightarrow{AB}| = ?$



$\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$

$= \begin{pmatrix} 6 \\ -2 \end{pmatrix} + \begin{pmatrix} 9 \\ 10 \end{pmatrix}$

$= \begin{pmatrix} 15 \\ 8 \end{pmatrix}$

$|\overrightarrow{AB}| = \sqrt{15^2 + 8^2}$

$= 17$

10. $\underset{\sim}{a} = \begin{pmatrix} 11 \\ -7 \end{pmatrix}$ $\underset{\sim}{b} = \begin{pmatrix} k \\ -13 \end{pmatrix}$

$|\underset{\sim}{a} + \underset{\sim}{b}| = 25$ unit. ①

Cari nilai k. $\underset{\sim}{a} + \underset{\sim}{b} = \begin{pmatrix} 11+k \\ -20 \end{pmatrix}$

②

$\sqrt{(11+k)^2 + (-20)^2} = 25$

$(11+k)^2 + (-20)^2 = 625$

$(11+k)(11+k) + 400 - 625 = 0$

$121 + 22k + k^2 - 225 = 0$

$k^2 + 22k - 104 = 0$

$(k-4)(k+26) = 0$

$\therefore k = 4$

$k = -26$

11. $\underset{\sim}{a} = \begin{pmatrix} 5 \\ -9 \end{pmatrix}$ $\underset{\sim}{b} = \begin{pmatrix} k \\ -7 \end{pmatrix}$

$|\underset{\sim}{a} + \underset{\sim}{b}| = 20$ unit. ①

Cari nilai k. $\underset{\sim}{a} + \underset{\sim}{b} = \begin{pmatrix} 5+k \\ -16 \end{pmatrix}$

②

$\sqrt{(5+k)^2 + (-16)^2} = 20$

$(5+k)^2 + (-16)^2 = 20^2$

$(5+k)(5+k) + 256 - 400 = 0$

$25 + 10k + k^2 - 144 = 0$

$k^2 + 10k - 119 = 0$

$(k-7)(k+17) = 0$

$\therefore k = 7$

$k = -17$

12. $\underset{\sim}{a} = \begin{pmatrix} 13 \\ k \end{pmatrix}$ $\underset{\sim}{b} = \begin{pmatrix} -11 \\ -4 \end{pmatrix}$

$|\underset{\sim}{a} - \underset{\sim}{b}| = 25$ unit. ①

Cari nilai k. $\underset{\sim}{a} + \underset{\sim}{b} = \begin{pmatrix} 24 \\ k+4 \end{pmatrix}$

②

$\sqrt{(24)^2 + (k+4)^2} = 25$

$(24)^2 + (k+4)^2 = 25^2$

$576 + (k+4)(k+4) = 625$

$k^2 + 8k + 16 + 576 - 625 = 0$

$k^2 + 8k - 33 = 0$

$(k-3)(k+11) = 0$

$\therefore k = 3$

$k = -11$

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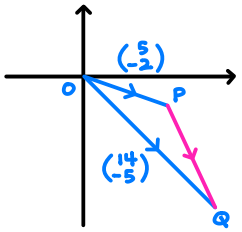
WORKSHEET 7: OPERASI ARITMETIK VEKTOR

13. $\overrightarrow{OP} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ $\overrightarrow{OQ} = \begin{pmatrix} 14 \\ -5 \end{pmatrix}$

$\overrightarrow{PR} = \frac{2}{3}\overrightarrow{PQ}$

Cari: a) $\overrightarrow{PQ}$ b) $|\overrightarrow{PR}|$



i) $\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$
$= \begin{pmatrix} -5 \\ 2 \end{pmatrix} + \begin{pmatrix} 14 \\ -5 \end{pmatrix}$
$= \begin{pmatrix} 9 \\ -3 \end{pmatrix}$

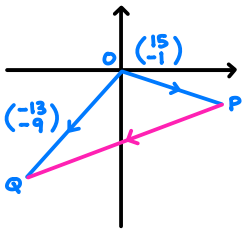
① ii) $\overrightarrow{PR} = \frac{2}{3}\overrightarrow{PQ}$
$= \frac{2}{3}\begin{pmatrix} 9 \\ -3 \end{pmatrix}$
$= \begin{pmatrix} 6 \\ -2 \end{pmatrix}$

② $|\overrightarrow{PR}| = \sqrt{(6)^2 + (-2)^2}$
$= 2\sqrt{10}$

14. $\overrightarrow{OP} = \begin{pmatrix} 15 \\ -1 \end{pmatrix}$ $\overrightarrow{OQ} = \begin{pmatrix} -13 \\ -9 \end{pmatrix}$

$\overrightarrow{PR} = \frac{3}{4}\overrightarrow{PQ}$

Cari: a) $\overrightarrow{PQ}$ b) $|\overrightarrow{PR}|$



i) $\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$
$= \begin{pmatrix} -15 \\ 1 \end{pmatrix} + \begin{pmatrix} -13 \\ -9 \end{pmatrix}$
$= \begin{pmatrix} -28 \\ -8 \end{pmatrix}$

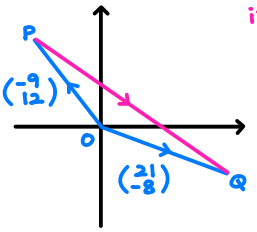
① ii) $\overrightarrow{PR} = \frac{3}{4}\overrightarrow{PQ}$
$= \frac{3}{4}\begin{pmatrix} -28 \\ -8 \end{pmatrix}$
$= \begin{pmatrix} -21 \\ -6 \end{pmatrix}$

② $|\overrightarrow{PR}| = \sqrt{(-21)^2 + (-6)^2}$
$= 3\sqrt{53}$

15. $\overrightarrow{OP} = \begin{pmatrix} -9 \\ 12 \end{pmatrix}$ $\overrightarrow{OQ} = \begin{pmatrix} 21 \\ -8 \end{pmatrix}$

$\overrightarrow{PR} = \frac{3}{5}\overrightarrow{PQ}$

Cari: a) $\overrightarrow{PQ}$ b) $|\overrightarrow{PR}|$



i) $\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$
$= \begin{pmatrix} 9 \\ -12 \end{pmatrix} + \begin{pmatrix} 21 \\ -8 \end{pmatrix}$
$= \begin{pmatrix} 30 \\ -20 \end{pmatrix}$

① ii) $\overrightarrow{PR} = \frac{3}{5}\overrightarrow{PQ}$
$= \frac{3}{5}\begin{pmatrix} 30 \\ -20 \end{pmatrix}$
$= \begin{pmatrix} 18 \\ -12 \end{pmatrix}$

② $|\overrightarrow{PR}| = \sqrt{(18)^2 + (-12)^2}$
$= 6\sqrt{13}$

16. A(−4,5) B(3,−2)

$2\overrightarrow{OA} = 5\overrightarrow{OB} + \overrightarrow{OC}$

Cari koordinat C.

$2\begin{pmatrix} -4 \\ 5 \end{pmatrix} = 5\begin{pmatrix} 3 \\ -2 \end{pmatrix} + \overrightarrow{OC}$

$\begin{pmatrix} -8 \\ 10 \end{pmatrix} = \begin{pmatrix} 15 \\ -10 \end{pmatrix} + \overrightarrow{OC}$

$\begin{pmatrix} -8 \\ 10 \end{pmatrix} - \begin{pmatrix} 15 \\ -10 \end{pmatrix} = \overrightarrow{OC}$

$\begin{pmatrix} -23 \\ 20 \end{pmatrix} = \overrightarrow{OC}$

$\therefore C(-23, 20)$

17. A(7,−4) B(−2,5)

$3\overrightarrow{OA} = -2\overrightarrow{OB} + \overrightarrow{OC}$

Cari koordinat C.

$3\begin{pmatrix} 7 \\ -4 \end{pmatrix} = -2\begin{pmatrix} -2 \\ 5 \end{pmatrix} + \overrightarrow{OC}$

$\begin{pmatrix} 21 \\ -12 \end{pmatrix} = \begin{pmatrix} 4 \\ -10 \end{pmatrix} + \overrightarrow{OC}$

$\begin{pmatrix} 21 \\ -12 \end{pmatrix} - \begin{pmatrix} 4 \\ -10 \end{pmatrix} = \overrightarrow{OC}$

$\begin{pmatrix} 17 \\ -2 \end{pmatrix} = \overrightarrow{OC}$

$\therefore C(17, -2)$

18. A(−1,−8) B(6,−2)

$4\overrightarrow{OA} = -3\overrightarrow{OB} + \overrightarrow{OC}$

Cari koordinat C.

$4\begin{pmatrix} -1 \\ -8 \end{pmatrix} = -3\begin{pmatrix} 6 \\ -2 \end{pmatrix} + \overrightarrow{OC}$

$\begin{pmatrix} -4 \\ -32 \end{pmatrix} = \begin{pmatrix} -18 \\ 6 \end{pmatrix} + \overrightarrow{OC}$

$\begin{pmatrix} -4 \\ -32 \end{pmatrix} - \begin{pmatrix} -18 \\ 6 \end{pmatrix} = \overrightarrow{OC}$

$\begin{pmatrix} 14 \\ -38 \end{pmatrix} = \overrightarrow{OC}$

$\therefore C(14, -38)$

19. $\underset{\sim}{a} = (2n - 3)\underset{\sim}{i} + (n - 6)\underset{\sim}{j}$

$\underset{\sim}{b} = -5\underset{\sim}{i} + 5\underset{\sim}{j}$

a dan b ialah vektor selari.
Cari nilai n.

$\underset{\sim}{a} = k\underset{\sim}{b}$

$(2n-3)\underset{\sim}{i} + (n-6)\underset{\sim}{j} = k(-5\underset{\sim}{i} + 5\underset{\sim}{j})$

$(2n-3)\underset{\sim}{i} + (n-6)\underset{\sim}{j} = -5k\underset{\sim}{i} + 5k\underset{\sim}{j}$

① $2n - 3 = -5k$
$2n + 5k = 3$

② $n - 6 = 5k$
$n - 5k = 6$

③ $2n + 5k = 3$
$n - 5k = 6$

$\therefore n = 3$
$k = -\frac{3}{5}$

20. $\underset{\sim}{a} = (3n - 7)\underset{\sim}{i} + (3n - 2)\underset{\sim}{j}$

$\underset{\sim}{b} = -2\underset{\sim}{i} - \underset{\sim}{j}$

a dan b ialah vektor selari.
Cari nilai n.

$\underset{\sim}{a} = k\underset{\sim}{b}$

$(3n-7)\underset{\sim}{i} + (3n-2)\underset{\sim}{j} = k(-2\underset{\sim}{i} - \underset{\sim}{j})$

$(3n-7)\underset{\sim}{i} + (3n-2)\underset{\sim}{j} = -2k\underset{\sim}{i} - k\underset{\sim}{j}$

① $3n - 7 = -2k$
$3n + 2k = 7$

② $3n - 2 = -k$
$3n + k = 2$

③ $3n + 2k = 7$
$3n + k = 2$

$\therefore n = -1$
$k = 5$

21. $\underset{\sim}{a} = (n + 5)\underset{\sim}{i} + (3n + 5)\underset{\sim}{j}$

$\underset{\sim}{b} = \underset{\sim}{i} - 2\underset{\sim}{j}$

a dan b ialah vektor selari.
Cari nilai n.

$\underset{\sim}{a} = k\underset{\sim}{b}$

$(n+5)\underset{\sim}{i} + (3n+5)\underset{\sim}{j} = k(\underset{\sim}{i} - 2\underset{\sim}{j})$

$(n+5)\underset{\sim}{i} + (3n+5)\underset{\sim}{j} = k\underset{\sim}{i} - 2k\underset{\sim}{j}$

① $n + 5 = k$
$n - k = -5$

② $3n + 5 = -2k$
$3n + 2k = -5$

③ $n - k = -5$
$3n + 2k = -5$

$\therefore n = -3$
$k = 2$

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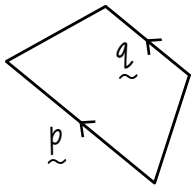
WORKSHEET 8: PENYELESAIAN MASALAH MELIBATKAN VEKTOR

1.



$\underset{\sim}{p} = \begin{pmatrix} 9 \\ -6 \end{pmatrix}$

$\underset{\sim}{q} = \begin{pmatrix} m-2 \\ -2 \end{pmatrix}$

Cari nilai m.

$\underset{\sim}{q} = k\underset{\sim}{p}$

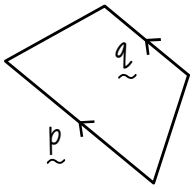
$\begin{pmatrix} m-2 \\ -2 \end{pmatrix} = k\begin{pmatrix} 9 \\ -6 \end{pmatrix}$

$\begin{pmatrix} m-2 \\ -2 \end{pmatrix} = \begin{pmatrix} 9k \\ -6k \end{pmatrix}$

① $-2 = -6k$, $k = \frac{1}{3}$

② $m - 2 = 9k$, $m = 9k + 2$, $m = 9(\frac{1}{3}) + 2$, $m = 5$

2.



$\underset{\sim}{p} = \begin{pmatrix} 12 \\ -8 \end{pmatrix}$

$\underset{\sim}{q} = \begin{pmatrix} 3 \\ m+5 \end{pmatrix}$

Cari nilai m.

$\underset{\sim}{q} = k\underset{\sim}{p}$

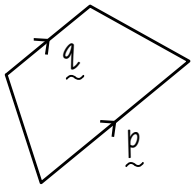
$\begin{pmatrix} 3 \\ m+5 \end{pmatrix} = k\begin{pmatrix} 12 \\ -8 \end{pmatrix}$

$\begin{pmatrix} 3 \\ m+5 \end{pmatrix} = \begin{pmatrix} 12k \\ -8k \end{pmatrix}$

① $3 = 12k$, $\frac{1}{4} = k$

② $m + 5 = -8k$, $m + 5 = -8(\frac{1}{4})$, $m + 5 = -2$, $m = -7$

3.



$\underset{\sim}{p} = \begin{pmatrix} 14 \\ 7 \end{pmatrix}$

$\underset{\sim}{q} = \begin{pmatrix} m-6 \\ 1 \end{pmatrix}$

Cari nilai m.

$\underset{\sim}{q} = k\underset{\sim}{p}$

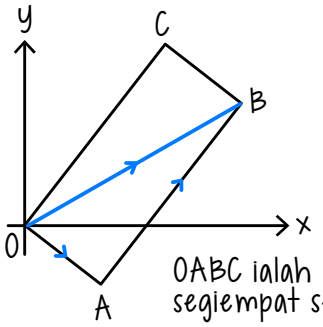
$\begin{pmatrix} m-6 \\ 1 \end{pmatrix} = k\begin{pmatrix} 14 \\ 7 \end{pmatrix}$

$\begin{pmatrix} m-6 \\ 1 \end{pmatrix} = \begin{pmatrix} 14k \\ 7k \end{pmatrix}$

① $1 = 7k$, $k = \frac{1}{7}$

② $m - 6 = 14k$, $m - 6 = 14(\frac{1}{7})$, $m - 6 = 2$, $m = 8$

4.



OABC ialah segiempat selari.

$\overrightarrow{OA} = 5\underset{\sim}{i} - 3\underset{\sim}{j}$ $\overrightarrow{OC} = 7\underset{\sim}{i} + 9\underset{\sim}{j}$

a) $\overrightarrow{OB}$ = ?

$\overrightarrow{OB} = \overrightarrow{OA} + \overrightarrow{AB}$
$= 5\underset{\sim}{i} - 3\underset{\sim}{j} + 7\underset{\sim}{i} + 9\underset{\sim}{j}$
$= 12\underset{\sim}{i} + 6\underset{\sim}{j}$

b) $\overrightarrow{CD} = 3\underset{\sim}{i} - 15\underset{\sim}{j}$

tunjukkan O, A dan D ialah segaris.

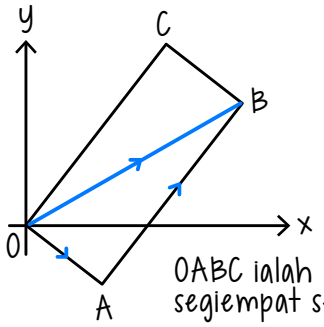
①
$\overrightarrow{OD} = \overrightarrow{OC} + \overrightarrow{CD}$
$= 7\underset{\sim}{i} + 9\underset{\sim}{j} + 3\underset{\sim}{i} - 15\underset{\sim}{j}$
$= 10\underset{\sim}{i} - 6\underset{\sim}{j}$

②
$\overrightarrow{OA} = k\overrightarrow{OD}$
$5\underset{\sim}{i} - 3\underset{\sim}{j} = k(10\underset{\sim}{i} - 6\underset{\sim}{j})$
$5\underset{\sim}{i} - 3\underset{\sim}{j} = 10k\underset{\sim}{i} - 6k\underset{\sim}{j}$

$5 = 10k$, $k = \frac{1}{2}$ $\quad -3 = -6k$, $k = \frac{1}{2}$

$\therefore \overrightarrow{OA} = \frac{1}{2}\overrightarrow{OD}$

5.



OABC ialah segiempat selari.

$\overrightarrow{OA} = 3\underset{\sim}{i} - 2\underset{\sim}{j}$ $\overrightarrow{OC} = 5\underset{\sim}{i} + 8\underset{\sim}{j}$

a) $\overrightarrow{OB}$ = ?

$\overrightarrow{OB} = \overrightarrow{OA} + \overrightarrow{AB}$
$= 3\underset{\sim}{i} - 2\underset{\sim}{j} + 5\underset{\sim}{i} + 8\underset{\sim}{j}$
$= 8\underset{\sim}{i} + 6\underset{\sim}{j}$

b) $\overrightarrow{CD} = 10\underset{\sim}{i} - 18\underset{\sim}{j}$

tunjukkan O, A dan D ialah segaris.

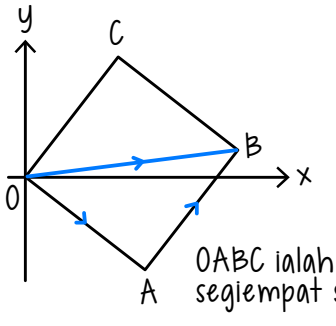
①
$\overrightarrow{OD} = \overrightarrow{OC} + \overrightarrow{CD}$
$= 5\underset{\sim}{i} + 8\underset{\sim}{j} + 10\underset{\sim}{i} - 18\underset{\sim}{j}$
$= 15\underset{\sim}{i} - 10\underset{\sim}{j}$

②
$\overrightarrow{OA} = k\overrightarrow{OD}$
$3\underset{\sim}{i} - 2\underset{\sim}{j} = k(15\underset{\sim}{i} - 10\underset{\sim}{j})$
$3\underset{\sim}{i} - 2\underset{\sim}{j} = 15k\underset{\sim}{i} - 10k\underset{\sim}{j}$

$3 = 15k$, $k = \frac{1}{5}$ $\quad -2 = -10k$, $k = \frac{1}{5}$

$\therefore \overrightarrow{OA} = \frac{1}{5}\overrightarrow{OD}$

6.



OABC ialah segiempat selari.

$\overrightarrow{OA} = 6\underset{\sim}{i} - 4\underset{\sim}{j}$ $\overrightarrow{OC} = 4\underset{\sim}{i} + 5\underset{\sim}{j}$

a) $\overrightarrow{OB}$ = ?

$\overrightarrow{OB} = \overrightarrow{OA} + \overrightarrow{AB}$
$= 6\underset{\sim}{i} - 4\underset{\sim}{j} + 4\underset{\sim}{i} + 5\underset{\sim}{j}$
$= 10\underset{\sim}{i} + \underset{\sim}{j}$

b) $\overrightarrow{CD} = 5\underset{\sim}{i} - 11\underset{\sim}{j}$

tunjukkan O, A dan D ialah segaris.

①
$\overrightarrow{OD} = \overrightarrow{OC} + \overrightarrow{CD}$
$= 4\underset{\sim}{i} + 5\underset{\sim}{j} + 5\underset{\sim}{i} - 11\underset{\sim}{j}$
$= 9\underset{\sim}{i} - 6\underset{\sim}{j}$

②
$\overrightarrow{OA} = k\overrightarrow{OD}$
$6\underset{\sim}{i} - 4\underset{\sim}{j} = k(9\underset{\sim}{i} - 6\underset{\sim}{j})$
$6\underset{\sim}{i} - 4\underset{\sim}{j} = 9k\underset{\sim}{i} - 6k\underset{\sim}{j}$

$6 = 9k$, $k = \frac{2}{3}$ $\quad -4 = -6k$, $k = \frac{2}{3}$

$\therefore \overrightarrow{OA} = \frac{2}{3}\overrightarrow{OD}$

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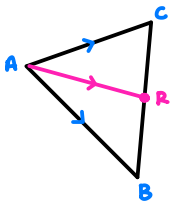
WORKSHEET 8: PENYELESAIAN MASALAH MELIBATKAN VEKTOR

7. Diberi segitiga ABC dengan $\overrightarrow{AB} = 2\underset{\sim}{i} - \underset{\sim}{j}$ dan $\overrightarrow{AC} = 10\underset{\sim}{i} + 5\underset{\sim}{j}$. R ialah satu titik pada $\overrightarrow{BC}$ dengan $\overrightarrow{BR} = \frac{1}{2}\overrightarrow{BC}$. Cari:



a) $\overrightarrow{BC}$

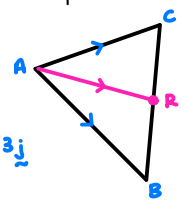
b) $\overrightarrow{AR}$

a) $\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AC}$
$= -2\underset{\sim}{i} + \underset{\sim}{j} + 10\underset{\sim}{i} + 5\underset{\sim}{j}$
$= 8\underset{\sim}{i} + 6\underset{\sim}{j}$

b) ① $\overrightarrow{BR} = \frac{1}{2}\overrightarrow{BC}$
$= \frac{1}{2}(8\underset{\sim}{i} + 6\underset{\sim}{j})$
$= 4\underset{\sim}{i} + 3\underset{\sim}{j}$

② $\overrightarrow{AR} = \overrightarrow{AB} + \overrightarrow{BR}$
$= 2\underset{\sim}{i} - \underset{\sim}{j} + 4\underset{\sim}{i} + 3\underset{\sim}{j}$
$= 6\underset{\sim}{i} + 2\underset{\sim}{j}$

8. Diberi segitiga ABC dengan $\overrightarrow{AB} = 3\underset{\sim}{i} - 2\underset{\sim}{j}$ dan $\overrightarrow{AC} = 12\underset{\sim}{i} + 13\underset{\sim}{j}$. R ialah satu titik pada $\overrightarrow{BC}$ dengan $\overrightarrow{BR} = \frac{1}{3}\overrightarrow{BC}$. Cari:



a) $\overrightarrow{BC}$

b) $\overrightarrow{AR}$

a) $\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AC}$
$= -3\underset{\sim}{i} + 2\underset{\sim}{j} + 12\underset{\sim}{i} + 13\underset{\sim}{j}$
$= 9\underset{\sim}{i} + 15\underset{\sim}{j}$

b) ① $\overrightarrow{BR} = \frac{1}{3}\overrightarrow{BC}$
$= \frac{1}{3}(9\underset{\sim}{i} + 15\underset{\sim}{j})$
$= 3\underset{\sim}{i} + 5\underset{\sim}{j}$

② $\overrightarrow{AR} = \overrightarrow{AB} + \overrightarrow{BR}$
$= 3\underset{\sim}{i} - 2\underset{\sim}{j} + 3\underset{\sim}{i} + 5\underset{\sim}{j}$
$= 6\underset{\sim}{i} + 3\underset{\sim}{j}$

9. Vektor kedudukan bandar A ialah $-10\underset{\sim}{i} + 10\underset{\sim}{j}$ dan bandar B ialah $10\underset{\sim}{i} - 11\underset{\sim}{j}$. Bandar A, B dan C terletak pada satu garis lurus dengan keadaan jarak di antara bandar A dengan C ialah dua kali jarak di antara bandar A dengan B. Cari:

a) $\overrightarrow{AB}$

b) jarak di antara bandar A dengan B

c) $\overrightarrow{OC}$

10. Vektor kedudukan bandar A ialah $-15\underset{\sim}{i} + 12\underset{\sim}{j}$ dan bandar B ialah $33\underset{\sim}{i} - 2\underset{\sim}{j}$. Bandar A, B dan C terletak pada satu garis lurus dengan keadaan jarak di antara bandar A dengan C ialah tiga kali jarak di antara bandar A dengan B. Cari:

a) $\overrightarrow{AB}$

b) jarak di antara bandar A dengan B

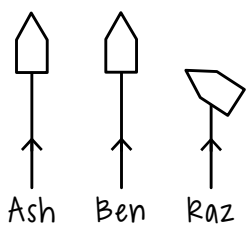
c) $\overrightarrow{OC}$

REFER EXTRA PAGE

11. Rajah menunjukkan kedudukan dan arah bot Ash dan Ben mengikut arah arus air. Halaju arus air diberi oleh $\underset{\sim}{v} = (3\underset{\sim}{i} + 8\underset{\sim}{j})$ ms^{-1}, halaju bot Ash ialah $\underset{\sim}{a} = (2\underset{\sim}{i} + 5\underset{\sim}{j})$ ms^{-1}, halaju bot Ben ialah $\underset{\sim}{b} = (4\underset{\sim}{i} + 10\underset{\sim}{j})$ ms^{-1}.

a) Kira halaju paduan bot Ash dan Ben. Seterusnya kira beza laju kedua-dua bot itu.

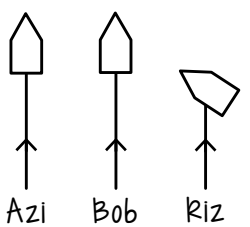
b) Bot Raz telah tersasar dari haluan. Halaju bot Raz ialah $\underset{\sim}{r} = (3\underset{\sim}{i} - \underset{\sim}{j})$ ms^{-1}. Cari vektor unit dalam arah halaju paduan bot tersebut.



11. Rajah menunjukkan kedudukan dan arah bot Azi dan Bob mengikut arah arus air. Halaju arus air diberi oleh $\underset{\sim}{v} = (5\underset{\sim}{i} + 4\underset{\sim}{j})$ ms^{-1}, halaju bot Azi ialah $\underset{\sim}{a} = (6\underset{\sim}{i} + 2\underset{\sim}{j})$ ms^{-1}, halaju bot Bob ialah $\underset{\sim}{b} = (9\underset{\sim}{i} + 3\underset{\sim}{j})$ ms^{-1}.

a) Kira halaju paduan bot Azi dan Bob. Seterusnya kira beza laju kedua-dua bot itu.

b) Bot Riz telah tersasar dari haluan. Halaju bot Riz ialah $\underset{\sim}{r} = (7\underset{\sim}{i} - 2\underset{\sim}{j})$ ms^{-1}. Cari vektor unit dalam arah halaju paduan bot tersebut.



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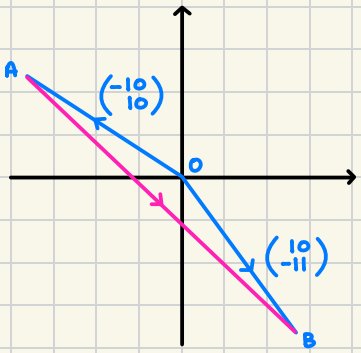
9. Vektor kedudukan bandar A ialah $-10\underset{\sim}{i} + 10\underset{\sim}{j}$ dan bandar B ialah $10\underset{\sim}{i} - 11\underset{\sim}{j}$. Bandar A, B dan C terletak pada satu garis lurus dengan keadaan jarak di antara bandar A dengan C ialah dua kali jarak di antara bandar A dengan B. Cari:

a) $\overrightarrow{AB}$

b) jarak di antara bandar A dengan B

c) $\overrightarrow{OC}$



a) $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$

$= \begin{pmatrix}10\\-10\end{pmatrix} + \begin{pmatrix}10\\-11\end{pmatrix}$

$= \begin{pmatrix}20\\-21\end{pmatrix}$

$= 20\underset{\sim}{i} - 21\underset{\sim}{j}$

b) $|\overrightarrow{AB}| = \sqrt{(20)^2 + (-21)^2}$

$= 29$

c) ①

$\overrightarrow{AC} = 2\overrightarrow{AB}$

$= 2\begin{pmatrix}20\\-21\end{pmatrix}$

$= \begin{pmatrix}40\\-42\end{pmatrix}$

②

$\overrightarrow{AC} = \overrightarrow{AO} + \overrightarrow{OC}$

$\begin{pmatrix}40\\-42\end{pmatrix} = \begin{pmatrix}10\\-10\end{pmatrix} + \overrightarrow{OC}$

$\overrightarrow{OC} = \begin{pmatrix}40\\-42\end{pmatrix} - \begin{pmatrix}10\\-10\end{pmatrix}$

$\overrightarrow{OC} = \begin{pmatrix}30\\-32\end{pmatrix}$

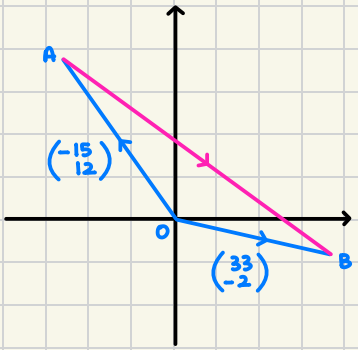
---

10. Vektor kedudukan bandar A ialah $-15\underset{\sim}{i} + 12\underset{\sim}{j}$ dan bandar B ialah $33\underset{\sim}{i} - 2\underset{\sim}{j}$. Bandar A, B dan C terletak pada satu garis lurus dengan keadaan jarak di antara bandar A dengan C ialah tiga kali jarak di antara bandar A dengan B. Cari:

a) $\overrightarrow{AB}$

b) jarak di antara bandar A dengan B

c) $\overrightarrow{OC}$



a) $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$

$= \begin{pmatrix}15\\-12\end{pmatrix} + \begin{pmatrix}33\\-2\end{pmatrix}$

$= \begin{pmatrix}48\\-14\end{pmatrix}$

$= 48\underset{\sim}{i} - 14\underset{\sim}{j}$

b) $|\overrightarrow{AB}| = \sqrt{(48)^2 + (-14)^2}$

$= 50$

c) ①

$\overrightarrow{AC} = 3\overrightarrow{AB}$

$= 3\begin{pmatrix}48\\-14\end{pmatrix}$

$= \begin{pmatrix}144\\-42\end{pmatrix}$

②

$\overrightarrow{AC} = \overrightarrow{AO} + \overrightarrow{OC}$

$\begin{pmatrix}144\\-42\end{pmatrix} = \begin{pmatrix}15\\-12\end{pmatrix} + \overrightarrow{OC}$

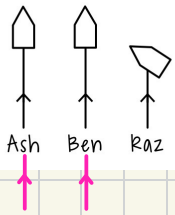
$\overrightarrow{OC} = \begin{pmatrix}144\\-42\end{pmatrix} - \begin{pmatrix}15\\-12\end{pmatrix}$

$\overrightarrow{OC} = \begin{pmatrix}129\\-30\end{pmatrix}$

11. Rajah menunjukkan kedudukan dan arah bot. Bot Ash dan Ben mengikut arah arus air. Halaju arus air diberi oleh $\underset{\sim}{v} = (3\underset{\sim}{i} + 8\underset{\sim}{j})$ ms^{-1}, halaju bot Ash ialah $\underset{\sim}{a} = (2\underset{\sim}{i} + 5\underset{\sim}{j})$ ms^{-1}, halaju bot Ben ialah $\underset{\sim}{b} = (4\underset{\sim}{i} + 10\underset{\sim}{j})$ ms^{-1}.

a) Kira halaju paduan bot Ash dan Ben. Seterusnya kira beza laju kedua-dua bot itu.

b) Bot Raz telah tersasar dari haluan. Halaju bot Raz ialah $\underset{\sim}{r} = (3\underset{\sim}{i} - \underset{\sim}{j})$ ms^{-1}. Cari vektor unit dalam arah halaju paduan bot tersebut.



a)

Ash

halaju paduan $= 2\underset{\sim}{i} + 5\underset{\sim}{j} + 3\underset{\sim}{i} + 8\underset{\sim}{j}$
$= 5\underset{\sim}{i} + 13\underset{\sim}{j}$

magnitud $= \sqrt{5^2 + 13^2}$
$= \sqrt{194}$
$= 13.9284$

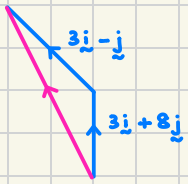
Ben

halaju paduan $= 4\underset{\sim}{i} + 10\underset{\sim}{j} + 3\underset{\sim}{i} + 8\underset{\sim}{j}$
$= 7\underset{\sim}{i} + 18\underset{\sim}{j}$

magnitud $= \sqrt{7^2 + 18^2}$
$= \sqrt{373}$
$= 19.3132$

$\therefore$ $19.3132 - 13.9284$
$= 5.3848$

b)



① halaju paduan $= 3\underset{\sim}{i} + 8\underset{\sim}{j} + 3\underset{\sim}{i} - \underset{\sim}{j}$
$= 6\underset{\sim}{i} + 7\underset{\sim}{j}$

② magnitud $= \sqrt{6^2 + 7^2}$
$= \sqrt{85}$

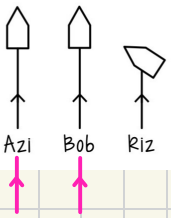
③ vektor unit $= \frac{6}{\sqrt{85}}\underset{\sim}{i} + \frac{7}{\sqrt{85}}\underset{\sim}{j}$

---

12. Rajah menunjukkan kedudukan dan arah bot. Bot Azi dan Bob mengikut arah arus air. Halaju arus air diberi oleh $\underset{\sim}{v} = (5\underset{\sim}{i} + 4\underset{\sim}{j})$ ms^{-1}, halaju bot Azi ialah $\underset{\sim}{a} = (6\underset{\sim}{i} + 2\underset{\sim}{j})$ ms^{-1}, halaju bot Bob ialah $\underset{\sim}{b} = (9\underset{\sim}{i} + 3\underset{\sim}{j})$ ms^{-1}.

a) Kira halaju paduan bot Azi dan Bob. Seterusnya kira beza laju kedua-dua bot itu.

b) Bot Riz telah tersasar dari haluan. Halaju bot Riz ialah $\underset{\sim}{r} = (7\underset{\sim}{i} - 2\underset{\sim}{j})$ ms^{-1}. Cari vektor unit dalam arah halaju paduan bot tersebut.



a)

Azi

halaju paduan $= 6\underset{\sim}{i} + 2\underset{\sim}{j} + 5\underset{\sim}{i} + 4\underset{\sim}{j}$
$= 11\underset{\sim}{i} + 6\underset{\sim}{j}$

magnitud $= \sqrt{11^2 + 6^2}$
$= \sqrt{157}$
$= 12.53$

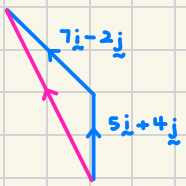
Bob

halaju paduan $= 9\underset{\sim}{i} + 3\underset{\sim}{j} + 5\underset{\sim}{i} + 4\underset{\sim}{j}$
$= 14\underset{\sim}{i} + 7\underset{\sim}{j}$

magnitud $= \sqrt{14^2 + 7^2}$
$= \sqrt{245}$
$= 15.6525$

$\therefore$ $15.6525 - 12.53$
$= 3.1225$

b)



① halaju paduan $= 5\underset{\sim}{i} + 4\underset{\sim}{j} + 7\underset{\sim}{i} - 2\underset{\sim}{j}$
$= 12\underset{\sim}{i} + 2\underset{\sim}{j}$

② magnitud $= \sqrt{12^2 + 2^2}$
$= 2\sqrt{37}$

③ vektor unit $= \frac{6}{\sqrt{37}}\underset{\sim}{i} + \frac{1}{\sqrt{37}}\underset{\sim}{j}$