Lembar Kerja Peserta Didik (LKPD)

Topik: Operasi Vektor di R2

Nama : ....

Kelas : ....

No Absen : ....

Operasi Vektor di R2

- Penjumlahan vektor
  a. Jika tidak diketahui sudut antara dua vektor, maka operasi penjumlahan vektor seperti operasi penjumlahan matriks.
  b. Jika diketahui sudut antara dua vektor:

  $$\vec{a}+\vec{b}=\sqrt{|\vec{a}|^2+\left|\vec{b}\right|^2+2|\vec{a}|\left|\vec{b}\right|\cos\alpha}$$

- Pengurangan vektor
  a. Jika tidak diketahui sudut antara dua vektor, maka operasi pengurangan vektor seperti operasi pengurangan matriks.
  b. Jika diketahui sudut antara dua vektor:

  $$\vec{a}-\vec{b}=\sqrt{|\vec{a}|^2+\left|\vec{b}\right|^2-2|\vec{a}|\left|\vec{b}\right|\cos(180^o-\alpha)}$$

- Perkalian vektor
  a. Jika tidak diketahui sudut antara dua vektor: $\vec{a}.\vec{b}=a_1b_1+a_2b_2$
  b. Jika diketahui sudut antara dua vektor: $\vec{a}.\vec{b}=|\vec{a}|\left|\vec{b}\right|\cos\alpha$
- Sudut antara dua vektor: $\cos\alpha=\frac{\vec{a}.\vec{b}}{|\vec{a}|\left|\vec{b}\right|}$

Latihan: *Selesaikan soal berikut*

Diketahui $\vec{a}=\binom{6}{4},\vec{b}=\binom{-8}{2},\vec{c}=\binom{10}{-9}$ dan $\vec{d}=\binom{-16}{-3}$.

1. Tentukan $5\vec{a}+2\vec{b}-3\vec{c}-\vec{d}$
2. Tentukan penjumlahan vektor $\vec{a}$ dan $\vec{b}$ jika besar sudut antara kedua vektor tersebut adalah 60^o.
3. Tentukan pengurangan vektor $\vec{c}$ dan $\vec{d}$ jika besar sudut antara kedua vektor tersebut adalah 60^o.
4. Tentukan perkalian vektor $\vec{a}$ dan $\vec{c}$
5. Tentukan perkalian antara vektor $\vec{b}$ dan $\vec{c}$ jika besar sudut antara kedua vektor tersebut adalah 60^o
6. Tentukan besar sudut yang terbentuk antara vektor $\vec{a}$ dan $\vec{c}$

Jawab:

No	Penyelesaian
1	Diketahui $\vec{a} = \binom{6}{4}, \vec{b} = \binom{-8}{2}, \vec{c} = \binom{10}{-9}$ dan $\vec{d} = \binom{-16}{-3}$. $5\vec{a} + 2\vec{b} - 3\vec{c} - \vec{d} = 5\binom{\dots\dots}{\dots\dots} + 2\binom{\dots\dots}{\dots\dots} - 3\binom{\dots\dots}{\dots\dots} - \binom{\dots\dots}{\dots\dots}$ $= \binom{\dots\dots}{\dots\dots} + \binom{\dots\dots}{\dots\dots} - \binom{\dots\dots}{\dots\dots} - \binom{\dots\dots}{\dots\dots}$ $= \binom{\dots\dots}{\dots\dots}$
2	Diketahui $\vec{a} = \binom{6}{4}, \vec{b} = \binom{-8}{2}$ dan $\alpha = 60^o \rightarrow a_1 = \dots\dots, a_2 = \dots\dots, b_1 = \dots\dots, b_2 = \dots\dots$ $\|\vec{a}\| = \sqrt{a_1^2 + a_2^2} = \sqrt{\dots\dots^2 + \dots\dots^2} = \sqrt{\dots\dots + \cdots\dots} = \sqrt{\dots\dots}$ $\|\vec{b}\| = \sqrt{b_1^2 + b_2^2} = \sqrt{\dots\dots^2 + \dots\dots^2} = \sqrt{\dots\dots + \cdots\dots} = \sqrt{\dots\dots}$ $\vec{a} + \vec{b} = \sqrt{\|\vec{a}\|^2 + \|\vec{b}\|^2 - 2\|\vec{a}\|\|\vec{b}\| \cos\alpha}$ $= \sqrt{(\sqrt{\dots\dots})^2 + (\sqrt{\dots\dots})^2 + 2(\sqrt{\dots\dots})(\sqrt{\dots\dots}) \cos \dots\dots^o}$ $= \sqrt{\dots\dots + \cdots\dots + 2(\sqrt{\dots\dots})x\left(\frac{\dots\dots}{\dots\dots}\right)}$ $= \sqrt{\dots\dots + \sqrt{\dots\dots\dots}}$ $= \sqrt{\dots\dots + \sqrt{\dots\dots x \dots\dots}}$ $= \sqrt{\dots\dots + \cdots\dots\sqrt{\dots\dots}}$ Jadi, $\vec{a} + \vec{b} = \sqrt{\dots\dots + \cdots\dots\sqrt{\dots\dots}}$
3	Diketahui $\vec{c} = \binom{10}{-9}, \vec{d} = \binom{-16}{-3}$ dan $\alpha = 60^o \rightarrow c_1 = \dots\dots, c_2 = \dots\dots, d_1 = \dots\dots, d_2 = \dots\dots$ $\|\vec{c}\| = \sqrt{c_1^2 + c_2^2} = \sqrt{\dots\dots^2 + \dots\dots^2} = \sqrt{\dots\dots + \cdots\dots} = \sqrt{\dots\dots}$ $\|\vec{d}\| = \sqrt{d_1^2 + d_2^2} = \sqrt{\dots\dots^2 + \dots\dots^2} = \sqrt{\dots\dots + \cdots\dots} = \sqrt{\dots\dots}$ $\vec{c} + \vec{d} = \sqrt{\|\vec{c}\|^2 + \|\vec{d}\|^2 - 2\|\vec{c}\|\|\vec{d}\| \cos(180 - \alpha)}$ $= \sqrt{(\sqrt{\dots\dots})^2 + (\sqrt{\dots\dots})^2 - 2(\sqrt{\dots\dots})(\sqrt{\dots\dots}) \cos(180 - \cdots\dots)}$

	$= \sqrt{\dots\dots + \cdots\dots - 2(\sqrt{\dots\dots})\cos\dots\dots.}$ $= \sqrt{\dots\dots + \cdots\dots - 2(\sqrt{\dots\dots})x\left(\frac{-}{-}\right)}$ $= \sqrt{\dots\dots + \sqrt{\dots\dots\dots}}$ Jadi, $\vec{c} - \vec{d} = \sqrt{\dots\dots + \sqrt{\dots\dots\dots}}$
4	Diketahui $\vec{a} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$ dan $\vec{c} = \begin{pmatrix} 10 \\ -9 \end{pmatrix} \rightarrow a_1 = \dots\dots,\ a_2 = \dots\dots,\ c_1 = \dots\dots,\ c_2 = \dots\dots$ $\vec{a}.\vec{c} = a_1c_1 + a_2c_2 = (\dots\dots.)(\dots\dots.) + (\dots\dots.)(\dots\dots.) = \dots\dots\dots + \dots\dots\dots = \dots\dots\dots\dots\dots$ Jadi, $\vec{a}.\vec{c} = \dots\dots\dots$
5	Diketahui $\vec{b} = \begin{pmatrix} -8 \\ 2 \end{pmatrix}, \vec{c} = \begin{pmatrix} 10 \\ -9 \end{pmatrix}$ dan $\alpha = 60^o \rightarrow b_1 = \dots\dots,\ b_2 = \dots\dots,\ c_1 = \dots\dots,\ c_2 = \dots\dots$ $\lvert\vec{b}\rvert = \sqrt{b_1^2 + b_2^2} = \sqrt{\dots\dots^2 + \dots\dots^2} = \sqrt{\dots\dots + \cdots\dots} = \sqrt{\dots\dots}$ $\lvert\vec{c}\rvert = \sqrt{c_1^2 + c_2^2} = \sqrt{\dots\dots^2 + \dots\dots^2} = \sqrt{\dots\dots + \cdots\dots} = \sqrt{\dots.\dots}$ $\vec{a}.\vec{b} = \lvert\vec{a}\rvert\lvert\vec{b}\rvert\cos\alpha = (\sqrt{\dots\dots})(\sqrt{\dots\dots})\cos\dots\dots$ $= (\sqrt{\dots\dots\dots})\left(\frac{\dots\dots}{\dots\dots}\right)$ $= (\sqrt{\dots\dots.x\dots\dots\dots})\left(\frac{\dots\dots}{\dots\dots}\right)$ $= \dots.\dots\sqrt{\dots\dots\dots\dots}\left(\frac{\dots\dots}{\dots\dots}\right)$ $= \sqrt{\dots\dots\dots\dots}$ Jadi, $\vec{a}.\vec{b} = \sqrt{\dots\dots\dots\dots}$
6	Diketahui $\vec{a} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$ dan $\vec{c} = \begin{pmatrix} 10 \\ -9 \end{pmatrix} \rightarrow a_1 = \dots\dots,\ a_2 = \dots\dots,\ c_1 = \dots\dots,\ c_2 = \dots\dots$ $\lvert\vec{a}\rvert = \sqrt{a_1^2 + a_2^2} = \sqrt{\dots\dots^2 + \dots\dots^2} = \sqrt{\dots\dots + \cdots\dots} = \sqrt{\dots\dots\dots}$ $\lvert\vec{c}\rvert = \sqrt{c_1^2 + c_2^2} = \sqrt{\dots\dots^2 + \dots\dots^2} = \sqrt{\dots\dots + \cdots\dots} = \sqrt{\dots\dots\dots}$

	$\vec{a}.\vec{c} = a_1c_1 + a_2c_2$ = (.......)(.......) + (.......)(.......) = ... + ... = ... $\cos\alpha = \frac{\vec{a}.\vec{c}}{\lvert\vec{a}\rvert\lvert\vec{c}\rvert} = \frac{\text{.................}}{(\sqrt{\text{...........}})(\sqrt{\text{............}})} = \frac{\text{................}}{\sqrt{\text{............}}}$ =................ α = arc cos .... = ...^{o} Jadi, besar sudut antara vektor $\vec{a}$ dan $\vec{c}$ adalah ....^{o}