

YAKEEN NEET 2.0

2026

Vectors

PHYSICS

Lecture - 04

By - Saleem Ahmed Sir

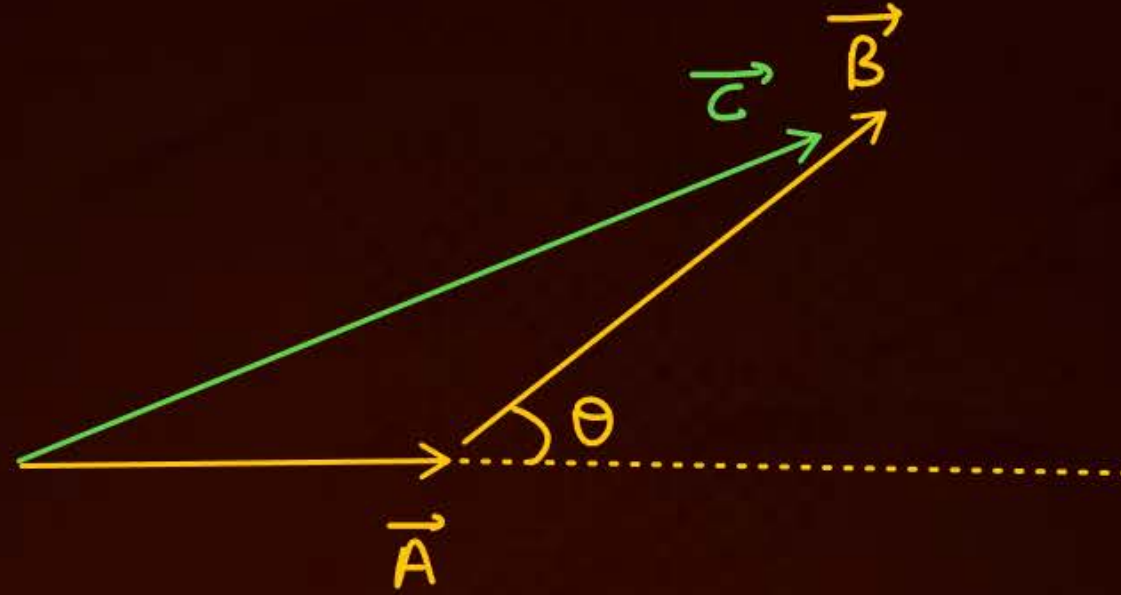


Today's Goal

- Ques Practice on addition of two vector
- Substraction of two vector.

$$\vec{A} \quad \vec{B}$$

$$|\vec{A}| = A \quad |\vec{B}| = B$$



$$A + B =$$

$$\vec{A} + \vec{B} = \vec{C} \quad \left\{ \begin{array}{l} \text{Resultant of } \vec{A} \text{ \& } \vec{B} \\ \text{Addition of } \vec{A} \text{ \& } \vec{B} \end{array} \right.$$

$$C = \sqrt{A^2 + B^2 + 2AB \cos \theta}$$

$$A, B, C \rightarrow +ve$$

Q Resultant of \vec{A} & \vec{B} is perpendicular to \vec{A} . If magnitude of resultant is half of the magnitude of \vec{B} . Find angle between \vec{A} & \vec{B} .

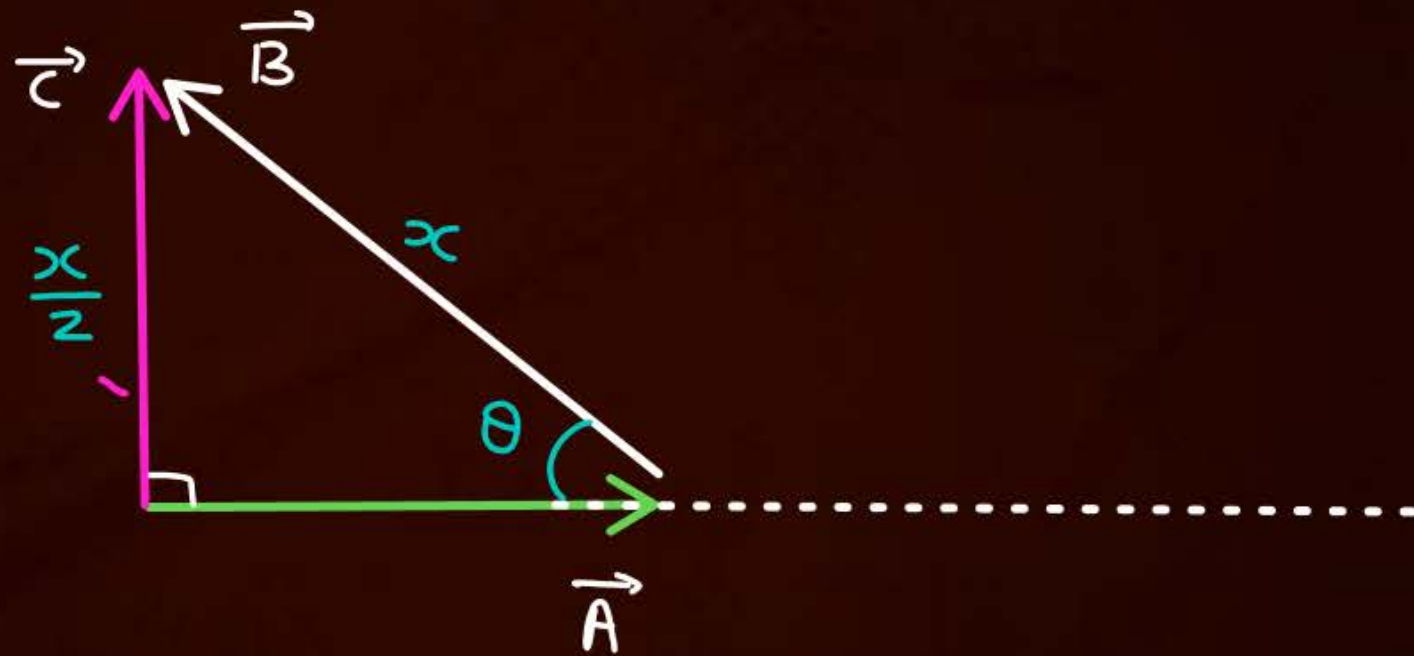
Solⁿ

$$\vec{A} + \vec{B} = \vec{C}$$

$$\sin \theta = \frac{x/2}{x} = \frac{1}{2}$$

$$\theta = 30^\circ$$

$$\text{Ans} = 15^\circ$$



Silly

(m-2)

$$(28)^2 = (3x)^2 + (5x)^2 + 2 \times 3x \times 5x \cos 60^\circ$$
$$= (9 + 25 + 15)x^2 = 49x^2$$

$$28 = 7x \quad \boxed{x = 4}$$

Ans $3x$ & $5x \Rightarrow 12$ & 20

Q Two forces have their magnitude in ratio 3:5 & their resultant is 28 N. Find magnitude of each force if angle between them is 60° .

Solⁿ

$$\frac{A}{B} = \frac{3}{5}$$

$$A = \frac{3B}{5}$$

$$28 = \sqrt{A^2 + B^2 + 2AB \cos 60^\circ}$$

$$(28)^2 = \frac{9}{25}B^2 + B^2 + \frac{3B}{5} \cdot B$$

$$= \left(\frac{9 + 25 + 15}{25} \right) B^2$$

$$(28)^2 = \frac{49}{25}B^2$$

$$28 = \frac{7}{5}B$$

$$\boxed{B = 20} \quad \boxed{A = 12}$$

$$C = \sqrt{A^2 + B^2 + 2AB \cos \theta}$$

$$C_{\max} \Rightarrow (\cos \theta)_{\max} = 1 \Rightarrow \theta = 0^\circ$$

$$C_{\max} = \sqrt{A^2 + B^2 + 2AB} = (A+B)$$

$$C_{\min} \Rightarrow (\cos \theta)_{\min} = -1, (\text{when } \theta = 180^\circ)$$

$$C_{\min} = \sqrt{A^2 + B^2 - 2AB} = |A-B|$$

= (Bada wala - Chota wala)

$$C_{\max} = A+B, (\text{when } \theta = 0^\circ)$$

$$C_{\min} = |A-B|, (\text{when } \theta = 180^\circ)$$

$$|A-B| \leq C \leq A+B$$

Q $A = 10\text{ N}$
 $B = 6\text{ N}$

$$\vec{A} + \vec{B} = \vec{C}$$

magnitude of $C \Rightarrow C_{\max} = 10 + 6 = 16$
 $C_{\min} = 10 - 6 = 4$

$$4 \leq C \leq 16$$

Q If two forces of magnitude 10N and 4N acting on a particle.
which of the following can be possible value of resultant.

☒ (A) 16N

☐ (B) 4N

☒ (C) 6N

☒ (D) 13N

☒ (E) 14N

☒ (F) 13.999 N

☐ (G) 14.0001 N

☒ (H) 6.0001 N

☐ (I) 5.9999 N

☐ (J) 20N

☐ (K) 0N

$$C_{\max} = 14$$

$$C_{\min} = 6$$

$$6 \leq C \leq 14$$

Q maximum and minimum value of resultant of \vec{A} & \vec{B} are 17N and 7N. Find

$$\textcircled{1} \frac{A}{B} = \frac{12}{5}$$

$$\begin{array}{r} A+B=17 \\ A-B=7 \\ \hline \text{Add } A=12, B=5 \end{array}$$

② Resultant of \vec{A} & \vec{B} when both vector are orthogonal to each other.

$$C = \sqrt{A^2 + B^2} = \sqrt{5^2 + 12^2} = \underline{13}$$

Note पढ करे



Q maximum and minimum resultant of two vector is 10 Unit & 6 Unit
If each force is increase by 3 Unit by keeping their direction same
find resultant of new vector if both vector are orthogonal to each other.

sol

$$A + B = 10$$

$$A - B = 6$$

$$A = 8, B = 2$$

11

5

$$\sqrt{(11)^2 + 5^2} = \sqrt{121 + 25}$$

$$= \sqrt{146}$$

Q If two forces \vec{A} & \vec{B} of magnitude 10N and 20N are acting at an angle 60° b/w them.

(a) find the magnitude of resultant $(\vec{A} + \vec{B})$

Sol $C = \sqrt{(10)^2 + (20)^2 + 2 \times 10 \times 20 \times \cos 60^\circ} = 10\sqrt{7}$

** (b) If \vec{B} is reversed and added to \vec{A} find magnitude of new resultant.

Sol

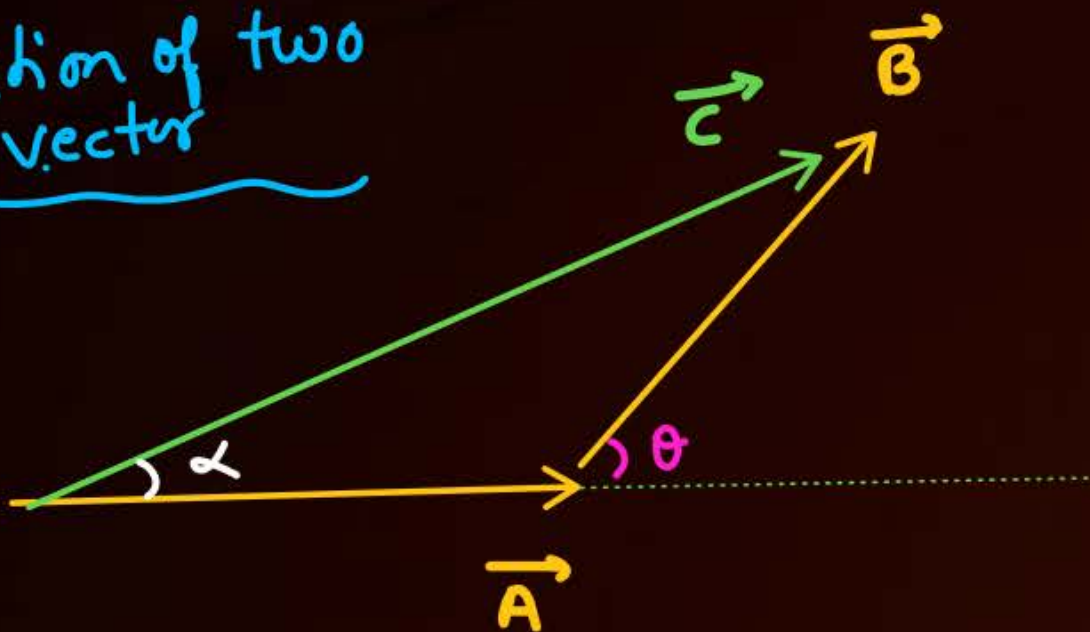
$$\begin{aligned} & \vec{A} + (-\vec{B}) \\ &= \vec{A} - \vec{B} \end{aligned}$$

or

$$C = \sqrt{10^2 + 20^2 + 2 \times 10 \times 20 \times \cos(180^\circ - 60^\circ)} = 10\sqrt{3}$$

$$\begin{aligned} C_{\text{net}} &= \sqrt{10^2 + 20^2 - 2 \times 10 \times 20 \cos 60^\circ} \\ &= 10\sqrt{3} \end{aligned}$$

Addition of two vector



$$* \quad \vec{A} + \vec{B} = \vec{C}$$

$$* \quad C = \sqrt{A^2 + B^2 + 2AB \cos \theta}$$

$$* \quad \tan \alpha = \frac{B \sin \theta}{A + B \cos \theta}$$

Angle made by \vec{C} with \vec{A}

Substraction of two Vector

- $\vec{A} - \vec{B} = \vec{A} + (-\vec{B}) = \vec{D}$
- θ is the angle b/w \vec{A} & \vec{B} .



$$D = \sqrt{A^2 + B^2 + 2AB \cos (180 - \theta)}$$

$$D = \sqrt{A^2 + B^2 - 2AB \cos \theta}$$

$$\tan \alpha = \frac{B \sin (180 - \theta)}{A + B \cos (180 - \theta)} = \frac{B \sin \theta}{A - B \cos \theta}$$

Q $A = 10$
 $B = 5$

Angle b/w \vec{A} & $\vec{B} = \theta = 60^\circ$

$$\vec{A} + \vec{B} = \vec{C}$$

$$\vec{A} - \vec{B} = \vec{D}$$

① Find magnitude of $\vec{A} + \vec{B} = \vec{C}$

$$C = \sqrt{10^2 + 5^2 + 2 \times 10 \times 5 \times \cos 60^\circ}$$

Agar \vec{C} ने \vec{A} के साथ Angle α बनाया

$$\tan \alpha = \frac{5 \sin 60^\circ}{10 + 5 \cos 60^\circ}$$

② Find magnitude of $\vec{A} - \vec{B} = \vec{D}$

$$C = \sqrt{10^2 + 5^2 - 2 \times 10 \times 5 \times \cos 60^\circ}$$

Agar \vec{D} ने \vec{A} के साथ Angle α बनाया

$$\tan \alpha = \frac{5 \sin 60^\circ}{10 - 5 \cos 60^\circ}$$

$$|\vec{A} + \vec{B}| = C = \sqrt{A^2 + B^2 + 2AB \cos \theta}$$

$$|\vec{A} - \vec{B}| = D = \sqrt{A^2 + B^2 - 2AB \cos \theta} \quad \theta = \text{angle between } \vec{A} \text{ \& } \vec{B}$$

$$|\vec{A} - \vec{B}| = D = \sqrt{A^2 + B^2 + 2AB \cos (180 - \theta)} \quad \theta \rightarrow \text{Angle b/w } \vec{A} \text{ \& } \vec{B} \text{ तो}$$

Angle between \vec{A} \& $-\vec{B}$
(180 - \theta)

$$D = \sqrt{A^2 + B^2 - 2AB \cos \theta}$$

SKC

Agar \vec{A} Aur \vec{B} ke beech angle θ hai to \vec{A} Aur $-\vec{B}$ ke beech angle $180-\theta$ hoga.

$$F = ma \rightarrow \sqrt{3}$$

Q Two forces F_1 & F_2 are acting on a particle at 120° . If one force is reversed acc of the particle become $\sqrt{3}$ times to previous.

find $\frac{F_1}{F_2} = ?$

soln — ① & ②

$$3F_1^2 + 3F_2^2 - 3F_1F_2 = F_1^2 + F_2^2 + F_1F_2$$

$$2F_1^2 + 2F_2^2 - 4F_1F_2 = 0$$

$$F_1^2 + F_2^2 - 2F_1F_2 = 0$$

$$(F_1 - F_2)^2 = 0$$

$$\boxed{F_1 = F_2}$$

$$\frac{F_1}{F_2} = 1$$

Solⁿ

$$R^2 = F_1^2 + F_2^2 + 2F_1F_2 \cos 120^\circ$$

$$R^2 = F_1^2 + F_2^2 - F_1F_2 \quad \text{--- ①}$$

$$(R\sqrt{3})^2 = F_1^2 + F_2^2 + 2F_1F_2 \cos 60^\circ$$

$$3R^2 = F_1^2 + F_2^2 + F_1F_2 \quad \text{--- ②}$$

Q Two forces F_1 & F_2 are acting on a particle at 120° . If one force is reversed acc of the particle become $\sqrt{3}$ times to previous.

find $\frac{F_1}{F_2} = ?$

Solⁿ

$$F_{\text{net}} = F^2 = \sqrt{F_1^2 + F_2^2 - F_1 F_2}$$

$$3F^2 = F_1^2 + F_2^2 + 2F_1 F_2 \cos 60^\circ \quad F = ma$$

$$\theta = 120^\circ \Rightarrow \vec{F_1} \Delta \vec{F_2}$$

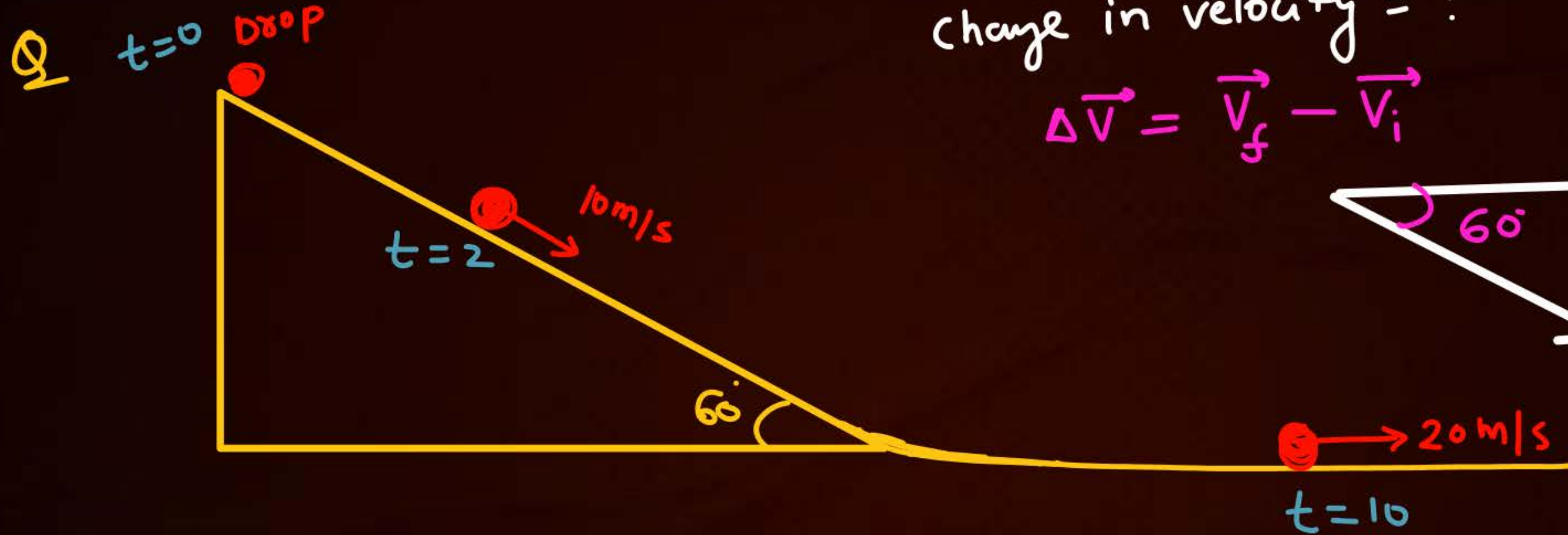
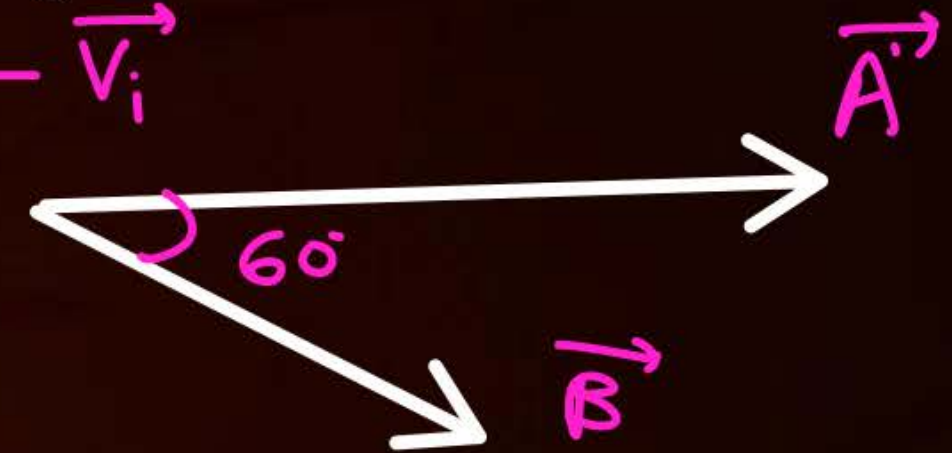
$$180 - \theta = 60^\circ$$

$\vec{F_1}$ & $-\vec{F_2}$

① $t=2 \longrightarrow t=10$

change in velocity = ?

$$\Delta \vec{V} = \vec{V}_f - \vec{V}_i$$



$$\Delta V = \sqrt{20^2 + 10^2 - 2 \times 10 \times 20 \cos 60}$$

$$= 10\sqrt{3}$$

join
it →



Homework

- DPP
- KPP-08 (will be uploaded At evening)
- HCV page 29
Ex. 6, 10, 22, 23, 25,
↓
just see phy.
(Calculation you can ignore)

Thank
You