YAKEEN NEET 2.0

2026

(One Shot)

Vectors

Physics

Summary Lecture

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In scalar P.Q →

{ +ve, −ve } mince
large / small

Scalar

No dirⁿ

→ Follow simple addⁿ / subⁿ

→ Mass, work

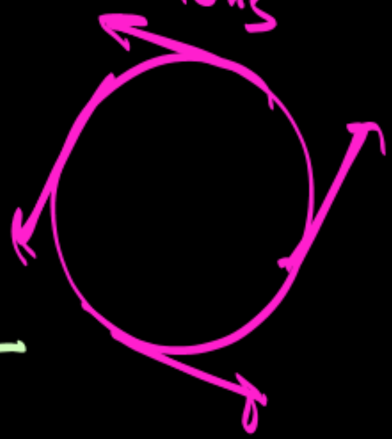
→ Speed = 10m/s — How fast

Tempʳ = 303 K.

e.m.f = Potential

length / Volume

↓ Current / density
energy



vector

Have dirⁿ + follow Triangle of addⁿ

Velocity = How fast / where

* force ⇒ 5N $\hat{i}$
* displᵐ, accⁿ
electric field
Current densit
Area (dirⁿ)

In vector +ve, −ve repres dirⁿ

→ follow Triangle law vect addⁿ

→ vector can be change by dirⁿ
or by mag
or by mag & dirⁿ

Ex

$m_1 = 2kg$, $m_2 = 4kg$ → $m_1 + m_2 = 6kg$

$f_1 = 10N$, $f_2 = 20N$ → $f_1 + f_2 = 30N$ ✓, 25N ✓, = 20N, 15 ✓, f_{M} = 10N ✓

→ 10N, → 20N } 30N

→ 20, ← 10N } 10N

Representation

Mathmatics

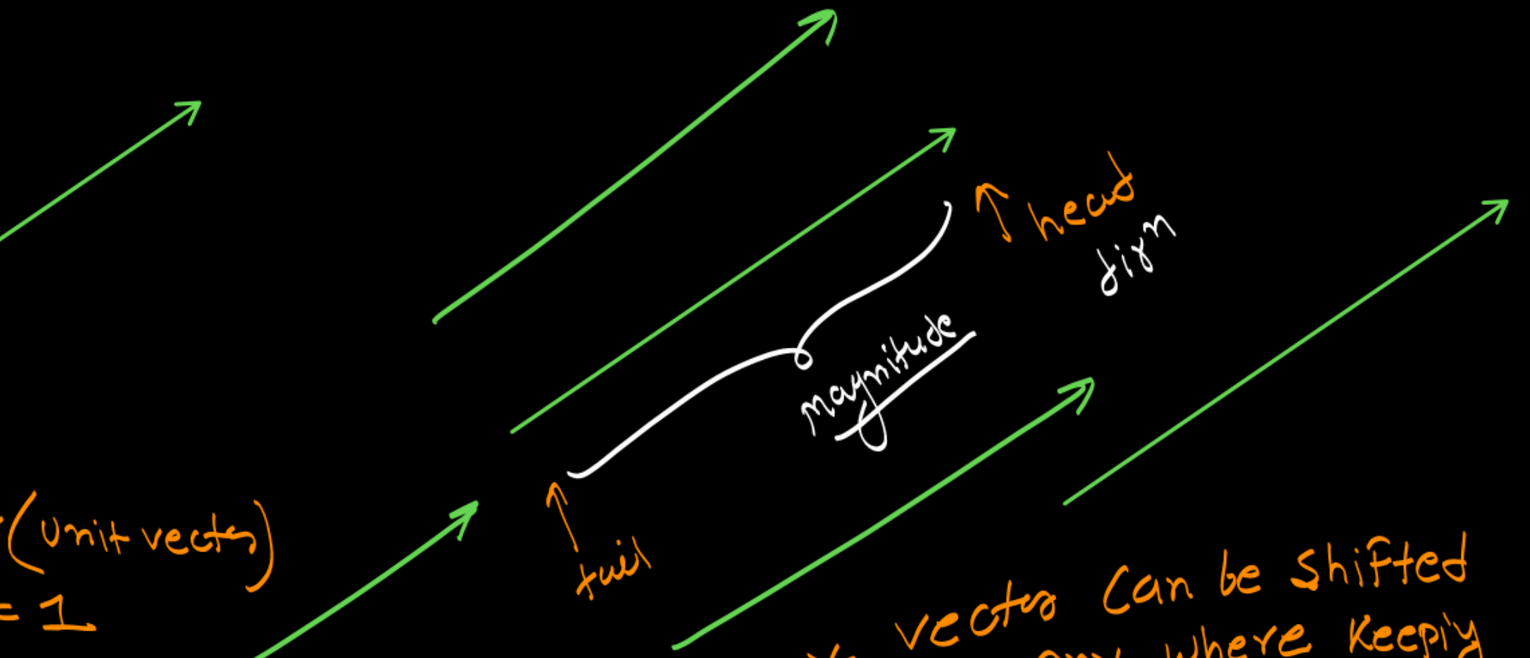
$\vec{A} = A\,\hat{A}$

A → Magnitude

$\hat{A}$ → dirn vector (Unit vector)

→ magnitude = 1

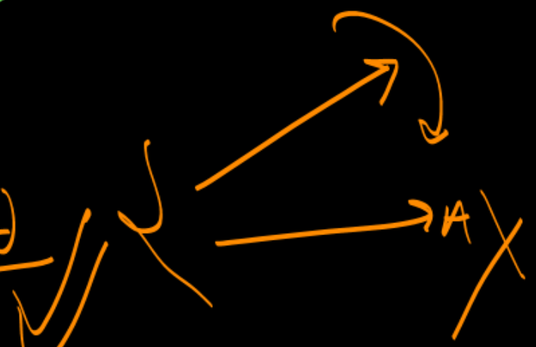
$$\hat{A} = \frac{\vec{A}}{A}$$



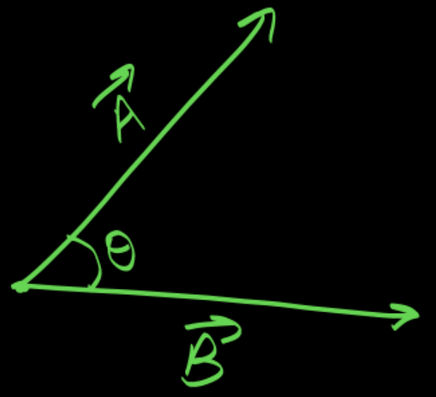
* vectors can be shifted any where keeping its magn & dirn same.

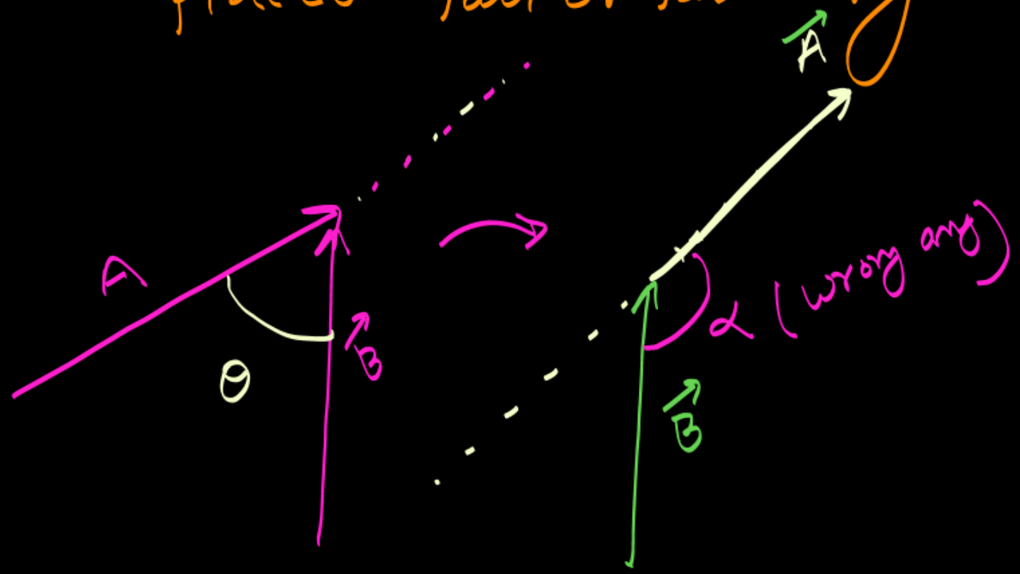
Rotn ($\theta \neq 360°$) is Not allowed

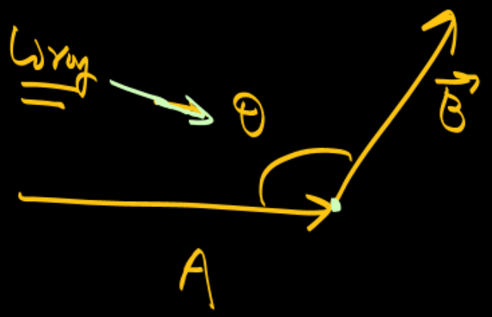
$\theta = 360°$ → vector Rotn is allowed

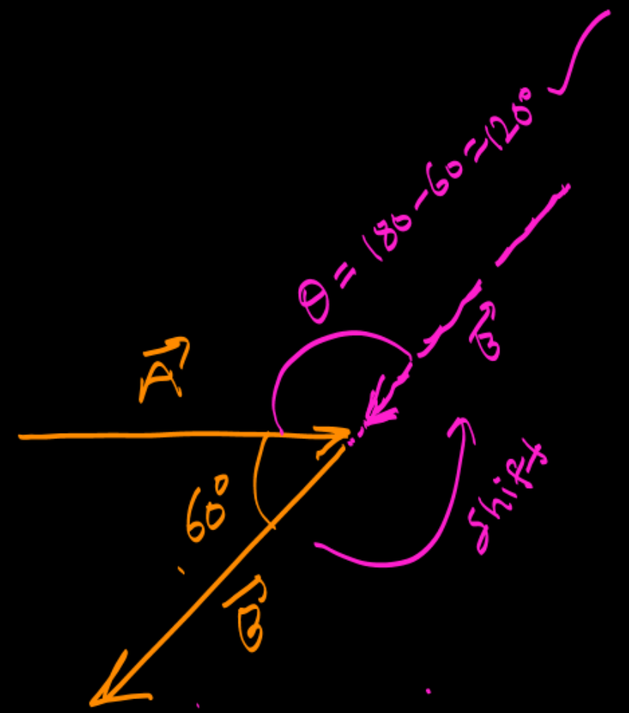


Angle b/w Vectors → Smaller angle b/w the vectors when they placed tail or tail together or head-head together



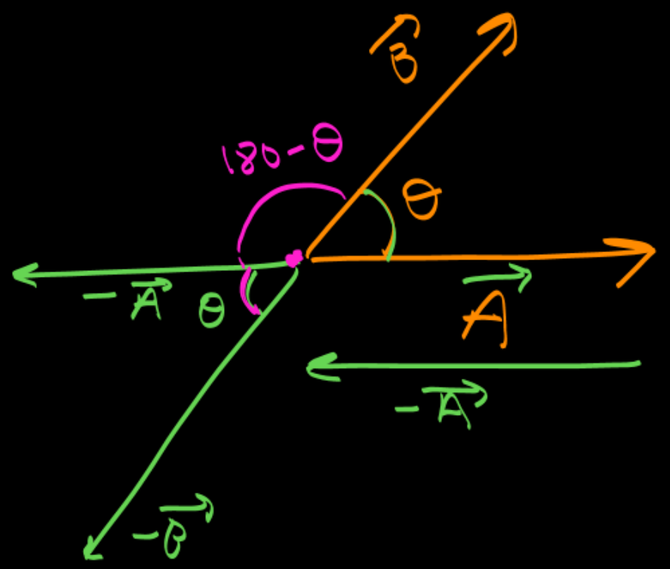




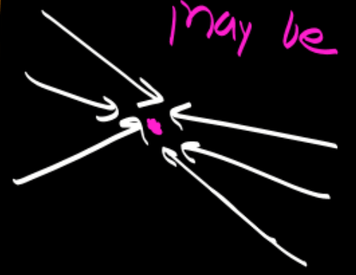


If Angle b/w $\vec{A}$ & $\vec{B}$ is θ then Angle b/w $\vec{A}$ & $-\vec{B}$ is $180-\theta$.

& $-\vec{A}$ & $-\vec{B}$ is θ



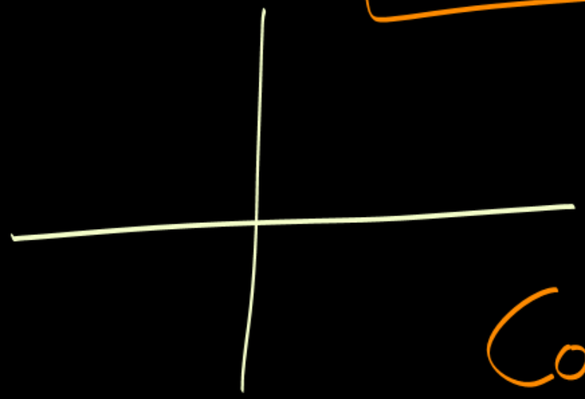
Type of vector	magnitude	dirn	diagram
(A) equal vector	Same	Same ($\theta=0$)	$\vec{A}$, $\vec{B}$
(B) Parall vectors	may be same or not	Same ($\theta=0$)	$\vec{A}$, $\vec{B}$, $\vec{C}$
(C) −ve vector (opposite vector)	Same	opposite ($\theta=180^\circ$)	$\vec{A}$, $-\vec{A}$
(d) anti Parallel vecto	may be same or diff	$\theta=180^\circ$	$\vec{A}$, $\vec{B}$
(e) orthogonal.	may be sure	$\theta=90^\circ$	A, B
(f) unit vector	1 (one)	$\hat{A}=\frac{\vec{A}}{A}$	
(g) zero vector (null vector)	zero	may be any where	Ex velocity of CAR at rest.
(h) Co-Plane vector	may be same	Same Plane 2-D space	
(I) Concurrent vecto	Point of actin same (may be		

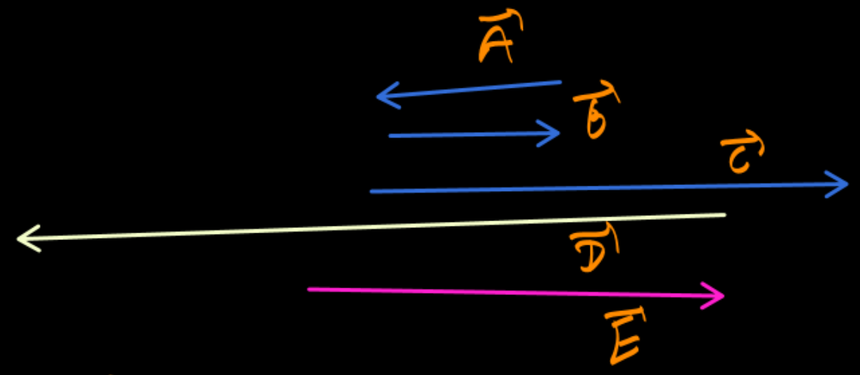


axial vector

→ Rotn → $\vec{\omega}$, $\vec{\alpha}$, $\vec{\tau}$, L

→ dirn along axis of Rotn





Colinear → along the same line

Equal vector

→ $(\vec{C}, \vec{D})$

-ve vector

$(\vec{A}, \vec{H})$ $(\vec{C}, \vec{F})$

Parallel vector

→ $(\vec{A}, \vec{B})$, (C, D)

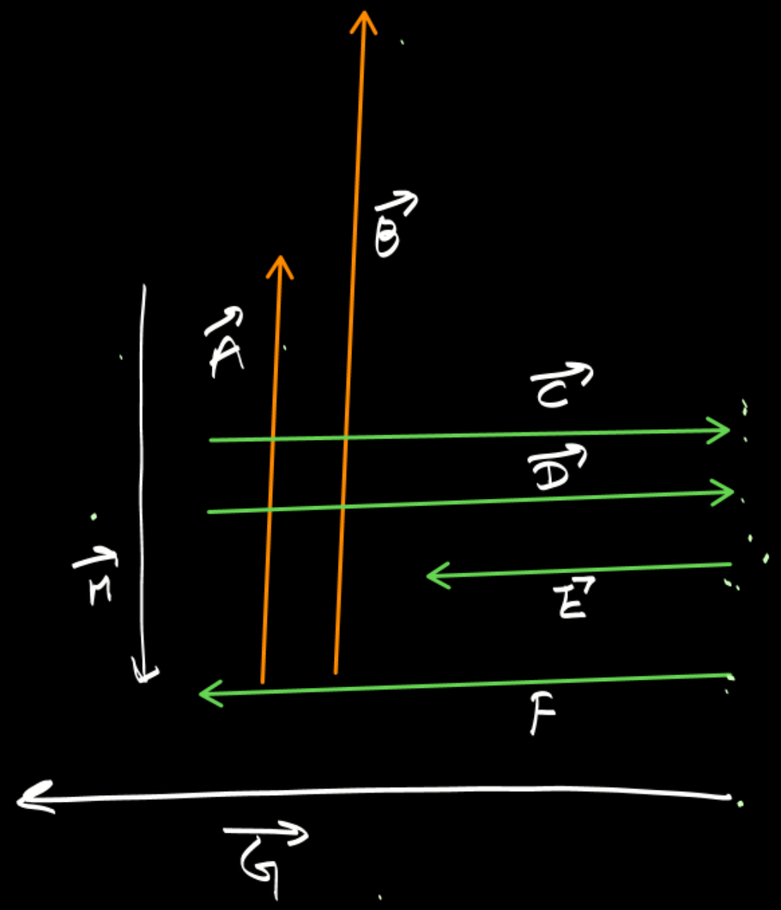
(E, F) (E, G) (G, F)

Anti Paral

(A, H), (B, H), (C, E) (D, E) (E, C) (E, D) (G, C) (G, D)

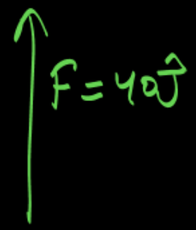
Orthogn

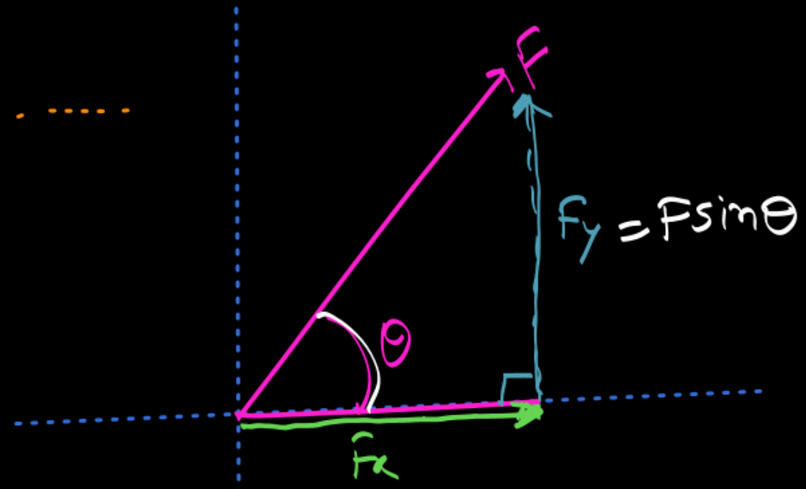
(H, C) [illegible]

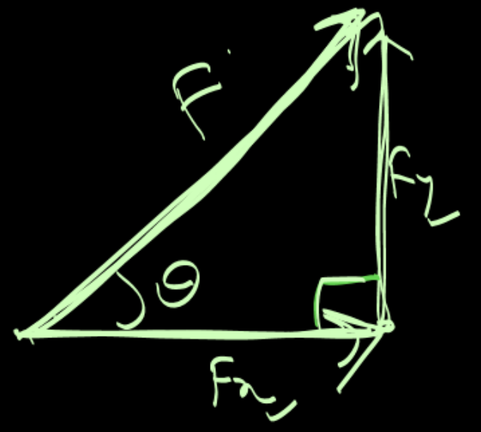


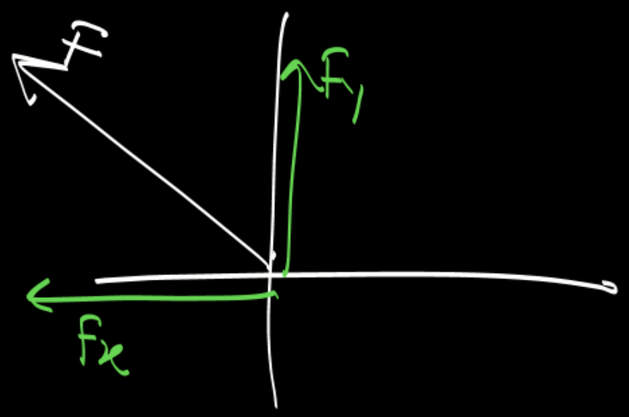
Component of vector

effect of vector → vector को तोड़ना



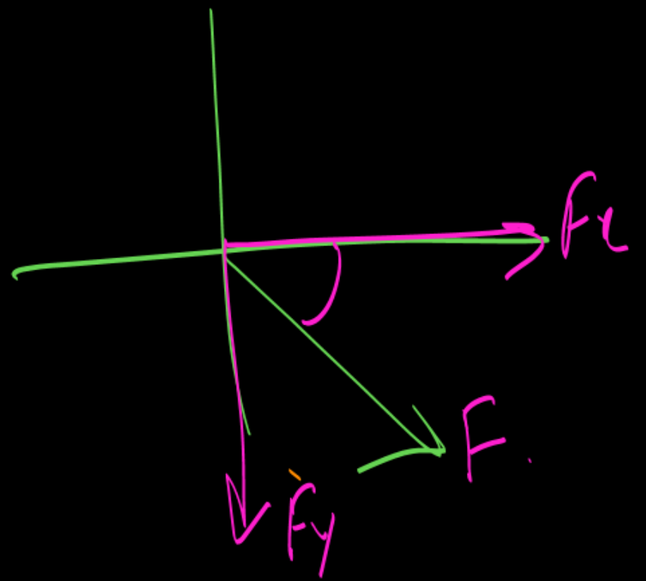


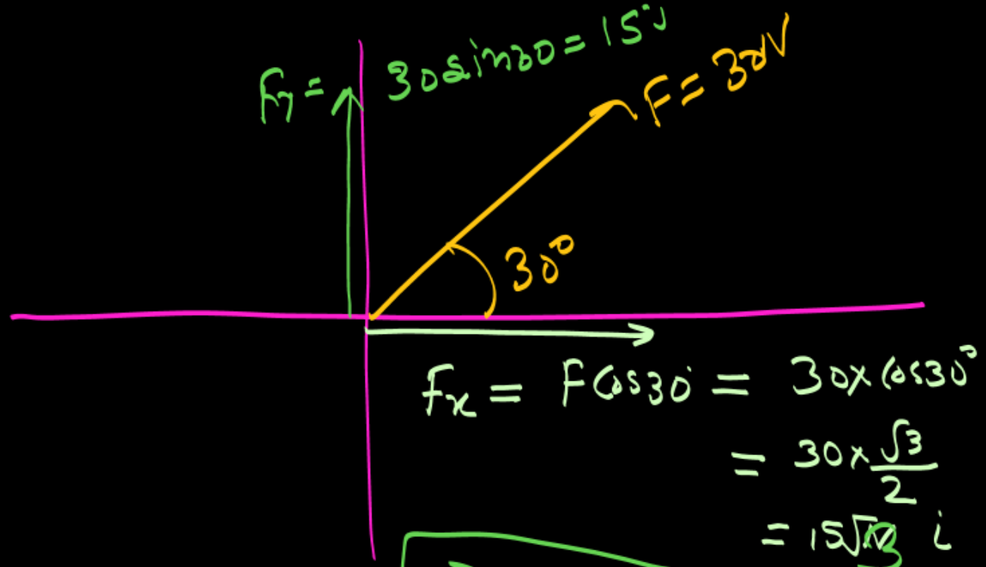




$$\cos\theta = \frac{F_x}{F}$$

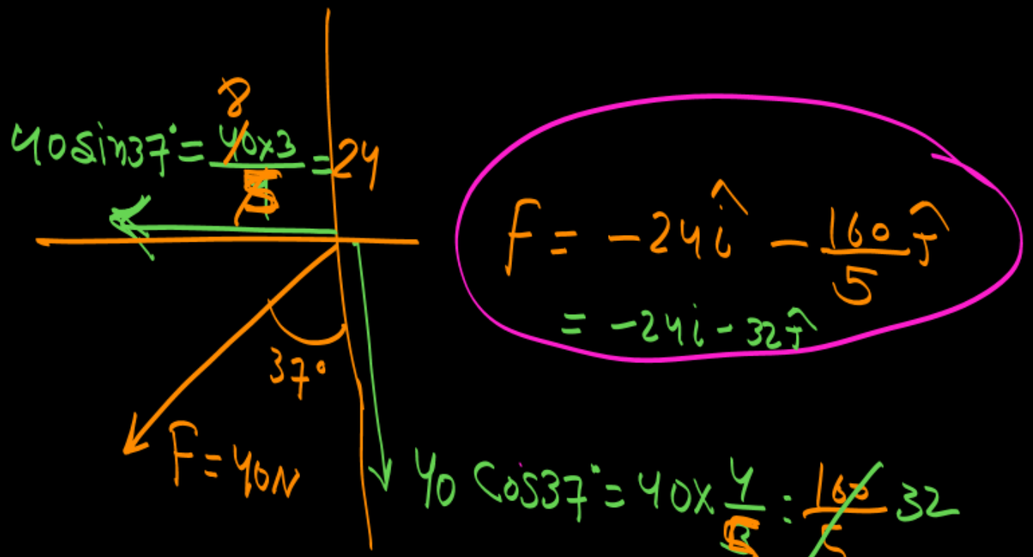
$$F_x = F\cos\theta$$



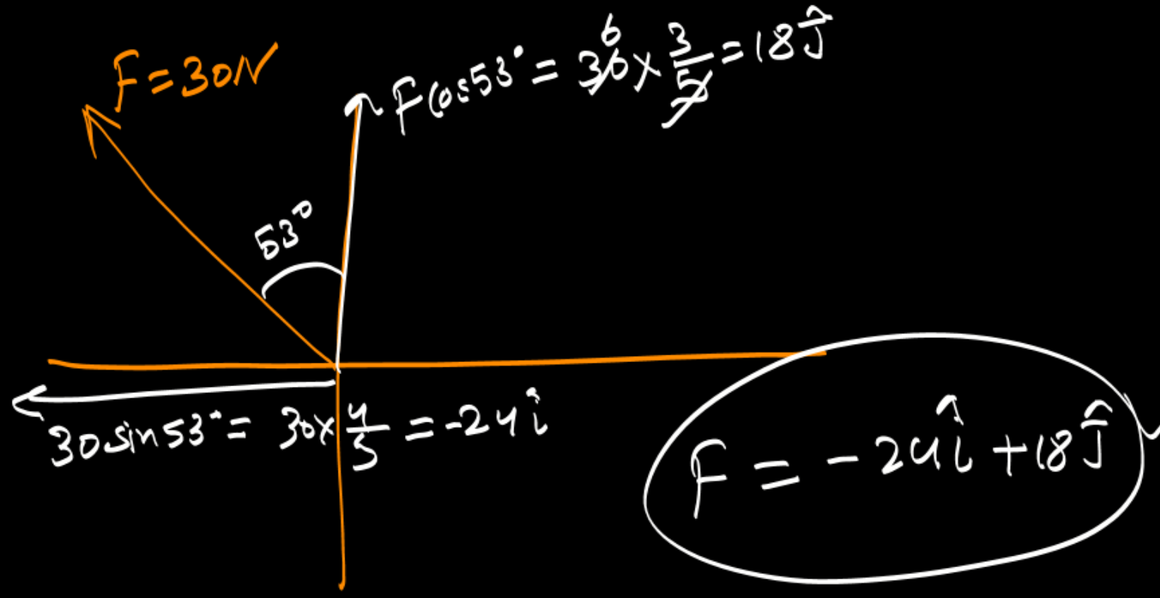


$$f_x = F\cos 30 = 30 \times \cos 30^\circ$$
$$= 30 \times \frac{\sqrt{3}}{2}$$
$$= 15\sqrt{3}\,i$$

$$\vec{F} = 15\sqrt{3}\,i + 15\hat{j}$$

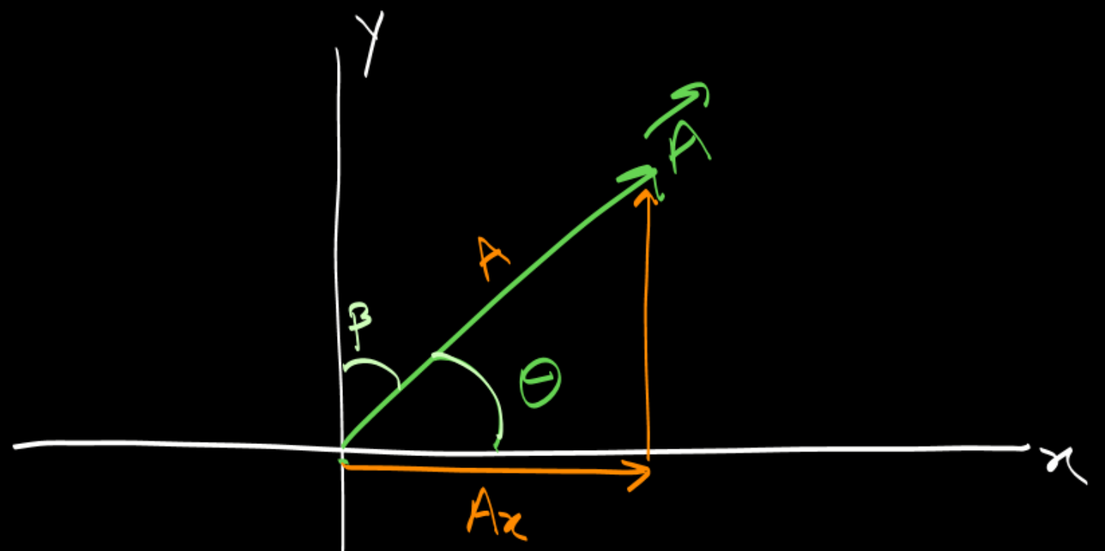


$$F = -24\hat{i} - \frac{160}{5}\hat{j}$$
$$= -24i - 32\hat{j}$$



$$F = -24\hat{i} + 18\hat{j}$$

Cosine (dirⁿ of vector from diffⁿ axis)



$\vec{A}, \hat{z}$ — Angle B/w $\vec{A}$ & y

$\cos\beta = \frac{A_y}{A}$

$\cos\gamma = \frac{A_z}{A}$

$\cos\theta = \frac{A_x}{A}$

Angle B/w $\hat{x}$ & $\vec{A}$

$\cos^2\theta + \cos^2\beta + \cos^2\gamma = \frac{A_x^2 + A_y^2 + A_z^2}{A^2}$ $\quad (A^2 = 1)$

$\sin^2\theta + \sin^2\beta + \sin^2\gamma = 2$

$\vec{A} = A_x\hat{i} + A_y\hat{j} + A_z\hat{k}$

$|\vec{A}| = A_x + A_y + A_z$ ✗

$A = \sqrt{A_x^2 + A_y^2 + A_z^2}$ ✓

$\vec{F} = 3\hat{i} + 4\hat{j} + 5\hat{k}$

Angle b/w $\vec{F}$ & $\hat{z}$ axis

Soln $\quad \cos\gamma = \frac{5}{\sqrt{3^2+4^2+5^2}}$

$= \frac{5}{\sqrt{9+16+25}}$

$= \frac{5}{\sqrt{50}} = \frac{5}{5\sqrt{2}} = \frac{1}{\sqrt{2}}$

$\cos\gamma = \frac{1}{\sqrt{2}}$

$\gamma = 45°$

$$\vec{A} = A_x \hat{i} + A_y \hat{j} + A_z \hat{k}$$

$$A = \sqrt{A_x^2 + A_y^2 + A_z^2}$$

$\vec{F} = 20i + 20\hat{j} \Rightarrow 20\sqrt{2} = F$

$\vec{F} = -10i + 10\hat{j} \Rightarrow 10\sqrt{2}$

$\vec{F} = \hat{i} - \hat{j}$

$|F| = \sqrt{1^2 + (-1)^2}$

$= \sqrt{2}$

$F = i + j + k$

$|F| = \sqrt{3}$

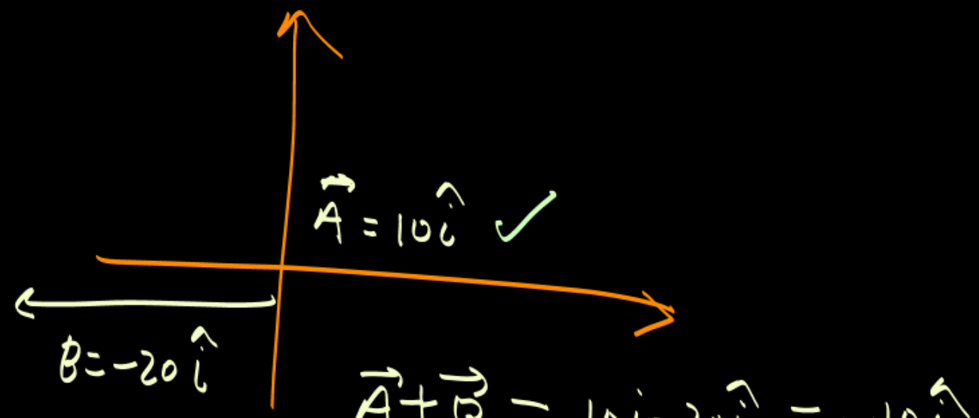
Simple Law of vector addn

$$\vec{A} = A_x \hat{i} + A_y \hat{j} + A_z \hat{k}$$

$$\vec{B} = B_x \hat{i} + B_y \hat{j} + B_z \hat{k}$$

$$\vec{A} + \vec{B} = (A_x + B_x)\hat{i} + (A_y + B_y)\hat{j} + (A_z + B_z)\hat{k}$$

$$\vec{A} \cdot \vec{B} = A_x B_x + A_y B_y + A_z B_z$$



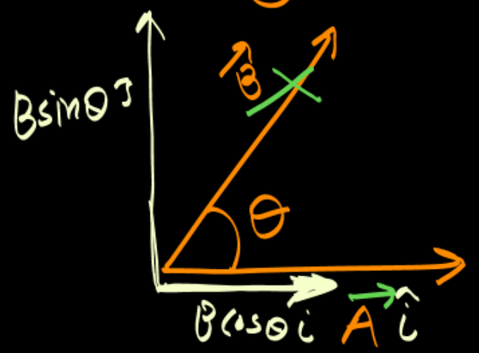
$$\vec{A} + \vec{B} = 10\hat{i} - 20\hat{i} = -10\hat{i}$$

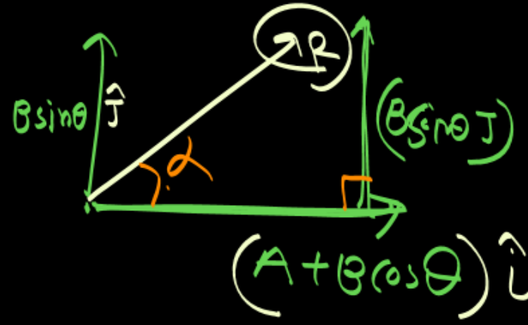
$$\vec{A} = 10\hat{i}, \quad \vec{B} = 10\hat{j} \;\Rightarrow\; \vec{A} = 10\hat{i} + 10\hat{j}$$

$$|A| = \sqrt{10^2 + 10^2} = 10\sqrt{2}$$

$\therefore$

Triangle law of vector addition



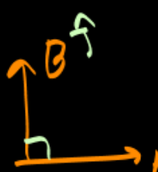


$$\tan\alpha = \frac{B\sin\theta}{A+B\cos\theta}$$

If $\theta = 0^\circ$ ⟹ $\vec{A} \parallel \vec{B}$

$$R_{max} = A + B$$

If $\theta = 90^\circ$



$$R = \sqrt{A^2+B^2}$$

If $\theta = 180^\circ$

$$R_{min} = A - B$$

✓

$$R = \sqrt{(A+B\cos\theta)^2 + (B\sin\theta)^2}$$

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

$A = 4,\ B = 5$

$$|\vec{A}+\vec{B}| \Rightarrow (9)$$

$$= \sqrt{5^2+4^2}$$

$$|\vec{A}+\vec{B}|_{min} = (1)$$

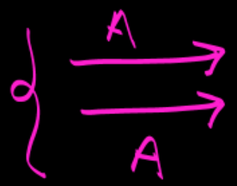
Two vectr of same magnitute

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

$R = 2A \cos(\theta/2)$

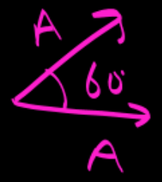
$\theta = 0$

$R = 2A$



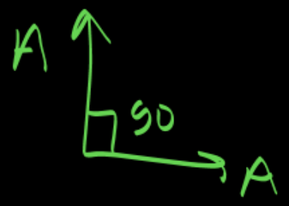
$\theta = 60$

$R = \sqrt{3}A$



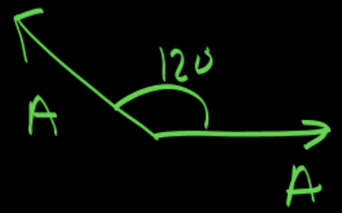
$\theta = 90$

$R = \sqrt{2}A$



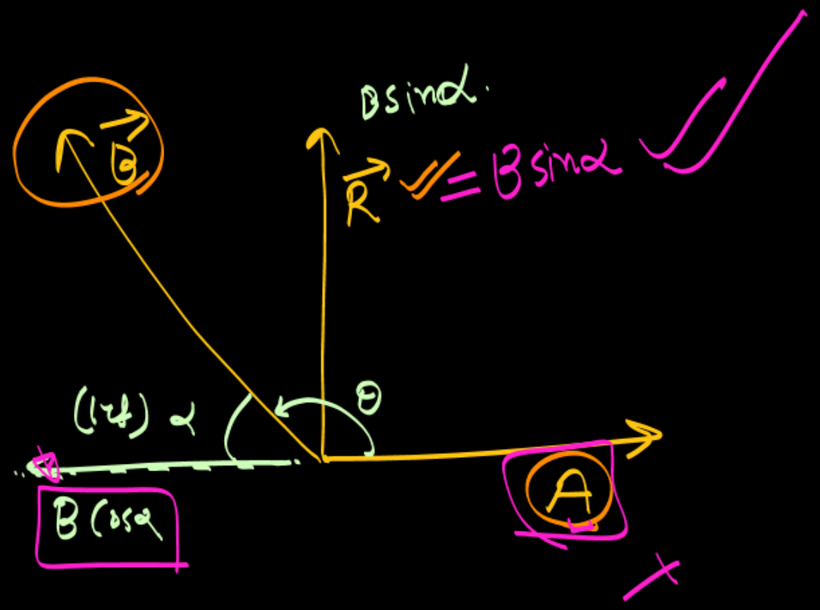
$\theta = 120$

$R = A$

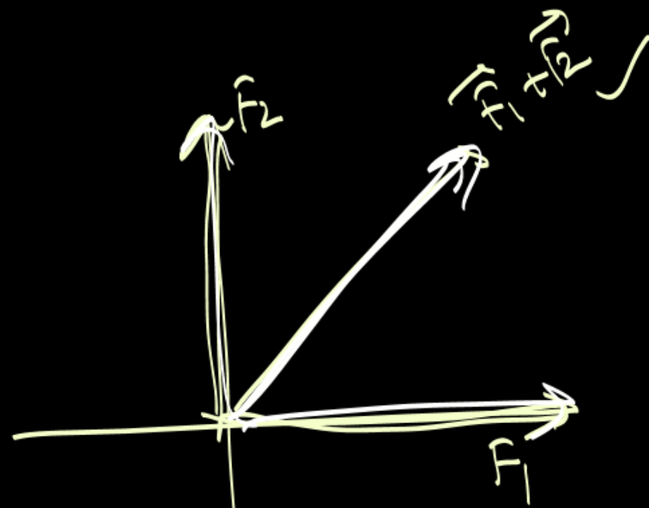


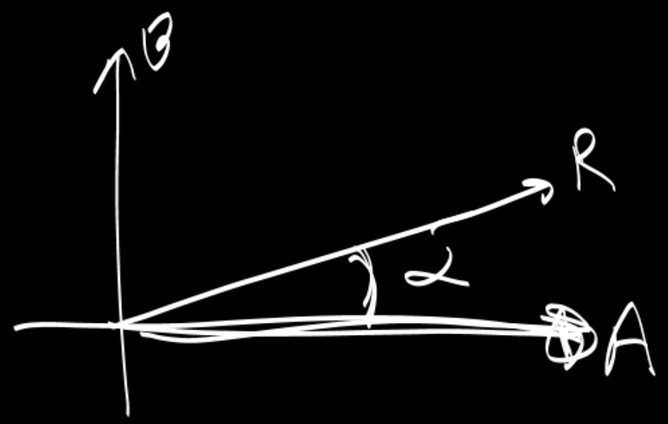
$\theta = 180$

$R = 0$



$B\cos\alpha = A$





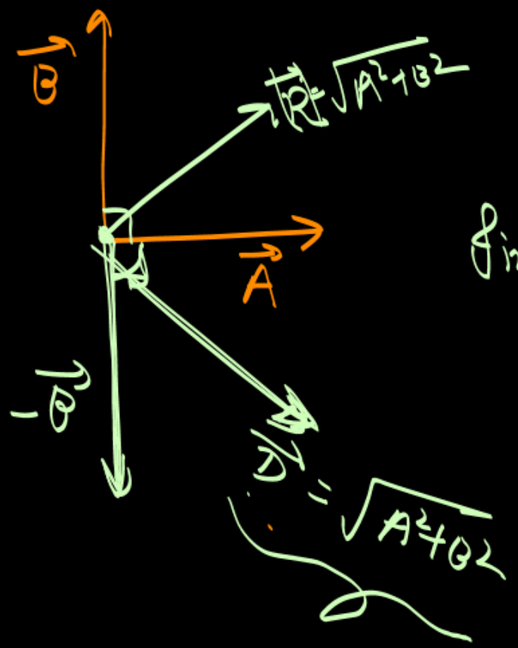
Vector subtraction ⇒ जिसको घटाना है उसको उल्टा कर के add कर दो

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

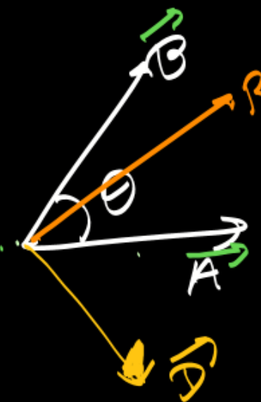
$$= \vec{A} + (-\vec{B})$$

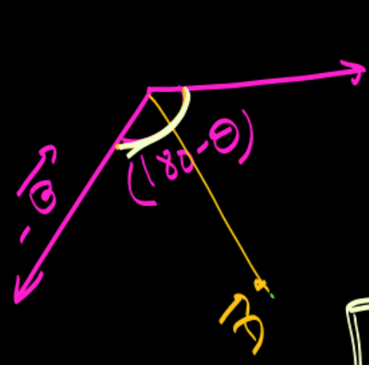
Vector addⁿ B/w $\vec{A}$ & $-\vec{B}$

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



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





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

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

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

$\theta = 0°$

$D = A - B$

$\Longrightarrow A$

$\Longrightarrow B$

$\theta = 90$

$D = \sqrt{A^2+B^2}$

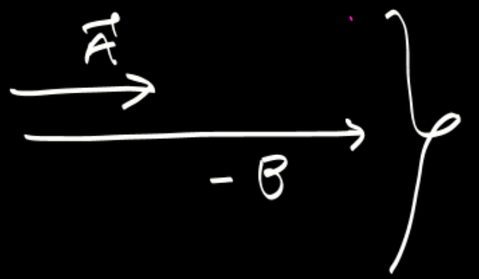
$|\vec{A}+\vec{B}| = |\vec{A}-\vec{B}|$

$\theta = 180$

$D = A + B$

$\theta = 90°$

$\vec{A} - \vec{B} = \vec{A} + (-\vec{B})$



THANK YOU