

YAKEEN NEET 2.0

2026

Vectors

Physics

Lecture - 01

By- Manish Raj (MR Sir)

Revision Kaam

Detailed Backlog lecture
→ 95% to 99%
content





Topics to be covered

1

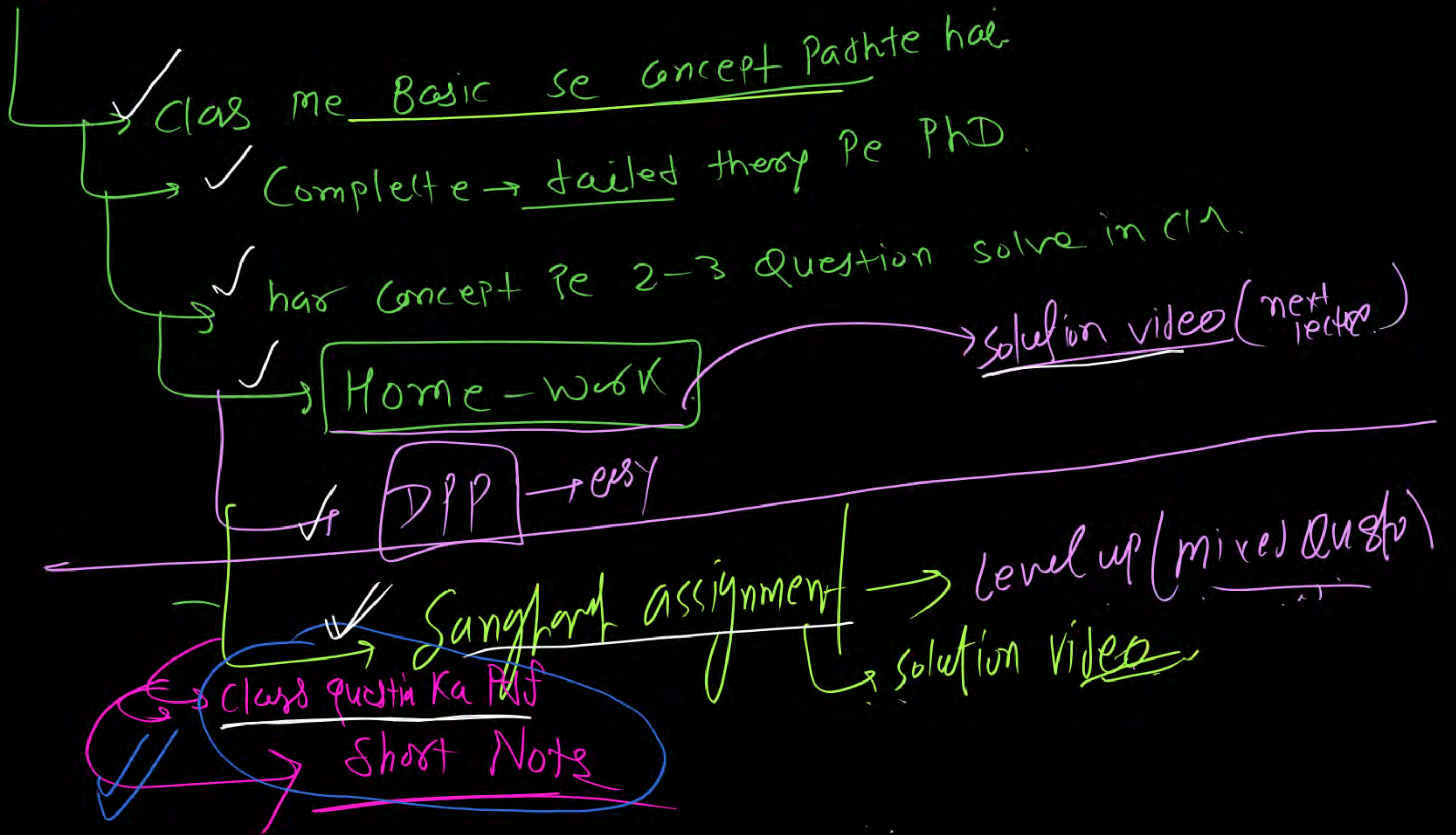
✓ feel of vector

2

3

4

Physics kaise padh rahi hai??



Physical quantity (quantity that can be measure)

✗ Non-physical quantity
↳ can't be measure

Ex- Love, hate
good, hotness

Scalar

→ Having only magnitude
does not have direction

→ follow simple algebraic addition

→ Ex → Mass, speed, energy.
Temp, Volume.

→ Scalar ka tre s-ve hona
uske Jayda Kam Ko batata hai.

$$\begin{array}{ll} \text{Ex} = 2+3=5 & 7+1=8 \\ 5-3=2 & 6-2=4 \end{array}$$

Vector

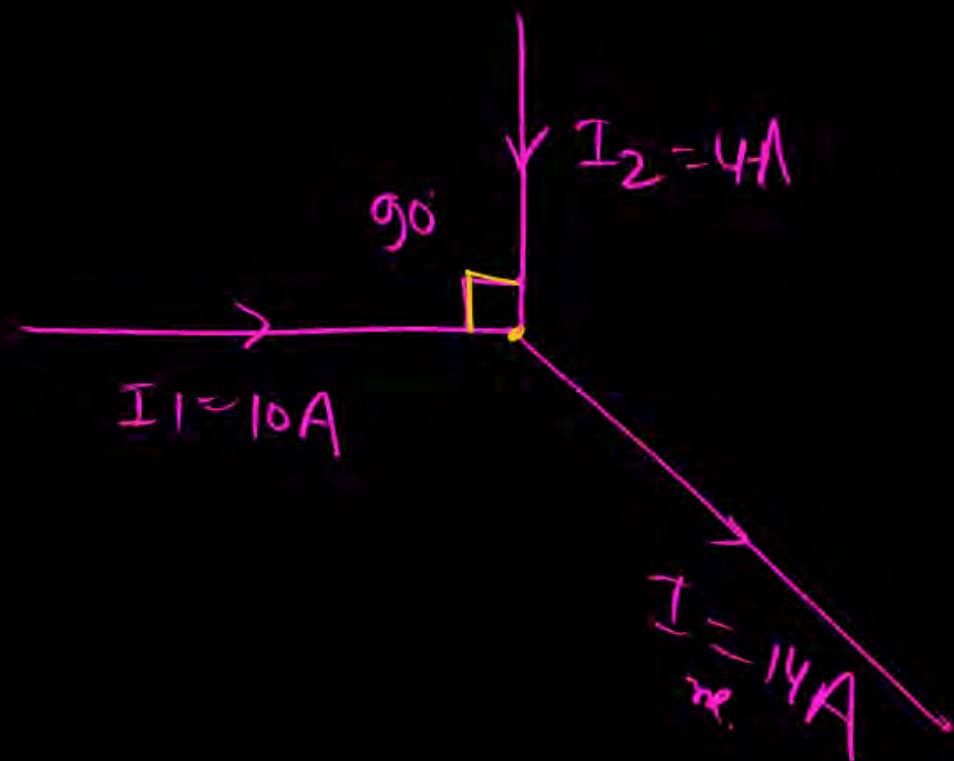
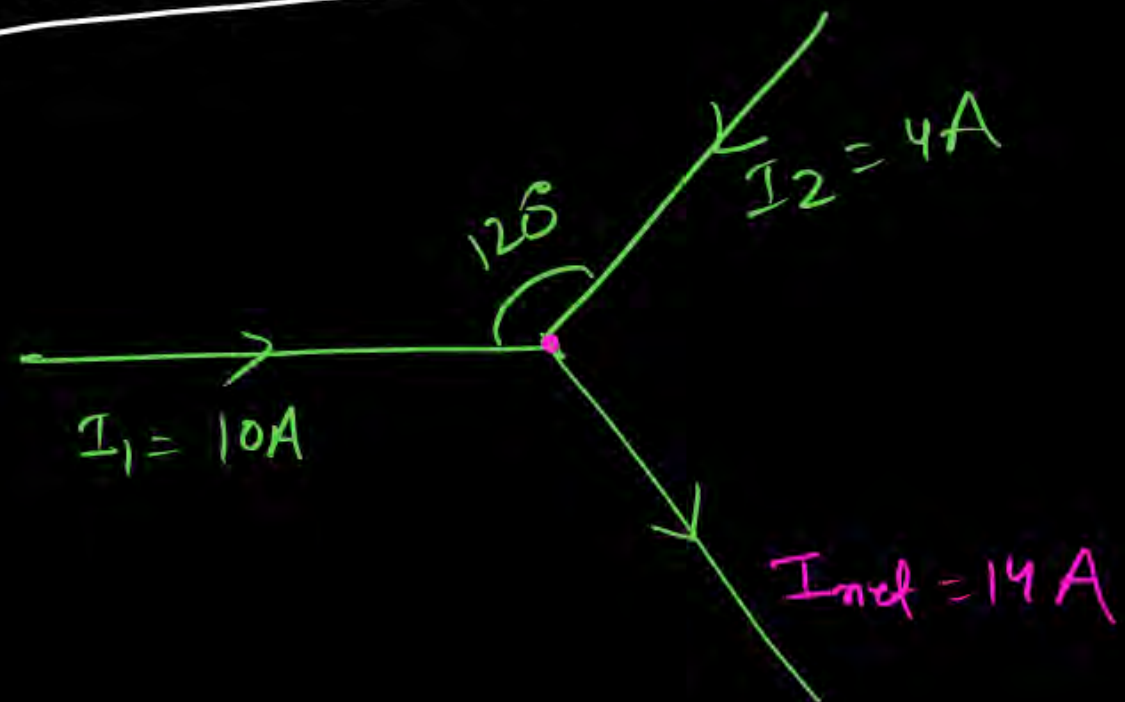
→ Having magnitude, direction.

and Triangle law of vector addition.

Ex- velocity, force, accⁿ, disp^m

→ Vector ka tre s-ve hona dirⁿ Ko batata hai.

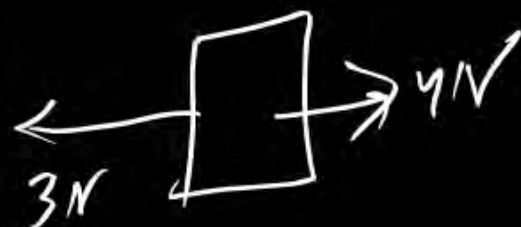
addition current



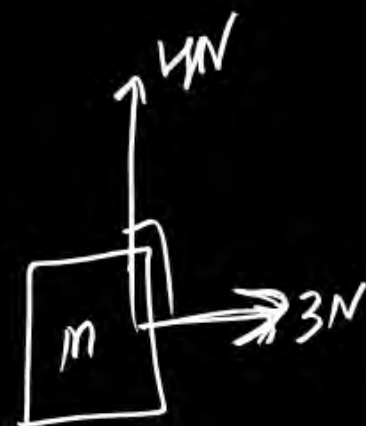
$$F_{net} = (10 - 4) = 6N$$

$$\left\{ \begin{array}{l} F_1 = 10N \\ F_2 = 4N \end{array} \right\}$$

addition of force

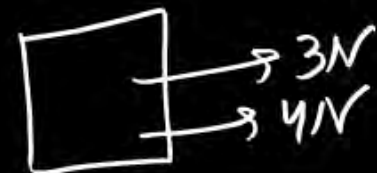


$$F_{net} = \underline{\underline{1N}}$$



$$F_{net} = \underline{\underline{5N}}$$

will expⁿ



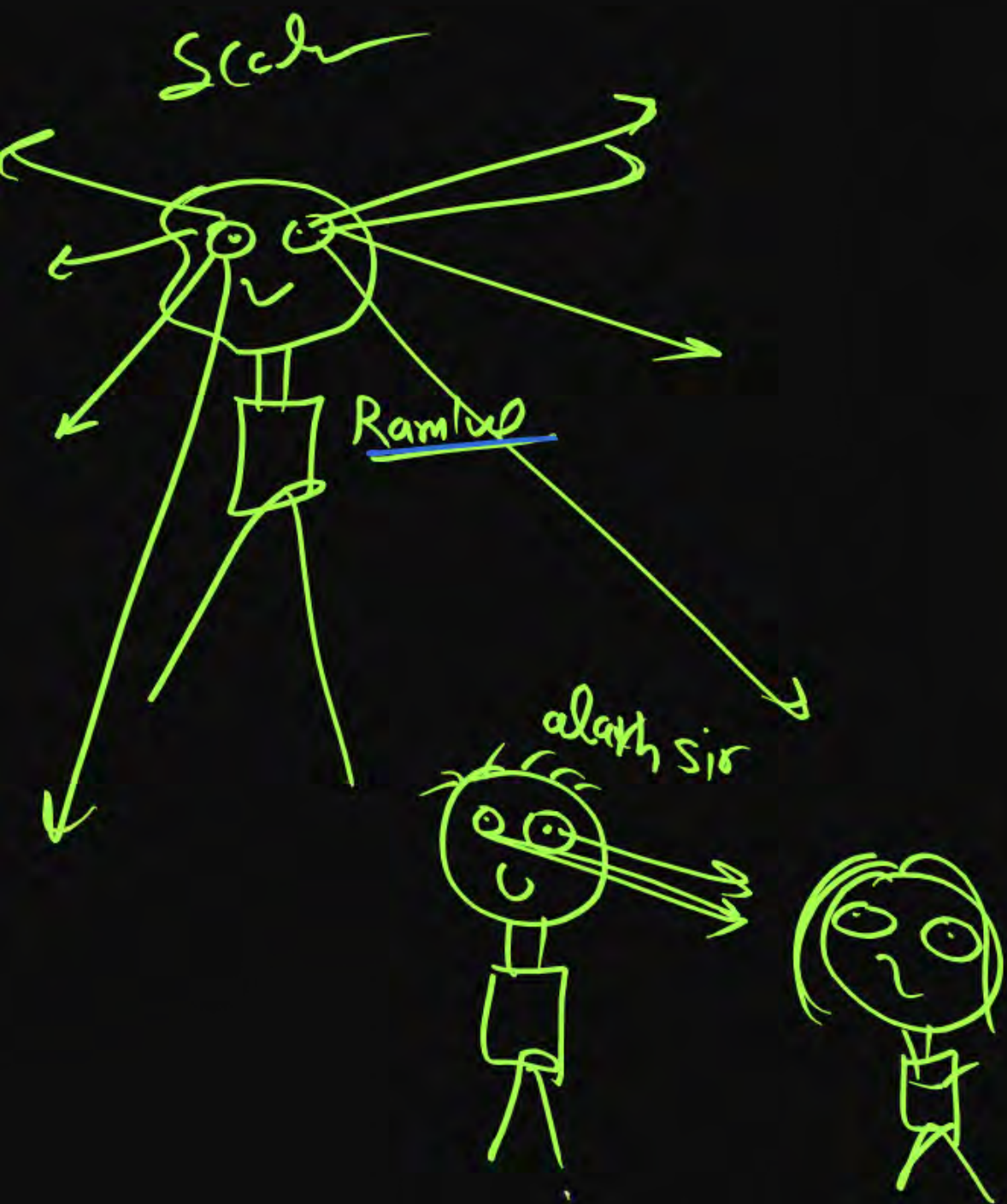
$$F_{net} = \underline{\underline{7N}}$$

Physics Teacher: Can someone explain the difference between scalar and vector?



← scalar

Scalar quantities to Vector quantities :



Question



Which of the following is vector??

- 1 ☒ Electromotive force (v)
 $\rightarrow e \cdot m \cdot f = \text{Potential diff}^n$
 scalar
- 2 ☐ Surface tension
 $\rightarrow (F/l) = \sigma \leftarrow \text{scalar}$
- 3 ☒ Weight (N) = $\vec{\text{Force}} = mg \downarrow$
- 4 ☐ Focal length
 scalar

mass \rightarrow quantity of matter (no direction)

Weight \rightarrow gravitational force (mg) \downarrow
 is called weight.

Question



Which of the following representation is correct??

1 Work (\vec{W})
(Scalar) ✗

2 Force (F)
vector ✗

3 Energy (E)
Scalar (47%) ✓

4 All of these

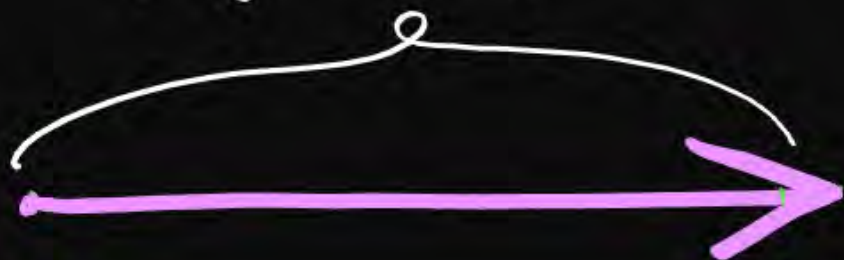
Work = 5J
Scalar

$W_1 = 3J$
 $W_2 = 4J$ } No direction
 $W_{net} = 7J$



Graphical Representation of Vector

length \propto magnitude



Tail

head represent direction.

Force = 10N (East)

⊕ Vector can be change by changing its
Magnitude or direction or by
changing both.

$F_1 = 1$ East



$F_2 = 1$ N North.



Mass

mass

$m_1 = 10 \text{ Kg}$

Scalar can be change
by changing its
magnitude only.

Force is 40 N in North
 $\vec{F} = 40 \text{ N (North)}$

Mathematical
representation
of vector

$$\vec{F} = F \hat{F}$$

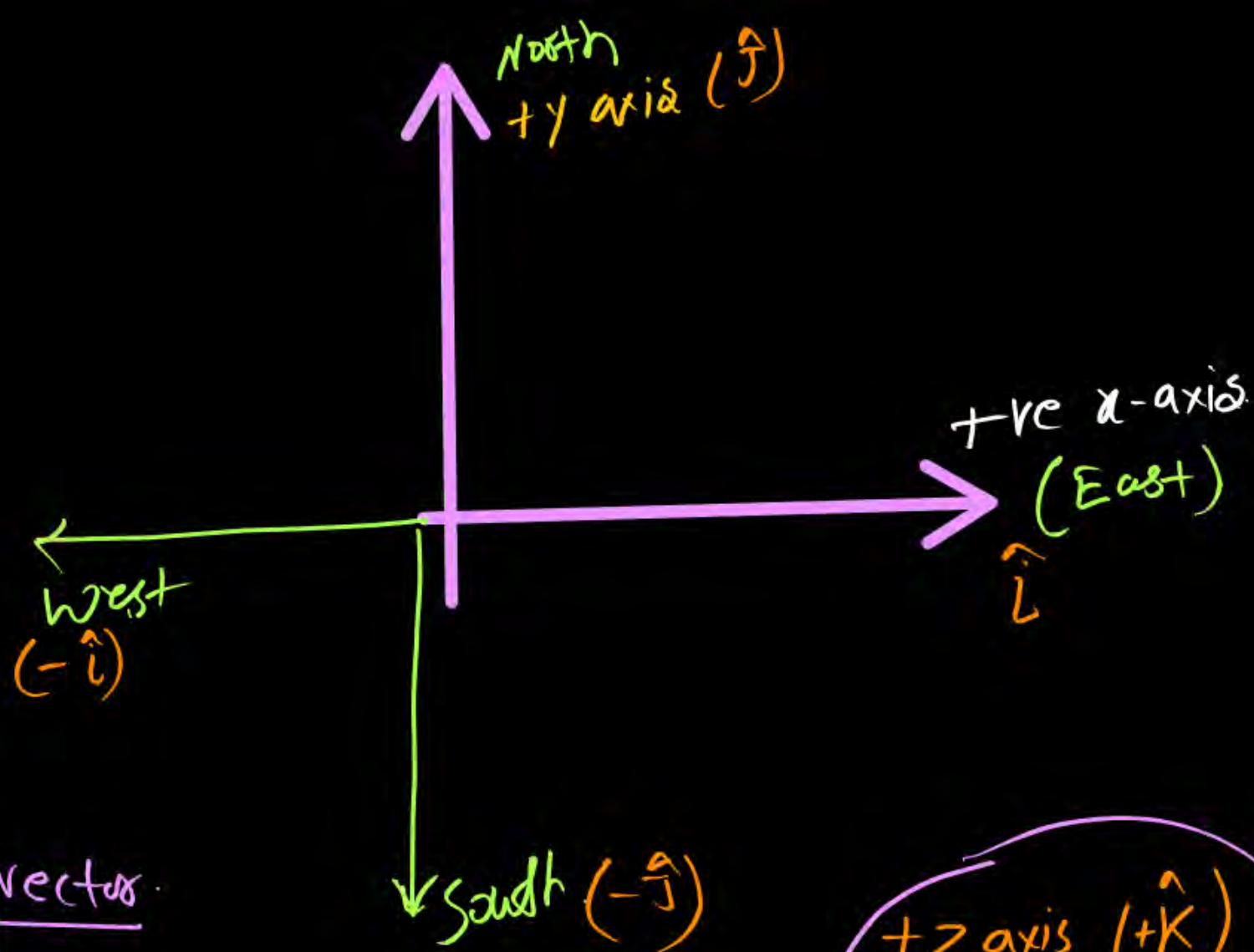
unit vector of vector

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

⑧ \vec{F} = force vector

F or $|\vec{F}|$ → magnitude of force

\hat{F} → direction of force



+z axis ($+\hat{k}$)
 -z axis ($-\hat{k}$)

(Q) If force $\vec{F} = 40\text{N } \hat{j}(\text{North})$
 then value of \hat{F} is ??

(a) 1N in north. ~~X~~

~~(b)~~ 1 in north. (46-1.)

(c) None of these

(d) both (a) & (b)

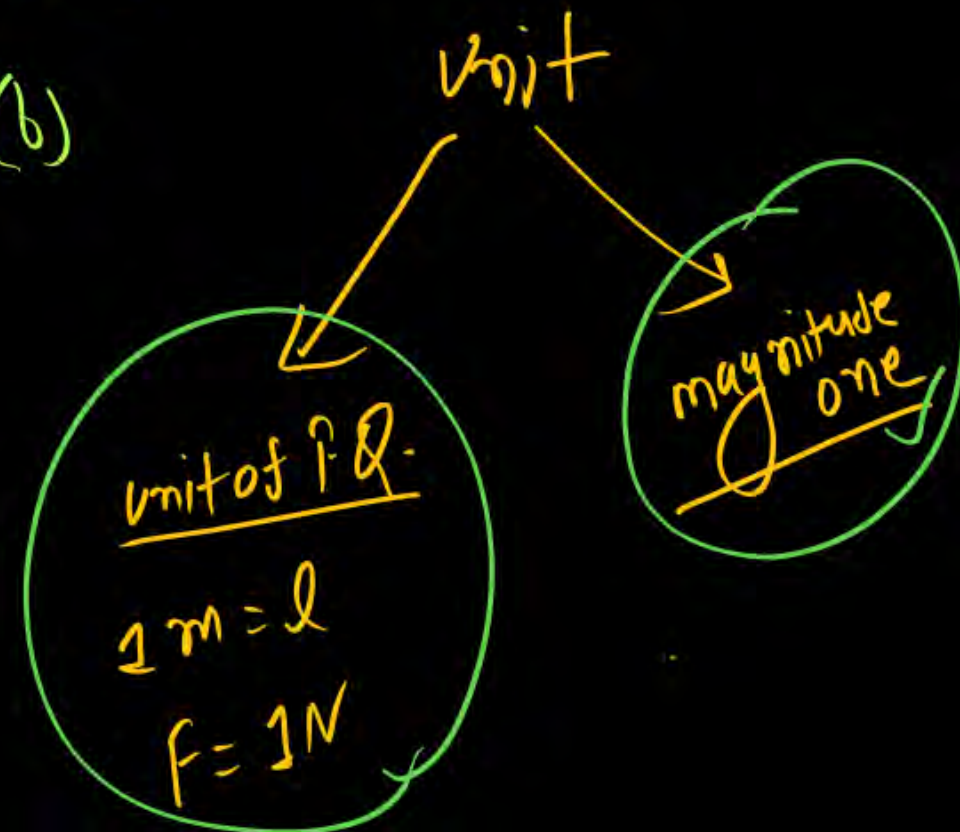
Solⁿ

$$\vec{F} = F \hat{F}$$

$$\hat{F} = \frac{\vec{F}}{F} = \frac{1}{40\text{N North}} \cdot 40\text{N}$$

$$\hat{F} = 1 \text{ North}$$

Unit vector represent only direction & magnitude one
 & does not have unit.



$$\vec{u} = 30 \text{ m/s east}$$

find \hat{v} ??

Solⁿ

$$\vec{u} = |\vec{v}| \hat{v}$$

$$\hat{v} = \frac{\vec{v}}{|\vec{v}|} = \frac{1}{\cancel{30 \text{ m/s}} \text{ east}} = \underline{\underline{1 \text{ east}}} \quad \checkmark$$

unit
vector

Question

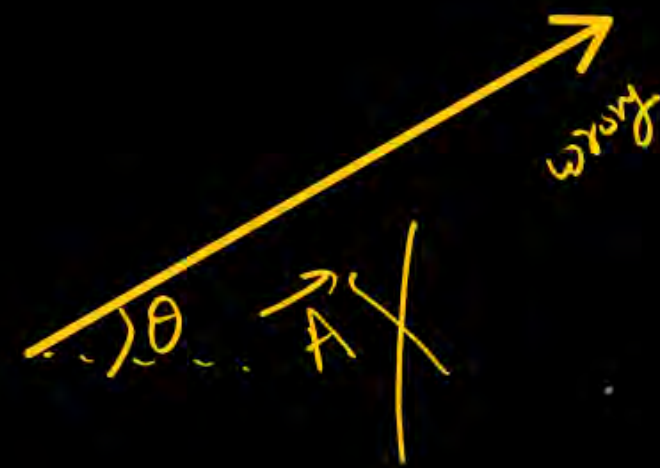
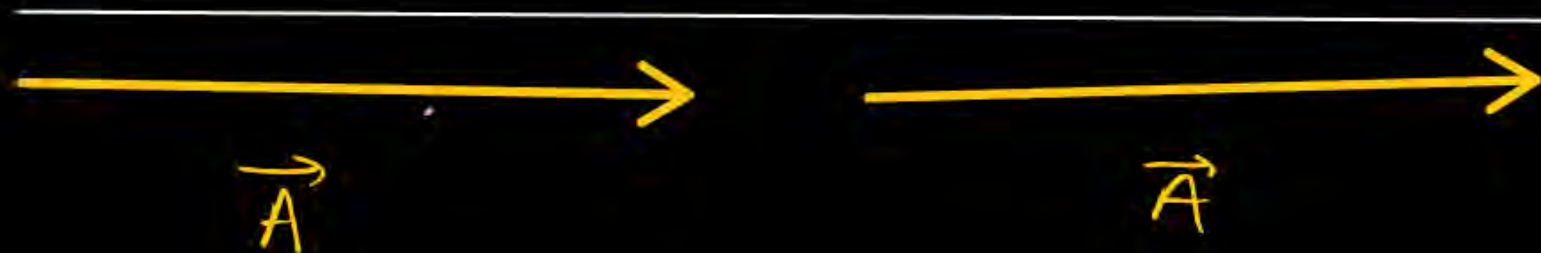
H/W



- A. Physical quantity which does not have direction must be scalar.
- B. Physical quantity which have direction must be vector.

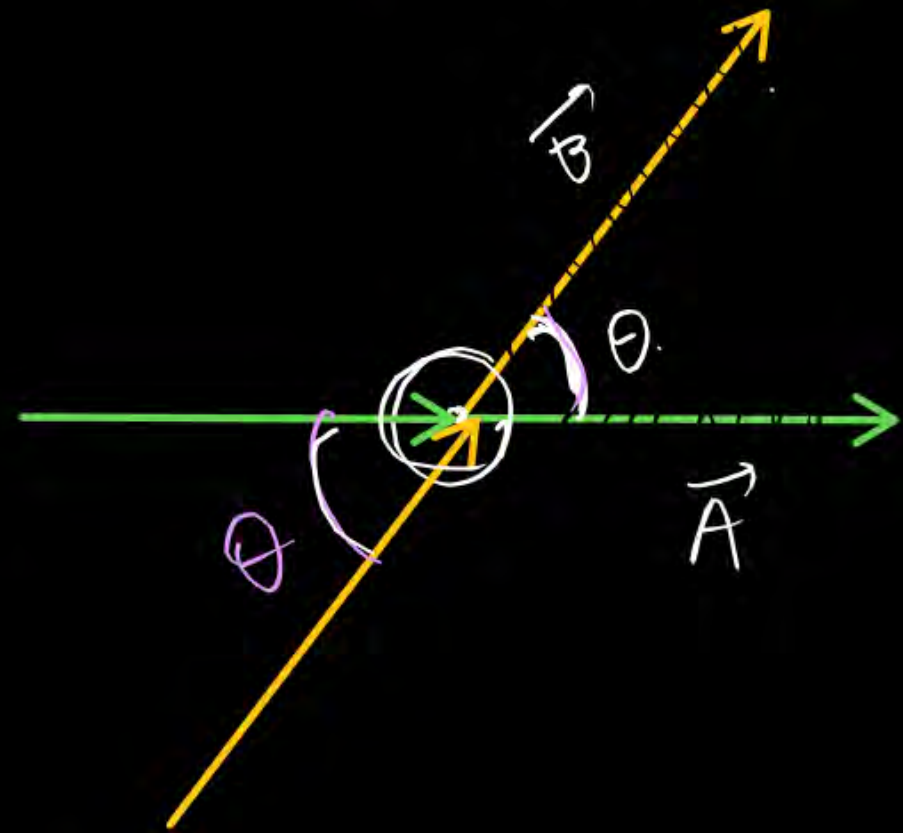
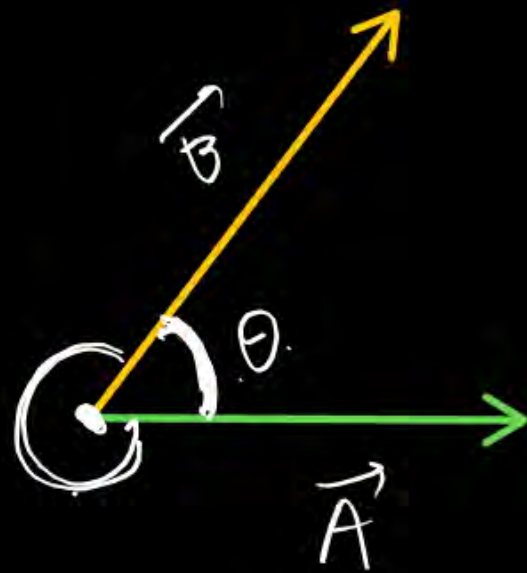
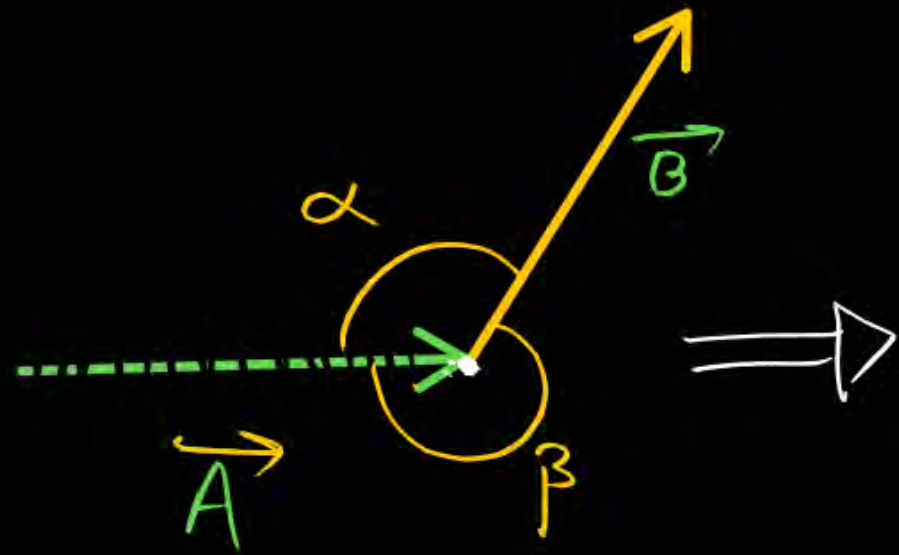
- 1 Both are true
- 2 Both are false
- 3 A true B false
- 4 A false B true

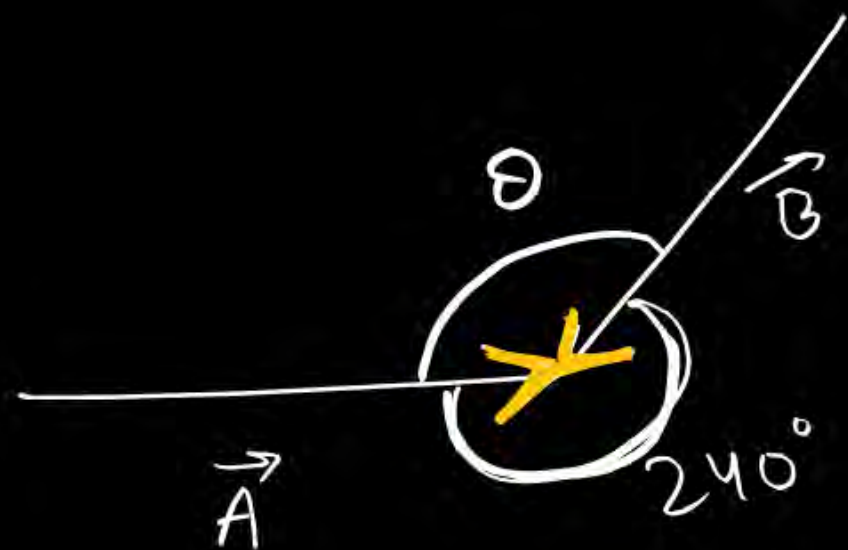
Vector in graphical representation can be shifted anywhere keeping its magnitude and direction fixed.
(But Rotation of vector is not allowed.
if Angle is other than 360° if we do so then vector [#] will change.)



Angle between vectors

→ Smaller Angle B/w two vectors when they Join tails
tail together (or) head to head together



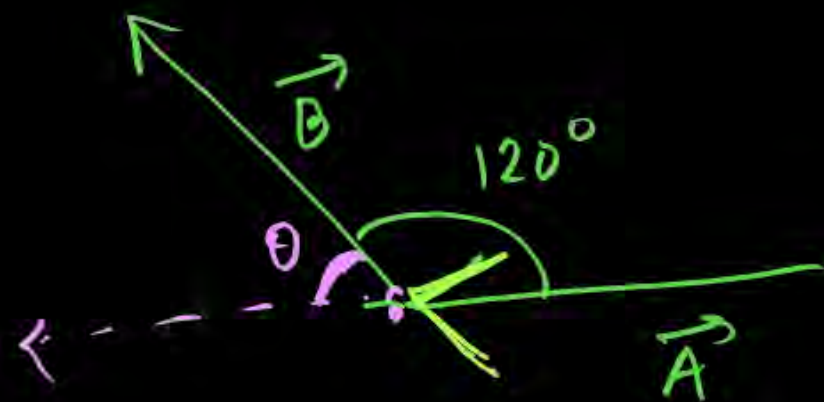


Angle b/w \vec{A} & \vec{B}

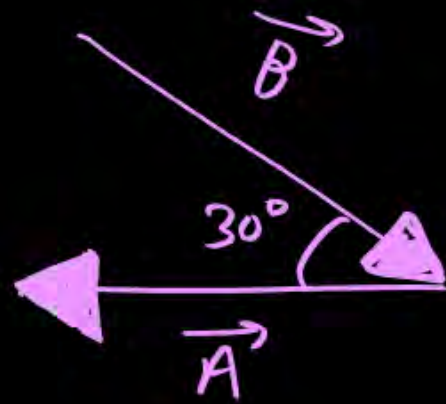
$$\theta + 240 = 360$$

$$\theta = 360 - 240$$

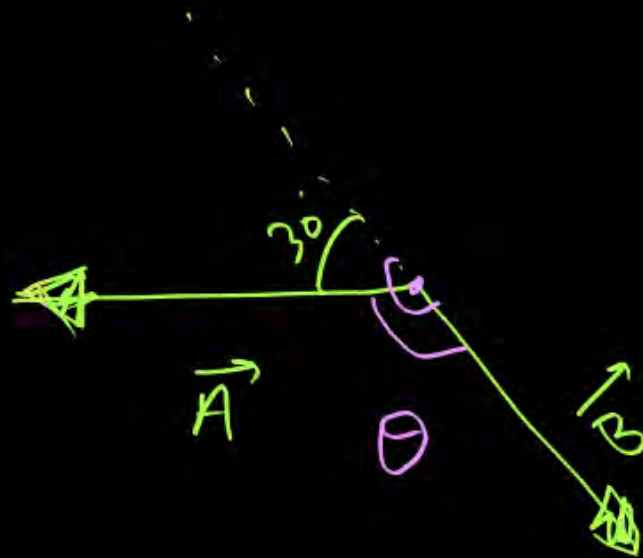
$$\boxed{\theta = 120}$$



Angle b/w \vec{A} & \vec{B}
 $\theta = 180 - 120 = \underline{\underline{60^\circ}}$




Angle B/w vectors



$$\theta = 180 - 30 = 150^\circ$$

Ans

How to Take -ve vector


$$\vec{A} = 30\text{m}\hat{i}$$



$$-\vec{A} = -30\text{m}\hat{i}$$

Angle B/w \vec{A} & $-\vec{A}$ is 180°

vector multiplied with scalar \rightarrow direction remains same only
magnitude will change
if scalar is ve

$$\text{Ex - } \vec{A} = 30\text{m}\hat{i}$$

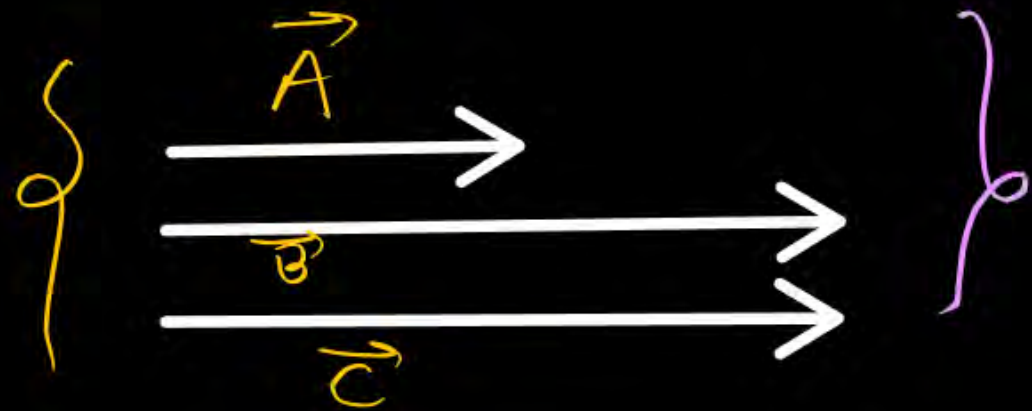
$$3\vec{A} = 3(30\text{m}\hat{i}) = 90\text{m}\hat{i}$$

Scalar is negative then
dirⁿ is reversed &
magnitude will change

$$\begin{aligned} \textcircled{\#} \quad -5\vec{A} &= -5(30\text{m}\hat{i}) \\ &= -150\text{m}\hat{i} \end{aligned}$$

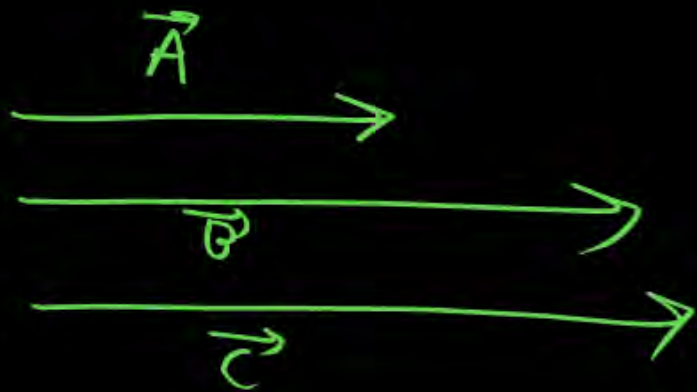
Type of vectors

① Parallel vector: \rightarrow direction same magnitude may or may not be same.



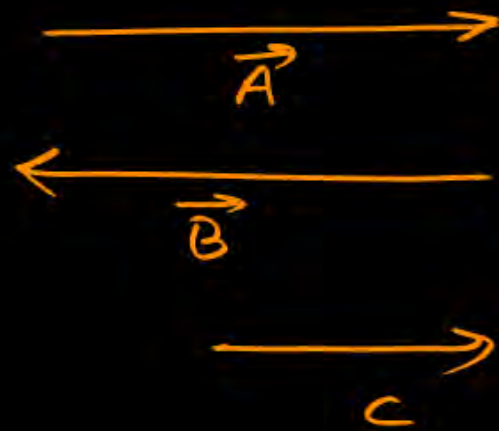
\neq all parallel vectors are equal \rightarrow false
all equal vectors are parallel \rightarrow yes

② Equal vector \rightarrow magnitude & direction must be same.



\vec{B} & \vec{C} are equal vectors (both vectors must be of same \vec{A})

III Anti-parallel vectors: — direction must be opposite
magnitude may or may not be same.

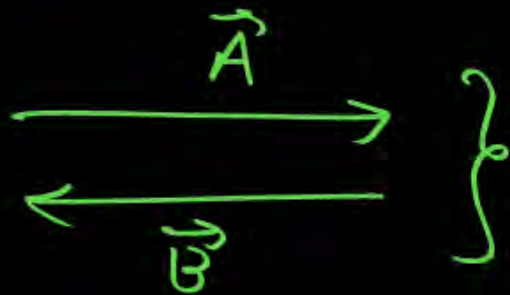


$\vec{A}, \vec{C} \rightarrow$ Parallel.

$\vec{A}, \vec{B} \rightarrow$ Anti-parallel

$\vec{B}, \vec{C} \rightarrow$ anti-parallel.

IV Negative vectors: \rightarrow { magnitude same; direction opposite }



\vec{A} & \vec{B} are Negative of each other.



all negative vectors are anti-parallel \rightarrow True
all anti-parallel vectors are negative vectors \rightarrow False

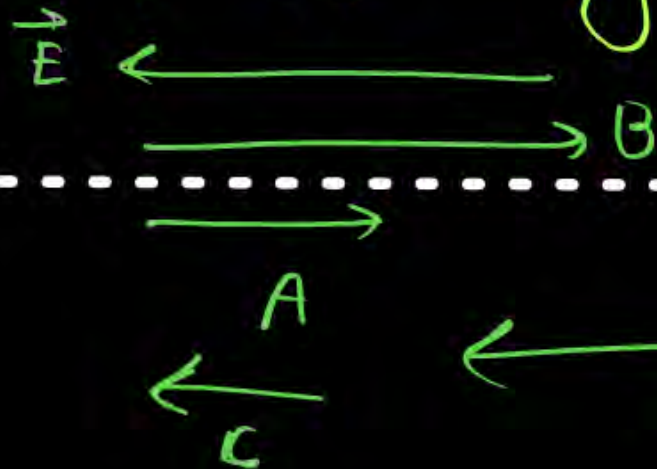
⑤ orthogonal vectors

vector Perpendicular to each other is called orthogonal.



⑥ Co-linear vectors

vector acting along same line is called co-linear $\rightarrow \boxed{\theta = 0^\circ, 180^\circ}$ ✓
 \rightarrow magnitudes may or may not be same.



(Null vector) Zero vector

- ↳ A vector having magnitude zero.
- ↳ Addition of two equal & opposite vectors



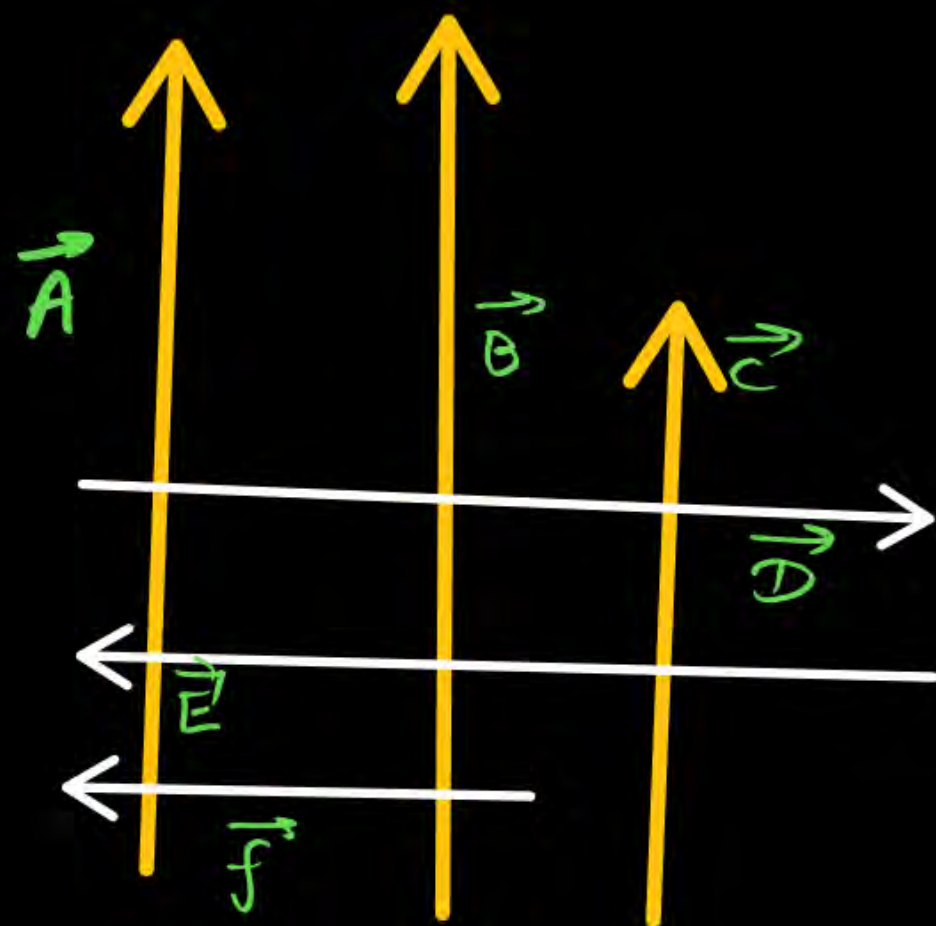
$$F_{net} = 0N$$

Null vector & zero vector

Bus is at rest

A diagram of a bus with a velocity vector $\vec{v} = 0$ pointing to the right. The vector is underlined.

H/w
next
lets



- (i) Parallel vectors \rightarrow
- (ii) Anti-Parallel \rightarrow
- (iii) orthogonal \rightarrow



Types of Vector

(A) Equal Vector: Two vector having same magnitude and same direction of same nature.

(B) Parallel Vector: Magnitude may or may not equal, but direction must be same.

All equal vectors are parallel

All parallel vector may or may not equal vector



Types of Vector



(C) Negative Vector: Magnitude must be same direction exactly opposite.

(D) Anti-Parallel Vector: Magnitude may or may not equal, but direction opposition.

All -ve vectors are anti-parallel

All anti-parallel may or may not be negative at each other.



Types of Vector

(E) Unit Vector: A vector having unit magnitude & represent only direction, does not have unit.

(F) Zero Vector (Null Vector): A vector having zero magnitude.

Ex. Velocity of car which is at rest. $\vec{v} = 0$



Types of Vector

(G) Colinear Vector: All vector are called colinear when they are along the same line.

(H) Coplaner Vector: Vectors are in same plane



Types of Vector



- (I) **Orthogonal Vector (Perpendicular Vector):** Magnitude may or may not be same, angle must be 90° .



Types of Vector



(J) Concurrent Vector: Magnitude & direction may or may not be same, but point of action is at same point.

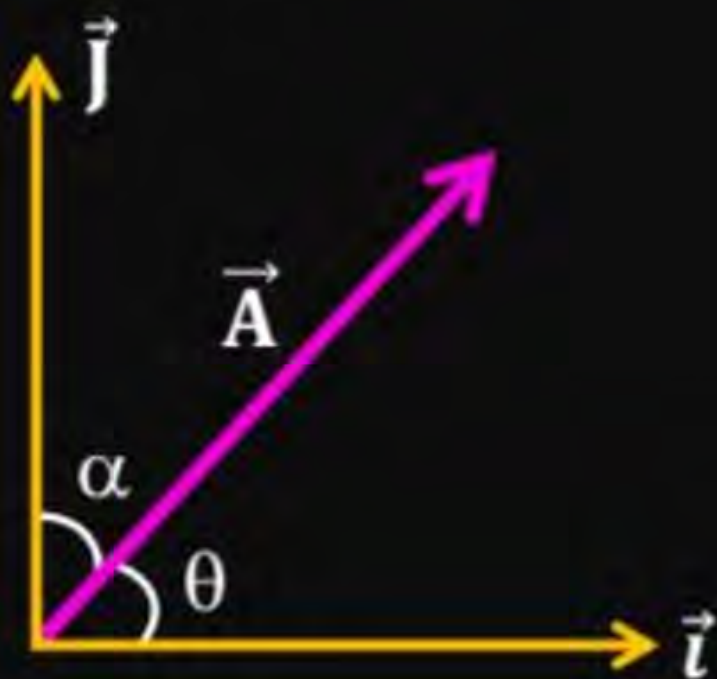
(K) Axial Vector: A vector having direction along axis of rotation.

Ex: Angle, torque angular velocity, acceleration angular momentum

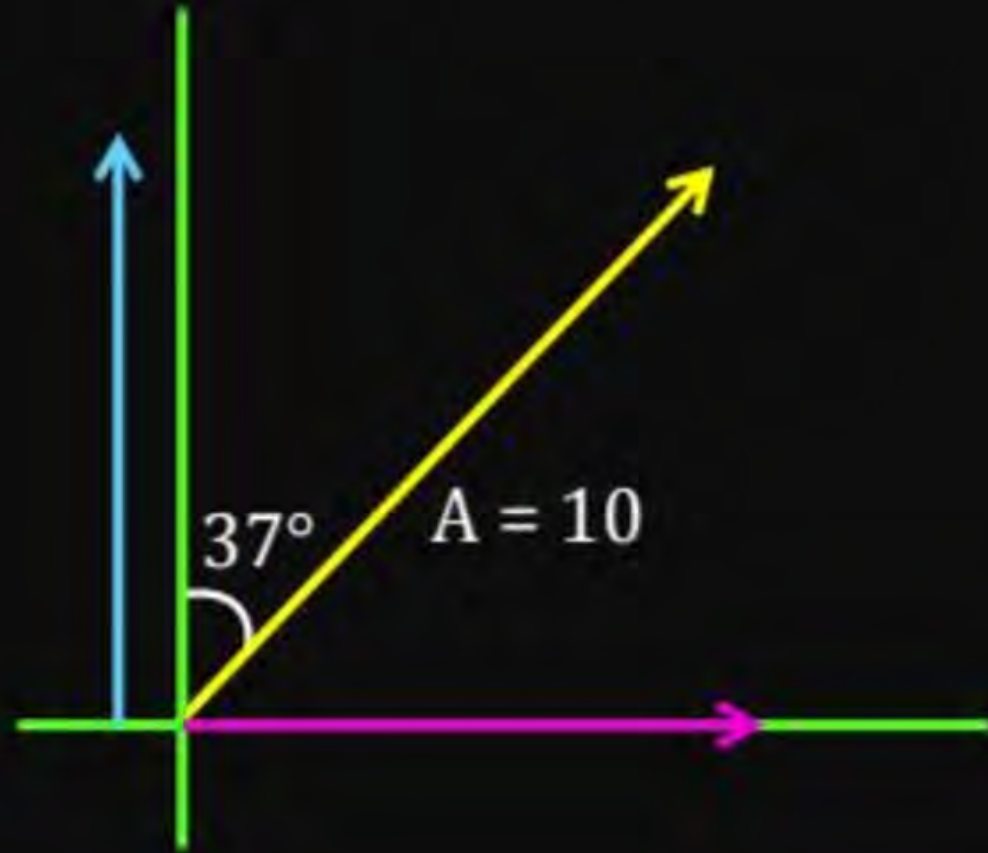


Component of Vector

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







Find magnitude of Vector:

$$\vec{A} = 2\hat{i} + 3\hat{j} \quad \rightarrow$$

$$\vec{B} = 3\hat{i} + 4\hat{j} \quad \rightarrow$$

$$\vec{C} = 3\hat{i} + 4\hat{j} + 5\hat{k} \quad \rightarrow$$

$$\vec{D} = \hat{i} - \hat{j} + \hat{k} \quad \rightarrow$$

$$\vec{E} = 6\hat{i} - 8\hat{j} + 10\hat{k} \quad \rightarrow$$

$$\vec{F} = 10\hat{i} - 10\hat{j} - 10\hat{k} \quad \rightarrow$$

THANK
YOU