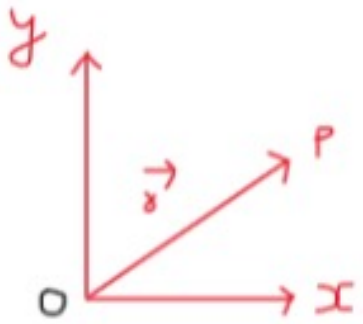
Physics

Ch - 4 Motion in a plane

(1) What is position Vector?

→ Vector which shows position.



$$|\overrightarrow{OP}| = |\vec{r}|$$

(2) What is Unit Vector?

→ Vector having magnitude = 1.

* Uses:

$\hat{U}_A$

$\vec{A}$ $\quad |\vec{A}| = 10$

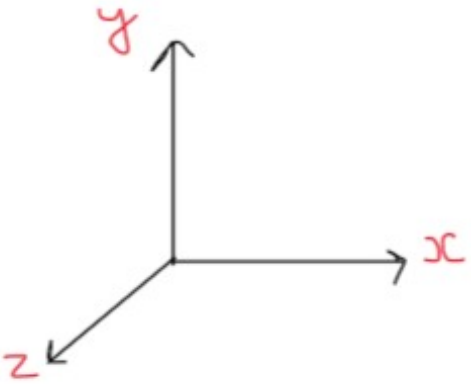
u cannot A.

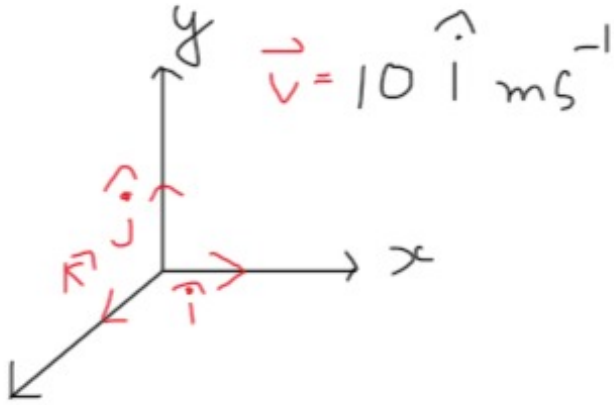
$\hat{A}$ or U_A

$$\hat{A} = \frac{\vec{A}}{|\vec{A}|} = 1$$

* what is the direction of Unit Vector?

→ It is the direction of given vector.



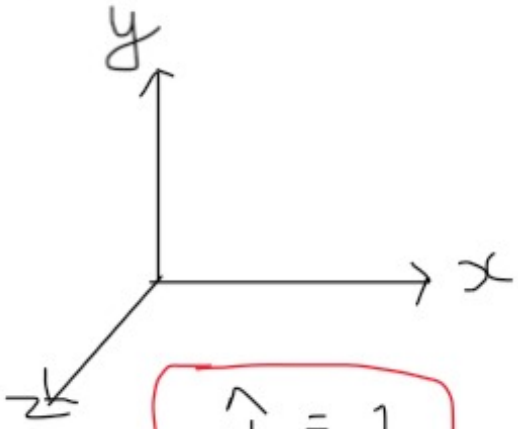


* Unit Vector :-

$|\hat{i}| = 1$

$|\hat{j}| = 1$

$|\hat{k}| = 1$



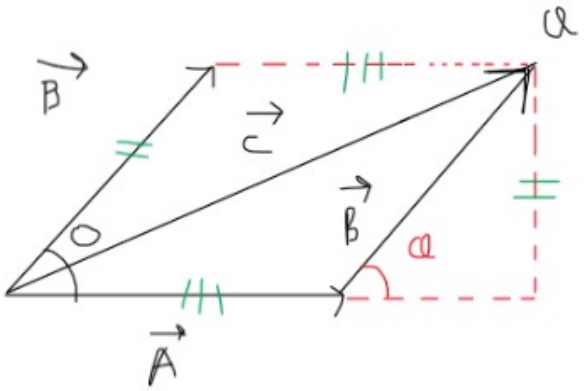
$\hat{U}_A = 1$

* Null Vector :- (zero Vector)

→ Vector having Magnitude —.

Vector + Vector = Always Vector!

$$\vec{A} - \vec{A} = \vec{0}$$



$$\cos\theta = \frac{PR}{PQ} = \frac{PR}{B}$$

$$PR = B\cos\theta$$

$$\sin\theta = \frac{QR}{QP}$$

$$QR = B\sin\theta$$

$$OQ^2 = OR^2 + QR^2$$

$$C^2 = (A + B\cos\theta)^2 + (B\sin\theta)^2$$

$$C^2 = A^2 + 2AB\cos\theta + B^2\cos^2\theta + B^2\sin^2\theta$$

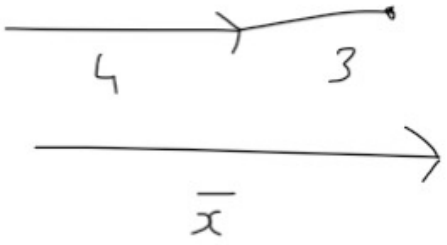
$$C^2 = A^2 + 2AB\cos\theta + B^2$$

Stamp

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

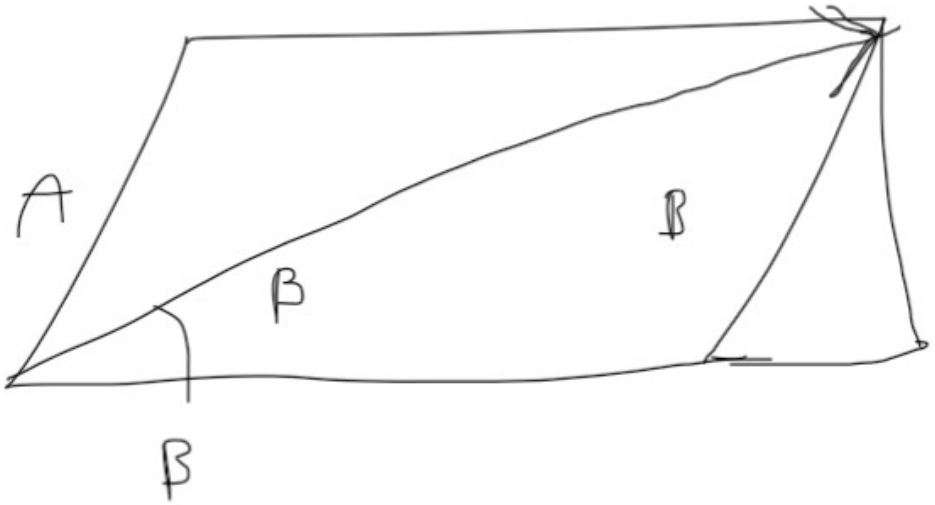
$|\vec{A}| = 4 \quad |\vec{B}| = 3$

$\theta = 0^\circ$



$$C = \sqrt{A^2 + 2ABC^2 1Q + B^2}$$

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

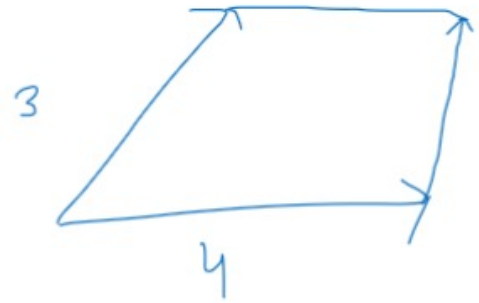


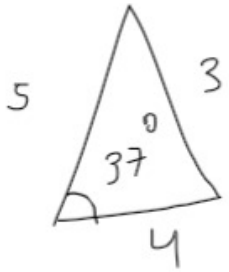
$C = A + B = 4 + 3 = 7$

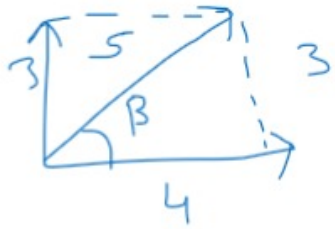
$\vec{C} = \vec{A} + \vec{B}$

Angle between $\vec{A}$ & $\vec{B}$ is zero.

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







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

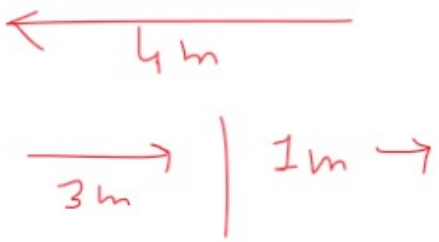
$$\tan\beta = 3/4$$

$$C^2 = A^2 + 2ABC\%C\alpha + B^2$$

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

$$\tan\beta = \frac{B\sin\theta}{A + B\cos\theta} = \frac{B}{A} = \frac{3}{4}$$

$\theta = 180^\circ$



$$c^2 = A^2 + 2AB\cos\theta + B^2$$

$$c^2 = A^2 - 2AB + B^2$$

$$|\vec{A} + \vec{B}| \leq |\vec{A}| + |\vec{B}| \quad 7$$

(3) (4)

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

between 7 & 1

$$|\vec{A} - \vec{B}| \leq |\vec{A}| - |\vec{B}|$$

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

(1) $= 0^\circ = (A - B)^{4-3} = 1$

(2) $= 180^\circ = (A + B)^{4+3} = 7$

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

1 & 7 4-3 ✓ 1

$$|\vec{A}-\vec{B}| \geq |\vec{A}| - |\vec{B}|$$

Resultant means

{ Ek Final Value }

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

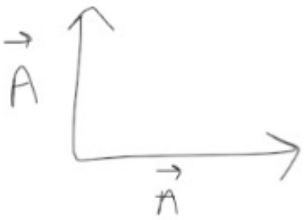
$$= \sqrt{A^2 + 2A^2 \cdot \tfrac{1}{2} + A^2}$$

$$= \sqrt{3A^2}$$

$$C = \sqrt{3}A$$

When angle between two vectors

resultant = $\sqrt{3}$ times either of time.



$$C = \sqrt{A^2 + 2AB\cos 90 + A^2}$$

$$C = \sqrt{2A}$$

$\cos 120^\circ$

$\cos 120 = \cos(90 + 30^\circ)$

$= -\sin 30$

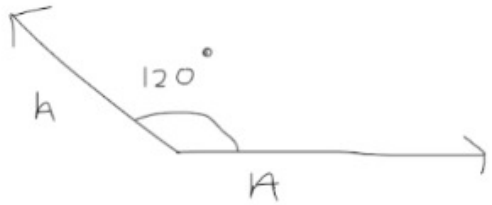
$= -1/2$

$$C = \sqrt{A^2 + 2AA\left(-\frac{1}{2}\right) + A^2}$$

$$= \sqrt{A^2 - A^2 + A^2}$$

$$C = \sqrt{A^2}$$

$C = A$



Wherever angle between two equal vector is

120° then resultant

= either of them.