YAKEEN NEET 2.0

2026

Vectors

PHYSICS | Lecture - 02

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Todays Goal

- Types of vector
- Angle between the vector.

Q $\int \frac{\sqrt{x}}{x^2} dx$

$= \int x^{-3/2} dx$

$= \frac{x^{-3/2+1}}{-3/2+1} = \frac{x^{-\frac{1}{2}}}{-\frac{1}{2}}$

$= \frac{-2}{\sqrt{x}} + C$

Q $\int \left(\frac{1}{x^2} + 3\sin 2x\right) dx$

$= \int (x^{-2} + 3\sin 2x) dx$

$= \frac{x^{-2+1}}{-2+1} + \frac{3}{2}(-\cos 2x) + C$

$= -\frac{1}{x} - \frac{3}{2}\cos 2x + C$

Q $\int_1^5 x^2 dx$

$= \frac{x^3}{3}\Big|_1^5$

$= \frac{1}{3}(125-1)$

$= \frac{124}{3}$

Q $\int_{-1}^{1} (ax^2+b)\,dx$

$= \int ax^2\,dx + \int b\,dx$

$= a\frac{x^3}{3}\Big|_{-1}^{1} + bx\Big|_{-1}^{1}$

$= \frac{a}{3}\left[1^3-(-1)^3\right] + b\left[1-(-1)\right]$

$= \frac{2a}{3} + b$

Q $\int_{R}^{\infty} \frac{GMm}{r^2}\,dr$

$= GMm\int_{R}^{\infty} r^{-2}\,dr$

$= GMm\left(\frac{r^{-2+1}}{-2+1}\right)\Big|_{R}^{\infty}$

$= GMm\left(\frac{-1}{r}\right)\Big|_{R}^{\infty}$

$= -GMm\left[\frac{1}{\infty}-\frac{1}{R}\right] = \frac{GMm}{R}$

Q $\int_{r_1}^{r_2} \frac{-kq_1q_2}{r^2}\,dr$

$= -kq_1q_2\int_{r_1}^{r_2} r^{-2}\,dr$

$= -kq_1q_2\left(\frac{-1}{r}\right)\Big|_{r_1}^{r_2}$

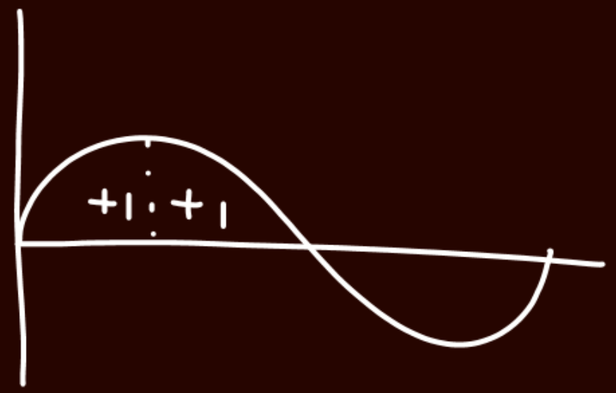
$= kq_1q_2\left(\frac{1}{r}\right)\Big|_{r_2}^{r_1}$

$= kq_1q_2\left(\frac{1}{r_1}-\frac{1}{r_2}\right)$

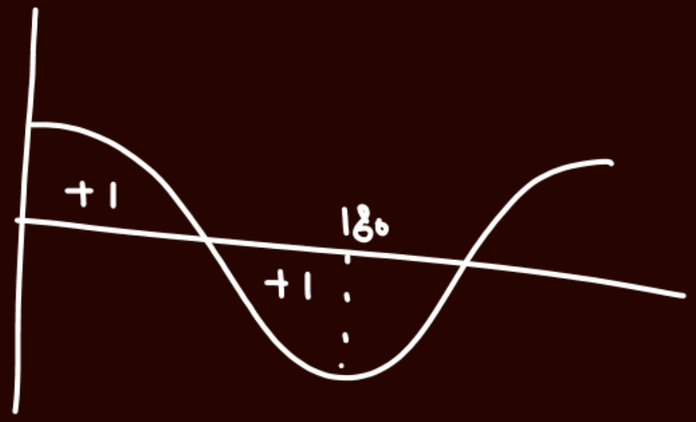
$$\int_u^v m v\,dv = m\int_u^v V\,dV = m\,\frac{v^2}{2}\Big|_u^v = \frac{m}{2}\,(v^2 - u^2)$$

Q $\int_0^{\pi} \sin x \, dx$

$= +1 + 1 = +2$



Q $\int_0^{\pi} \cos x \, dx$ $= 1 - 1 = 0$



Q $\int_{-\pi/2}^{\pi/2} \cos x \, dx = \sin x \Big|_{-\pi/2}^{+\pi/2} = \sin\frac{\pi}{2} - \left(\sin(-\pi/2)\right)$

$= \sin\frac{\pi}{2} + \sin\pi/2 = 2$

Vector

- (A) आता हूँ 35%
- (B) नहीं आता हूँ 20%
- (C) कुछ - कुछ आता। 95%

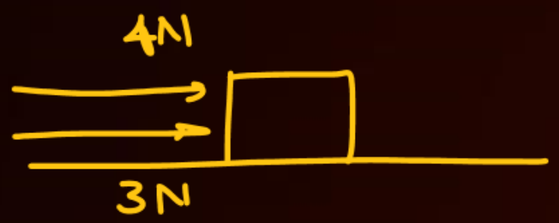
Vector

Scalar ⟶ those phy. quan. which have magnitude but no dir^{n}.

Ex. Speed, distance

Vector ⟶ those physical quan. which have ① magnitude
② Direction
③ Follow Law of Vectoralgebra.

Ex. Force, momentum . .



$F_{net} = 4 + 3$

$= 7$

$F_{net} = 4 - 3$

$= 1$

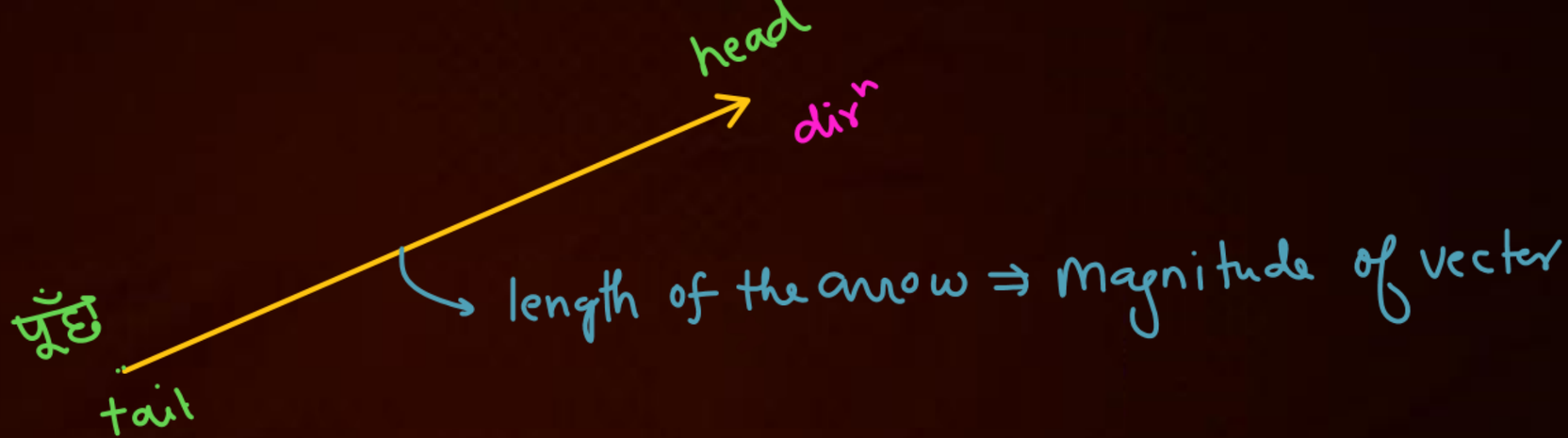
$F_{net} = \sqrt{3^2 + 4^2} = 5$

Representation of Vector

Force = $\vec{F}$

Vector A = $\vec{A}$

Analytically.

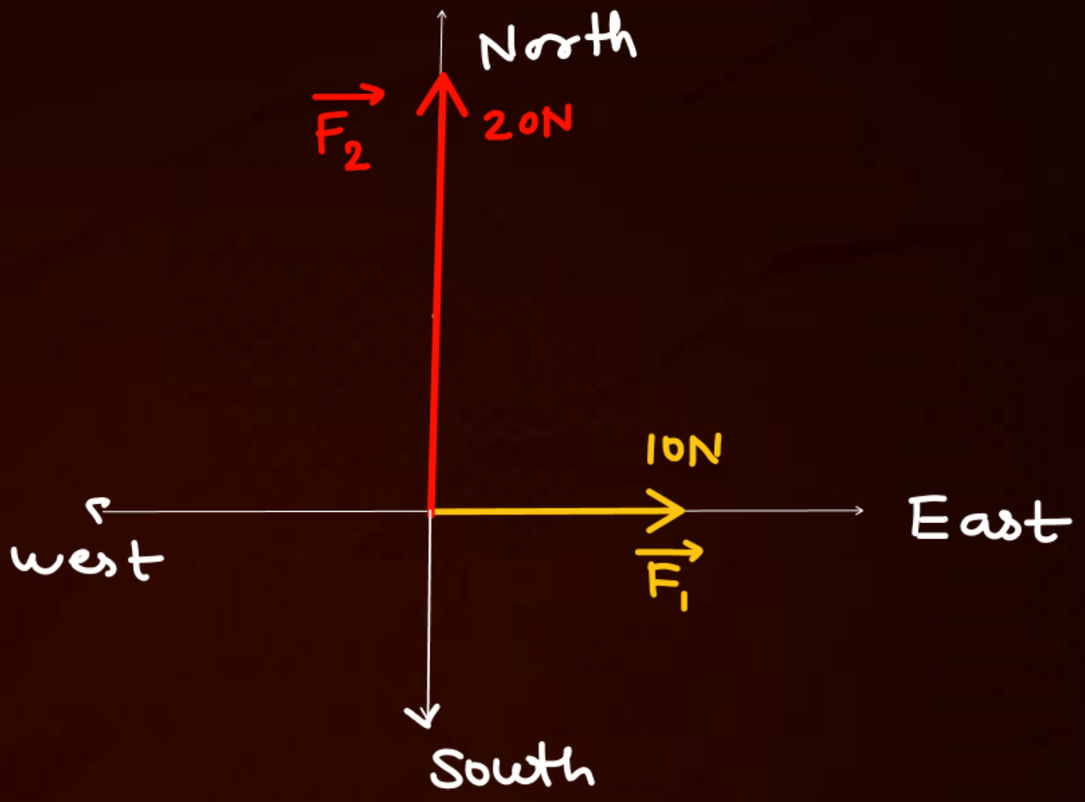


Daigramatically

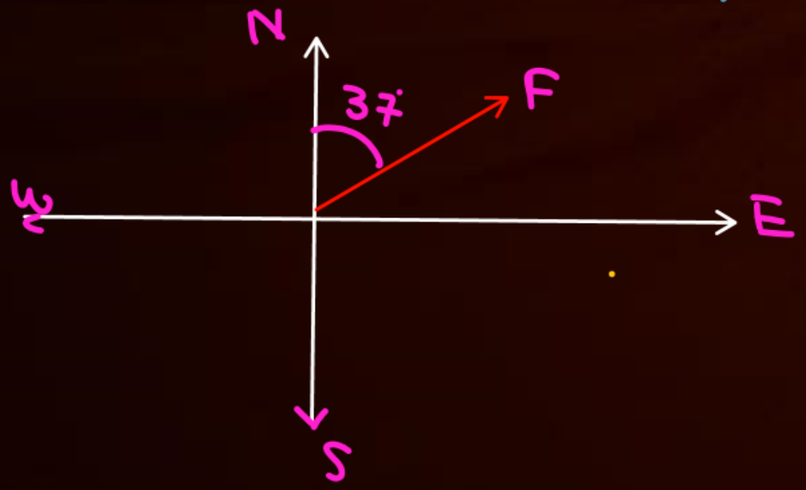
① Represent a force vector $\vec{F_1}$

$F_1 = 10N$ (Along east)

$F_2 = 20N$ (along North)



② $F = 10N$ (37° east of North)

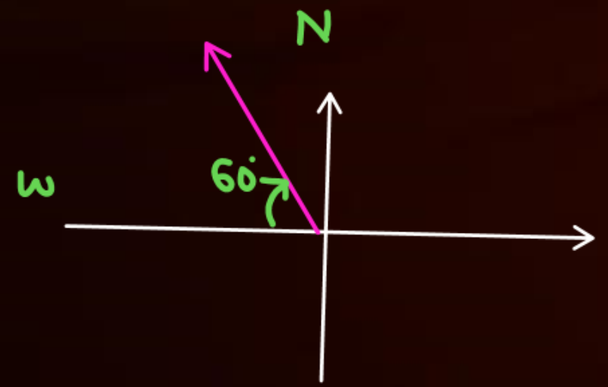


③ $F_1 = 10\ N$. (53° west of north)

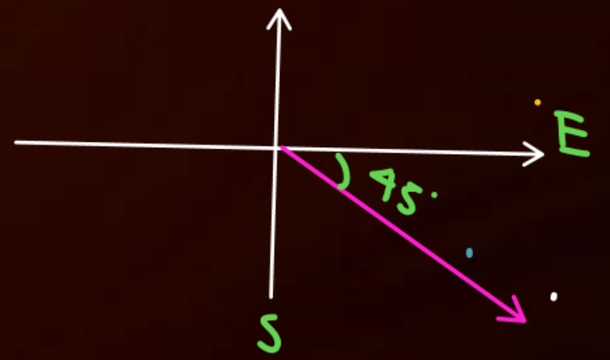
④ $F_2 = 20\ N$ (30° west of South)

60° South of west

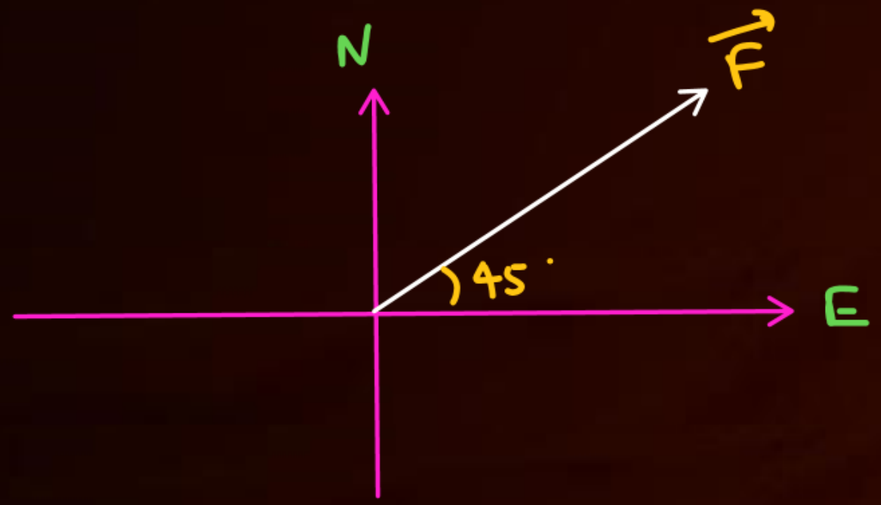
⑤ $F = 10\ N$ (60° North of west)



* ⑥ $F = 10\ N$ (East–South)



⑦ $F = 10N$ (north-east)



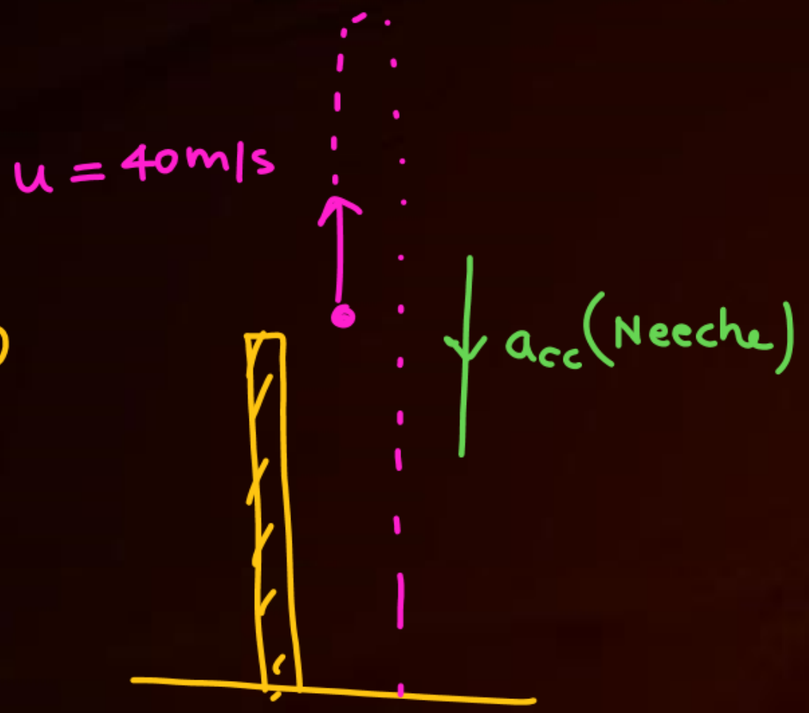
Type of vector

① Equal vector ⟶ Sab kuch equal (magnitude, Dir^n, physical quan) ⟶ same.

Two vector are said to be equal vector if they have same magnitude, same dir^n & same phy. quantity.

② Parallel vector ⟶ Direction same. (magnitude, phy. quantity may vary)

③ Antiparallel parallel ⟶ Direction opposite (" " ")



(1)

Initial velocity $\vec{u}$

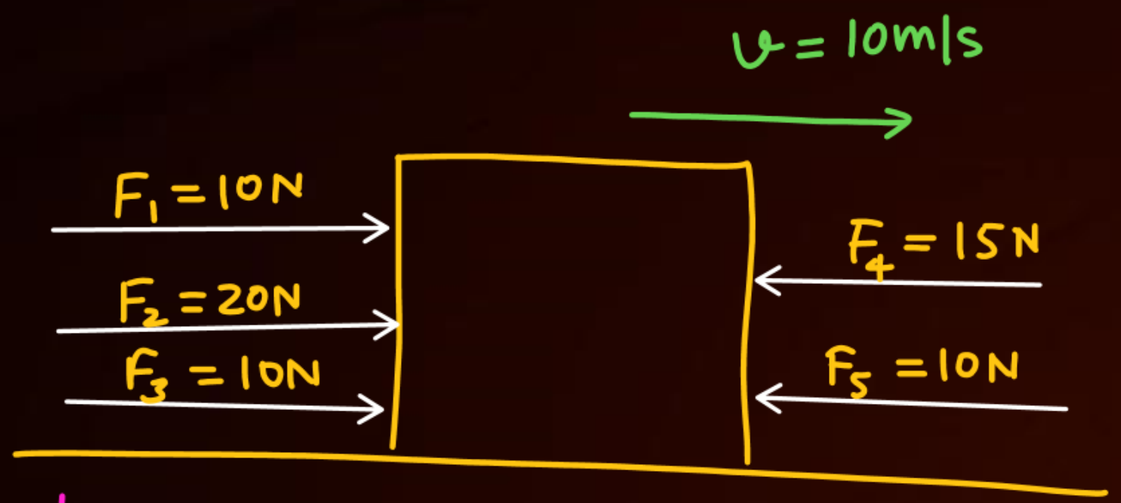
acc = $\vec{a}$

} Antiparallel.

(2)

$\vec{u}$, $\vec{a}$ ⇒ Equal vector ✗

Parallel vector ✓



here

$\vec{F_1}$ & $\vec{v}$ are equal vector → No

$\vec{F_1}$ & $\vec{v}$ are parallel Vector → Yes

$\vec{F_1}$ & $\vec{F_2}$ are equal vector → No

$\vec{F_1}$ & $\vec{F_3}$ are equal vector → Yes

	Equal vector	parallel vector	Antiparallel Vector
F_1 & F_2	X	✓	X
F_1 & F_4	X	X	✓
F_2 & v	X	✓	X
F_4 & v	X	X	✓
F_4 & F_5	X	✓	X
F_2 & F_4	X	X	✓
F_1 & F_5	X	X	✓
(*) F_1 & F_3	✓	✓	X

All the equal vector are parallel vector. but vice versa not true.

- Equal →
- Parallel
- Antiparallel.
- Negative Vector ⟶ magnitude same, Dir^{n} opposite, Phy. quant. same.

Zero vector
Unit vector
Position vector
Axial vector

- Coplanner Vector ⟶ same plane.

** orthogonal vector ⟶ If they are perpendicular to each other. ($\theta = 90^{\circ}$)

- Coinitial Vector ⟶
  ↳ same initial point.

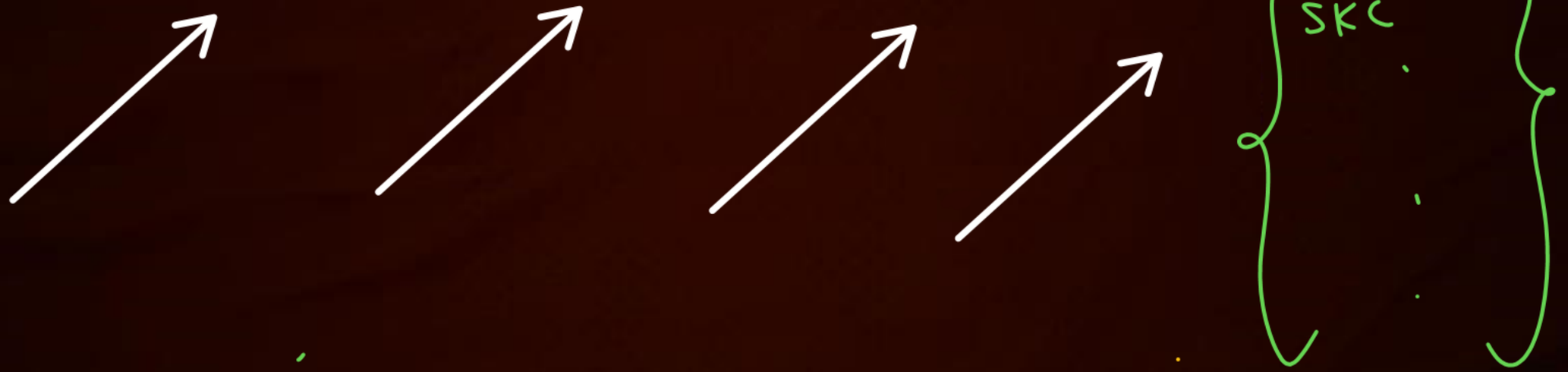
($\vec{A}$ & $\vec{B}$ are co-initial vector)

- Concurrent Vector

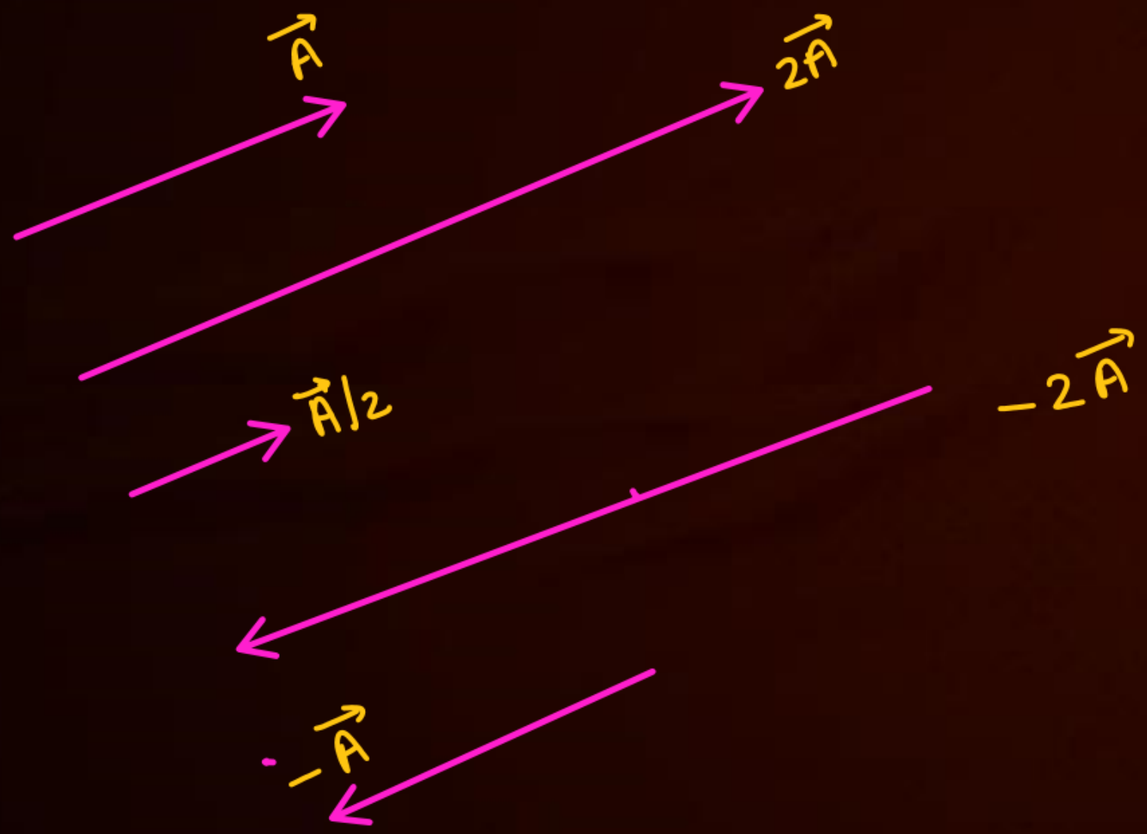
Colinear Vector → Along same line

Parallel shifting of vector

Whenever we need, we can parallelly shift any vector without changing direction and magnitude, then we can say that vector will not change.



Multiplication of a vector by a number



SKC

अगर मैं किसी vector को
3 से multiply करु तो
वो vector का magnitude 3 times
And dir^ Same रहेगी और

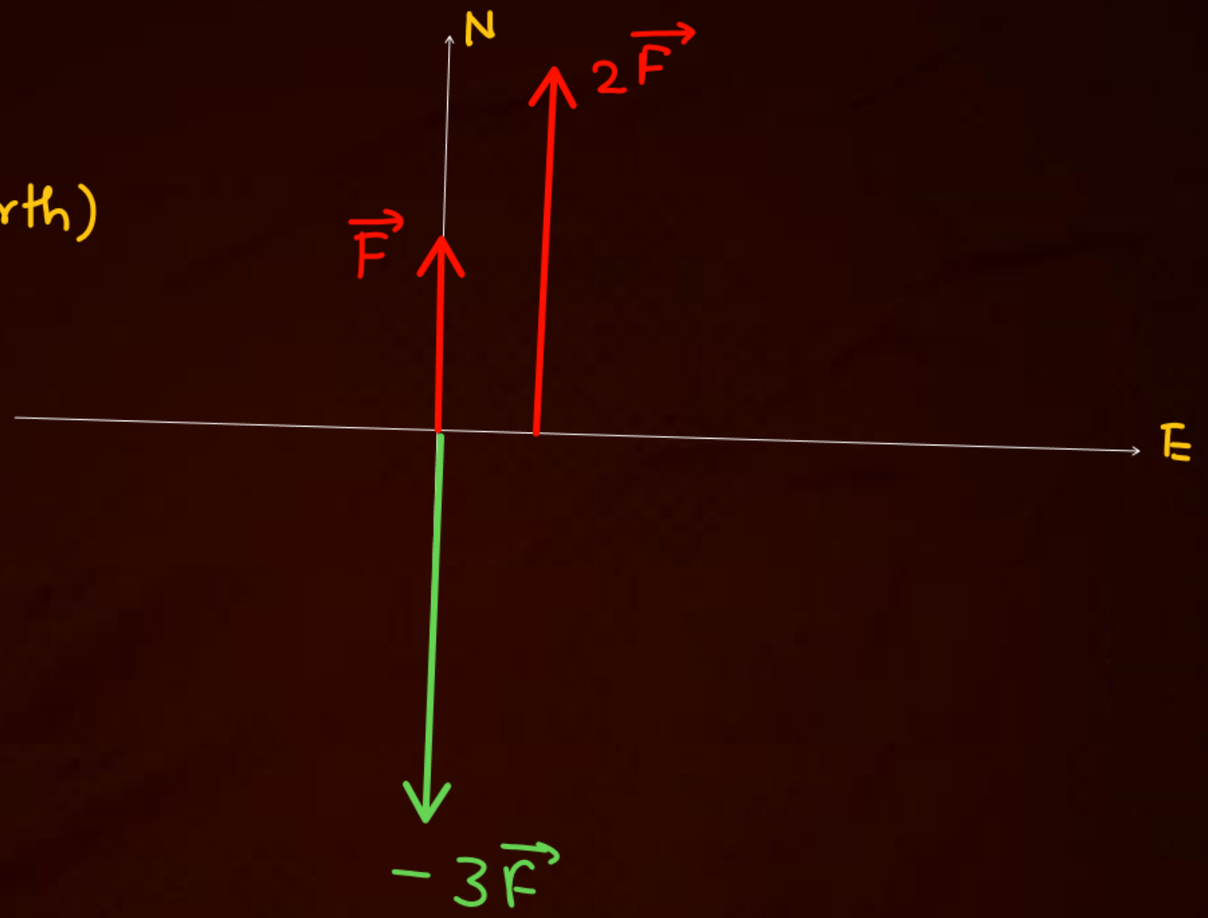
अगर मैं किसी vector को
−3 से multiply करु तो
वो vector का magnitude 3 times
And dir^ opposite हो जाएगी

Q $\vec{F}$ = 10N along (North)

then Draw

$2\vec{F}$ = 20N (North)

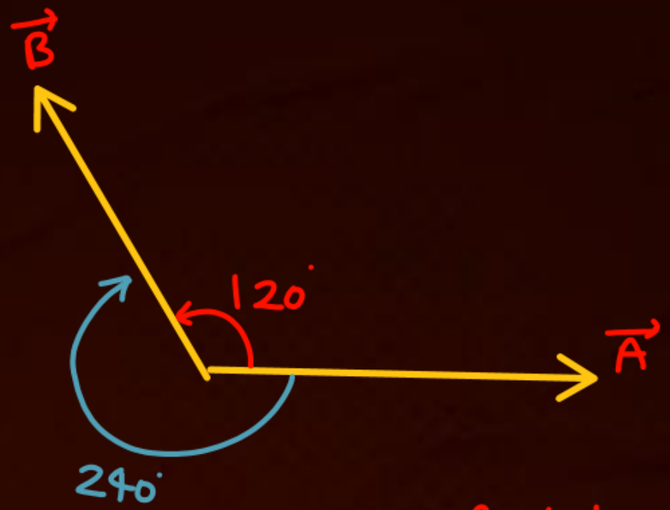
$-3\vec{F}$ = 30N (South)



Angle between vector

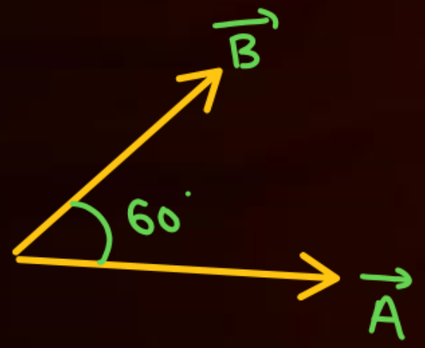
- Angle between their tail
- Angle between their head.

$0 \leq \theta \leq 180$



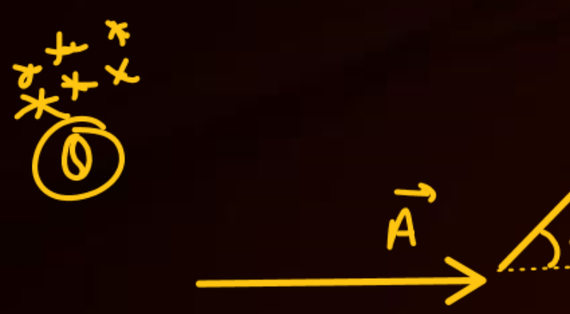
Angle between $\vec{A}$ & $\vec{B}$ = 120 ✓

= 240 ✗

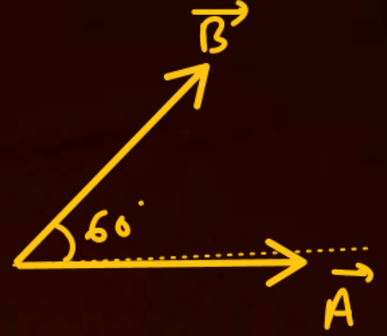


$\theta = 60°$

$\theta = 60°$.

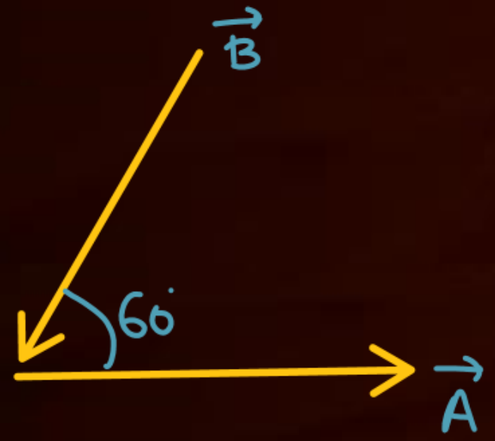


$\Rightarrow$

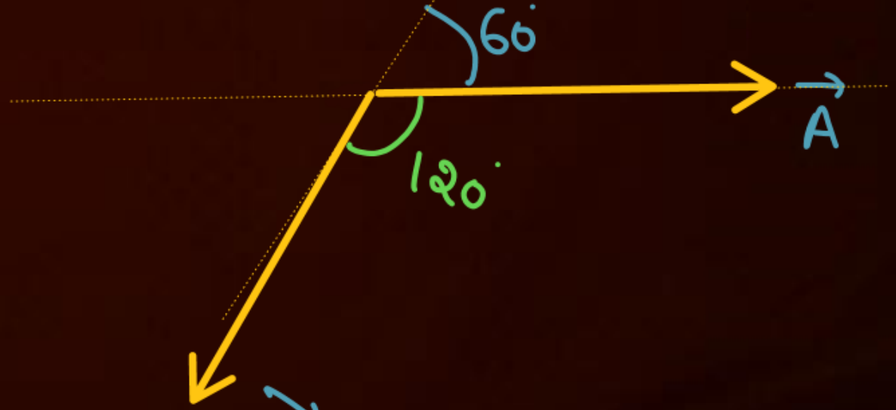


Angle between vector $\vec{A}$ & $\vec{B}$ = 60°

Q

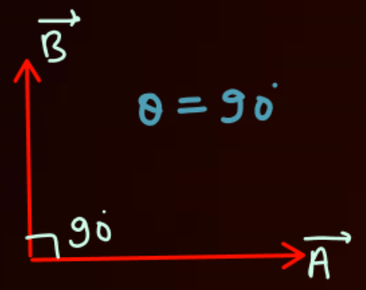


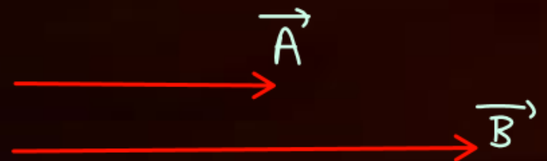
$\Longrightarrow$



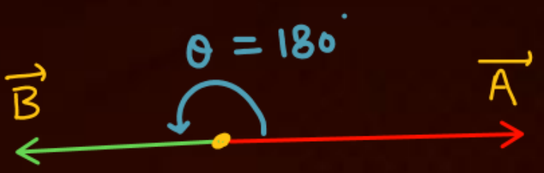
Angle between $\vec{A}$ & $\vec{B}$ = 120°

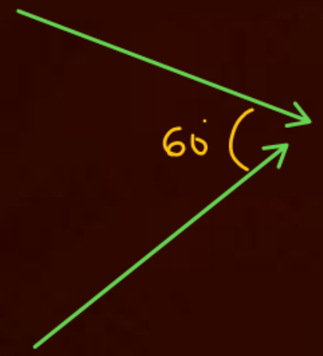
Q Find angle between $\vec{A}$ & $\vec{B}$

① 

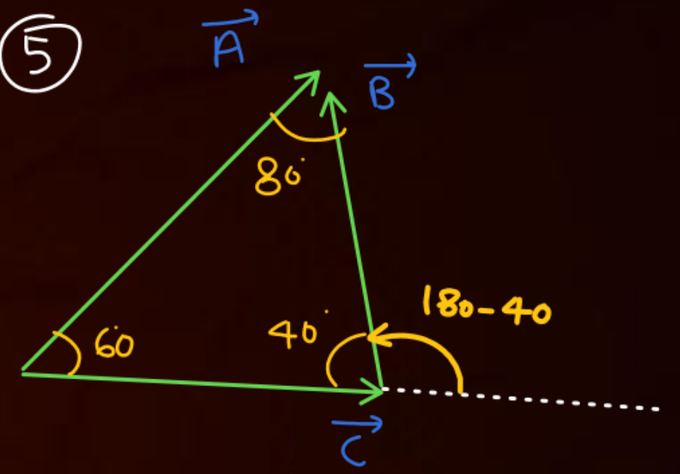
② 

θ = 0

③ 

④ 

θ = 60°

⑤ 

Angle between $\vec{A}$ & $\vec{B}$ = 80°

Angle between $\vec{B}$ & $\vec{C}$ = 140

Angle between $\vec{A}$ & $\vec{C}$ = 60°

$$\text{Avrg value} = \frac{\int y\,dx}{\int dx} \cdot \frac{\int y\,dt}{\int dt}$$

Q $i = 3t^2$

find avrg current from $t=0$ $t=2$ sec.

$$\text{Avrg current} = \frac{\int i\,dt}{\int dt} = \frac{\int_0^2 3t^2\,dt}{\int_0^2 dt} = \frac{3\left|\frac{t^3}{3}\right|_0^2}{t\Big|_0^2} = \frac{8-0}{2} = 4$$

Average value of current $= \dfrac{\int i\,dt}{\int dt}$

Average value of velocity $= \dfrac{\int v\,dt}{\int dt}$

Average value of acc $= \dfrac{\int a\,dt}{\int dt}$

Avg value of kaddu

$= \dfrac{\int (\text{kaddu})\,dt}{\int dt}$

Home work

- DPP
- KPP 06 and KPP 07 (must solve)

II

will give you solution vedio today evening.

join it

THANK YOU