YAKEEN NEET 2.0

2026

Vectors

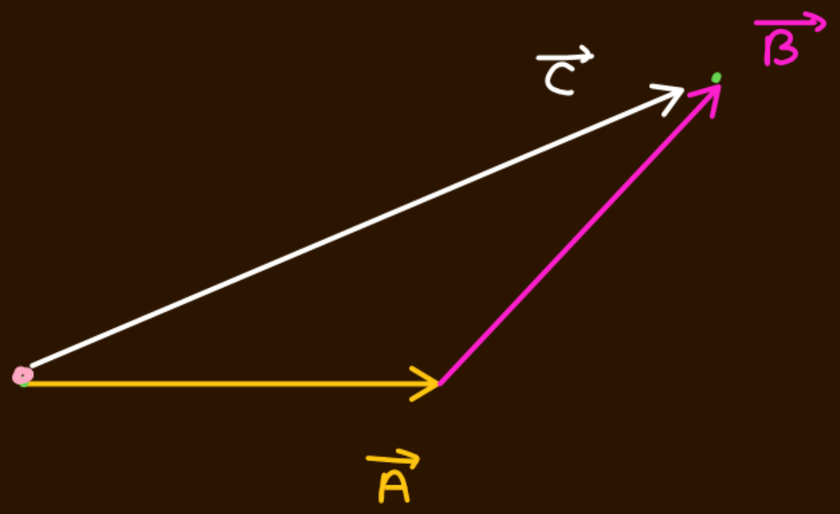
PHYSICS | Lecture - 03

By - Saleem Ahmed Sir

Todays Goal

- Triangle Law of Vector addition
- magnitude of resultant of two forces.

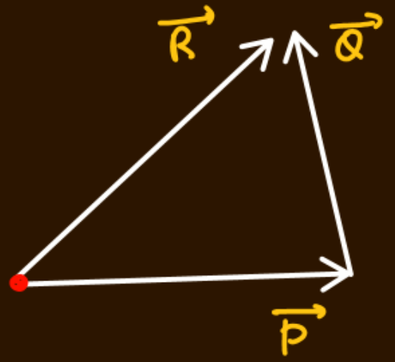
Triangle Law of vector addition



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

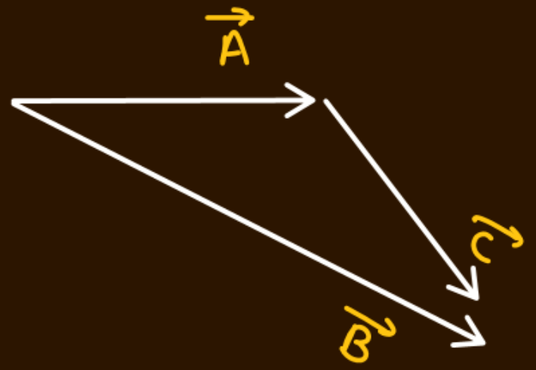
tail मिलती है = start

(1)



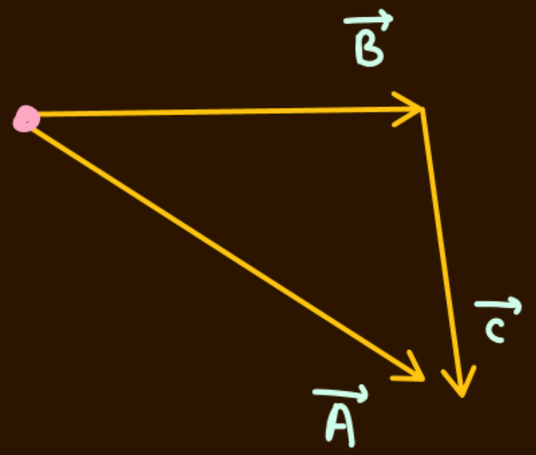
$\vec{P} + \vec{Q} = \vec{R}$

(2)



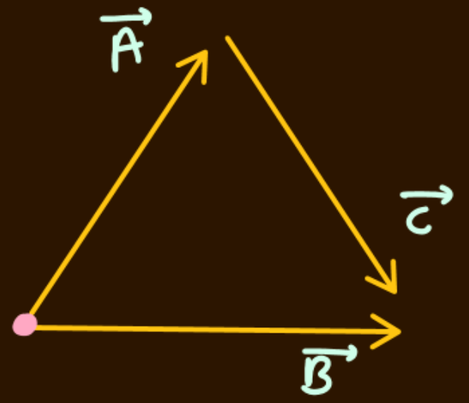
$\vec{A} + \vec{C} = \vec{B}$

③



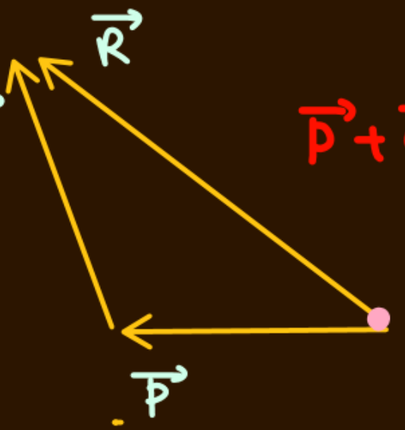
$\vec{B} + \vec{C} = \vec{A}$

④



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

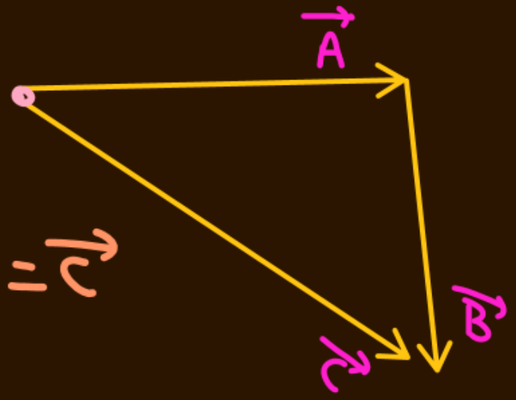
⑤



$\vec{P} + \vec{Q} = \vec{R}$

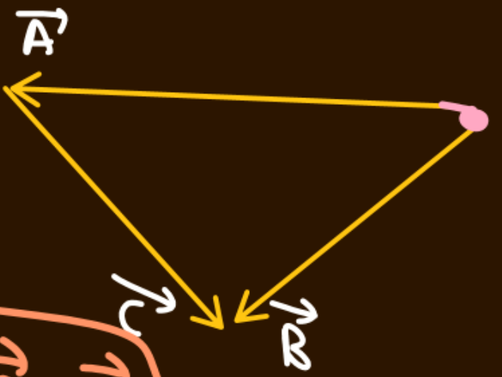
SKC

⑥



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

⑦



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

① Magnitude of resultant of $\vec{A}$ & $\vec{B}$

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

magnitude of $\vec{A} = |\vec{A}| = A$

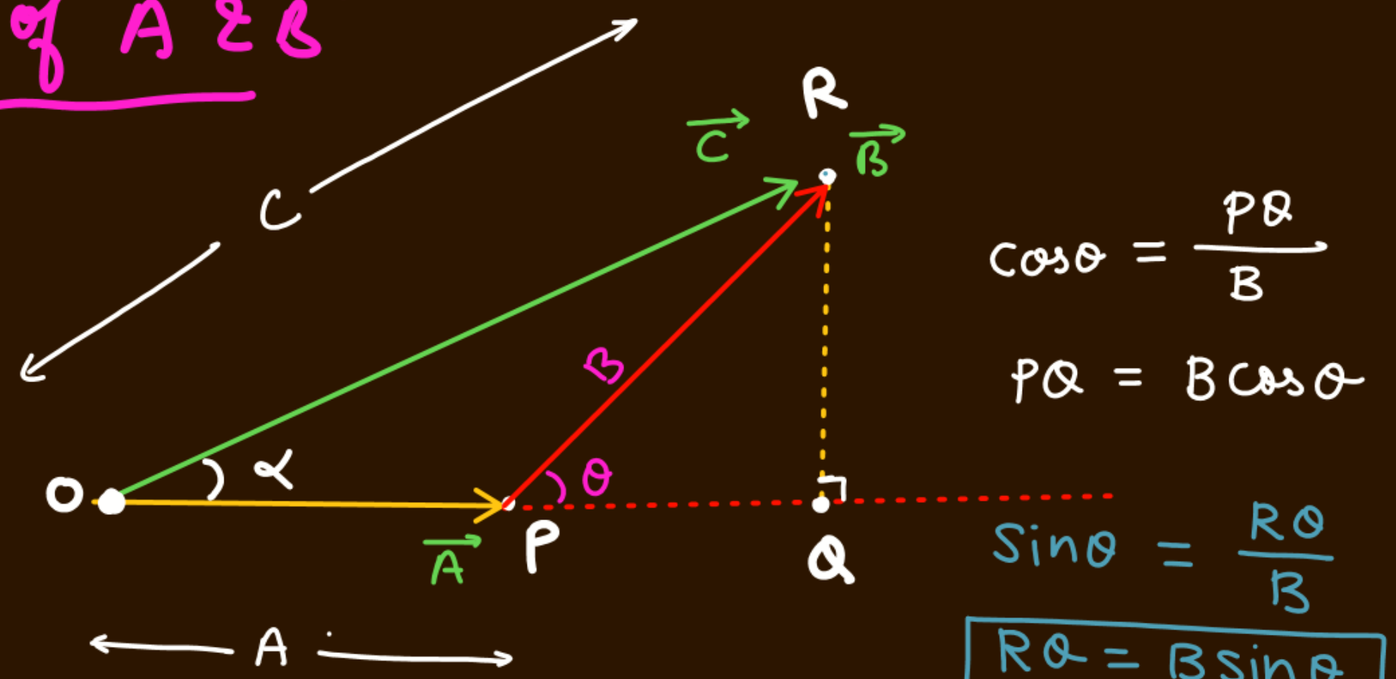
magnitude of $\vec{B} = |\vec{B}| = B$

magnitude of $\vec{C} = |\vec{C}| = C$

$\theta \rightarrow$ Angle between $\vec{A}$ & $\vec{B}$.

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

$\alpha \equiv$ Angle made by $\vec{C}$ with $\vec{A}$



ΔOQR

$(OQ)^2 + (QR)^2 = (OR)^2$ (Pytho. -)

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

$\therefore$

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

$PQ = B\cos\theta$

$\sin\theta = \frac{RQ}{B}$

$\boxed{RQ = B\sin\theta}$

(2)

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

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

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

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

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

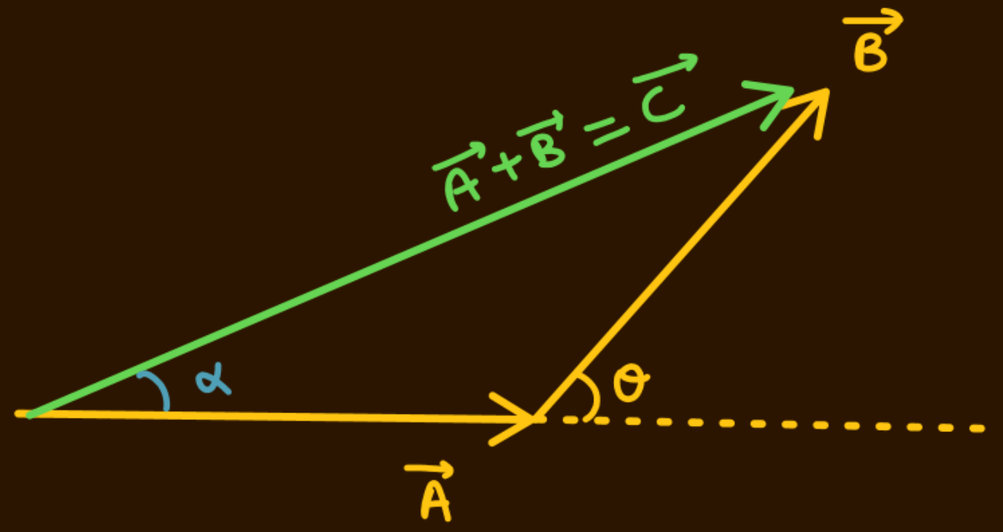
③

Resultant of $\vec{A}$ & $\vec{B}$ = $\vec{A}+\vec{B}$ = $\vec{C}$

Addition of $\vec{A}$ & $\vec{B}$ = $\vec{A}+\vec{B}$ = $\vec{C}$

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

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



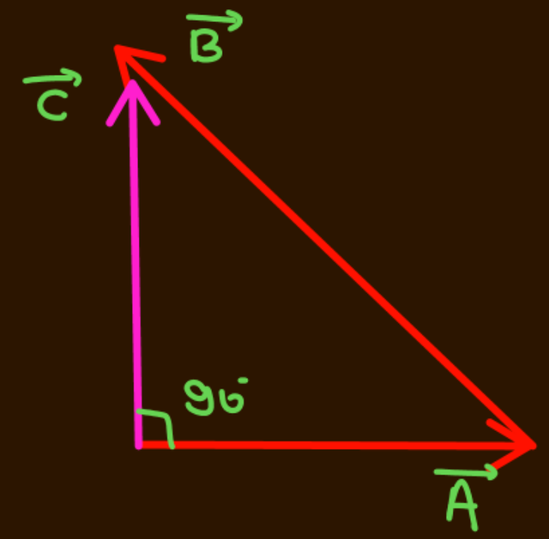
A, B, C ⟶ magnitude, (+ve)

SKC

→ orthogonal

Resultant of $\vec{A}$ & $\vec{B}$ is perpendicular to $\vec{A}$

Draw Daigram



note

$\alpha = 90^\circ$

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

③

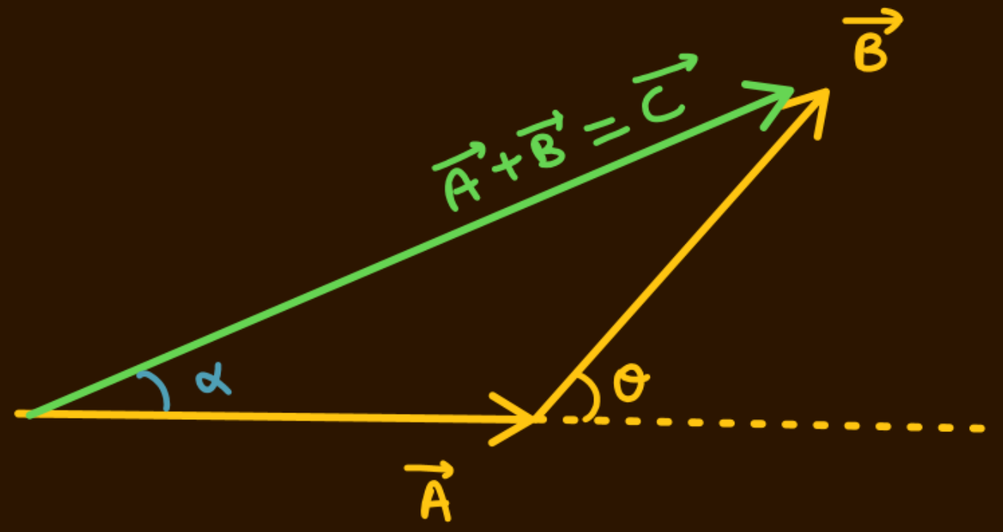
Resultant of $\vec{A}$ & $\vec{B}$ = $\vec{A}+\vec{B}$ = $\vec{C}$

Addition of $\vec{A}$ & $\vec{B}$ = $\vec{A}+\vec{B}$ = $\vec{C}$

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

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

$\theta \longrightarrow$ Angle b/w $\vec{A}$ & $\vec{B}$



A, B, C ⟶ magnitude, (+ve)

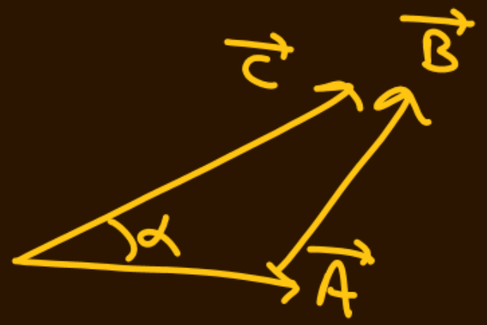
Q If two vector of magnitude 10N and 20N are such that angle between them is 60°. Find magnitude of their resultant. and angle made by resultant with smaller vector.

Sol^{n} (a) $A = 10$

$B = 20$

$\theta = 60°$

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



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

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

$$C = \sqrt{100 + 400 + 200} = \sqrt{700}$$

$$C = 10\sqrt{7}$$

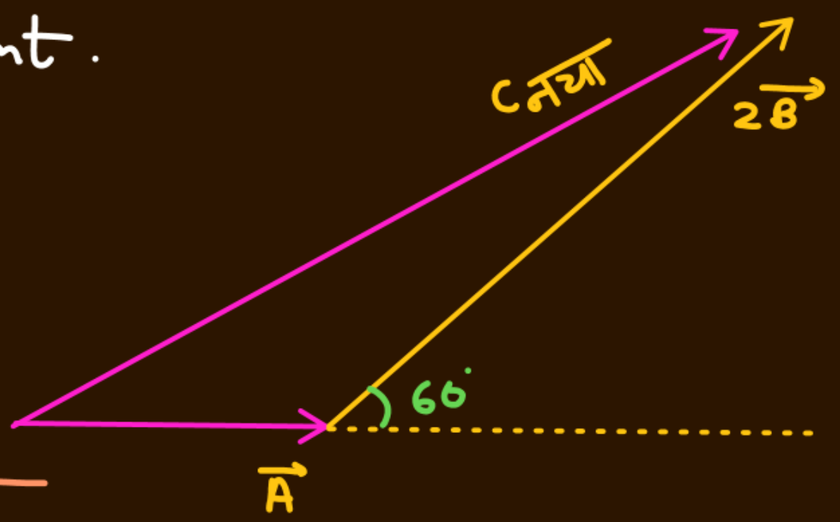
$$\tan\alpha = \frac{B\sin\theta}{A + B\cos\theta}$$

$$\tan\alpha = \frac{20\sin 60}{10 + 20\cos 60}$$

$$= \frac{20\sqrt{3}/2}{10 + 20 \times \frac{1}{2}}$$

$$\tan\alpha = \frac{\sqrt{3}}{2}$$

(b) In above part $(A = 10, B = 20, \theta = 60)$ if $\vec{B}$ become twice and added to $\vec{A}$ find magnitude of new resultant.



Sol^n

$A_{new} = 10$

$B_{new} = 40$

$$C_{new} = \sqrt{(10)^2 + (40)^2 + 2 \times 10 \times 40 \times \cos 60}$$

$$= 10\sqrt{21}$$

Q magnitude of resultant of two forces $\vec{A}$ & $\vec{B}$ is 5 Newton. If magnitude of A is $5\sqrt{3}$ N and magnitude of $\vec{B}$ is 5 N. then angle between $\vec{A}$ & $\vec{B}$.

(A) $\theta = 60$

(B) $\theta = -60$

(C) $\theta = 150$

(d) $\theta = 120$

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

$$5 = \sqrt{(5\sqrt{3})^2 + (5)^2 + 2 \times 5\sqrt{3} \times 5\cos\theta}$$

$$25 = 75 + 25 + 50\sqrt{3}\cos\theta$$

$$-75 = 50\sqrt{3}\cos\theta$$

$$\cos\theta = \frac{-75}{50\sqrt{3}} = \frac{-3}{2\sqrt{3}} = -\frac{\sqrt{3}}{2}$$

$$\cos\theta = -\frac{\sqrt{3}}{2}$$

2^{nd} quad.

$\cos(180-30) = -\frac{\sqrt{3}}{2}$

$\theta = 150$

Q If two vector $\vec{A}$ and $\vec{B}$ have same magnitude x.
find magnitude of their resultant if angle between is θ

(a) $\theta = 0$.

$$c = \sqrt{x^2 + x^2 + 2 \cdot x \cdot x \cdot \cos 0^\circ} = 2x$$

(b) $\theta = 60^\circ$

$$c = \sqrt{x^2 + x^2 + 2 \cdot x \cdot x \cdot \cos 60} = x\sqrt{3}$$

(c) $\theta = 90^\circ$

$$c = \sqrt{x^2 + x^2 + 2 \cdot x \cdot x \cdot \cos 90^\circ} = x\sqrt{2}$$

(d) $\theta = 120^\circ$

$$c = \sqrt{x^2 + x^2 + 2 \cdot x \cdot x \cdot \cos 120^\circ}$$

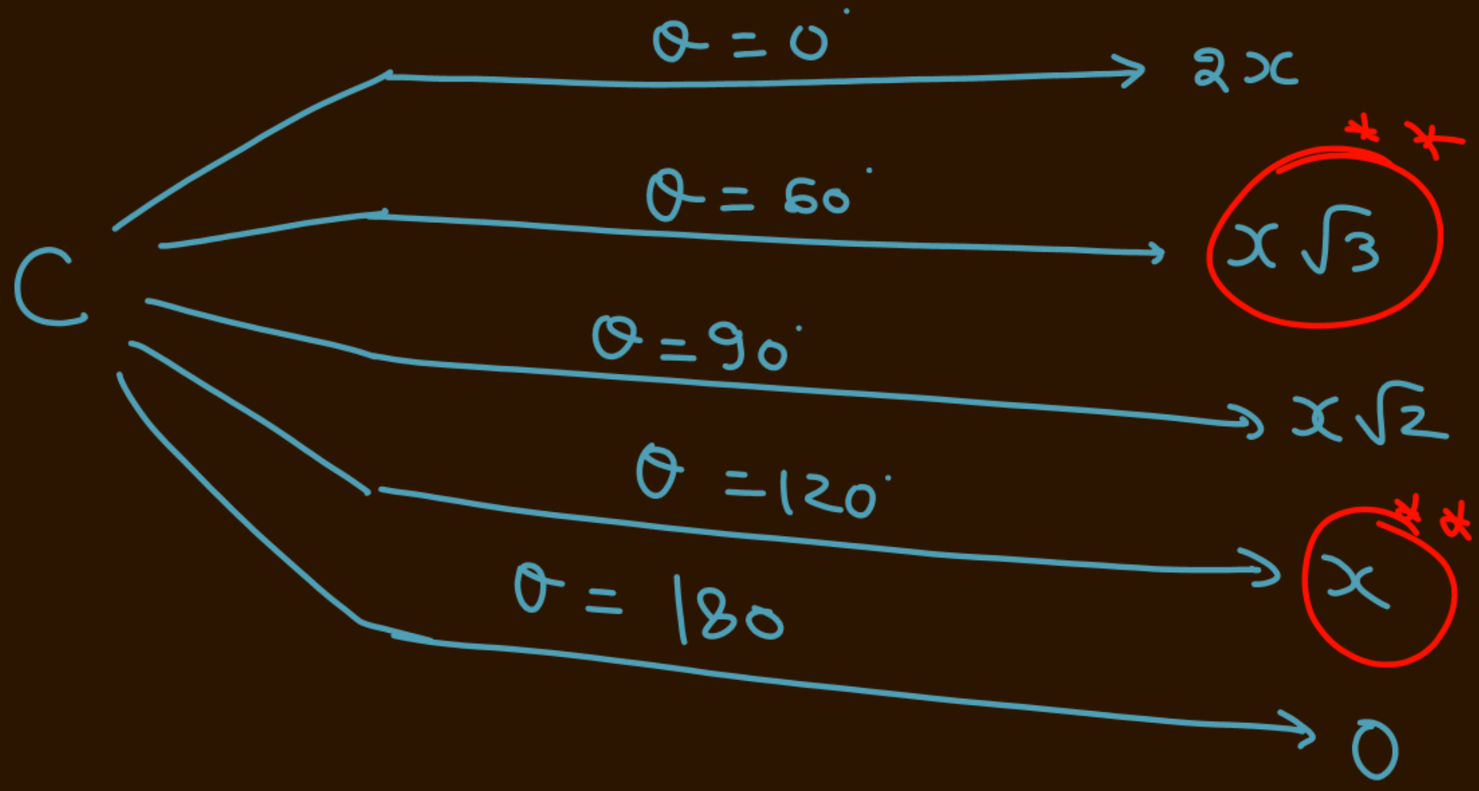
$$c = \sqrt{x^2 + x^2 - 2x^2 \cdot \frac{1}{2}} = x$$

(e) $\theta = 180$

$$c = \sqrt{x^2 + x^2 + 2 \cdot x \cdot x \cdot \cos 180^\circ} = 0$$

note

If two vectors of same magnitude 'x' are acting.



Q Two vector $\vec{A}$ & $\vec{B}$ have the same magnitude 'a' and resultant has magnitude 'R'. Now $\vec{B}$ is doubled and added to $\vec{A}$, and new resultant become $a\sqrt{3}$. Find angle between $\vec{A}$ & $\vec{B}$.

Sol. $R = \sqrt{a^2 + a^2 + 2 \cdot a \cdot a \cdot \cos\theta}$

↳ Use ही नहीं हुआ

$$R_{new} = a\sqrt{3} = \sqrt{a^2 + (2a)^2 + 2 \cdot a \cdot 2a \cos\theta}$$

$$3a^2 = a^2 + 4a^2 + 4a^2 \cos\theta$$

$$3 = 5 + 4\cos\theta$$

$$3 - 5 = 4\cos\theta$$

$$\cos\theta = -\frac{1}{2}$$

$$\theta = 120^\circ$$

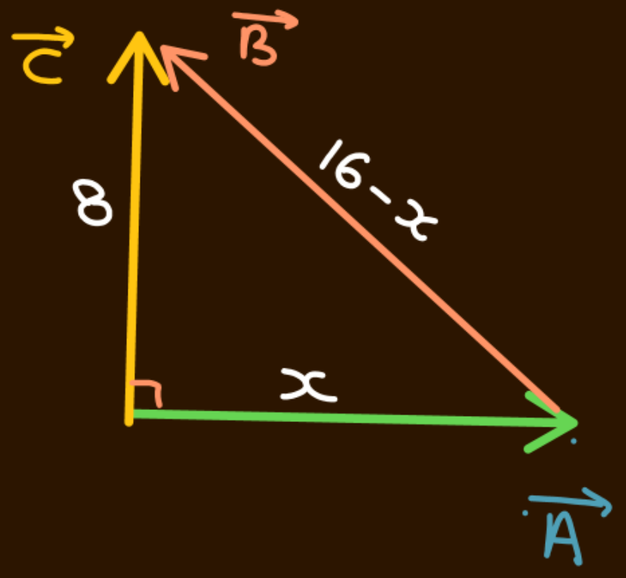
(b) $\frac{R_{new}}{R_{old}} =$ ✓

Exp NEET

(***) (Saleem Sir Special ques) SSSR

Q Sum of the magnitude of $\vec{A}$ & $\vec{B}$ is 16N. If magnitude of resultant of $\vec{A}$ & $\vec{B}$ is 8N such that resultant is perpendicular to the $\vec{A}$. Find magnitude of $\vec{A}$ & $\vec{B}$. Also find $\frac{A}{B}$.

Soln



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

$8^2 + x^2 = (16-x)^2$

Solve $x = 6$

$A = 6$

$B = 16 - x = 10$

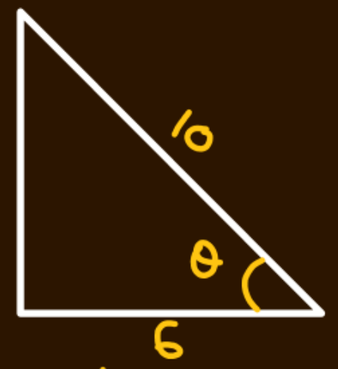
∴

(b) Find angle b/w $\vec{A}$ & $\vec{B}$

$\tan\theta = \frac{8}{6}$

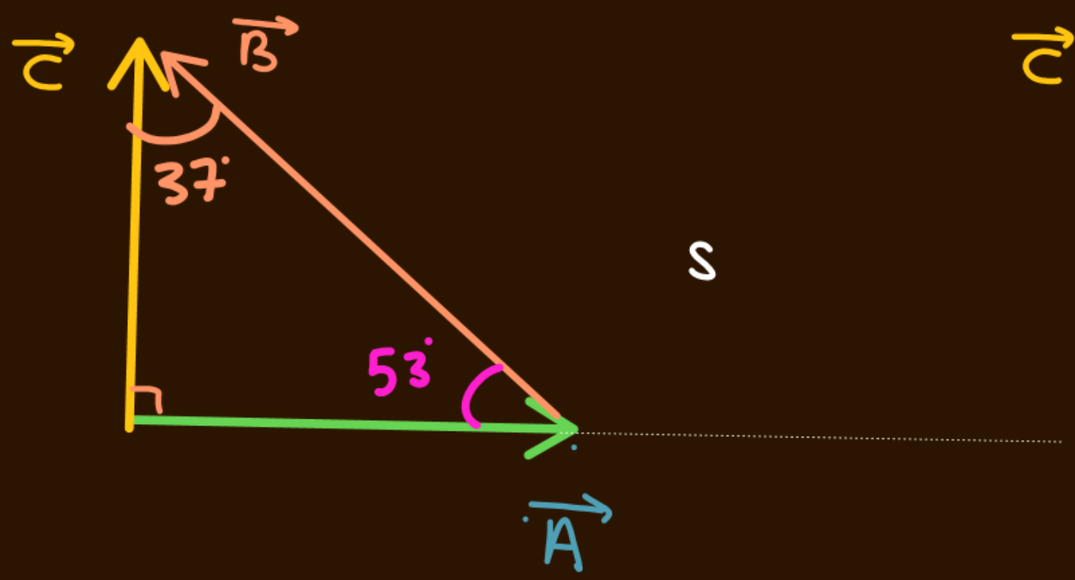
$\tan\theta = \frac{4}{3}$

$\theta = 53$

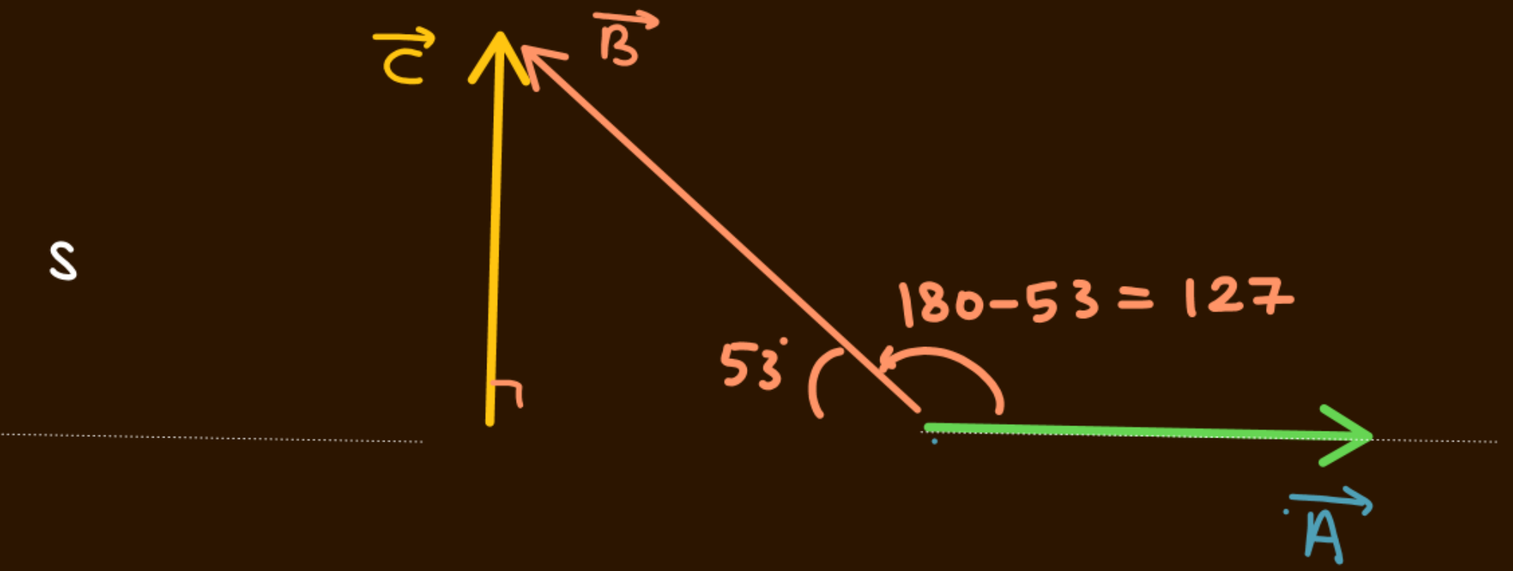


∴

Ans ≡ $180 - 53 = 127$



S



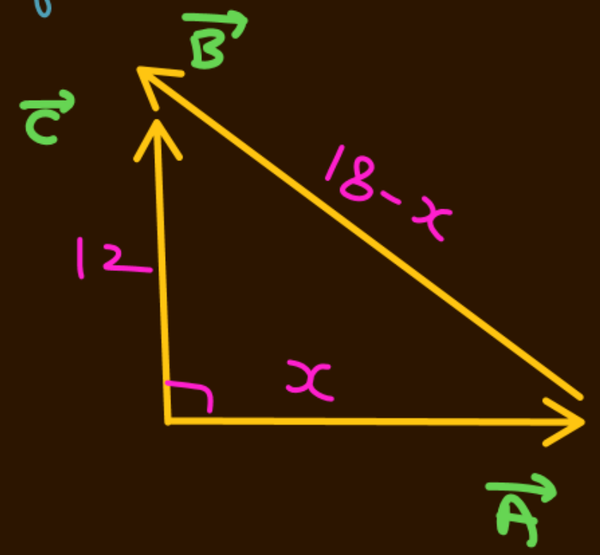
Angle b/w $\vec{A}$ & $\vec{B}$ = 180 − 53 = 127°

Angle b/w $\vec{A}$ & $\vec{C}$ = 90°

" " $\vec{B}$ & $\vec{C}$ = 37°

Q Sum of the magnitude of $\vec{A}$ & $\vec{B}$ is 18N. If magnitude of resultant of $\vec{A}$ & $\vec{B}$ is 12N. such that resultant is perpendicular to the $\vec{A}$. Find magnitude of $\vec{A}$ & $\vec{B}$. Also find $\frac{A}{B}$.

Sol^n



$$(12)^2 + x^2 = (18-x)^2$$

$x = 5$

$12^2 + 5^2 = 13^2$

$A = 5$

$B = 13$

Home Work

- DPP - 07 (Basic Maths and calculus)
- DPP - 08 (" " " ")
- KPP (06 & 07) ≡ Solve if you have not solved ≡ Discussion Vedio uploaded .... Clear your doubt then.
-

KPP-08 (Vector)
Under making
if i upload
Solve it on Sunday

join it

THANK YOU