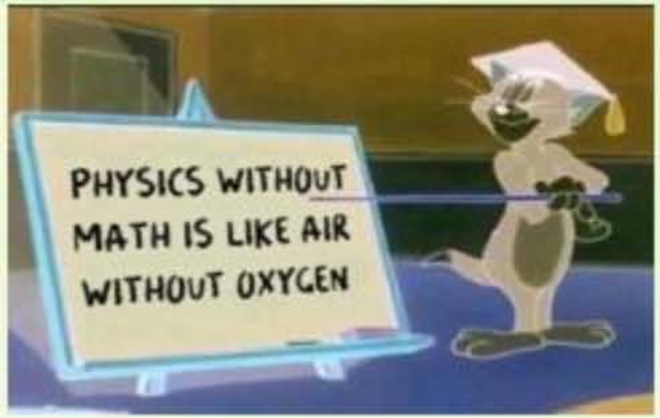
YAKEEN

NEET 2025

BASIC MATHS AND CALCULUS



PHYSICS | **Lecture - 02**

By - TANUJ BANSAL SIR

Topics

to be covered

1. Range and Graph
2. Trigonometric Function Change
3.
4.

चलिए शुरू करते हैं

* All classes
↓
Physics
↓
All Content
↙ ↘
DPP | DPP PDF
↓ | ↓
Quiz Format | PDF → Ek Saath

Solutions Available

DPP → After the Class
↓
Kitne Solve Hue?

Revision Pro Max HD Prime

* $\theta = \frac{S}{R} \Rightarrow S = R\theta$.

* ① rad
② °
③ '
④ ''

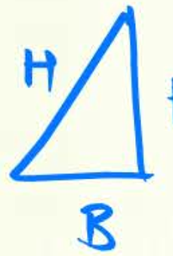
$360° = 2\pi$
$180° = \pi$
$90° = \frac{\pi}{2}$
$45° = \pi/4$

$120° = 2\pi/3$
$60° = \pi/3$
$30° = \pi/6$

$1° = 60'$
$1' = 60''$

Deg to rad $\Rightarrow$ Mul. by $\frac{\pi}{180}$

Rad to Deg $\Rightarrow$ Mul. by $\frac{180°}{\pi}$



$\tan\theta = \frac{\sin\theta}{\cos\theta}$

$\operatorname{cosec}\theta = \frac{1}{\sin\theta}$

$\sec\theta = \frac{1}{\cos\theta}$

$\cot\theta = \frac{1}{\tan\theta}$

Degree to radian

1. $330° \rightarrow \frac{\cancel{330}^{11}}{\cancel{180}_{6}} \times \frac{\pi}{} = 11\frac{\pi}{6}$

2. $390° \rightarrow \frac{\cancel{390}^{13}}{\cancel{180}_{6}} \times \frac{\pi}{} = 13\frac{\pi}{6}$

3. $750° \rightarrow \frac{\cancel{750}^{25}}{\cancel{180}_{6}} \times \frac{\pi}{} = 25\frac{\pi}{6}$

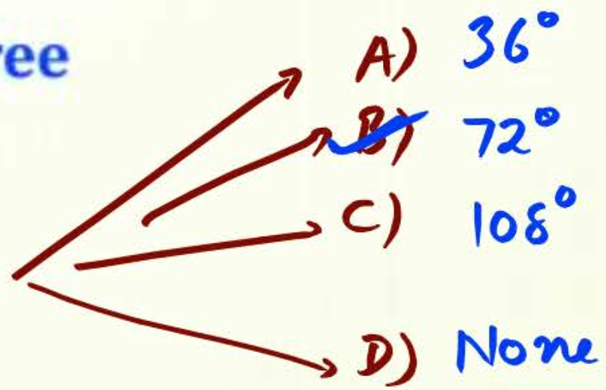
4. $1080° \rightarrow \frac{\cancel{1080}^{6} \times \pi}{\cancel{180}} = 6\pi$

5. $900° \rightarrow \frac{\cancel{900}^{5} \times \pi}{\cancel{180}} = 5\pi$

6. $780° \rightarrow \frac{\cancel{780}^{13} \times \pi}{\cancel{180}_{3}} = \frac{13\pi}{3}$

Radian to degree

1. $2\pi/5 \rightarrow$



$\frac{2\pi}{5} \times \frac{36}{180} = 72°$

2. $13\pi/3 \rightarrow$

$13\frac{\pi}{3} \times \frac{60}{180} = 780°$

3. $8\pi \rightarrow$ $8\pi \times \frac{180}{\pi} = 1440°$

4. $5\pi \rightarrow$ $5\pi \times \frac{180}{\pi} = 900°$

5. $9\pi/2 \rightarrow$ $\frac{9\pi}{2} \times \frac{180^{90}}{\pi} = 810°$

6. $3.5\pi \rightarrow$ $\frac{35^{7}}{10_{2}}\pi = \frac{7\pi}{2} = \frac{7\pi}{2} \times \frac{180^{90}}{\pi} = 630°$

7. $1.25\pi \rightarrow$ $\frac{125^{5}\pi}{100_{4}} = \frac{5\pi}{4} = \frac{5\pi}{4} \times \frac{180^{45}}{\pi} = 5 \times 45°$
$= 225°$

8. $3\pi \rightarrow$ $3\pi \times \frac{180}{\pi} = 540°$

$$4\overline{)180}\quad 45,\ 16,\ 20,\ 20,\ \times$$

AIIMS
Delhi

Ques. Convert $\frac{5\pi}{3}$ rad into minutes.

A) 1800'

~~B)~~ 18000'

C) 180'

D) Humein Nhi Pta!

$\frac{5\pi}{3} \times \frac{180^{60^\circ}}{\pi} = 5 \times 60^\circ = 300^\circ$

$1^\circ = 60'$

$\Rightarrow 300 \times 60' = \underline{18000'}$

Ques How many seconds are there in $2°$.

$1° = 60' = 60 \times 60''$

$\boxed{1° = 3600''}$

$\Downarrow$

$2° \times (60') = 120'$

$= 120 \times (60'') = 7200''$

Direct $\Rightarrow 2° \times 3600'' = 7200''$

$1° = 60'$

$1' = 60''$

Convert into degree

A) $20' = \frac{20}{60} = \left(\frac{1}{3}\right)^\circ = 0.33^\circ$

B) $30' = \frac{30}{60} = \left(\frac{1}{2}\right)^\circ = 0.5^\circ$

$1^\circ = 60'$

$\Downarrow$

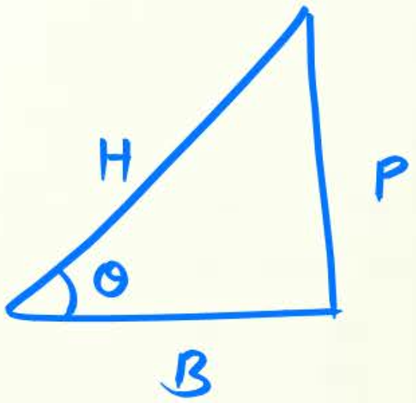
$60' = 1^\circ$

$1' = \left(\frac{1}{60}\right)^\circ$

Deg to min => Mul. by 60

min to deg => Div. by 60

Pythagoras Theorem



$$P^2 + B^2 = H^2$$

$$\sqrt{P^2 + B^2} = H$$

(Pythagorean Triplets)

Values to learn

$3^2 + 4^2 = 5^2$

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

$6^2 + 8^2 = 10^2$

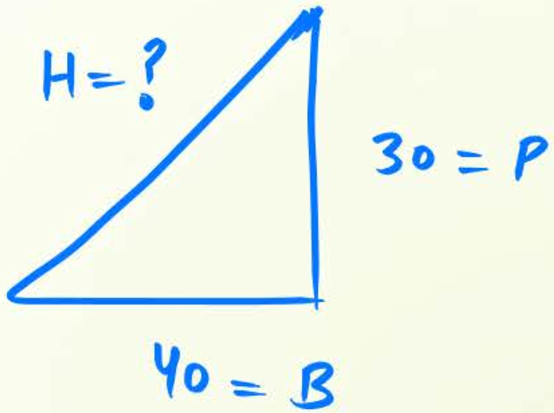
$24^2 + 7^2 = 25^2$

Ques

BPU

↓

Swaal



Bina Pen Uthaye

H = 50 Ans

$3^2 + 4^2 = 5^2$

↓ ↓ ↓

$30^2 + 40^2 = 50^2$

$6^2 + 8^2 = 10^2$

$60^2 + 80^2 = 100^2$

Ques

BPU

H = ?

H = 100 Ans

Values to Learn

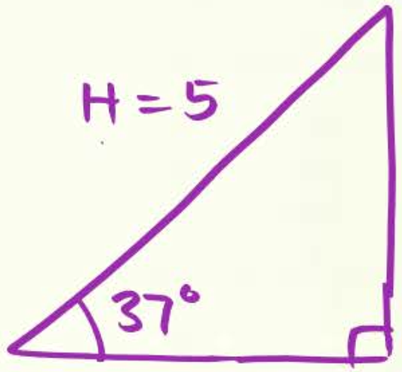
Learn. Learn.

	0°	30°	45°	60°	90°	120°	135°	150°	180°
sin θ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
cos θ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	−1
tan θ	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞	$-\sqrt{3}$	−1	$\frac{-1}{\sqrt{3}}$	0

Famous Angle

$\Downarrow$

$37^\circ, 53^\circ$



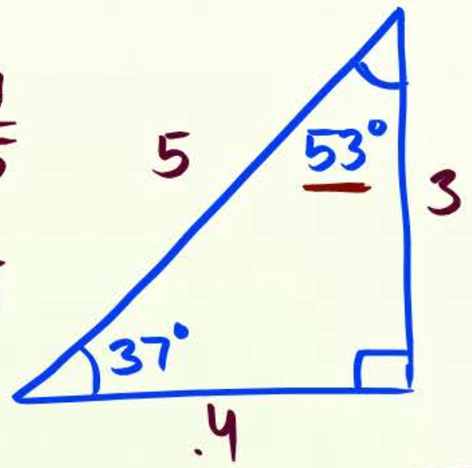
$\sin 37^\circ = \frac{3}{5}$, $\cos 37^\circ = \frac{4}{5}$

$\tan 37^\circ = \frac{3}{4}$

$\sin 53^\circ = \frac{4}{5}$

$\cos 53^\circ = \frac{3}{5}$

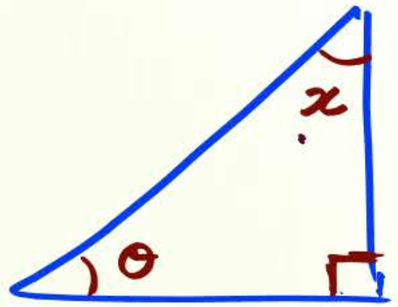
$\tan 53^\circ = \frac{4}{3}$



Here $\theta = 37^\circ$

$90 - \theta = 90 - 37^\circ$

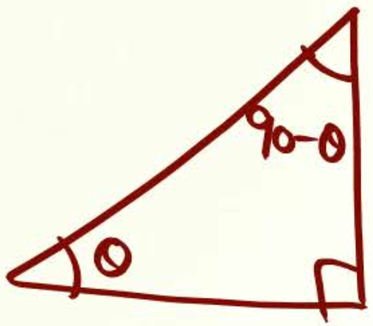
$= 53^\circ$

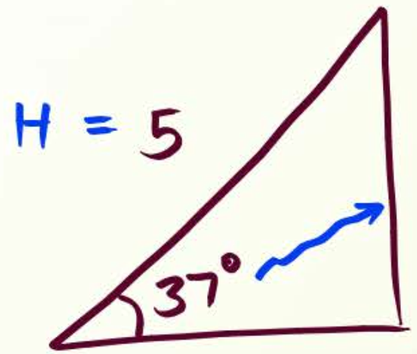


$\theta + 90^\circ + x = 180^\circ$

$x = 180^\circ - 90^\circ - \theta$

$x = 90 - \theta$

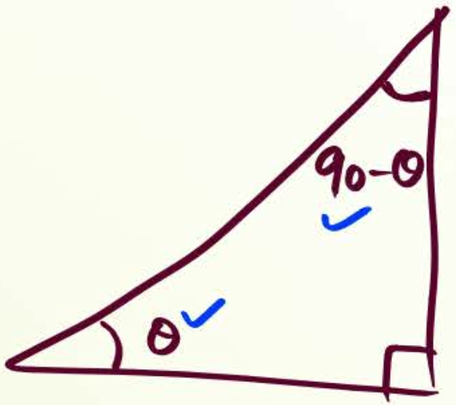


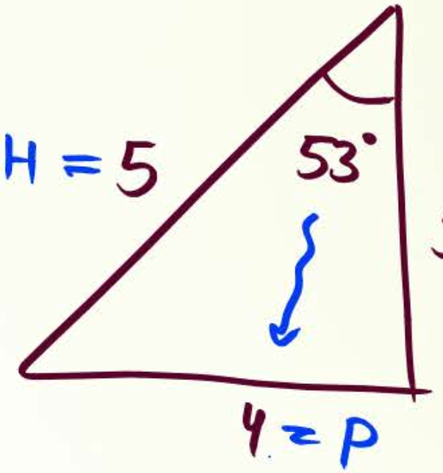


$\sin 37^\circ = \frac{3}{5}$

$\cos 37^\circ = \frac{4}{5}$

$\tan 37^\circ = \frac{3}{4}$





$\sin 53^\circ = \frac{4}{5}$

$\cos 53^\circ = \frac{3}{5}$

$\tan 53^\circ = \frac{4}{3}$

* Complimentary angles

⇒ Sum of angles = 90°

eg :- $37^\circ + 53^\circ = 90^\circ$

$\theta + 90-\theta = 90^\circ$

eg :- $30^\circ + 60^\circ = 90^\circ$

$15^\circ + 75^\circ = 90^\circ$

Complementary angles Ki Khaasiyat → sin & cos fit values Interchange Ho Jaati Hain!

$\sin 37^\circ = \cos 53^\circ = \frac{3}{5}$

$\sin 53^\circ = \cos 37^\circ = \frac{4}{5}$

$\sin 30^\circ = \cos 60^\circ = \frac{1}{2}$

$\sin 60^\circ = \cos 30^\circ = \frac{\sqrt{3}}{2}$

Supplementary angles

Sum 180°

eg : $30^\circ + 150^\circ$

$60^\circ + 120^\circ$

Range and Graph

① $(\sin\theta)_{max} = +1$

$(\sin\theta)_{min} = -1$

$\Rightarrow \boxed{-1 \leq \sin\theta \leq 1}$

② Similarly $\Rightarrow \boxed{-1 \leq \cos\theta \leq 1}$

③ $\boxed{-\infty < \tan\theta < \infty}$

QUESTION

Which of the following option is correct for the possible value of sin θ.

1. 2 ✗
2. $1/\sqrt{5}$
3. $\sqrt{2} = 1.414$ ✗
4. $\sqrt{5}/2 \Rightarrow \frac{\sqrt{5}}{2}$ ✗

$\frac{1}{\sqrt{5}} = \frac{1}{2.\ldots} < 1$

Less than 1

Learn

$\sqrt{2} = 1.414$

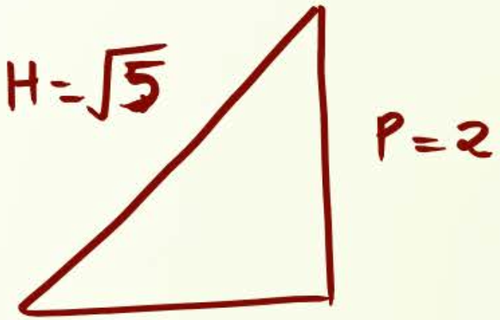
$\sqrt{3} = 1.732$

$\sqrt{4} = 2$

$\frac{\sqrt{5}}{2} = \frac{2.\ldots}{2} = 1.\ldots > 1$

greater than 1

Ques. If $\tan\theta = \frac{2}{1}$, find $\sin\theta$ & $\cos\theta$



$$H = \sqrt{2^2+1^2}$$
$$= \sqrt{4+1}$$
$$= \sqrt{5}.$$

$$\tan\theta = \frac{2}{1} = \frac{P}{B}$$

$$\downarrow$$

$$\sin\theta = \frac{P}{H} = \frac{2}{\sqrt{5}}$$
$$\cos\theta = \frac{B}{H} = \frac{1}{\sqrt{5}}$$

→ Any

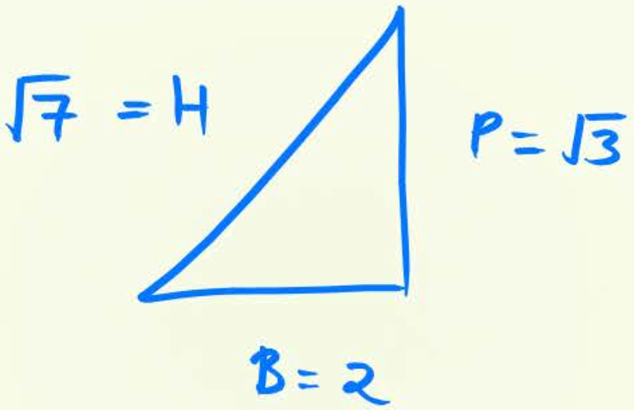
Ques If $\tan\theta = \frac{\sqrt{3}}{2}$, find $\sin\theta$

A) $\frac{\sqrt{3}}{5}$

B) $\frac{\sqrt{3}}{7}$

C) $\sqrt{\frac{3}{7}}$

D) None



$H = \sqrt{P^2 + B^2}$

$= \sqrt{(\sqrt{3})^2 + 2^2}$

$= \sqrt{3+4} = \sqrt{7}$

$\sin\theta = \frac{\sqrt{3}}{\sqrt{7}} = \sqrt{\frac{3}{7}}$

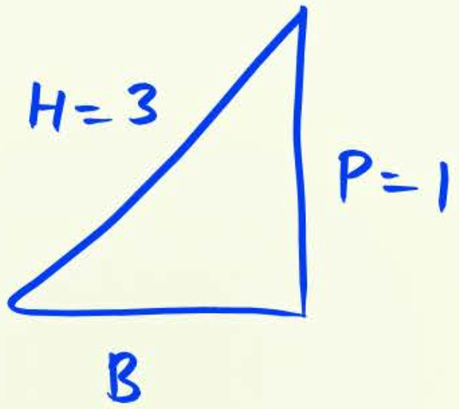
Ques. If $\sin\theta = \frac{1}{3}$, find $\cos\theta = ?$

A) $\frac{\sqrt{2}}{3}$

~~B)~~ $2\frac{\sqrt{2}}{3}$ ← Babita Ji

C) $\frac{\sqrt{5}}{3}$

D) None



$\sin\theta = \frac{1}{3} = \frac{P}{H}$

$\cos\theta = \frac{B}{H} = \frac{2\sqrt{2}}{3}$

$P^2 + B^2 = H^2$

$1^2 + B^2 = 3^2$

$1 + B^2 = 9$

$B^2 = 9 - 1 = 8$

$B = \sqrt{8} = \sqrt{2\times2\times2}$

$B = 2\sqrt{2}$

Ques. Find $\frac{\sin\theta}{\theta}$ if $\theta = 30^\circ$

$$\Rightarrow \frac{\sin\theta}{\theta} = \frac{\sin 30^\circ}{30^\circ} = \frac{1/2}{\pi/6}$$

$$= \frac{1}{2} \times \frac{6}{\pi} = \frac{3}{\pi} \text{ Ans}$$

$\sin 30^\circ \rightarrow$ Trigono

$30^\circ \rightarrow$ Algebraic

TBS ÷ अगर अकेला θ हो, तो उसको Radian में Convert करना है!

Ques. Find $\frac{\cos\theta}{\theta}$ if $\theta = 60°$?

$$\Downarrow$$

$$\frac{\cos 60°}{60°} = \frac{1/2}{\pi/3} = \frac{1}{2} \times \frac{3}{\pi} = \frac{3}{2\pi} \quad \text{Ans}$$

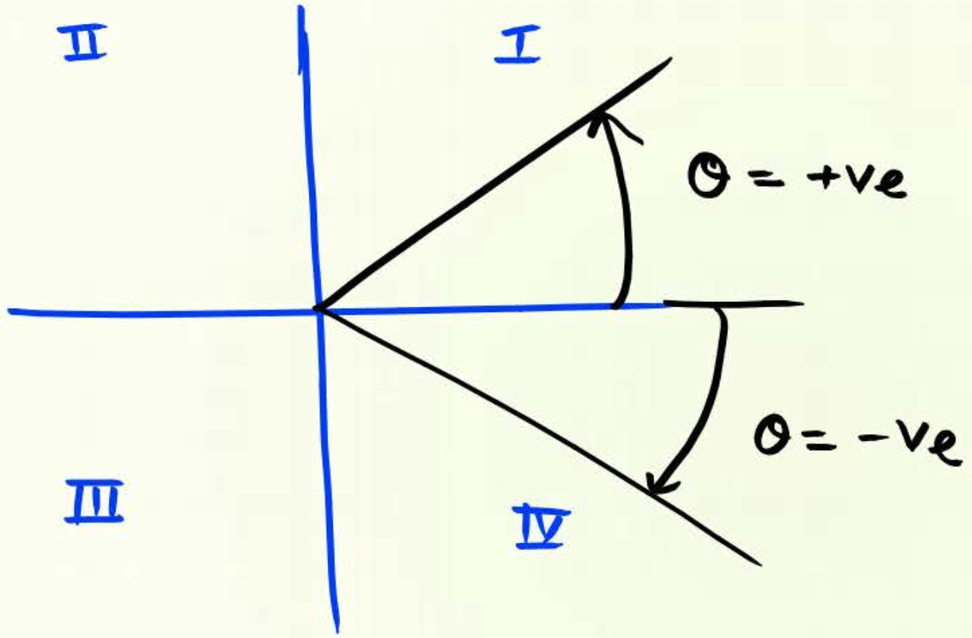
QUESTION

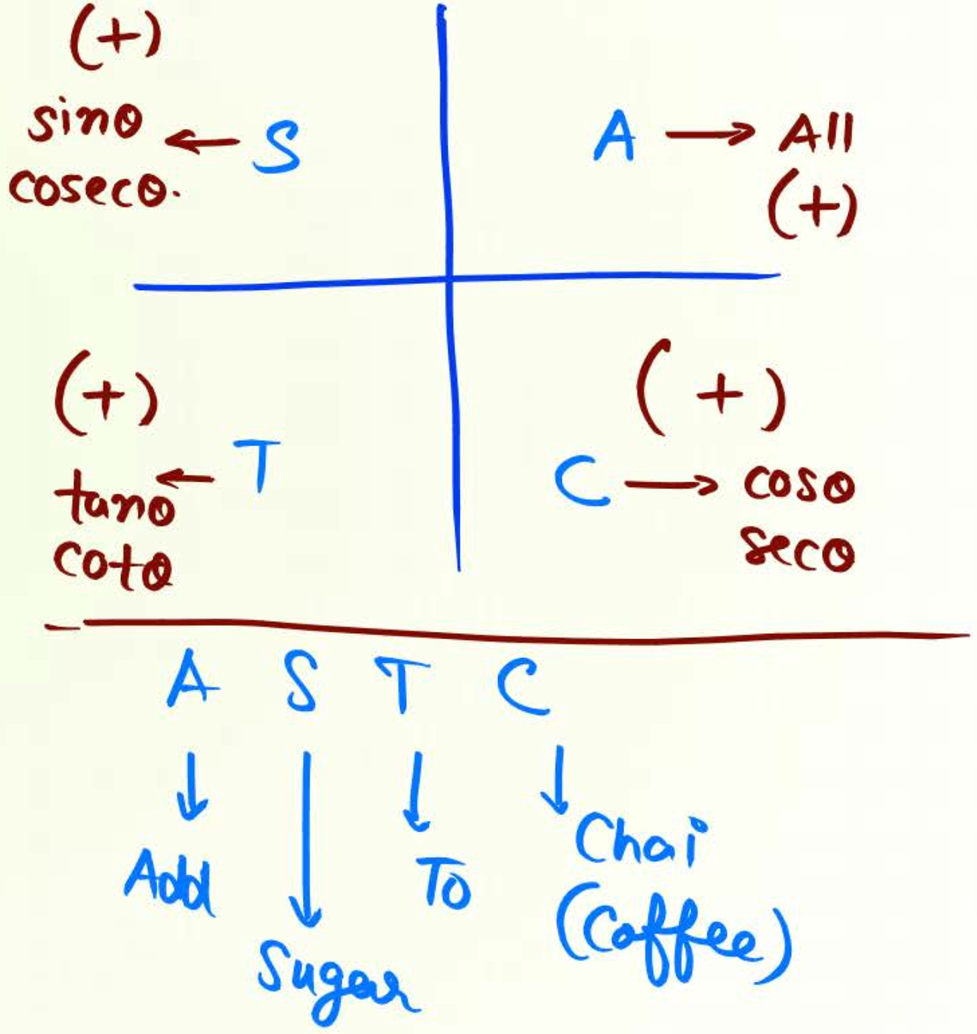
HW

Find the value of $\frac{\sin(\theta/2)}{\theta}$ if $\theta = 180°$

1. $2/3\pi$
2. $1/3\pi$
3. $1/2\pi$
4. $1/\pi$

Trigonometric Function Change





Note: ACW angles are positive,
CW angles are negative.

Doubts

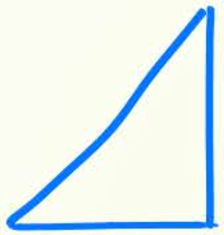
π rad $= 180^\circ$

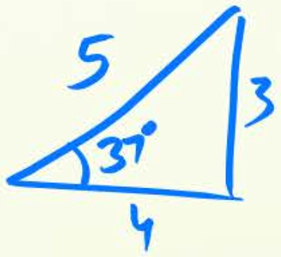
1 rad $= \left(\frac{180}{\pi}\right)^\circ$

$\frac{\pi}{3}$ rad $= \frac{\pi}{3} \times \frac{180^\circ}{\pi} = 60^\circ$

Backlog Nahi Hona Chaiye!

Revision



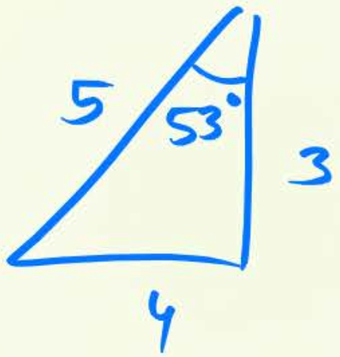


$3^2+4^2=5^2$

$6^2+8^2=10^2$

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

$24^2+7^2=25^2$



Range $\Rightarrow$ $-1 \leq \sin\theta \leq 1$

$-1 \leq \cos\theta \leq 1$

$-\infty < \tan\theta < \infty$

$=$

शुक्रिया !

ज़िंदा रहे तो फिर मिलेंगे

THANK YOU

DPP - 01

↓

Leave

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→ After Tomorrow Class