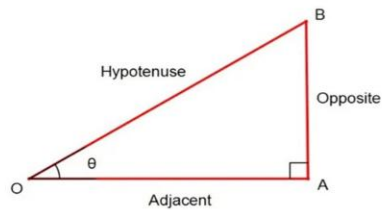


ONE-PAGE TRIGONOMETRY FORMULA CHART (REVISION)

Basics



$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{AB}{OB}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{OA}{OB}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{AB}{OA}$$

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

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

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

Table of Angle

angle (α°)	$\sin \alpha$	$\cos \alpha$	$\tan \alpha$	$\cot \alpha$	$\sec \alpha$	$\operatorname{cosec} \alpha$
0°	0	1	0	∞	1	∞
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$	$\sqrt{3}$	$\frac{2}{\sqrt{3}}$	2
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1	1	$\sqrt{2}$	$\sqrt{2}$
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{1}{\sqrt{3}}$	2	$\frac{2}{\sqrt{3}}$
90°	1	0	∞	0	∞	1

General

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

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

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

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

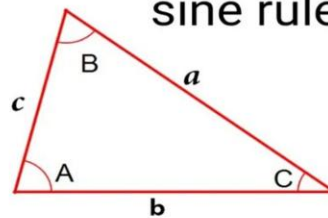
$$\tan \theta \cdot \cot \theta = 1$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\sec^2 \theta - \tan^2 \theta = 1$$

$$\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$$

sine rule cosine rule



Sine Rule

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine rule

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

Trigonometric Ratio Table

@ math-only-math.com

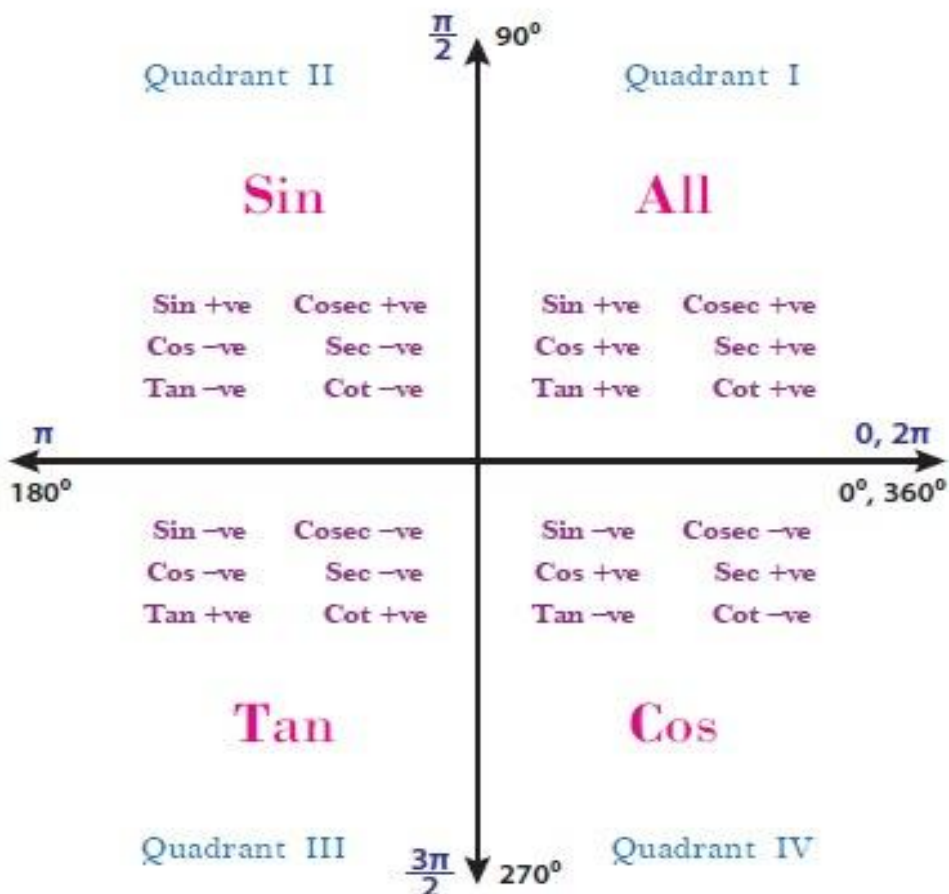
@ math-only-math.com

Angle T. Ratio	0°	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	undefined
csc	undefined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
sec	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	undefined
cot	undefined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

Non-Rationalized

Name : _____

ASTC CHART



Printable Math, Charts and Tables @ www.mathworksheets4kids.com

Basic Ratios

- $\sin\theta = P/H$
- $\cos\theta = B/H$
- $\tan\theta = P/B$

Identities

- $\sin^2\theta + \cos^2\theta = 1$
- $1 + \tan^2\theta = \sec^2\theta$
- $1 + \cot^2\theta = \operatorname{cosec}^2\theta$

Complementary Angles

- $\sin(90^\circ - \theta) = \cos\theta$
- $\cos(90^\circ - \theta) = \sin\theta$

Allied Angles

- $\sin(180^\circ - \theta) = \sin\theta$
- $\cos(180^\circ - \theta) = -\cos\theta$
- $\tan(180^\circ - \theta) = -\tan\theta$

Standard Values

θ	0°	30°	45°	60°	90°
$\sin$	0	$1/2$	$1/\sqrt{2}$	$\sqrt{3}/2$	1
$\cos$	1	$\sqrt{3}/2$	$1/\sqrt{2}$	$1/2$	0
$\tan$	0	$1/\sqrt{3}$	1	$\sqrt{3}$	ND

GEOMETRY – CHAPTER 4: TRIGONOMETRY Class X | BSE Odisha

Chapter Overview (What this chapter covers)

English

- Trigonometric ratios
- Complementary angles ($90^\circ - \theta$)
- Allied angles ($180^\circ - \theta$, $90^\circ + \theta$)
- Trigonometric ratios of angles $> 90^\circ$
- Standard values of trigonometric ratios
- Simple identities & applications

ଓଡ଼ିଆ

- ତ୍ରିକୋଣମିଟ୍ରି ଅନୁପାତ
- ପୂରକ କୋଣ ($90^\circ - \theta$)
- ସହଯୋଗୀ କୋଣ ($180^\circ - \theta$, $90^\circ + \theta$)
- 90° ଠାରୁ ବଡ଼ କୋଣର ତ୍ରିକୋଣମିଟ୍ରି ଅନୁପାତ
- ମାନକ ମୂଲ୍ୟ
- ସରଳ ପ୍ରମାଣ ଓ ପ୍ରୟୋଗ

4.1 Introduction | ପରିଚୟ

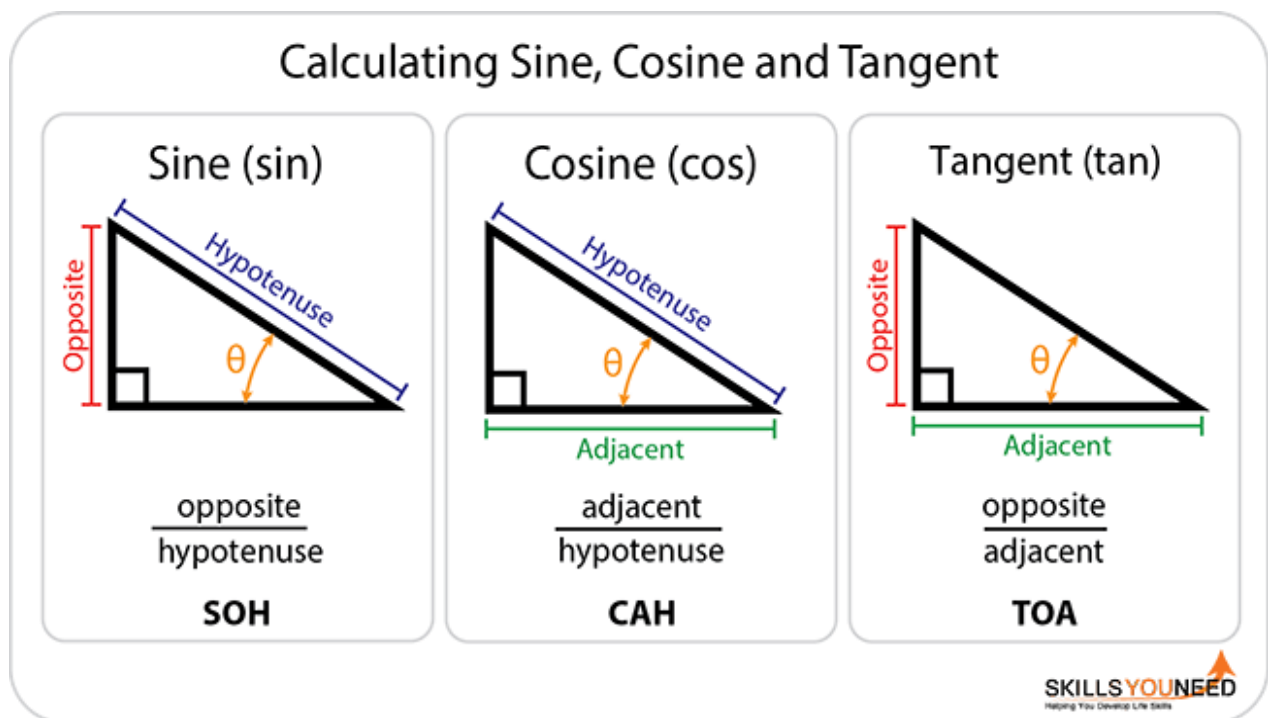
English

Trigonometry deals with the relationship between the **angles and sides of a right-angled triangle**.

The six trigonometric ratios are: **$\sin \theta$, $\cos \theta$, $\tan \theta$, $\cot \theta$, $\sec \theta$, $\operatorname{cosec} \theta$** .

ଓଡ଼ିଆ

ତ୍ରିକୋଣମିତି ହେଉଛି ସମକୋଣୀ ତ୍ରିଭୁଜର କୋଣ ଓ ଭୁଜାମାନଙ୍କ ସମ୍ପର୍କ ଅଧ୍ୟୟନ ।
 ଛଅଟି ତ୍ରିକୋଣମିତିର ଅନୁପାତ ଅଛି—
 $\sin \theta$, $\cos \theta$, $\tan \theta$, $\cot \theta$, $\sec \theta$, $\operatorname{cosec} \theta$ ।



4.2 Trigonometric Ratios | ତ୍ରିକୋଣମିତିର ଅନୁପାତ

Ratio Formula

$\sin \theta$	Opposite / Hypotenuse
$\cos \theta$	Adjacent / Hypotenuse
$\tan \theta$	Opposite / Adjacent
$\cot \theta$	Adjacent / Opposite
$\sec \theta$	Hypotenuse / Adjacent
$\operatorname{cosec} \theta$	Hypotenuse / Opposite

ଓଡ଼ିଆ (ସୂତ୍ର)

- $\sin \theta = \text{ଲମ୍ବ} / \text{କର୍ଣ୍ଣ}$
- $\cos \theta = \text{ଭୂଜ} / \text{କର୍ଣ୍ଣ}$
- $\tan \theta = \text{ଲମ୍ବ} / \text{ଭୂଜ}$

4.3 Complementary Angles ($90^\circ - \theta$)

ପୂରକ କୋଣ ($90^\circ - \theta$)

English

If two angles add up to 90° , they are complementary.

Identities

- $\sin(90^\circ - \theta) = \cos \theta$

- $\cos(90^\circ - \theta) = \sin \theta$
- $\tan(90^\circ - \theta) = \cot \theta$
- $\sec(90^\circ - \theta) = \operatorname{cosec} \theta$

ଓଡ଼ିଆ

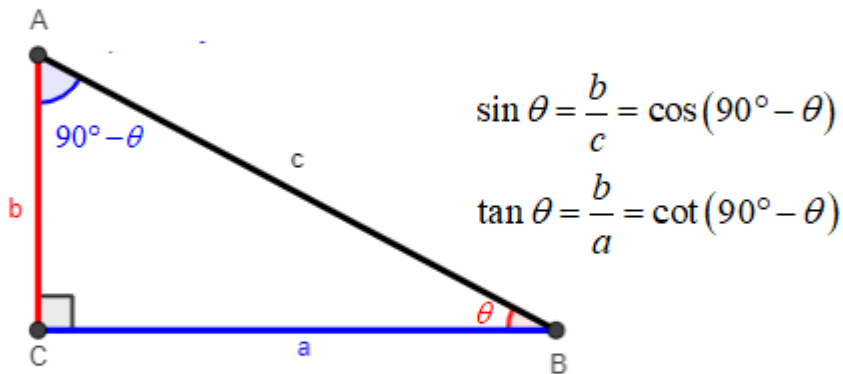
ଯଦି ଦୁଇଟି କୋଣର ଯୋଗ 90° ହୁଏ, ସେମାନେ ପୂରକ କୋଣ ।

ସମୀକରଣ

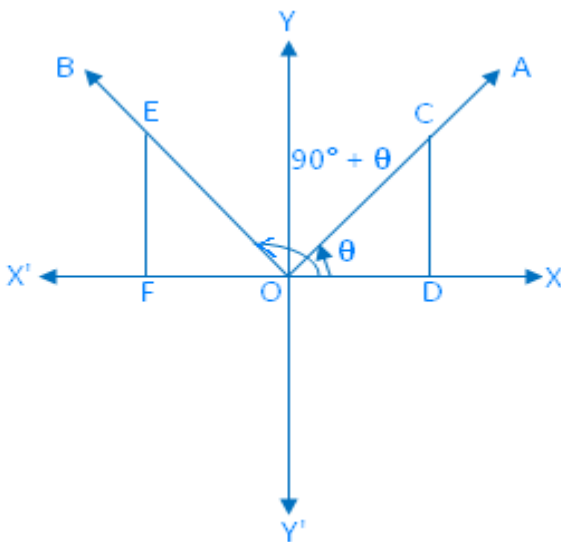
- $\sin(90^\circ - \theta) = \cos \theta$
- $\cos(90^\circ - \theta) = \sin \theta$

Complementary Angle Theorem

Cofunction of complementary angles are equal.



if A and B are complementary ($A + B = 90^\circ$)
 $\sin A = \cos B$
 $\tan A = \cot B$



4.4 Allied Angles ($180^\circ - \theta$)

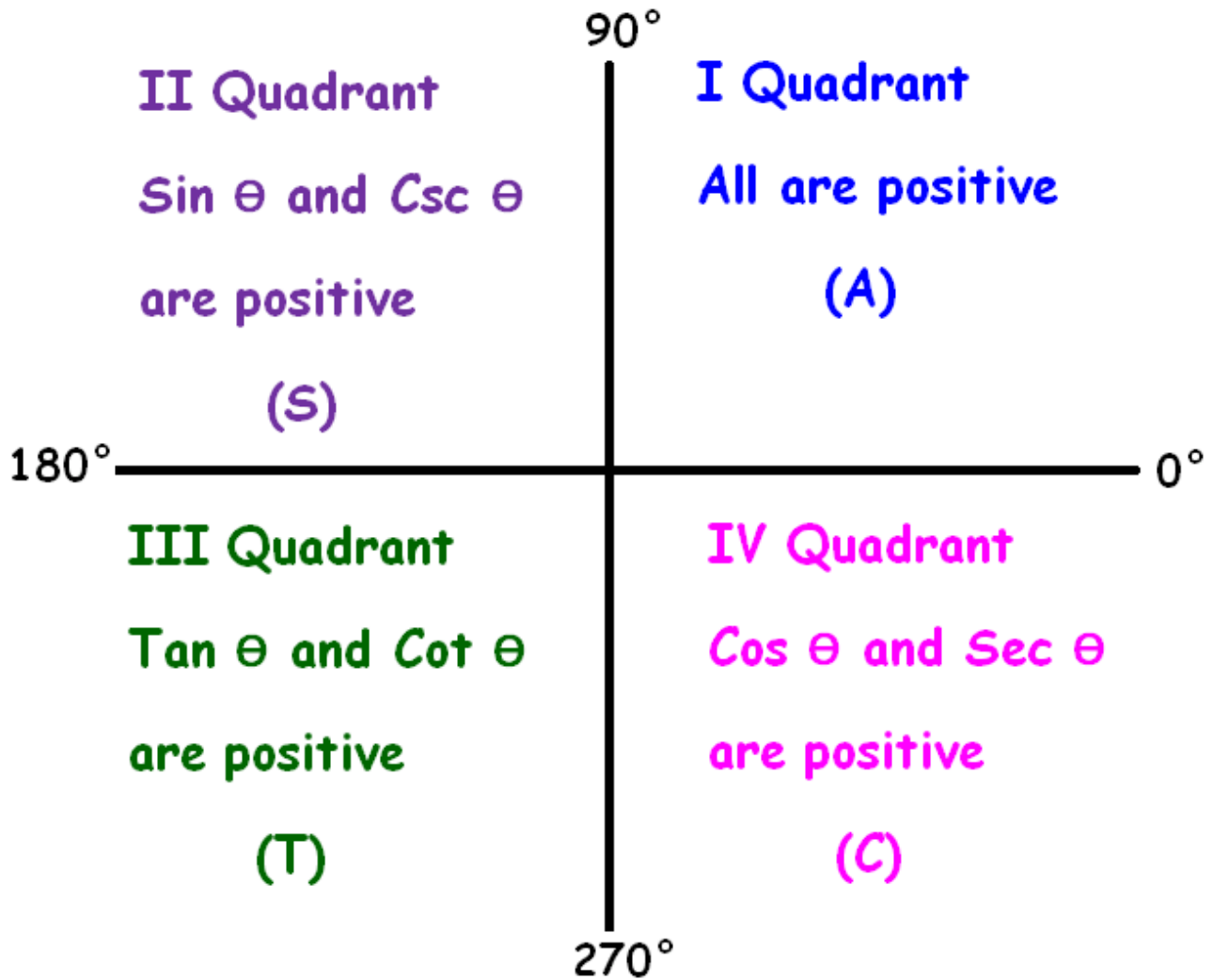
ସହଯୋଗୀ କୋଣ ($180^\circ - \theta$)

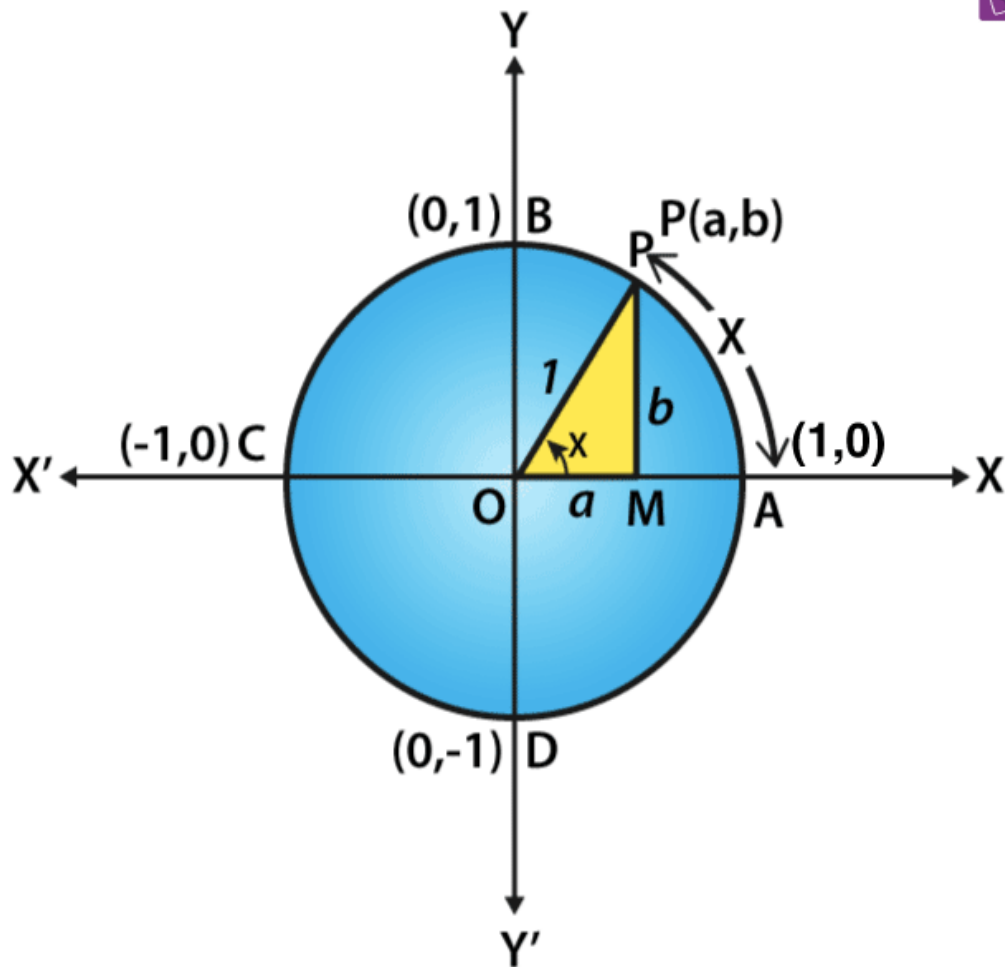
English – Identities

- $\sin(180^\circ - \theta) = \sin \theta$
- $\cos(180^\circ - \theta) = -\cos \theta$
- $\tan(180^\circ - \theta) = -\tan \theta$

ଉଦାହରଣ

- $\sin(180^\circ - \theta) = \sin \theta$
- $\cos(180^\circ - \theta) = -\cos \theta$
- $\tan(180^\circ - \theta) = -\tan \theta$





4.5 Angles Greater than 90°

90° ଠାରୁ ବଡ଼ କୋଣ

English

Using identities of $90^\circ \pm \theta$ and $180^\circ - \theta$, trigonometric ratios of angles like 120° , 135° , 150° are found.

Examples

- $\sin 120^\circ = \sin(180^\circ - 60^\circ) = \sin 60^\circ = \frac{\sqrt{3}}{2}$
- $\cos 135^\circ = -\cos 45^\circ = -\frac{1}{\sqrt{2}}$

4.6 Standard Trigonometric Values

ମାନକ ତ୍ରିକୋଣମିତିର ମୂଲ୍ୟ

θ	0°	30°	45°	60°	90°
$\sin \theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan \theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined

SOLVED QUESTIONS (Board Pattern)

Example–1 (5 Marks – Very Common)

Question (English)

Prove that:

$$\sin(90^\circ - \theta) = \cos \theta \quad \sin(90^\circ - \theta) = \cos \theta$$

Solution

In a right-angled triangle, the side opposite $(90^\circ - \theta)$ is adjacent to θ .

Hence,

$$\sin(90^\circ - \theta) = \cos \theta \quad \sin(90^\circ - \theta) = \cos \theta$$

Proved.

ଓଡ଼ିଆ

ସମକୋଣୀ ତ୍ରିଭୁଜରେ,

$$\sin(90^\circ - \theta) = \cos \theta \quad \sin(90^\circ - \theta) = \cos \theta$$

ପ୍ରମାଣିତ ।

Example–2 (3 Marks)

Question

Find the value of $\sin 150^\circ$.

Solution

$$\sin 150^\circ = \sin(180^\circ - 30^\circ) = \sin 30^\circ = \frac{1}{2} \quad \sin 150^\circ = \sin(180^\circ - 30^\circ) = \sin 30^\circ = \frac{1}{2}$$

Example–3 (5 Marks – Equation)

Question

Solve:

$$\sin \theta = \frac{1}{2}, \quad 0^\circ \leq \theta \leq 180^\circ \quad \sin \theta = \frac{1}{2}, \quad 0^\circ \leq \theta \leq 180^\circ$$

Solution

$$\theta = 30^\circ, 150^\circ \quad \theta = 30^\circ, 150^\circ$$

Example–4 (4 Marks)

Question

Find $\cos 120^\circ$.

Solution

$$\cos 120^\circ = \cos(180^\circ - 60^\circ) = -\cos 60^\circ = -\frac{1}{2} \quad \cos 120^\circ = \cos(180^\circ - 60^\circ) = -\cos 60^\circ = -\frac{1}{2}$$

GEOMETRY – CHAPTER 4: TRIGONOMETRY

SECTION–A : MCQs

(1 × 5 = 5 marks)

Q1. (English)

The value of $\sin 150^\circ \circ \sin 150^\circ$ is

(a) 1 (b) 0 (c) $\frac{1}{2}$ (d) $\frac{\sqrt{3}}{2}$

Answer: (c) $\frac{1}{2}$

ଓଡ଼ିଆ

$\sin 150^\circ \circ \sin 150^\circ$ ର ମୂଲ୍ୟ—

ଉତ୍ତର: $\frac{1}{2}$

Q2.

$\cos(180^\circ - \theta) = \cos(180^\circ - \theta) = \cos(180^\circ - \theta) =$

(a) $\cos \theta$ (b) $-\cos \theta$ (c) $\sin \theta$ (d) $-\sin \theta$

Answer: (b) $-\cos \theta$

Q3.

Which trigonometric ratio is **not defined** at 90° ?

(a) $\sin$ (b) $\cos$ (c) $\tan$ (d) $\sec$

Answer: (c) $\tan$

Q4.

$\sin(90^\circ - \theta) = \sin(90^\circ - \theta) = \sin(90^\circ - \theta) =$

(a) $\sin \theta$ (b) $\cos \theta$ (c) $\tan \theta$ (d) $\operatorname{cosec} \theta$

Answer: (b) $\cos \theta$

Q5.

The value of $\cos 120^\circ \circ \cos 120^\circ$ is

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) $\frac{\sqrt{3}}{2}$ (d) $-\frac{\sqrt{3}}{2}$

Answer: (b) $-\frac{1}{2}$

SECTION-B : VSA (Very Short Answer)

(2 × 5 = 10 marks)

Q6. Write the value of $\sin 0^\circ$.

Ans: 0

ଉତ୍ତର: $\sin 0^\circ = 0$

Q7. Write $\sin(90^\circ - \theta)$.

Ans: $\cos \theta$

ଉତ୍ତର: $\sin(90^\circ - \theta) = \cos \theta$

Q8. What is complementary angle?

Ans: Two angles whose sum is 90° .

ଉତ୍ତର: ଯେଉଁ ଦୁଇ କୋଣର ଯୋଗ 90° ।

Q9. Write the value of $\cos 180^\circ$.

Ans: -1

ଉତ୍ତର: $\cos 180^\circ = -1$

Q10. Write $\tan 45^\circ$.

Ans: 1

ଉତ୍ତର: $\tan 45^\circ = 1$

SECTION-C : SA (Short Answer)

(4 × 5 = 20 marks)

Q11. Find the value of $\sin 120^\circ$.

Solution (English)

$$\sin 120^\circ = \sin(180^\circ - 60^\circ) = \sin 60^\circ = \frac{\sqrt{3}}{2}$$

ଉତ୍ତର

$$\sin 120^\circ = \frac{\sqrt{3}}{2}$$

Q12. Prove: $\sin(90^\circ - \theta) = \cos \theta$

Solution (English)

In a right-angled triangle, opposite side of $(90^\circ - \theta)$ equals adjacent side of θ .
Hence, $\sin(90^\circ - \theta) = \cos \theta$

ଉତ୍ତର

ସମକୋଣୀ ତ୍ରିଭୁଜରୁ—

$$\sin(90^\circ - \theta) = \cos \theta$$

ପ୍ରମାଣିତ ।

Q13. Find $\cos 135^\circ$.

$$\cos 135^\circ = \cos(180^\circ - 45^\circ) = -\cos 45^\circ = -\frac{1}{\sqrt{2}}$$

Q14. Solve: $\sin \theta = \frac{1}{2}$,

$$0^\circ \leq \theta \leq 180^\circ, \sin \theta = \frac{1}{2}$$

Answer: $\theta = 30^\circ, 150^\circ$

ଉତ୍ତର: $\theta = 30^\circ, 150^\circ$

SECTION-D : LA (Long Answer)

(5 marks × 1)

Q15. Prove:

$$\tan(180^\circ - \theta) = -\tan \theta$$

Solution (English)

$$\begin{aligned} \tan(180^\circ - \theta) &= \frac{\sin(180^\circ - \theta)}{\cos(180^\circ - \theta)} = \frac{\sin \theta}{-\cos \theta} = -\tan \theta \end{aligned}$$

Hence proved.

ଉତ୍ତର

$$\tan(180^\circ - \theta) = -\tan \theta$$

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EXPECTED 2026 QUESTIONS – CHAPTER 4 (WITH REASONS)

Sure (5 marks)

1. Prove identity using $90^\circ - \theta$
Reason: Asked every year (direct, scoring)
2. Prove identity using $180^\circ - \theta$
Reason: Sign (+/-) testing – examiner favourite

Very Likely

3. Find value of $\sin 120^\circ$, $\cos 135^\circ$, $\tan 150^\circ$
Reason: From standard-value section
4. Solve equation: $\sin \theta = \frac{1}{2}$ with interval
Reason: Interval-based compulsory pattern

JAI HIND! BINAYA