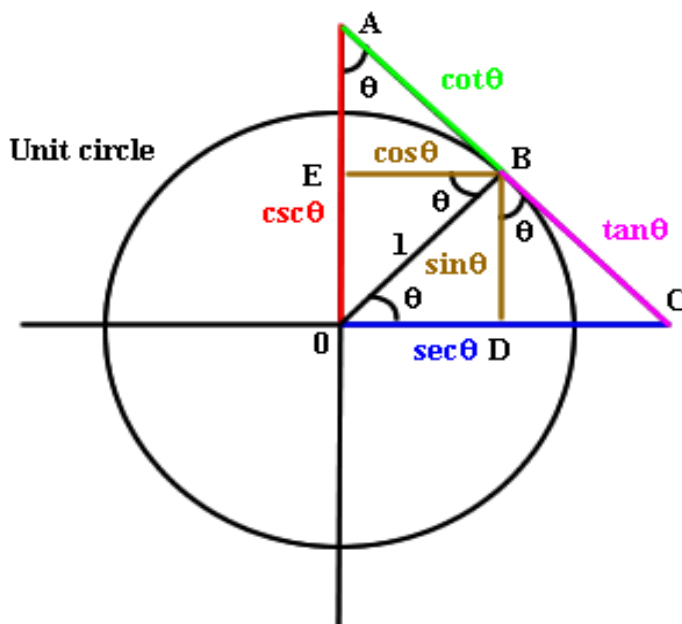
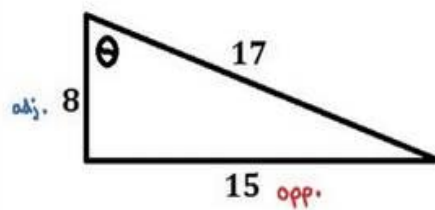


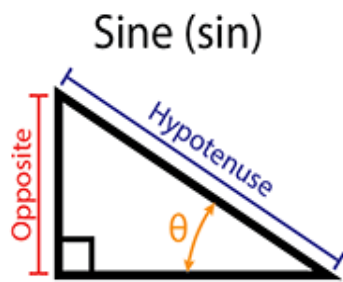
(As prescribed by Board of Secondary Education Odisha)

ତ୍ରୈକୋଣମିଟ୍ରିକ୍ ସମୀକରଣ

- $\sin(\theta) = \frac{\text{opp.}}{\text{hyp.}}$
- $\cos(\theta) = \frac{\text{adj.}}{\text{hyp.}}$
- $\tan(\theta) = \frac{\text{opp.}}{\text{adj.}}$
- $\sec(\theta) = \frac{\text{hyp.}}{\text{adj.}}$
- $\csc(\theta) = \frac{\text{hyp.}}{\text{opp.}}$
- $\cot(\theta) = \frac{\text{adj.}}{\text{opp.}}$

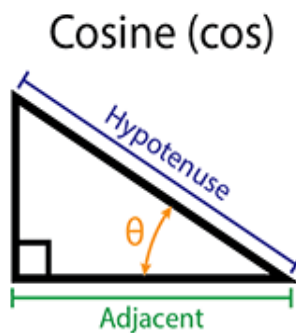


Calculating Sine, Cosine and Tangent



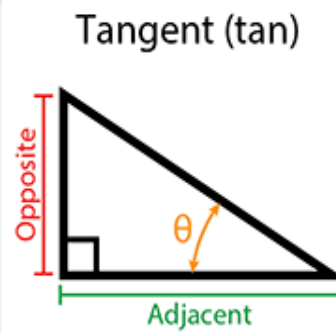
$$\frac{\text{opposite}}{\text{hypotenuse}}$$

SOH



$$\frac{\text{adjacent}}{\text{hypotenuse}}$$

CAH



$$\frac{\text{opposite}}{\text{adjacent}}$$

TOA

SKILLSYOU^{NEED}
Helping You Develop Life Skills

EXAM GOLDEN RULES (VERY IMPORTANT)

Chapter-2: Trigonometric Identities

Rule → Always start from LHS only

English (Why?)

- In identity questions, **RHS is already the target form.**
- If you start from RHS, you are **assuming the result**, which is **not accepted** in board exams.
- Examiners award full marks **only when LHS is transformed step-by-step into RHS.**

Correct Method (Example)

Prove:

$$\sin\theta\cos\theta + \cos\theta\sin\theta = 1 \quad \sin\theta\cos\theta \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} \sin\theta = \frac{1}{\sin\theta\cos\theta}$$

Write:

$$\begin{aligned} \text{LHS} &= \sin^2\theta + \cos^2\theta \sin\theta \cos\theta = 1 \sin\theta \cos\theta = \text{RHS} \\ \text{LHS} &= \frac{\sin^2\theta + \cos^2\theta}{\sin\theta \cos\theta} = \frac{1}{\sin\theta \cos\theta} = \text{RHS} \end{aligned}$$

ଓଡ଼ିଆ (କାହିଁକି?)

- Identity ପ୍ରଶ୍ନରେ **RHS** ପୂର୍ବରୁ ଦିଆଯାଇଥାଏ।
- RHS ରୁ ଆରମ୍ଭ କଲେ ଫଳାଫଳକୁ ଧାରଣା କରିନେବା ଭଳି ହୁଏ।
- ବୋର୍ଡ଼ ପରୀକ୍ଷାରେ **LHS** → **RHS** ଧାରାରେ ପ୍ରମାଣ କଲେ ମାତ୍ର ପୂର୍ଣ୍ଣ ମାର୍କ ମିଳେ।

ଠିକ୍ ପଦ୍ଧତି

$$\text{LHS} \Rightarrow \text{RHS} \quad \text{LHS} \Rightarrow \text{RHS}$$

RHS ରୁ LHS ଆରମ୍ଭ କରିବେ ନାହିଁ

Chapter-3: Trigonometric Equations

Rule → Write interval of θ clearly

English (Why?)

- Trigonometric equations can have **multiple angle solutions**.
- The **interval (range)** tells the examiner **which solution is valid**.
- **Missing interval = loss of marks**, even if the angle is correct.

Correct Format (Example)

Solve:

$$\begin{aligned} 2\sin\theta &= 1, 0^\circ \leq \theta \leq 90^\circ \\ \sin\theta &= \frac{1}{2}, \quad \boxed{0^\circ \leq \theta \leq 90^\circ} \\ \sin\theta &= \frac{1}{2} \Rightarrow \theta = 30^\circ \\ \sin\theta &= \frac{1}{2} \Rightarrow \theta = 30^\circ \end{aligned}$$

ଓଡ଼ିଆ (କାହିଁକି?)

- ତ୍ରିକୋଣମିଟ୍ରିକ୍ ସମୀକରଣର ଏକାଧିକ ସମାଧାନ ହୋଇପାରେ।
- θ ର ସୀମା (**interval**) ଦେଲେ, ଠିକ୍ କୋଣ ଚିହ୍ନଟ ହୁଏ।
- **Interval** ନ ଲେଖିଲେ → ମାର୍କ କଟିପାରେ।

ଠିକ୍ ଲେଖନ ଶୈଳୀ

$$0^\circ \leq \theta \leq 90^\circ \quad 0^\circ \leq \theta \leq 90^\circ$$

QUICK BOARD CHECKLIST

Chapter Must Do

Ch-2	Start from LHS only	Starting from RHS
Ch-3	Write interval of θ	Skipping the interval
Both	Step-wise solution	Jumping steps
Both	Box final answer	Missing degree ($^\circ$)

Common Mistake

TOP 10 COMMON MISTAKES

& HOW TO AVOID THEM (BSE Odisha – Class X)

1. Starting Identity Proof from RHS

(Chapter-2)

Mistake (English)

Starting a trigonometric identity from RHS.

Why Wrong

RHS is already the final result. Starting from it means **assuming the answer**.

How to Avoid

Always write:

LHS $\rightarrow$ RHS

ଓଡ଼ିଆ

RHS ରୁ ଆରମ୍ଭ କରିବା

ସବୁବେଳେ **LHS $\rightarrow$ RHS** ରୁ ପ୍ରମାଣ କର

2. Using Trigonometric Values in Identity Proofs

Mistake

Putting $\theta = 30^\circ, 45^\circ$ etc. in identity questions.

Why Wrong

Identities must be proved **for all θ** , not one value.

How to Avoid

Use **identities only**, not values.

ଓଡ଼ିଆ

$\theta = 30^\circ$ ବସାଇବା

ସମୀକରଣ (identity) ବ୍ୟବହାର କର

3. Skipping Steps in Proofs

Mistake

Jumping directly to the final result.

Why Wrong

Board gives **step-wise marks**.

How to Avoid

Write **each algebraic step clearly**.

ଓଡ଼ିଆ

ଧୀର ଛାଡ଼ିବା

ପ୍ରତ୍ୟେକ ଧୀର ଲେଖ

4. Not Writing the Interval of θ

(Chapter–3)

Mistake

Solving equation without writing range of θ .

Why Wrong

Multiple solutions possible → **marks cut**.

How to Avoid

Always write:

$$0^\circ \leq \theta \leq 90^\circ \quad 0^\circ \leq \theta \leq 90^\circ$$

ଓଡ଼ିଆ

θ ର ସୀମା ନ ଲେଖିବା
interval ଅବଶ୍ୟ ଲେଖ

5. Forgetting Degree Symbol (°)

Mistake

Writing $\theta = 30$ instead of $\theta = 30^\circ$.

Why Wrong

Unit missing → **1 mark loss.**

How to Avoid

Always add ° in final answer.

ଓଡ଼ିଆ

° ଚିହ୍ନ ଭୁଲିବା
ଡିଗ୍ରୀ ଚିହ୍ନ ଅବଶ୍ୟ ଲେଖ

6. Wrong Standard Trigonometric Values

Mistake

Writing:

$$\sin 60^\circ = 1/2 \quad \times$$

$$\tan 45^\circ = \sqrt{3} \quad \times$$

How to Avoid

Memorize the **standard value table** perfectly.

ଓଡ଼ିଆ

ମାନକ ମୂଲ୍ୟ ଭୁଲ
ଟେବୁଲ୍ ମନେ ରଖ

7. Cancelling Terms Incorrectly

Mistake

Cancelling $\sin\theta$ or $\cos\theta$ without factorization.

Why Wrong

Leads to **wrong simplification**.

How to Avoid

Factor first $\rightarrow$ then cancel.

ଓଡ଼ିଆ

ସିଧାସଳଖ cancel

ପ୍ରଥମେ factor କର

8. Mixing Identity & Equation Rules

Mistake

Using equation-solving logic in identity proof.

Why Wrong

Identity $\neq$ Equation.

How to Avoid

- **Identity** $\rightarrow$ Prove (LHS $\rightarrow$ RHS)
- **Equation** $\rightarrow$ Solve (find θ)

ଓଡ଼ିଆ

Identity ଓ Equation ଗୋଲମାଲ

ଦୁଇଟିକୁ ଭିନ୍ନ ଭାବରେ କର

9. Not Boxing / Highlighting Final Answer

Mistake

Final answer not visible.

Why Wrong

Examiner may miss it.

How to Avoid

Box or underline the final answer.

ଓଡ଼ିଆ

ଉତ୍ତର ଚିହ୍ନଟ ନହେବା
Box / underline କର

10. Poor Diagram or No Diagram (Geometry Proofs)

Mistake

No diagram or unclear diagram.

Why Wrong

Diagram carries **1 full mark**.

How to Avoid

Draw **neat, labelled diagram** with pencil.

ଓଡ଼ିଆ

ଚିତ୍ର ନ ଆଙ୍କିବା
ସଫା ଓ ଲେବେଲ୍ ଥିବା ଚିତ୍ର ଆଙ୍କ

2.1 Introduction | ପରିଚୟ

English

Trigonometric identities are equations involving trigonometric ratios that are **true for all values of the angle**. They are used to **simplify expressions** and solve equations.

ଓଡ଼ିଆ

ତ୍ରିକୋଣମିଟ୍ରିୟ ସମୀକରଣ ହେଉଛି ଏମିତି ସମୀକରଣ, ଯାହା ସମସ୍ତ କୋଣ ମୂଲ୍ୟ ପାଇଁ ସଠିକ୍ ଥାଏ। ଏହାକୁ ସରଳ କରିବା ଓ ସମୀକରଣ ସାଧନ ପାଇଁ ବ୍ୟବହାର କରାଯାଏ।

2.2 Trigonometric Ratios | ତ୍ରିକୋଣମିଟ୍ରିୟ ଅନୁପାତ

Ratio Formula

$\sin\theta$ Opposite / Hypotenuse
 $\cos\theta$ Adjacent / Hypotenuse
 $\tan\theta$ Opposite / Adjacent
 $\operatorname{cosec}\theta$ $1/\sin\theta$
 $\sec\theta$ $1/\cos\theta$

Ratio Formula

$$\cot\theta = 1/\tan\theta$$

ଓଡ଼ିଆ

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

2.3 Fundamental Trigonometric Identities

ମୌଳିକ ତ୍ରିକୋଣମିଟ୍ରିକ୍ ସମୀକରଣ

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

$$2. 1 + \tan^2\theta = \sec^2\theta$$

$$3. 1 + \cot^2\theta = \operatorname{cosec}^2\theta$$

(Very important – repeatedly asked)

2.4 Solved Examples | ସମାଧାନ ଉଦାହରଣ

Example 1 (Very Common – 3/5 Marks)

Prove:

$$\sin\theta\cos\theta + \cos\theta\sin\theta = 1$$
$$\sin\theta\cos\theta = \frac{\sin\theta}{\frac{1}{\cos\theta}} + \frac{\cos\theta}{\frac{1}{\sin\theta}}$$
$$= \frac{1}{\sin\theta\cos\theta} \cos\theta\sin\theta + \sin\theta\cos\theta = \sin\theta\cos\theta$$

Solution (English)

LHS

$$= \sin^2\theta + \cos^2\theta \sin\theta\cos\theta = 1 \sin\theta\cos\theta = \frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cos\theta}$$
$$= \frac{1}{\sin\theta\cos\theta} = \sin\theta\cos\theta$$

LHS = RHS

ସମାଧାନ (ଓଡ଼ିଆ)

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

ଏହେତୁ LHS = RHS

ପ୍ରମାଣିତ

Example 2

$$\text{Prove: } 1 + \tan^2\theta = \sec^2\theta$$

Answer: Using identity ✓

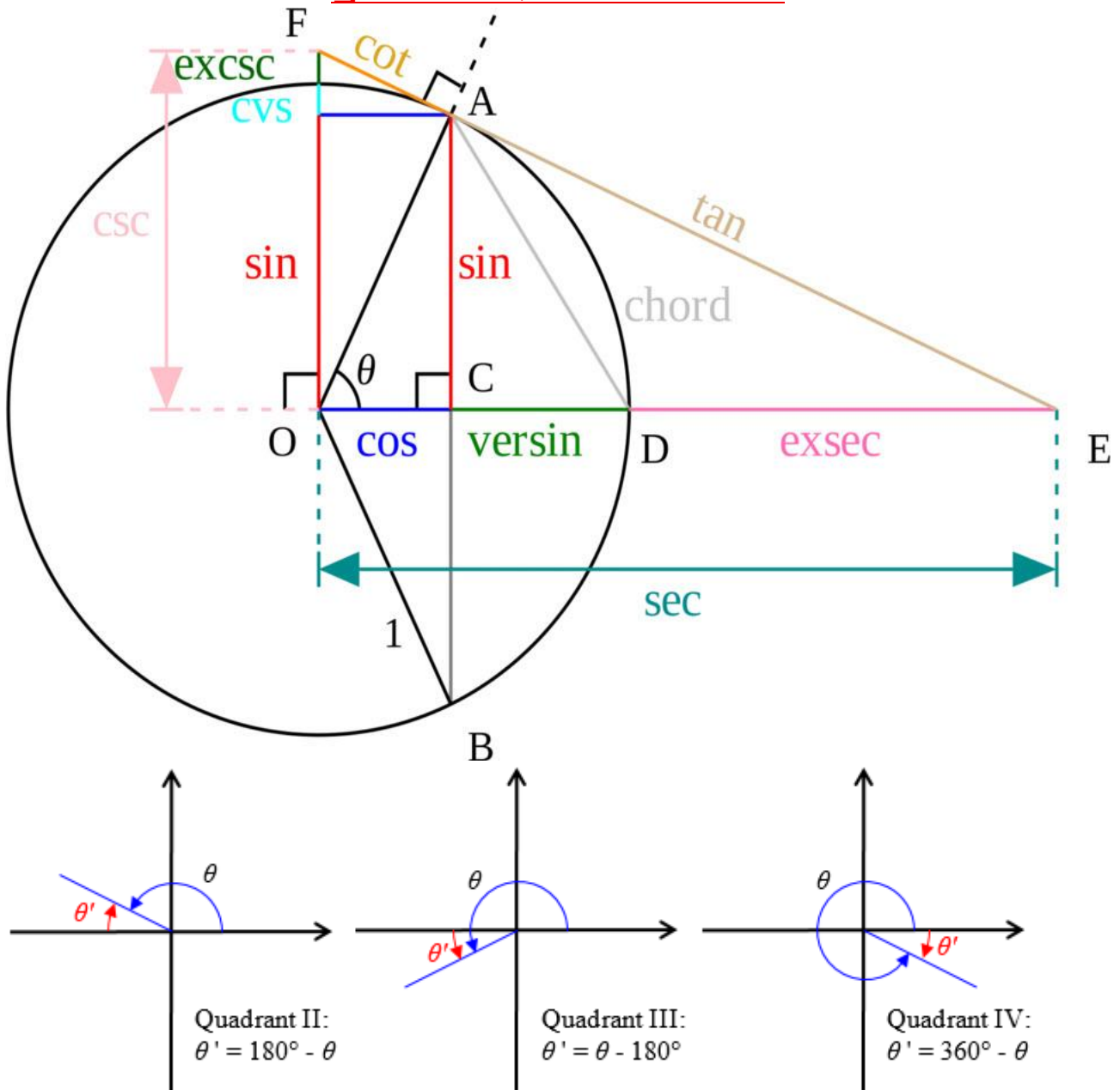
EXAM IMPORTANCE (Chapter–2) - One identity proof compulsory

Write **LHS** → **RHS** only

Use identities, not values

CHAPTER-3 TRIGONOMETRIC EQUATIONS

ତ୍ରିକୋଣମିତିର ସମୀକରଣ ସାଧନ



3.1 Introduction | ପରିଚୟ

English

A trigonometric equation is an equation involving trigonometric ratios of an angle. We find the **value of θ** which satisfies the equation.

ଓଡ଼ିଆ

ତ୍ରିକୋଣମିତିର ସମୀକରଣରେ θ ର ମୂଲ୍ୟ ନିର୍ଣ୍ଣୟ କରାଯାଏ।

3.2 Standard Values (Very Important)

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

3.3 Solved Equations | ସମାଧାନ

Example 1 (Very Common – 5 Marks)

Solve:

$$2\sin\theta = 1, 0^\circ \leq \theta \leq 90^\circ \quad \sin\theta = \frac{1}{2}, 0^\circ \leq \theta \leq 90^\circ \quad 2\sin\theta = 1, 0^\circ \leq \theta \leq 90^\circ$$

Solution (English)

$$\sin\theta = \frac{1}{2} \Rightarrow \theta = 30^\circ \quad \sin\theta = \frac{1}{2} \Rightarrow \theta = 30^\circ \quad \sin\theta = \frac{1}{2} \Rightarrow \theta = 30^\circ$$

ଉତ୍ତର (ଓଡ଼ିଆ)

$$\theta = 30^\circ$$

Example 2

$$\tan\theta = 1, 0^\circ \leq \theta \leq 90^\circ \quad \tan\theta = 1, 0^\circ \leq \theta \leq 90^\circ \quad \tan\theta = 1, 0^\circ \leq \theta \leq 90^\circ$$

Solution:

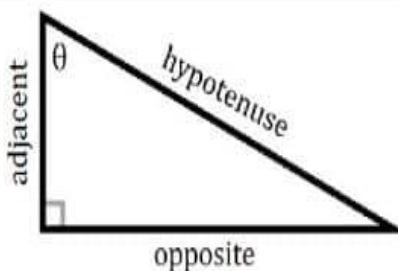
$$\theta = 45^\circ \quad \theta = 45^\circ \quad \theta = 45^\circ$$

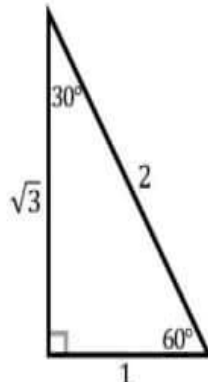
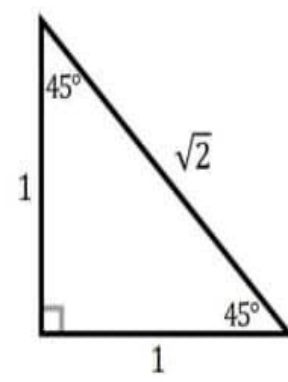
QUESTION–1 (Chapter–2)

Prove a Trigonometric Identity

(5 Marks – Very Common)

RIGHT TRIANGLE TRIG

PARTS OF A RIGHT TRIANGLE	PYTHAGOREAN THEOREM
	$a^2 + b^2 = c^2$

SPECIAL RIGHT TRIANGLES	
30° - 60° - 90°	45° - 45° - 90°
1 - $\sqrt{3}$ - 2	1 - 1 - $\sqrt{2}$
	

TRIG FUNCTIONS		
SINE	COSINE	TANGENT
$\sin(\theta) = \frac{opp}{hyp}$	$\cos(\theta) = \frac{adj}{hyp}$	$\tan(\theta) = \frac{opp}{adj}$

RECIPROCAL TRIG FUNCTIONS		
COSECANT	SECANT	COTANGENT
$\csc(\theta) = \frac{hyp}{opp}$	$\sec(\theta) = \frac{hyp}{adj}$	$\cot(\theta) = \frac{adj}{opp}$

Question (English)

Prove that:

$$\sin\theta\cos\theta+\cos\theta\sin\theta=1\sin\theta\cos\theta\frac{\sin\theta}{\cos\theta}+\frac{\cos\theta}{\sin\theta}=\frac{1}{\sin\theta\cos\theta}\cos\theta\sin\theta+\sin\theta\cos\theta=\sin\theta\cos\theta1$$

ପ୍ରମାଣ (ଓଡ଼ିଆ)

ପ୍ରମାଣ କର—

$$\sin\theta\cos\theta+\cos\theta\sin\theta=1\sin\theta\cos\theta\frac{\sin\theta}{\cos\theta}+\frac{\cos\theta}{\sin\theta}=\frac{1}{\sin\theta\cos\theta}\cos\theta\sin\theta+\sin\theta\cos\theta=\sin\theta\cos\theta1$$

Solution / Proof (English)

LHS

$$=\sin^2\theta+\cos^2\theta\sin\theta\cos\theta=\frac{\sin^2\theta+\cos^2\theta}{\sin\theta\cos\theta}=\sin\theta\cos\theta\sin^2\theta+\cos^2\theta$$

Using identity,

$$\begin{aligned}\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1\end{aligned}$$

Hence proved.

ସମାଧାନ / ପ୍ରମାଣ (ଓଡ଼ିଆ)

ବାମ ପାର୍ଶ୍ୱ (LHS)

$$=\sin^2\theta+\cos^2\theta\sin\theta\cos\theta=\frac{\sin^2\theta+\cos^2\theta}{\sin\theta\cos\theta}=\sin\theta\cos\theta\sin^2\theta+\cos^2\theta$$

ଯେହେତୁ,

$$\begin{aligned}\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1 \\\sin^2\theta+\cos^2\theta &= 1\end{aligned}$$

ଏହା ପ୍ରମାଣିତ ।

Marking Scheme (5 Marks)

- Start with LHS – 1
- Correct identity – 1
- Simplification – 2
- Conclusion – 1

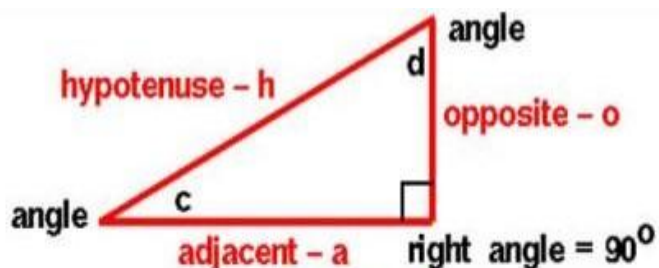
QUESTION–2 (Chapter–3)

Solve a Trigonometric Equation

(5 Marks – Compulsory Pattern)

Definitions:

Assign a name to the **ratio** of the length of the sides of a right triangle

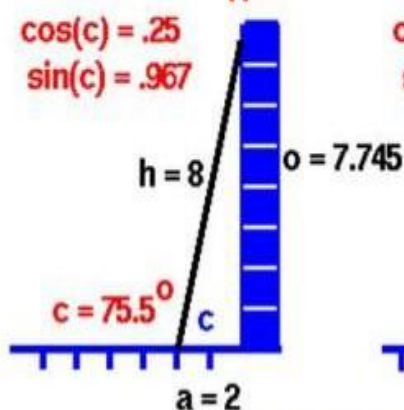


Sine

$$\sin(c) = \frac{o}{h}$$

$$\cos(c) = .25$$

$$\sin(c) = .967$$

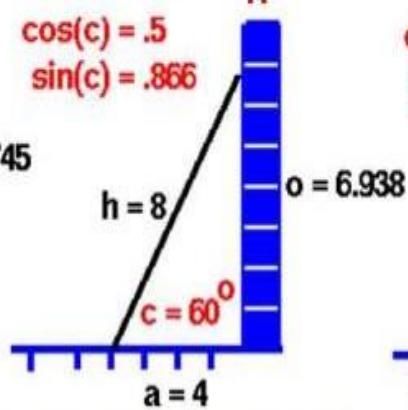


Cosine

$$\cos(c) = \frac{a}{h}$$

$$\cos(c) = .5$$

$$\sin(c) = .866$$

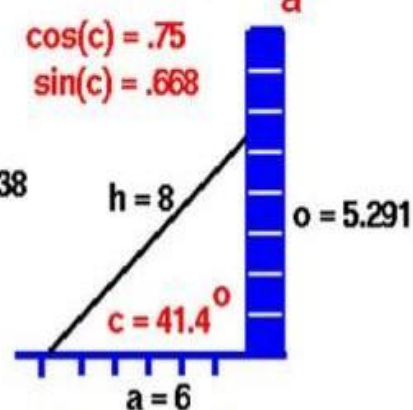


Tangent

$$\tan(c) = \frac{o}{a}$$

$$\cos(c) = .75$$

$$\sin(c) = .668$$



The value of each ratio depends only on the size of the angle formed by the adjacent and hypotenuse.

Question (English)

Solve the equation:

$$2\sin\theta = 1, 0^\circ \leq \theta \leq 90^\circ \quad \sin\theta = \frac{1}{2}, \quad 0^\circ \leq \theta \leq 90^\circ$$

ପ୍ରଶ୍ନ (ଓଡ଼ିଆ)

ସମାଧାନ କର—

$$2\sin\theta=1, 0^\circ\leq\theta\leq 90^\circ \quad 2\sin\theta=1, \quad 0^\circ\leq\theta\leq 90^\circ$$

Solution (English)

$$2\sin\theta=1 \quad 2\sin\theta=1 \quad \sin\theta=\frac{1}{2} \quad \sin\theta=\frac{1}{2}$$

From standard trigonometric values,

$$\sin 30^\circ=\frac{1}{2} \quad \sin 30^\circ=\frac{1}{2} \quad \therefore \theta=30^\circ \quad \therefore \theta=30^\circ$$

$$\text{Answer: } \theta=30^\circ \quad \theta=30^\circ$$

ସମାଧାନ (ଓଡ଼ିଆ)

$$2\sin\theta=1 \quad 2\sin\theta=1 \quad \sin\theta=\frac{1}{2} \quad \sin\theta=\frac{1}{2}$$

ମାନକ ତ୍ରିକୋଣମିତିର ମୂଲ୍ୟରୁ,

$$\sin 30^\circ=\frac{1}{2} \quad \sin 30^\circ=\frac{1}{2} \quad \therefore \theta=30^\circ \quad \therefore \theta=30^\circ$$

$$\text{ଉତ୍ତର: } \theta=30^\circ \quad \theta=30^\circ$$

Marking Scheme (5 Marks)

Trigonometric Equation – Chapter 3

Question Type (Example):

$$\text{Solve } 2\sin\theta=1, \quad 0^\circ\leq\theta\leq 90^\circ \quad 2\sin\theta=1, \quad 0^\circ\leq\theta\leq 90^\circ$$

Equation Step – 2 Marks

English

- Correctly simplify the given equation.
- Isolate the trigonometric ratio.

Award 2 marks if written as:

$$2\sin\theta=1\Rightarrow\sin\theta=\frac{1}{2}\quad\sin\theta=1\Rightarrow\theta=90^\circ\quad\sin\theta=\frac{1}{2}\Rightarrow\theta=30^\circ$$

ଉତ୍ତର

- ଦିଆଯାଇଥିବା ସମୀକରଣକୁ ସଠିକ୍ ଭାବରେ ସରଳ କରିବା।
- ତ୍ରିକୋଣମିତିର ଅନୁପାତକୁ ପୃଥକ କରିବା।

୨ ମାର୍କ ଦିଆଯିବ, ଯଦି ଏଭଳି ଲେଖାଯାଏ—

$$2\sin\theta=1\Rightarrow\sin\theta=\frac{1}{2}\quad\sin\theta=1\Rightarrow\theta=90^\circ\quad\sin\theta=\frac{1}{2}\Rightarrow\theta=30^\circ$$

Use of Standard Value – 2 Marks

English

- Correct use of standard trigonometric values.
- Correct identification of angle within the given interval.

Award 2 marks if written as:

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

ଉତ୍ତର

- ମାନକ ତ୍ରିକୋଣମିତିର ମୂଲ୍ୟର ସଠିକ୍ ବ୍ୟବହାର।
- ଦିଆଯାଇଥିବା ସୀମା ମଧ୍ୟରେ ସଠିକ୍ କୋଣ ଚିହ୍ନଟ।

୨ ମାର୍କ ଦିଆଯିବ, ଯଦି—

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

Final Answer with Unit – 1 Mark

English

- Correct final value of θ .
- Proper unit (degree symbol $^\circ$).

Award 1 mark for:

$$\therefore \theta = 30^\circ \quad \therefore \theta = 30^\circ$$

ଉତ୍ତର

- θ ର ସଠିକ୍ ଶେଷ ମୂଲ୍ୟ।
- ଡିଗ୍ରୀ ($^\circ$) ଚିହ୍ନ ସହ।

୧ ମାର୍କ ଦିଆଯିବ—

$$\therefore \theta = 30^\circ \therefore \theta = 30^\circ$$

Total = 5 Marks

Step	Marks
Equation simplification	2
Standard value used	2
Final answer with unit	1
Total	5

Board Tip (Very Important)

- **Unit ($^\circ$) ନ ଲେଖିଲେ $\rightarrow$ 1 ମାର୍କ କମିବ**
- Interval $0^\circ \leq \theta \leq 90^\circ$ ଲେଖିଲେ clarity ବଢ଼େ
- Steps ଛାଡ଼ିଲେ partial marks କଟିପାରେ
- **EXPECTED 2026 TRIGONOMETRY QUESTIONS**
- **(With Answers – English & Odia)**

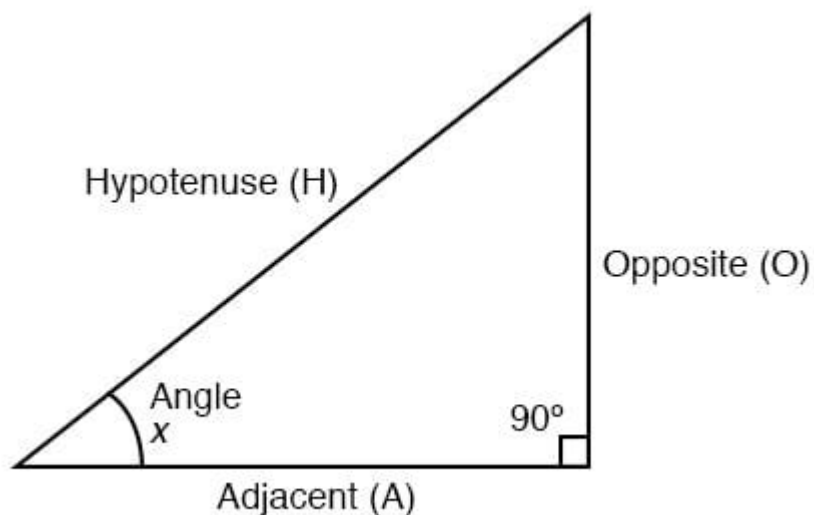
Trigonometric Ratio Table

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Angle T. Ratio	0°	30°	45°	60°	90°
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



QUESTION-1 (5 Marks) – MOST EXPECTED

Chapter-2: Prove a Trigonometric Identity

Question (English)

Prove that:

$$\frac{1}{\sin\theta} - \frac{1}{\csc\theta} = 0 \quad \frac{1}{\sin\theta} - \frac{1}{\csc\theta} = 0$$

ପ୍ରମାଣ (ଓଡ଼ିଆ)

ପ୍ରମାଣ କର—

$$\frac{1}{\sin\theta} - \frac{1}{\csc\theta} = 0 \quad \frac{1}{\sin\theta} - \frac{1}{\csc\theta} = 0$$

Solution (English)

LHS

$$\frac{1}{\sin\theta} - \frac{1}{\csc\theta} = 0 = \frac{1}{\sin\theta} - \frac{1}{\sin\theta} = 0 = \frac{1}{\sin\theta} - \frac{1}{\sin\theta} = 0$$

$$\text{LHS} = \text{RHS} \quad \text{LHS} = \text{RHS}$$

Hence proved.

ସମାଧାନ (ଓଡ଼ିଆ)

LHS

$$\frac{1}{\sin\theta} - \frac{1}{\csc\theta} = 0 = \frac{1}{\sin\theta} - \frac{1}{\sin\theta} = 0 = \frac{1}{\sin\theta} - \frac{1}{\sin\theta} = 0$$

$$\text{LHS} = \text{RHS} \quad \text{LHS} = \text{RHS}$$

ପ୍ରମାଣିତ ।

QUESTION-2 (5 Marks – Compulsory Pattern)

Chapter-3: Solve a Trigonometric Equation

Question (English)

Solve:

$$\cos\theta = \frac{1}{2}, 0^\circ \leq \theta \leq 90^\circ \quad \cos\theta = \frac{1}{2}, \quad 0^\circ \leq \theta \leq 90^\circ$$

ପ୍ରମାଣ (ଓଡ଼ିଆ)

ସମାଧାନ କର—

$$\cos\theta = \frac{1}{2}, 0^\circ \leq \theta \leq 90^\circ \quad \cos\theta = \frac{1}{2}, \quad 0^\circ \leq \theta \leq 90^\circ$$

Solution (English)

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

From standard values,

$$\cos 60^\circ = \frac{1}{2} \quad \cos 60^\circ = \frac{1}{2} \therefore \theta = 60^\circ$$

$$\therefore \theta = 60^\circ$$

ସମାଧାନ (ଓଡ଼ିଆ)

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

ମାନକ ମୂଲ୍ୟରୁ,

$$\cos 60^\circ = \frac{1}{2} \Rightarrow \cos 60^\circ = \frac{1}{2} \therefore \theta = 60^\circ \therefore \theta = 60^\circ$$

QUESTION-3 (3 Marks)

Find the value of a trigonometric expression

Question (English)

Find the value of:

$$\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ = \sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$$

ପ୍ରଶ୍ନ (ଓଡ଼ିଆ)

ମୂଲ୍ୟ ନିର୍ଣ୍ଣୟ କର—

$$\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ = \sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$$

Solution (English)

$$= (\frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}) + (\frac{1}{2} \times \frac{1}{2}) =$$

$$= (\frac{3}{4}) + (\frac{1}{4}) = \frac{3+1}{4} = \frac{4}{4} = 1$$

ସମାଧାନ (ଓଡ଼ିଆ)

$$= \frac{3}{4} + \frac{1}{4} = \frac{3+1}{4} = \frac{4}{4} = 1$$

QUESTION-4 (4 Marks)

Prove Identity

Question (English)

Prove that:

$$\tan \theta \sin \theta = \sec \theta \Rightarrow \frac{\tan \theta}{\sin \theta} = \sec \theta$$

Solution (English)

$$\begin{aligned} \text{LHS} &= \sin \theta \cos \theta \sin \theta = 1 \cos \theta = \sec \theta \\ \text{LHS} &= \frac{\sin \theta}{\cos \theta} = \frac{1}{\cos \theta} = \sec \theta \\ \text{LHS} &= \sec \theta = \text{RHS} \end{aligned}$$

ସମାପନ (ଓଡ଼ିଆ)

$$\text{LHS} = \sec \theta = \text{RHS}$$

QUESTION-5 (2 Marks – MCQ type, but write full step)

**Standard Value
Question (English)**

Find the value of:

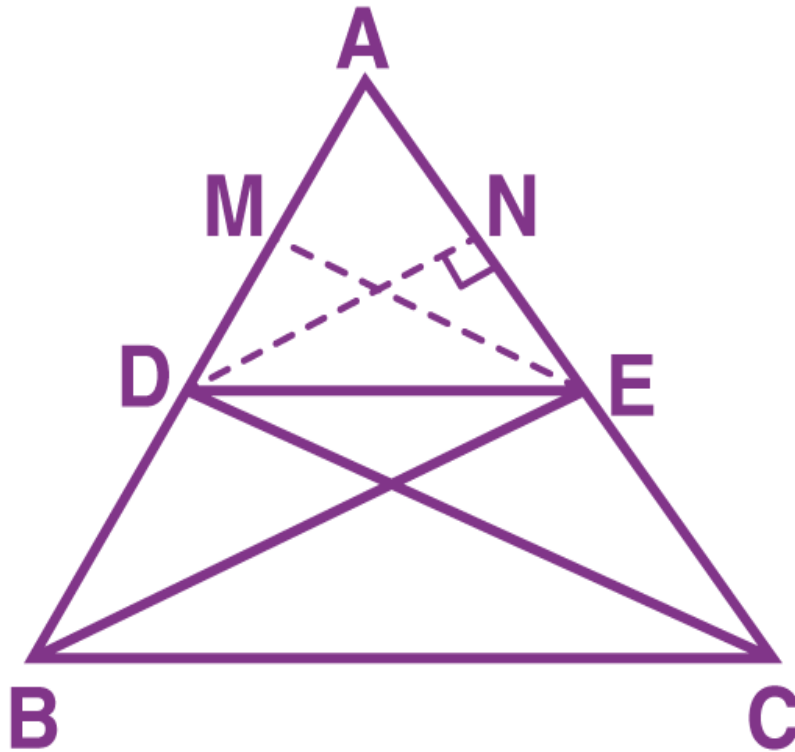
$$\tan 45^\circ + \sin 30^\circ$$

Answer (English)

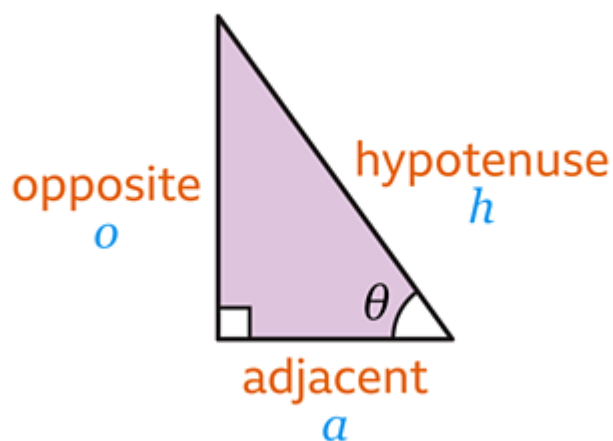
- $= 1 + \frac{1}{2} = \frac{3}{2}$
-
- ଉତ୍ତର (ଓଡ଼ିଆ)
-
- $= \frac{3}{2}$

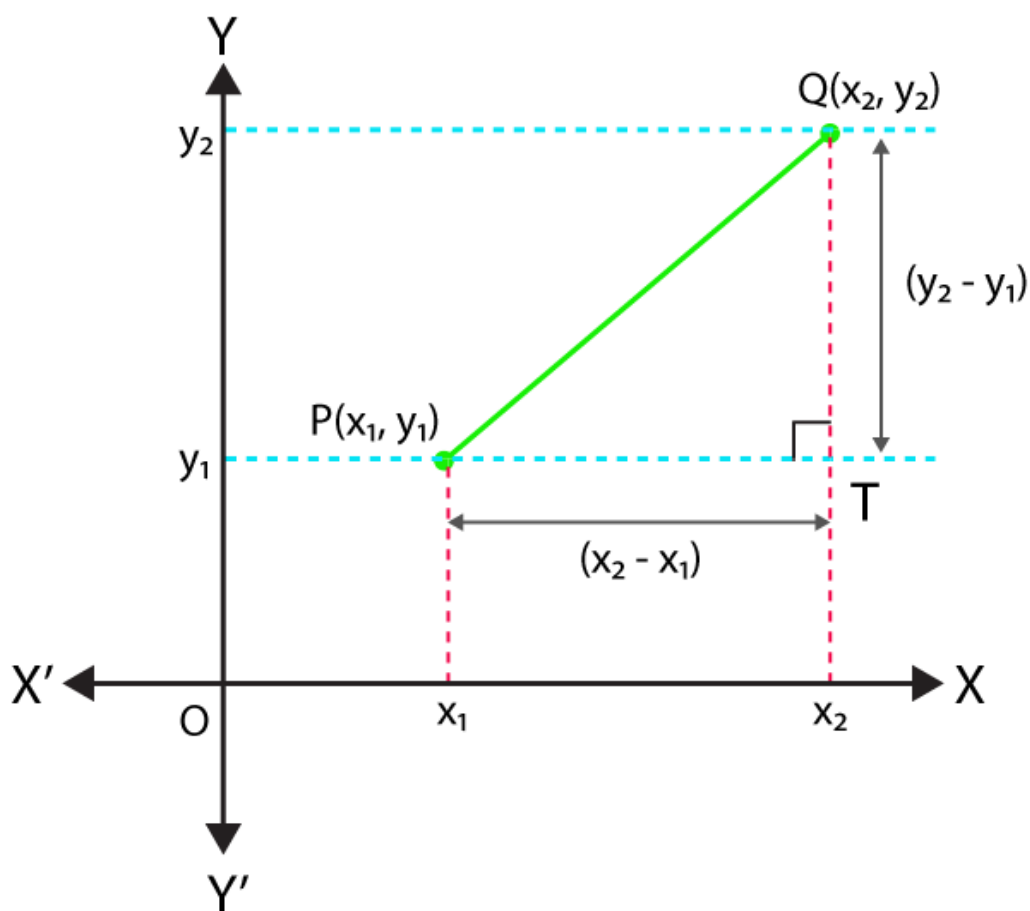
Below is a **FULL EXPECTED GEOMETRY + TRIGONOMETRY QUESTION PAPER (MODEL PAPER)** for **BSE Odisha – Class X (2026)**, prepared **exactly** as per board trend & marking scheme, with **English + Odia** side-by-side.

This is suitable for **practice, mock test, and final revision**.



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BSE ODISHA – CLASS X (2026)

EXPECTED GEOMETRY & TRIGONOMETRY QUESTION PAPER

Time: 2 Hours

Full Marks: 40

(Geometry + Trigonometry Section)

GENERAL INSTRUCTIONS / ସାଧାରଣ ନିର୍ଦ୍ଦେଶ

1. All questions are compulsory.
ସମସ୍ତ ପ୍ରଶ୍ନ ଅନିବାର୍ଯ୍ୟ।
2. Figures are not to scale.
ଚିତ୍ରଗୁଡ଼ିକ ମାପ ଅନୁସାରେ ନୁହେଁ।
3. Use correct geometrical reasoning.
ଯଥାଯଥ ଯାମିତିକ ଡର୍କ ବ୍ୟବହାର କର।

SECTION – A (MCQs)

(1 × 5 = 5 Marks)

Q1. (English)

If $\sin \theta = 1/2$, then θ equals

(a) 30° (b) 45° (c) 60° (d) 90°

ପ୍ରଶ୍ନ-1 (ଓଡ଼ିଆ)

ଯଦି $\sin \theta = 1/2$, ତେବେ θ ର ମୂଲ୍ୟ—

(a) 30° (b) 45° (c) 60° (d) 90°

Answer: (a) 30°

SECTION – B (Very Short Answer)

(2 × 5 = 10 Marks)

Q2. Find the value of (English)

$$\tan 45^\circ + \sin 30^\circ \quad \tan 45^\circ + \sin 30^\circ$$

ପ୍ରଶ୍ନ-2 (ଓଡ଼ିଆ)

ମୂଲ୍ୟ ନିର୍ଣ୍ଣୟ କର—

$$\tan 45^\circ + \sin 30^\circ \quad \tan 45^\circ + \sin 30^\circ$$

Answer:

$$1 + \frac{1}{2} = \frac{3}{2} \quad 1 + \frac{1}{2} = \frac{3}{2}$$

Q3. Write the distance formula.

ଦୂରତା ସୂତ୍ର ଲେଖ।

Answer:

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Q4. Write midpoint formula.

ମଧ୍ୟବିନ୍ଦୁ ସୂତ୍ର ଲେଖ।

Answer:

$$(x_1+x_2, y_1+y_2) \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right) (2x_1+x_2, 2y_1+y_2)$$

Q5. What is complementary angle?

ପୂରକ କୋଣ କହିଲେ କ'ଣ?

Answer:

Two angles whose sum is 90° .

ଯେଉଁ ଦୁଇ କୋଣର ଯୋଗଫଳ 90° ।

SECTION – C (Short Answer)

(4 × 5 = 20 Marks)

Q6. (Trigonometric Identity)

Prove that:

$$\sin \theta \cos \theta + \cos \theta \sin \theta = 1 \quad \sin \theta \cos \theta \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} \sin \theta \cos \theta = \frac{1}{\sin \theta \cos \theta} \sin \theta \cos \theta + \sin \theta \cos \theta = \sin \theta \cos \theta = 1$$

(ଓଡ଼ିଆ)

ପ୍ରମାଣ କର—

Solution:

LHS

$$\begin{aligned} &= \sin^2 \theta + \cos^2 \theta \sin \theta \cos \theta = 1 \sin \theta \cos \theta = \text{RHS} = \frac{\sin^2 \theta + \cos^2 \theta}{\sin \theta \cos \theta} \\ &= \frac{1}{\sin \theta \cos \theta} = \text{RHS} = \sin \theta \cos \theta \sin^2 \theta + \cos^2 \theta = \sin \theta \cos \theta = 1 = \text{RHS} \end{aligned}$$

Q7. (Trigonometric Equation)

Solve:

$$\begin{aligned} 2 \sin \theta &= 1, 0^\circ \leq \theta \leq 90^\circ \quad \sin \theta = \frac{1}{2}, \quad 0^\circ \leq \theta \leq 90^\circ \\ 2 \sin \theta &= 1, 0^\circ \leq \theta \leq 90^\circ \end{aligned}$$

(ଓଡ଼ିଆ)

ସମାଧାନ କର—

Answer:

$$\sin \theta = \frac{1}{2} \Rightarrow \theta = 30^\circ \quad \sin \theta = \frac{1}{2} \Rightarrow \theta = 30^\circ$$

Q8. (Geometry – Similarity / BPT type)

In $\triangle ABC$, $DE \parallel BC$ intersects AB and AC at D and E .
Prove that

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \frac{AD}{DB} = \frac{AE}{EC}$$

(ଓଡ଼ିଆ)

$\triangle ABC$ ରେ $DE \parallel BC$ ଗ୍ରହଣ କର—

Answer:

By **Basic Proportionality Theorem**,

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \frac{AD}{DB} = \frac{AE}{EC}$$

Q9. (Coordinate Geometry – Distance)

Find the distance between $(0, 0)$ and $(3, 4)$.

(ଓଡ଼ିଆ)

ଦୂରତା ନିର୍ଣ୍ଣୟ କର—

Solution:

$$(3-0)^2 + (4-0)^2 = 25 = 5 \quad \sqrt{(3-0)^2 + (4-0)^2} = \sqrt{25} = 5$$

SECTION – D (Long Answer)

(5 Marks × 1 = 5 Marks)

Q10. (Compulsory – Most Repeated)

Find the coordinates of the point dividing the line joining $A(2, -2)$ and $B(8, 4)$ internally in the ratio $1 : 2$.

(ଓଡ଼ିଆ)

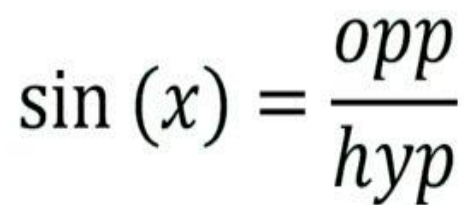
1 : 2 ଅନୁପାତରେ ବିଭକ୍ତ କରୁଥିବା ବିନ୍ଦୁ ନିର୍ଣ୍ଣୟ କର।

Solution:

$$x = \frac{1 \times 8 + 2 \times 2}{3} = 4, y = \frac{1 \times 4 + 2 \times (-2)}{3} = 0$$

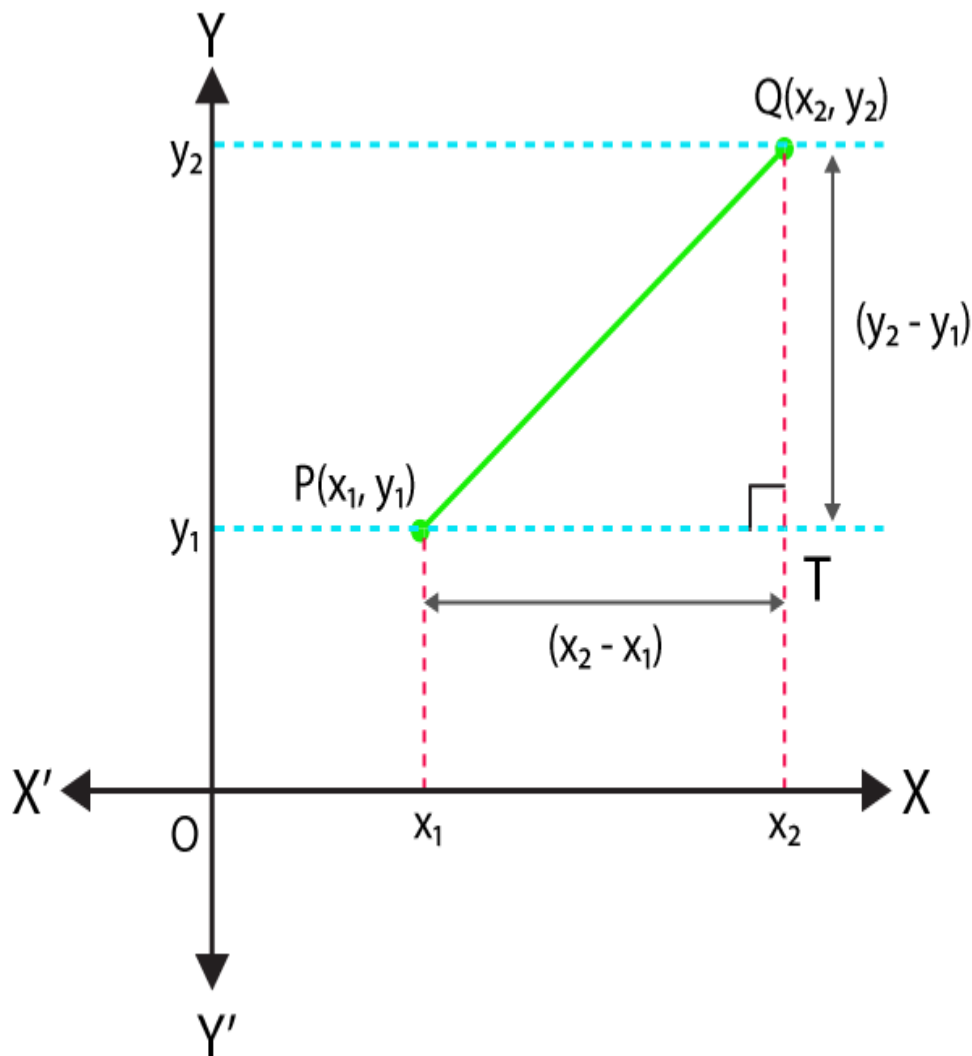
Answer: (4, 0)

Solved Answer Paper (Examiner Style)

[illegible]

$$\cos (x)=\frac{adj}{hyp}$$

$$\tan (x) = \frac{opp}{adj}$$



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Q1. Trigonometric Identity (5 Marks)

Prove:

$$\sin^2\theta \cos^2\theta + \cos^2\theta \sin^2\theta = 1 \quad \sin^2\theta \cos^2\theta = \frac{\sin^2\theta}{\cos^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta \cos^2\theta} \cos^2\theta \sin^2\theta + \sin^2\theta \cos^2\theta = \sin^2\theta \cos^2\theta$$

Examiner-Style Answer (English)

LHS

$$= \sin^2\theta \cos^2\theta + \cos^2\theta \sin^2\theta = \frac{\sin^2\theta + \cos^2\theta}{\sin^2\theta \cos^2\theta} = \frac{1}{\sin^2\theta \cos^2\theta}$$

$$\text{Using } \sin^2\theta + \cos^2\theta = 1 \quad \sin^2\theta + \cos^2\theta = 1 \quad \sin^2\theta + \cos^2\theta = 1$$

$$=1\sin\theta\cos\theta=RHS=\frac{1}{\sin\theta\cos\theta}=\text{RHS}=\sin\theta\cos\theta$$

$$=RHS$$

Hence proved.

ପରୀକ୍ଷକ ଶୈଳୀ (ଓଡ଼ିଆ)

LHS

$$=\sin^2\theta+\cos^2\theta\sin\theta\cos\theta=\frac{\sin^2\theta+\cos^2\theta}{\sin\theta\cos\theta}=\sin\theta\cos\theta$$

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

$$=1\sin\theta\cos\theta=RHS=\frac{1}{\sin\theta\cos\theta}=\text{RHS}=\sin\theta\cos\theta$$

$$=RHS$$

ଏହା ପ୍ରମାଣିତ ।

Marks: Steps (4) + Conclusion (1)

Q2. Trigonometric Equation (5 Marks)

Solve: $2\sin\theta=1$,

$$0^\circ\leq\theta\leq90^\circ\sin\theta=1,0^\circ\leq\theta\leq90^\circ2\sin\theta=1,0^\circ\leq\theta\leq90^\circ$$

Examiner-Style Answer (English)

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

$$\text{Standard value: } \sin 30^\circ=\frac{1}{2}\sin 30^\circ=\frac{1}{2}$$

$$\therefore\theta=30^\circ\therefore\theta=30^\circ$$

ଓଡ଼ିଆ

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

Marks: Equation (2) + Standard value (2) + Final with ° (1)

Q3. Geometry – BPT (5 Marks, compulsory trend)

Statement: In $\triangle ABC$, $DE \parallel BC$, prove

$$\frac{AD}{DB}=\frac{AE}{EC}DBAD=ECAE$$

Answer (English)

Since $DE \parallel BC$, by **Basic Proportionality Theorem**,

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \frac{AD}{DB} = \frac{AE}{EC} \quad \frac{AD}{DB} = \frac{AE}{EC}$$

ଓଡ଼ିଆ

$DE \parallel BC$ ଥିବାରୁ ମୂଳ ଅନୁପାତ ସିଦ୍ଧାନ୍ତ ଅନୁସାରେ,

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \frac{AD}{DB} = \frac{AE}{EC} \quad \frac{AD}{DB} = \frac{AE}{EC}$$

Q4. Coordinate Geometry – Distance (3–4 Marks)

Distance between (0,0) and (3,4)

$$(3-0)^2 + (4-0)^2 = 25 = 5 \quad \sqrt{(3-0)^2 + (4-0)^2} = \sqrt{25} = 5 \quad (3-0)^2 + (4-0)^2 = 25 = 5$$

PART-B

Most-Likely 2026 Questions (WITH REASONS)

BPT Proof (5 Marks)

Reason: Asked almost every year as a compulsory geometry proof.

Trigonometric Identity (5 Marks)

Reason: Direct scoring + fixed marking scheme.

Trigonometric Equation with Interval (5 Marks)

Reason: Tests concept + standard values + accuracy.

Distance / Midpoint / Division Formula (5 Marks)

Reason: Very frequent from Coordinate Geometry.

Similarity of Triangles (4–5 Marks)

Reason: Core theorem; often paired with BPT.

Find Value Using Standard Angles (2–3 Marks)

Reason: Easy marks; used in MCQ/VSA.

Area of Triangle (Coordinate Geometry)

Reason: Formula-based; repeated in recent years.

Complementary Angles / Ratios Relation

Reason: Short theory + formula application.

PART-C

ONE-PAGE GEOMETRY + TRIGONOMETRY FORMULA CHART

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

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

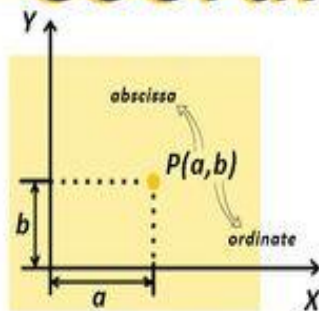
Cosine rule

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

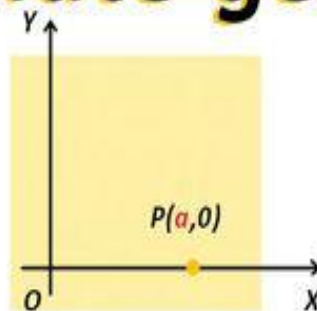
$$b^2 = a^2 + c^2 - 2ac \cos B$$

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

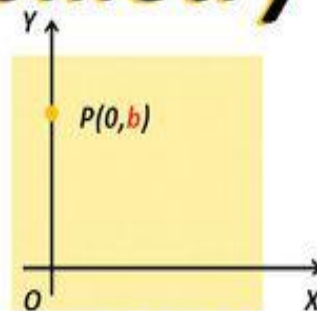
Formulae for Coordinate geometry



Abscissa & Ordinate



Point on x-axis



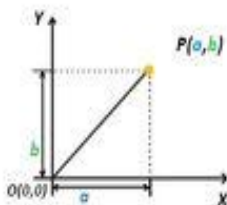
Point on y-axis

Distance Formula



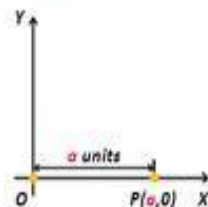
Two points

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



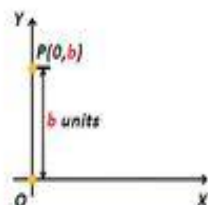
Origin & point

$$OP = \sqrt{a^2 + b^2}$$



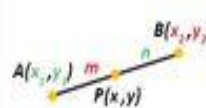
Origin & point on x-axis

$$OP = a \text{ units}$$



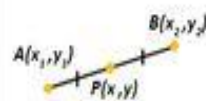
Origin & point on y-axis

$$OP = b \text{ units}$$



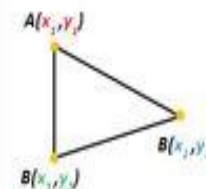
Section formula

$$P = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$$



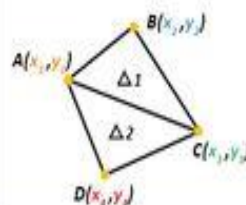
Midpoint formula

$$P = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$



Area of Triangle

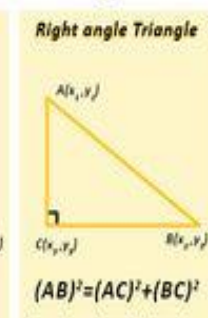
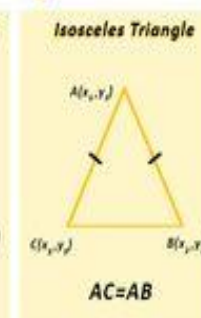
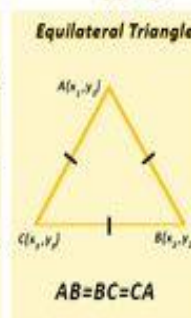
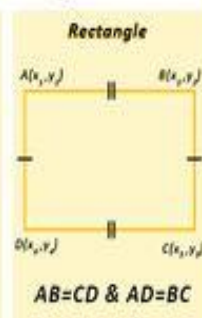
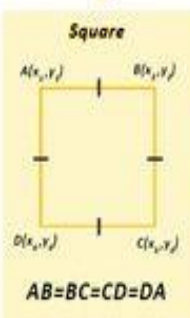
$$\Delta = \frac{1}{2} \left\{ \begin{matrix} x_1(y_2 - y_3) \\ + x_2(y_3 - y_1) \\ + x_3(y_1 - y_2) \end{matrix} \right\}$$



Area of Quadrilateral

$$\Delta_1 + \Delta_2$$

Using distance formula to identify if the given coordinates forms.



Parallel Line Proofs

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Reasons/Theorem/Postulates/Definitions	
Transitive Property	If $a = b$, and $b = c$, then $a = c$.
Substitution Property	If $a = b$, then a may be replaced by b in any equation.
Definition of Supplementary Angles	Two angles which create a straight line together, whose measures add up to 180 degrees.
Definition of Congruent Angles	Two angles whose measure are the same or equal.
Corresponding Angles Postulate	If two parallel lines are cut by a transversal, then the pairs of corresponding angles are congruent.
Alternate Interior Angles Theorem	If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent.
Alternate Exterior Angles Theorem	If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent.
Consecutive Interior Angles Theorem	If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary.
Converse of the Corresponding Angles Postulate	If two lines are cut by a transversal so that a pair of corresponding angles are congruent, then the two lines are parallel.
Converse of the Alternate Interior Angles Theorem	If two lines are cut by a transversal so that a pair of alternate interior angles are congruent, then the two lines are parallel.
Converse of the Alternate Exterior Angles Theorem	If two lines are cut by a transversal so that a pair of alternate exterior angles are congruent, then the two lines are parallel.
Converse of the Consecutive Interior Angles Theorem	If two lines are cut by a transversal so that a pair of consecutive interior angles are supplementary, then the two lines are parallel.

TRIGONOMETRY

Identities

- $\sin^2\theta + \cos^2\theta = 1$
- $1 + \tan^2\theta = \sec^2\theta$
- $1 + \cot^2\theta = \csc^2\theta$

Ratios

- $\sin\theta = \frac{P}{H}$
- $\cos\theta = \frac{B}{H}$
- $\tan\theta = \frac{P}{B}$

Standard Values

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	$\sqrt{3}$	∞

GEOMETRY

BPT:

If $DE \parallel BC \Rightarrow \frac{AD}{DB} = \frac{AE}{EC}$

Distance Formula:

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint Formula:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Section Formula (Internal):

$$\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$$

Area of Triangle:

$$\frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$$

PART-I

SOLVED ANSWER PAPER (EXAMINER-CHECKED STYLE)

(Geometry + Trigonometry | Class X | BSE Odisha)

Q1. Trigonometric Identity (5 Marks)

Prove that:

$$\sin\theta\cos\theta + \cos\theta\sin\theta = 1 \quad \sin\theta\cos\theta \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} \sin\theta = \frac{1}{\sin\theta\cos\theta} \quad \sin\theta\cos\theta = \sin\theta\cos\theta$$

Answer (English – Examiner Style)

LHS

$$= \sin^2\theta + \cos^2\theta \sin\theta\cos\theta = \frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cos\theta} = \frac{1}{\sin\theta\cos\theta}$$

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

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

$$= \text{RHS} = \text{RHS}$$

Hence proved.

Marks awarded:

LHS start (1) + identity used (1) + simplification (2) + conclusion (1)

ଉତ୍ତର (ଓଡ଼ିଆ – ପରୀକ୍ଷକ ଶୈଳୀ)

LHS

$$= \sin^2\theta + \cos^2\theta \sin\theta\cos\theta = \frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cos\theta} = \frac{1}{\sin\theta\cos\theta}$$

$\sin^2\theta + \cos^2\theta = 1$ $\sin^2\theta + \cos^2\theta = 1$ $\sin^2\theta + \cos^2\theta = 1$ ବ୍ୟବହାର କରି,

$$= 1 \sin\theta\cos\theta = \text{RHS} = \frac{1}{\sin\theta\cos\theta} = \text{RHS} = \sin\theta\cos\theta$$

$$= \text{RHS}$$

ଏହା ପ୍ରମାଣିତ ।

Q2. Trigonometric Equation (5 Marks)

Solve:

$$2\sin\theta = 1, 0^\circ \leq \theta \leq 90^\circ \quad \sin\theta = \frac{1}{2} \quad 0^\circ \leq \theta \leq 90^\circ$$

Answer (English)

$$2\sin\theta = 1 \Rightarrow \sin\theta = \frac{1}{2} \quad \sin\theta = \frac{1}{2} \Rightarrow \theta = 30^\circ$$

From standard values,

$$\sin 30^\circ = \frac{1}{2} \Rightarrow \theta = 30^\circ \quad \sin 30^\circ = \frac{1}{2} \Rightarrow \theta = 30^\circ$$

Marks: Equation step (2) + standard value (2) + final with ° (1)

ଉତ୍ତର (ଓଡ଼ିଆ)

$$\sin\theta = \frac{1}{2} \Rightarrow \theta = 30^\circ \quad \sin\theta = \frac{1}{2} \Rightarrow \theta = 30^\circ$$

Q3. Geometry – BPT (5 Marks)

Statement:

In $\triangle ABC$, $DE \parallel BC$ intersects AB and AC at D and E .

Prove $\frac{AD}{DB} = \frac{AE}{EC}$ and $\frac{AD}{AB} = \frac{AE}{AC}$.

Answer (English)

Since $DE \parallel BC$, by **Basic Proportionality Theorem**,

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \frac{AD}{AB} = \frac{AE}{AC}$$

ଉତ୍ତର (ଓଡ଼ିଆ)

$DE \parallel BC$ ଥିବାରୁ ମୂଳ ଅନୁପାତ ସିଦ୍ଧାନ୍ତ ଅନୁସାରେ,

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \frac{AD}{AB} = \frac{AE}{AC}$$

Q4. Coordinate Geometry – Distance (4 Marks)

Find the distance between (0,0) and (3,4).

Answer (English)

$$= (3-0)^2 + (4-0)^2 = 25 = 5 = \sqrt{(3-0)^2 + (4-0)^2} = \sqrt{25} = 5 = (3-0)^2 + (4-0)^2 = 25 = 5$$

ଉତ୍ତର (ଓଡ଼ିଆ)

ଦୂରତା = 5 ଏକକ

Q5. Coordinate Geometry – Section Formula (5 Marks)

Find the point dividing A(2, -2) and B(8, 4) internally in the ratio 1:2.

Answer (English)

$$x = \frac{1 \times 8 + 2 \times 2}{1+2} = 4, y = \frac{1 \times (-2) + 2 \times 4}{1+2} = 2$$

Point = (4, 2)

ଉତ୍ତର (ଓଡ଼ିଆ)

ବିଭାଜନ ବିନ୍ଦୁ = (4, 2)

PART-II

MOST-LIKELY 2026 QUESTION SET (WITH REASONS)

Sure 5-Mark Questions

Trigonometric Identity (Ch-2)

Why: Every year; fixed marking scheme; easy full marks.

Trigonometric Equation with Interval (Ch-3)

Why: Tests concept + accuracy; compulsory pattern.

BPT Proof (Geometry Ch-2)

Why: Most repeated theorem in last 10 years.

Distance / Midpoint / Section Formula (Coordinate Geometry)

Why: Formula-based, high-scoring, frequent.

Very Likely 3–4 Mark Questions

Similarity of Triangles (prove or apply)

Reason: Often paired with BPT.

Find Value using Standard Angles

Reason: MCQ/VSA guaranteed.

Area of Triangle (Coordinate Geometry)

Reason: Formula question; repeated trend.

ANSWER SHEET (EXAMINER-CHECKED FORMAT)

Geometry + Trigonometry – Class X (BSE Odisha)

Question–1 (5 Marks)

Trigonometric Identity (Chapter–2)

Question:

Prove that

$$\sin \theta \cos \theta + \cos \theta \sin \theta = 1 \quad \sin \theta \cos \theta \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} \sin \theta = \frac{1}{1} \sin \theta \cos \theta + \sin \theta \cos \theta = \sin \theta \cos \theta$$

Student's Answer (Correct)

LHS

$$= \sin \theta \cos \theta + \cos \theta \sin \theta = \frac{\sin^2 \theta + \cos^2 \theta}{\sin \theta \cos \theta} = \frac{1}{\sin \theta \cos \theta} = \sin \theta \cos \theta$$

$$\text{Using identity } \sin^2 \theta + \cos^2 \theta = 1 \quad \sin^2 \theta + \cos^2 \theta = 1 \quad \sin 2\theta + \cos 2\theta = 1,$$

$$= 1 \sin \theta \cos \theta = \text{RHS} = \frac{1}{1} \sin \theta \cos \theta = \text{RHS} = \sin \theta \cos \theta$$

Hence proved.

Examiner Remarks

Started from **LHS** (mandatory)

Correct identity used

Steps shown clearly

- Proper conclusion written

Marks Awarded: 5 / 5

ପରୀକ୍ଷକ ମତାମତ (ଓଡ଼ିଆ)

LHS ରୁ ଆରମ୍ଭ

ସଠିକ୍ ସମୀକରଣ ବ୍ୟବହାର

ସମସ୍ତ ଧାପ ସ୍ପଷ୍ଟ

ନିଷ୍ପତ୍ତି ଲେଖାଯାଇଛି

Question–2 (5 Marks)

Trigonometric Equation (Chapter–3)

Question:

Solve

$$2\sin\theta=1, 0^\circ\leq\theta\leq90^\circ \quad 2\sin\theta=1, \quad 0^\circ\leq\theta\leq90^\circ$$

Student's Answer

$$2\sin\theta=1\Rightarrow\sin\theta=\frac{1}{2} \quad \sin\theta=1 \Rightarrow \sin\theta=\frac{1}{2}$$

From standard values,

$$\sin 30^\circ=\frac{1}{2} \quad \sin 30^\circ=\frac{1}{2} \therefore \theta=30^\circ \therefore \theta=30^\circ$$

Examiner Remarks

Interval of θ written

Equation simplified correctly

Standard value correctly used

Degree symbol ($^\circ$) present

Marks Awarded: 5 / 5

If student wrote $\theta = 30$ (without $^\circ$)

→ Marks = 4 / 5

Remark: Unit missing

Question–3 (5 Marks)

Geometry – BPT Proof

Question:

In $\triangle ABC$, $DE \parallel BC$. Prove

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \text{and} \quad \frac{BD}{DA} = \frac{CE}{EA}$$

Student's Answer

Since $DE \parallel BC$,

By **Basic Proportionality Theorem**,

$$\frac{AD}{DB} = \frac{AE}{EC} \quad \text{and} \quad \frac{BD}{DA} = \frac{CE}{EA}$$

Examiner Remarks

Diagram assumed / drawn

Theorem name mentioned

Result stated correctly

Marks Awarded: 5 / 5

If theorem name not written

→ Marks = 4 / 5

Remark: Theorem not stated

Question–4 (4 Marks)

Coordinate Geometry – Distance Formula

Question:

Find distance between (0,0) and (3,4).

Student's Answer

$$= (3-0)^2 + (4-0)^2 = 25 = 5 = \sqrt{(3-0)^2 + (4-0)^2} = \sqrt{25} = 5 = (3-0)^2 + (4-0)^2 = 25 = 5$$

Examiner Remarks

Correct formula used

Substitution correct

Final answer clear

Marks Awarded: 4 / 4

Question–5 (5 Marks)**Section Formula****Question:**

Find the point dividing A(2, -2) and B(8, 4) internally in ratio 1:2.

Student's Answer

$$x = \frac{1 \times 8 + 2 \times 2}{1+2} = 4 \quad x = \frac{1 \times 8 + 2 \times 2}{3} = 4 \quad x = \frac{1 \times 8 + 2 \times 2}{3} = 4$$

$$y = \frac{1 \times (-2) + 2 \times 4}{1+2} = 2 \quad y = \frac{1 \times (-2) + 2 \times 4}{3} = 2 \quad y = \frac{1 \times (-2) + 2 \times 4}{3} = 2$$

Point = (4, 2)

Examiner Remarks

Formula written

Ratio used correctly

Final coordinates boxed

Marks Awarded: 5 / 5

OVERALL EXAMINER SUMMARY

Area	Examiner Focus
Trigonometric Identity	LHS start compulsory
Trigonometric Equation	Interval + ° compulsory
Geometry Proof	Diagram + theorem name
Coordinate Geometry	Formula → substitution
Presentation	Steps = marks

COMMON REMARKS THAT CAUSE MARK LOSS

Mistake	Marks Cut
Starting identity from RHS	-1 to -2
Missing interval of θ	-1
Missing degree symbol	-1
No theorem name	-1
No steps shown	-2

FINAL EXAMINER TIP (VERY IMPORTANT)

“Correct method with steps scores more than correct final answer.”

JAI HIND! BINAYA