# NCERT Solutions Class 10 Maths
# Chapter 8: Introduction to Trigonometry
# Exercise 8.1

**Document Information:**
**Class:** 10 | **Subject:** Mathematics | **Chapter:** 8 | **Exercise:** 8.1
**Total Questions:** 11 | **Academic Year:** 2025-26
**Source:** www.ncertbooks.net | **Generated:** February 21, 2026

**Quick Summary:** In NCERT Solutions Class 10 Maths Chapter 8 Exercise 8.1, students learn the fundamental concepts of trigonometric ratios including sine, cosine, tangent, cosecant, secant, and cotangent. This exercise covers problems involving finding trigonometric ratios in right triangles and calculating unknown ratios using given values, which are essential building blocks for CBSE board exams and higher-level mathematics.

**Key Takeaways:**

- Master the six trigonometric ratios: \sinθ = (opposite)/(hypotenuse), \cosθ = (adjacent)/(hypotenuse), \tanθ = (opposite)/(adjacent)
- Learn reciprocal relationships: \cosecθ = (1)/(\sinθ), \secθ = (1)/(\cosθ), \cotθ = (1)/(\tanθ)
- Apply the fundamental Pythagorean identity \sin^2θ + \cos^2θ = 1 to find unknown ratios
- Solve problems involving right triangles using side relationships and given trigonometric values

## Complete Solutions

## Question 1

### QUESTION

In ΔABC, right-angled at B, AB = 24 cm, BC = 7 cm. Determine:

(i) sin A, cos A

(ii) sin C, cos C

### SOLUTION

**Given:** In , , cm, cm.

**Goal:** Find and .

**Step 1: Identify the hypotenuse**

In a right-angled triangle, the side opposite the right angle is the **hypotenuse**. Since , the hypotenuse is .

**Step 2: Find using Pythagoras theorem**

Pythagoras theorem says:

Substitute values:

So, cm.

**Student Note:** Always compute the hypotenuse first in such questions, because and need the hypotenuse in the denominator.

**Step 3: Use definitions of and**

For any angle in a right triangle:

,

**(i) For angle :**

Look at angle :

**Opposite to** is cm (the side across from angle ).

**Adjacent to** is cm (the side touching angle other than the hypotenuse).

**Hypotenuse** is cm.

So,

**Student Note:** For angle , remember: opposite is , adjacent is . (Opposite changes with the angle you choose!)

**(ii) For angle :**

Now look at angle :

**Opposite to** is cm.

**Adjacent to** is cm.

**Hypotenuse** is still cm.

So,

**Quick Check (helps avoid mistakes):**

Since and are complementary in a right triangle, and . Here, matches , and matches . So the answers are consistent.

ANSWER

(i) sin A = (7)/(25), cos A = (24)/(25)

(ii) sin C = (24)/(25), cos C = (7)/(25)

## Question 2

QUESTION

In Fig. 8.13, find tan P − cot R.

SOLUTION

**From Fig. 8.13:** is right-angled at . Given cm and cm (the slant side).

**To find:** .

**Step 1: Identify the hypotenuse**

The hypotenuse is the side opposite the right angle. Since , the hypotenuse is . So, cm.

**Step 2: Find the third side using Pythagoras theorem**

Pythagoras theorem:

Substitute the values:

cm.

**Student Note:** Here the triangle is a common right triangle, so the missing side comes out neatly.

**Step 3: Calculate**

For angle :

Opposite side = cm, Adjacent side = cm.

So, .

**Step 4: Calculate**

For angle :

Opposite side = cm, Adjacent side = cm.

So, .

**Step 5: Find**

.

**Quick Check:** In a right triangle, angles and are complementary, so . That's why the difference becomes .

ANSWER

0

## Question 3

QUESTION

If sin A = (3)/(4), calculate cos A and tan A.

SOLUTION

**Given:** .

**To find:** and .

**Step 1: Understand what means**

In a right-angled triangle (taking as an acute angle),

.

So we can assume:

Opposite side = units and Hypotenuse = units.

**Student Note:** This is a standard trick: when a ratio like is given, we choose sides in the same ratio (3 and 4). The final trigonometric values remain the same.

**Step 2: Find the adjacent side using Pythagoras theorem**

Using :

So, units.

**Step 3: Calculate**

.

**Step 4: Calculate**

.

**Student Note (Optional):** Sometimes we rationalize the denominator:

. Both forms are correct unless your book specifically asks for rationalized form.

**Quick Check:** Since ,

. Correct.

ANSWER

cos A = √74, tan A = (3)/(√7)

## Question 4

QUESTION

Given 15 cot A = 8, find sin A and sec A.

SOLUTION

**Given:** .

**To find:** and .

**Step 1: First isolate**

.

**Step 2: Convert into a right-triangle ratio**

We know:

.

So we can assume a right triangle for angle such that:

Adjacent side units and Opposite side units.

**Student Note:** In trigonometry, whenever you get a ratio like , you can safely take the sides in the same ratio (8 and 15). This makes finding other ratios easy.

**Step 3: Find the hypotenuse using Pythagoras theorem**

Hypotenuse

.

So, Hypotenuse units.

**Step 4: Find**

.

**Step 5: Find**

First recall:

and .

So, .

Therefore,

.

**Final Answer:** , .

**Quick Check (optional):** Since , we get , which matches the given value. So the result is correct.

**ANSWER**

sin A = (15)/(17), sec A = (17)/(8)

## Question 5

### QUESTION

Given sec θ = (13)/(12), calculate all other trigonometric ratios.

### SOLUTION

**Given:**

**To find:** .

**Step 1: Use the definition of secant**

We know:

So, if , we can take:

**Hypotenuse** and **Adjacent** (with respect to angle ).

**Student Note:** Whenever a ratio is given as a fraction, you can treat numerator and denominator as sides of a right triangle (same scale). This makes finding other ratios easy.

**Step 2: Find the opposite side using Pythagoras theorem**

In a right triangle:

So,

.

**Quick Triangle Summary:** Adjacent = , Opposite = , Hypotenuse = .

**Step 3: Write all required trigonometric ratios**

**(a) Cosine:**

**(b) Sine:**

**(c) Tangent:**

**(d) Cotangent:**

**(e) Cosecant:**

**Student Note (Check):** Since , and we got , its reciprocal is which matches the given value. So everything is consistent.

### ANSWER

sin θ = (5)/(13), cos θ = (12)/(13), tan θ = (5)/(12), cot θ = (12)/(5), cosec θ = (13)/(5)

## Question 6

QUESTION

If ∠A and ∠B are acute angles such that cos A = cos B, then show that ∠A = ∠B.

SOLUTION

**Given:** and are **acute angles** and .

**To show:** .

**Step 1: Recall what "acute angle" means**

An acute angle lies between and . So,

and .

**Step 2: Use the key property of in the acute range**

On the interval to , the cosine function is **one-to-one** (it gives a different value for each different acute angle). In simple words:

**If two acute angles have the same cosine value, then the angles must be equal.**

**Step 3: Apply this property to the given statement**

We are given .

Since both and are acute, cosine cannot take the same value for two different angles in this range.

Therefore, the only possibility is:

.

**Conclusion:** .

**Student Note (why "acute" is important):**

The condition "acute" matters because outside the acute range, cosine can repeat values. For example, , but . In acute angles ( to ) this kind of repetition does not happen, so equality of cosines forces equality of angles.

## Question 7

QUESTION

If cot θ = (7)/(8), evaluate:

(i) ((1 + \sin θ)(1 - \sin θ))/((1 + \cos θ)(1 - \cos θ))

(ii) cot² θ

SOLUTION

**Given:**

**To find:**

(i)

(ii)

**Step 1: Form a right triangle using**

In a right-angled triangle (with angle ),

.

So take adjacent side = 7 units and opposite side = 8 units.

**Step 2: Find the hypotenuse using Pythagoras theorem**

Let hypotenuse be . Then

.

**Step 3: Write and using sides**

**Step 4: Evaluate part (i)**

First expand each product:

Now substitute and :

Numerator:

Denominator:

Therefore,

**So, (i) = .**

**Step 5: Evaluate part (ii)**

.

**Final Answers:**

(i)

(ii)

**ANSWER**

(i) (49)/(64)

(ii) (49)/(64)

## Question 8

QUESTION

If 3 cot A = 4, check whether (1 - \tan^2 A)/(1 + \tan^2 A) = \cos^2 A - \sin^2 A or not.

SOLUTION

**Given:** .

**To check:** whether

.

**Step 1: Find and**

From , divide both sides by 3:

.

Since , we get:

.

**Step 2: Check the LHS**

LHS = .

First square :

.

Now substitute:

Convert 1 into :

Divide the fractions:

.

**Step 3: Find and using a right triangle idea**

We have . Think of a right triangle where:

Opposite side = 3 units, Adjacent side = 4 units.

Then hypotenuse = units.

**Student Note:** This is the standard right triangle, which makes and very easy to write.

So,

, and .

**Step 4: Check the RHS**

RHS = .

So,

.

**Step 5: Compare LHS and RHS**

LHS = and RHS = .

Since LHS = RHS, the given relation is **true**.

**Conclusion:** Yes, is verified for .

**ANSWER**

Yes

## Question 9

### QUESTION

In triangle ABC, right-angled at B, if tan A = (1)/(√3), find:

(i) sin A cos C + cos A sin C

(ii) cos A cos C − sin A sin C

### SOLUTION

**Given:** In right triangle , and .

**Step 1: Convert into side ratio**

In a right-angled triangle, .

So, . Take and (any proportional sides work).

**Step 2: Find the hypotenuse using Pythagoras theorem**

.

**Step 3: Write and using side ratios**

**For angle :**

, .

**For angle :** (opposite to is , adjacent to is )

, .

**Step 4: Substitute to find the required values**

**(i)**

=

= .

**So, (i) = 1.**

**(ii)**

=

= .

**So, (ii) = 0.**

ANSWER

(i) 1

(ii) 0

## Question 10

QUESTION

In ΔPQR, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine sin P, cos P and tan P.

SOLUTION

**Given:** In , . Also, cm and cm.

**To determine:** , and .

**Step 1: Identify the sides in the right triangle**

Since is the right angle, the side opposite is the hypotenuse.

So, **hypotenuse** .

**Step 2: Use the given sum to set up a variable**

We know . Let cm.

Then cm.

**Step 3: Apply Pythagoras theorem**

In a right triangle,

Substitute , , :

Expand the left side:

Now cancel from both sides:

So, cm.

Then cm.

**Student Note:** Once you get one side, immediately find the other using the given sum. Here, the triangle becomes a neat right triangle.

**Step 4: Mark sides with respect to angle**

For angle :

**Opposite side** = cm

**Adjacent side** = cm

**Hypotenuse** = cm

**Step 5: Use trigonometric definitions**

**Quick Check:** Since and are both fractions with denominator , that confirms (hypotenuse) is cm, matching our result.

**ANSWER**

sin P = (12)/(13)

cos P = (5)/(13)

tan P = (12)/(5)

## Question 11

QUESTION

State whether the following are true or false. Justify your answer:

(i) The value of tan A is always less than 1.

(ii) sec A = (12)/(5) for some value of angle A.

(iii) cos A is the abbreviation used for the cosecant of angle A.

(iv) cot A is the product of cot and A.

(v) sin θ = (4)/(3) for some angle θ.

SOLUTION

We will check each statement using basic facts of trigonometry and write a clear justification.

**(i) “The value of is always less than 1.”**

**False.** can be less than 1, equal to 1, or greater than 1 depending on the angle.

Example: if , then (not less than 1).

Also, if , then , which is **greater** than 1. So it is not always less than 1.

**(ii) “ for some value of angle .”**

**True.** We know . So means:

.

This is possible because for an acute angle, can take any value between 0 and 1, and lies between 0 and 1.

**Student Note:** A quick check: in a right triangle, . Taking adjacent = 5 and hypotenuse = 12 is valid (hypotenuse is bigger), so such an angle can exist.

**(iii) “ is the abbreviation used for the cosecant of angle .”**

**False.** means **cosine** of angle .

The abbreviation for **cosecant** is , not .

**(iv) “ is the product of cot and .”**

**False.** is a single trigonometric ratio called **cotangent** of angle .

It does **not** mean (cot) × (A). It is like or : a function value, not a multiplication.

**(v) “ for some angle .”**

**False.** The value of for any real angle always lies between and , i.e.,

.

But , which is greater than 1, so it is not possible for any angle.

**Student Note:** The same idea is true for as well (it also lies between and ).

**ANSWER**

(i) False

(ii) True

(iii) False

(iv) False

(v) False

## Relevant Resources

**Explore more NCERT solutions (click links to visit):**

| Resource | Visit Link |
|---|---|
| NCERT Class 10 Maths All Chapters | View Solutions → |
| NCERT Class 10 Science Solutions | View Solutions → |
| NCERT Class 10 Social Science | View Solutions → |
| NCERT Class 10 English Solutions | View Solutions → |

## Key Formulas

### Important Formulas for Exercise 8.1

| Formula / Concept | Description |
|---|---|
| Pythagorean Theorem | In a right-angled triangle, the square of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the other two sides. |
| a^2 + b^2 = c^2 | Where 'a' and 'b' are the lengths of the legs of the right-angled triangle, and 'c' is the length of the hypotenuse. |
| Trigonometric Ratios | These ratios relate the angles of a right-angled triangle to the ratios of the lengths of its sides. |

| Formula / Concept | Description |
|---|---|
| \sin(θ) = \textOpposite\textHypotenuse | The ratio of the length of the side opposite angle θ to the length of the hypotenuse. |
| \cos(θ) = \textAdjacent\textHypotenuse | The ratio of the length of the side adjacent to angle θ to the length of the hypotenuse. |
| \tan(θ) = \textOpposite\textAdjacent | The ratio of the length of the side opposite angle θ to the length of the side adjacent to angle θ. |
| Reciprocal Identities | The reciprocal trigonometric ratios are cosecant, secant, and cotangent. |
| \csc(θ) = (1)/(\sin(θ)) = \textHypotenuse\textOpposite | The reciprocal of the sine function. |
| \sec(θ) = (1)/(\cos(θ)) = \textHypotenuse\textAdjacent | The reciprocal of the cosine function. |
| \cot(θ) = (1)/(\tan(θ)) = \textAdjacent\textOpposite | The reciprocal of the tangent function. |
| Quotient Identities | Identities that express one trigonometric ratio in terms of others. |
| \tan(θ) = (\sin(θ))/(\cos(θ)) | The tangent of an angle is the ratio of its sine to its cosine. |
| \cot(θ) = (\cos(θ))/(\sin(θ)) | The cotangent of an angle is the ratio of its cosine to its sine. |

## ❓ Top FAQs

### Q1. How many questions are in NCERT Solutions for Class 10 Maths Chapter 8 Introduction to Trigonometry Exercise 8.1?

Exercise 8.1 of NCERT Solutions for Class 10 Maths Chapter 8 Introduction to Trigonometry contains exactly 11 questions. These questions focus on understanding trigonometric ratios including sine, cosine, tangent, cosecant, secant, and cotangent for angles in right-angled triangles. All 11 questions with step by step solutions are available for CBSE board exam 2025-26 preparation.

### Q2. Where can I download free PDF of NCERT Solutions for Class 10 Maths Chapter 8 Introduction to Trigonometry Exercise 8.1?

Free PDF download of NCERT Solutions for Class 10 Maths Chapter 8 Introduction to Trigonometry Exercise 8.1 is available on the official NCERT website and various educational platforms. These step by step solutions PDF files are updated according to the CBSE syllabus 2025-26 and include detailed explanations for all 11 questions. Students can download and access these solutions offline for effective exam preparation.

### Q3. How many marks does Introduction to Trigonometry Chapter 8 carry in CBSE Class 10 board exam 2025-26?

Introduction to Trigonometry from NCERT Class 10 Maths Chapter 8 carries 8 marks in the CBSE Class 10 board exam 2025-26 as part of Unit IV - Trigonometry. These marks are shared with other chapters in the Trigonometry unit, making Exercise 8.1 and subsequent exercises crucial for scoring well. The trigonometric ratios covered in Exercise 8.1 form the foundation for questions worth these 8 marks.

### Q4. Which is the most difficult question in NCERT Solutions Class 10 Maths Chapter 8 Introduction to Trigonometry Exercise 8.1?

Question 11 is generally considered the most difficult question in NCERT Solutions for Class 10 Maths Chapter 8 Exercise 8.1 as it requires students to apply multiple trigonometric ratios simultaneously and involves complex calculations. However, with proper understanding of trigonometric ratios and step by step solutions practice, students can master this question for CBSE board exam 2025-26. Regular practice of all 11 questions helps in building conceptual clarity.

### Q5. What is Trigonometric Ratios in NCERT Solutions Class 10 Maths Chapter 8 Introduction to Trigonometry Exercise 8.1?

Trigonometric Ratios in NCERT Class 10 Maths Chapter 8 Exercise 8.1 are the ratios of sides of a right-angled triangle with respect to any of its acute angles, including sine (sin), cosine (cos), tangent (tan), cosecant (cosec), secant (sec), and cotangent (cot). Exercise 8.1 focuses on calculating these six trigonometric ratios for given right-angled triangles, which is fundamental for CBSE Class 10 board exam 2025-26. These concepts are essential for solving all 11 questions in this exercise.

## 📚 More Exercises

**Visit all exercises from Chapter 8:**


Exercise 8.1 ✓ →

Exercise 8.2 →

Exercise 8.3 →

🌐 **Complete Chapter:** Class 10 Maths Ch 8: Introduction to Trigonometry →