

Trigonometry isn't just a theoretical concept; it has enormous practical applications in daily life as well. In Chapter 9 of CBSE Class 10 Math, "Some Applications of Trigonometry", you will be studying ways in which trigonometric ratios are used in the world around you, particularly in calculating heights and distances. This chapter shows how trigonometric ratios and concepts in relation to angles of elevation and depression find applications in architectural, navigational, and engineering practices. The notes have been presented with an easy approach using concise explanations, formulas, and examples, all designed to make the chapter approachable for an exam-preparatory course.

## **CBSE Class 10 Maths Notes Chapter 9 Some Applications of Trigonometry - Revision Notes**

### **1. Important Concepts in Applications of Trigonometry:**

- **Angle of Elevation:** The angle of elevation is the angle that is formed between the horizontal and the observer's line of sight when looking at an item that is above their line of sight.
- **Angle of Depression:** The measure of the angle between the horizontal line and the line of sight of the observer looking at an object below his or her line of sight is referred to as an angle of depression.

- **Right-Angled Triangle in Problem-Solving:** Use the trigonometric ratios to determine the unknown side or angle of a right triangle that is created by the line of sight and the horizontal.

### **2. Definitions:**

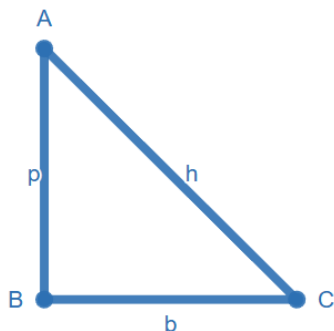
- **Horizontal Line:** The straight line parallel to the ground that serves as the base reference for measuring angles of elevation or depression.
- **Line of Sight:** The line drawn from the observer's eye to the point of observation.
- **Perpendicular Height:** The vertical distance from the base to the top of an object.

### **3. Formulas:**

In a right-angled triangle, the sides are defined as follows:

- **Hypotenuse (H):** The longest side, opposite the right angle.
- **Perpendicular (P):** The side opposite the angle being considered.
- **Base (B):** The side adjacent to the angle being considered.

Below is a diagram to clarify these terms:



The primary trigonometric ratios used in this chapter include:

- Sine ( $\sin \theta$ ): Opposite side/Hypotenuse =  $BC/AC$
- Cosine ( $\cos \theta$ ): Adjacent side/Hypotenuse =  $AB/AC$
- Tangent ( $\tan \theta$ ): Opposite side/Adjacent side =  $BC/AB$

Using these ratios, students can solve for unknown sides or angles in problems involving heights and distances.

### Solved Examples

**Problem 1:** A 20-meter rope that is securely linked and stretched from the top of a vertical pole to the ground is being climbed by a circus performer. If the angle formed by the rope and ground level is  $30^\circ$ , find the pole's height.

#### Solution:

The length of the rope is 20 m, and the angle made by the rope with the ground level is  $30^\circ$ .

Given:  $AC = 20$  m and angle  $C = 30^\circ$

To Find the height of the pole

Let AB be the vertical pole

In right angle ABC, using the sine formula

$$\sin 30^\circ = AB/AC$$

Using the value of  $\sin 30$  degrees, that is  $\frac{1}{2}$ , we have

$$\frac{1}{2} = AB/20$$

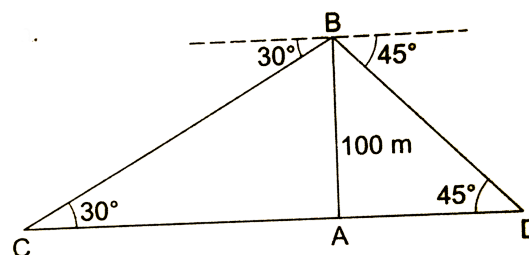
$$AB = 20/2$$

$$AB = 10$$

Therefore, the height of the pole is 10 m.

**Problem2:** Two ships are observed from the top of a 100 m lighthouse, which are on the same straight line but on two opposite sides of the lighthouse. The angles of depression to the ships are  $30^\circ$  and  $45^\circ$ . Find the distance between the ships.

#### Solution:



As per the diagram, AB is the lighthouse, the ships are at points C & D, and the distances of the two ships from the base of the lighthouse are AC ( $d_1$ ) and AD ( $d_2$ ).

**For ship 1 ( $\theta_1=45^\circ$ )**

$$\tan 45^\circ = 100/d_2 = 1$$

$$d_2 = 100\text{m}$$

**For ship 2 ( $\theta_1=30^\circ$ )**

$$\tan 30^\circ = \text{Perpendicular} / \text{Base} \Rightarrow 1 / \sqrt{3} = 100/d_2$$

$$d_2 = 100 / \sqrt{3} = 100 \times 1.732 = 173.2\text{m}$$

Distance between the ships:

$$D = d_2 + d_1 = 100 + 173.2 = 273.2\text{m}$$

The distance between the ships is approximately 273.2 m.

#### 4. Tips and Tricks:

- **Visualisation of the Problem:** Create a clear diagram that illustrates the situation at hand. All known and unknown values should be explicitly labelled.
- **Understand the Angle:** Differentiate between angles of elevation and angles of depression with this consideration based on information alone, which is fundamentally important to establishing the right triangle.
- **Focus on the Triangle:** Use the appropriate trigonometric ratios and isolate the right-angled triangle to simplify this problem.
- **Check Units:** Prior to computations, all measurements must be stated in a single unit, such as meters or kilometers.

### Key Features of CBSE Class 10 Maths Notes Chapter 9 Some Applications of Trigonometry

- **Comprehensive Explanations:** The notes simplify angles of elevation and depression with clear, real-world applications.
- **Solved Examples:** Step-by-step problems demonstrate the use of trigonometric ratios to calculate heights and distances.
- **Visual Aids and Diagrams:** Diagrams make geometry engaging and easy to understand through labelled triangles and angles.
- **Exam-Oriented Approach:** Highlights frequently asked questions and key methods for effective preparation.
- **Real-Life Applications:** Measuring the height of buildings, figuring out how far apart ships are, or figuring out a mountain's elevation angle. These situations give the topic a relevant and useful quality.
- **Practice Problems:** A wide range of questions builds confidence, from basic to advanced.
- **Tips for Simplification:** Simplified methods and shortcuts are offered for solving problems so that time can be saved while students calculate during exams.
- **Aligned with CBSE Syllabus:** Strictly follows the CBSE syllabus,

ensuring complete coverage of required topics.

- **Revision-Friendly Format:** The formulas and step-by-step solutions along with explanations are concise, making the notes ideal for last-minute revision.
- **Practical and Engaging:** Relatable examples connect textbook concepts to real-life situations.

The student will be guided, given thorough information on the topic, and assisted in understanding and mastering it by these CBSE Class 10 Maths Notes for Chapter 9: Some Applications of Trigonometry. By learning about how the topic is used in real-world situations through clear explanations, solved examples, and helpful recommendations, students may confidently respond to queries.