

# NCERT Solutions Class 9 Maths

## Chapter 11: Surface Areas and Volumes

### EXERCISE 11.1

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#### Document Information:

**Class:** 9 | **Subject:** Mathematics | **Chapter:** 11 | **Exercise:** 11.1

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**Quick Summary:** In NCERT Solutions Class 9 Maths Chapter 11 Exercise 11.1, students learn to calculate surface areas and volumes of three-dimensional shapes including cubes, cuboids, and cones. This exercise covers fundamental formulas for curved surface area and total surface area calculations, which are essential for CBSE Class 9 board exams and form the foundation for advanced geometry concepts.

#### Key Takeaways:

- Master the total surface area of a cube formula:  $6a^2$  where  $a$  is the side length
- Learn curved surface area of cone:  $\pi rl$  and total surface area:  $\pi r(l + r)$  where  $r$  is radius and  $l$  is slant height
- Understand real-world applications like calculating material required for conical tents and container surfaces
- Practice converting between different units and applying formulas to solve multi-step geometry problems

## Complete Solutions

### Question 1

#### QUESTION

Diameter of the base of a cone is 10.5 cm and its slant height is 10 cm. Find its curved surface area. (Assume  $\pi = 22/7$ )

#### SOLUTION

We are asked to find the curved surface area of a cone, given the diameter of its base and its slant height.

##### Step 1: Identify the given values

The diameter of the base of the cone is given as 10.5 cm.

The slant height of the cone is given as 10 cm.

##### Step 2: Find the radius of the base

The radius is half of the diameter. Therefore,

cm

##### Step 3: Recall the formula for the curved surface area of a cone

The curved surface area (CSA) of a cone is given by the formula:

, where  $r$  is the radius of the base and  $l$  is the slant height.

##### Step 4: Substitute the values into the formula

We have cm and cm. Also, .

Substituting these values into the formula, we get:

##### Step 5: Simplify the expression

First, simplify .

Then,

**Final Answer:** The curved surface area of the cone is 165 cm<sup>2</sup>.

#### ANSWER

165 cm<sup>2</sup>

## Question 2

### QUESTION

Find the total surface area of a cone, if its slant height is 21 m and diameter of its base is 24 m.

### SOLUTION

We need to find the total surface area (TSA) of a cone given its slant height and the diameter of its base. The formula for the TSA of a cone is  $\pi r^2 + \pi r l$ , where  $r$  is the radius and  $l$  is the slant height.

#### Step 1: Find the radius

The diameter of the base is given as 24 m. The radius is half of the diameter.

$r = 12$  m

#### Step 2: Write down the given slant height

The slant height,  $l$ , is given as 21 m.

#### Step 3: Apply the formula for the total surface area of a cone

The total surface area (TSA) of a cone is given by:

Substituting the values of  $r$  and  $l$ :

#### Step 4: Simplify the expression

#### Step 5: Substitute the value of $\pi$ (approximately 3.14159)

#### Step 6: Round to two decimal places and include units

$1244.57$  m<sup>2</sup>

**Final Answer:** The total surface area of the cone is 1244.57 m<sup>2</sup>.

### ANSWER

1244.57 m<sup>2</sup>

### Question 3

#### QUESTION

Curved surface area of a cone is  $308 \text{ cm}^2$  and its slant height is  $14 \text{ cm}$ . Find (i) radius of the base and (ii) total surface area of the cone.

#### SOLUTION

This question tests our understanding of the formulas for the curved surface area and total surface area of a cone.

##### (i) Finding the radius of the base

**Step 1: Recall the formula for the curved surface area (CSA) of a cone.**

The curved surface area of a cone is given by  $\pi r l$ , where  $r$  is the radius of the base and  $l$  is the slant height.

**Step 2: Set up the equation using the given information.**

We are given that the curved surface area is  $308 \text{ cm}^2$  and the slant height is  $14 \text{ cm}$ . Therefore, we have:

**Step 3: Substitute the value of and solve for .**

Using  $\pi r l = 308$ , we get:

$r = 7$   
cm

Therefore, the radius of the base is  $7 \text{ cm}$ .

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##### (ii) Finding the total surface area of the cone

**Step 1: Recall the formula for the total surface area (TSA) of a cone.**

The total surface area of a cone is given by  $\pi r (r + l)$ , where  $r$  is the radius of the base and  $l$  is the slant height.

**Step 2: Substitute the values of and into the formula.**

We have  $r = 7 \text{ cm}$  and  $l = 14 \text{ cm}$ . Therefore:

**Step 3: Simplify and calculate the total surface area.**

$462$   
 $\text{cm}^2$

Therefore, the total surface area of the cone is  $462 \text{ cm}^2$ .

**Final Answer:** (i)  $7 \text{ cm}$  (ii)  $462 \text{ cm}^2$

#### ANSWER

(i)  $7 \text{ cm}$  (ii)  $462 \text{ cm}^2$

## Question 4

### QUESTION

A conical tent is 10 m high and the radius of its base is 24 m. Find (i) slant height of the tent, (ii) cost of the canvas required to make the tent, if the cost of 1 m<sup>2</sup> canvas is ₹70.

### SOLUTION

This question tests our understanding of the surface area of a cone and its application in a real-world scenario. We need to find the slant height and then use it to calculate the curved surface area, which will help us find the cost of the canvas.

#### (i) Finding the slant height of the tent

The tent is conical in shape. We are given the height (h) and the radius (r) of the base.

h = 10

r = 24

The slant height (l) of a cone is related to the height and radius by the Pythagorean theorem:

**Step 1: Substitute the values of h and r**

**Step 2: Calculate the squares**

**Step 3: Add the values**

**Step 4: Find the square root**

Therefore, the slant height of the tent is 26 m.

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#### (ii) Finding the cost of the canvas

The canvas required to make the tent is equal to the curved surface area (CSA) of the cone.

The formula for the CSA of a cone is:

**Step 1: Substitute the values of l and r**

**Step 2: Use the value of l**

**Step 3: Calculate the area**

The cost of 1 m<sup>2</sup> canvas is ₹70.

**Step 4: Calculate the total cost**

**Final Answer:** (i) 26 m (ii) ₹137280

## ANSWER

(i) 26 m (ii) ₹137280

## Question 5

### QUESTION

What length of tarpaulin 3 m wide will be required to make a conical tent of height 8 m and base radius 6 m? Assume extra material required is 20 cm (use  $\pi = 3.14$ ).

### SOLUTION

We need to find the length of tarpaulin required to make a conical tent, given its height, base radius, and the width of the tarpaulin. We also need to account for extra material.

#### Step 1: Find the slant height of the cone

The tent is conical, with height  $m$  and base radius  $m$ . The slant height can be found using the Pythagorean theorem:

Substituting the values:

#### Step 2: Calculate the curved surface area (CSA) of the cone

The curved surface area of a cone is given by:

Using  $m$ ,  $m$ , and  $m$ :

#### Step 3: Calculate the length of the tarpaulin

The area of the tarpaulin required is equal to the curved surface area of the cone. The tarpaulin is 3 m wide. Let the length of the tarpaulin be  $l$ .

Area of tarpaulin =

#### Step 4: Account for extra material

The extra material required is 20 cm, which is 0.2 m. This is added to the length.

Total length =  $m$

**Final Answer:** The length of the tarpaulin required is 63 m.

## ANSWER

63 m

## Question 6

### QUESTION

The slant height and base diameter of a conical tomb are 25 m and 14 m respectively. Find the cost of white-washing its curved surface at the rate of ₹210 per 100 m<sup>2</sup>.

### SOLUTION

This question tests our understanding of the curved surface area of a cone and its application in a real-world problem.

#### Step 1: Identify the given information

We are given:

Slant height, m

Base diameter, m

Rate of white-washing = ₹210 per 100 m<sup>2</sup>

#### Step 2: Calculate the radius

The radius is half of the diameter :

m

#### Step 3: Calculate the curved surface area (CSA) of the cone

The formula for the curved surface area of a cone is:

Substituting the values of and :

Using :

m<sup>2</sup>

#### Step 4: Calculate the cost of white-washing

The rate is ₹210 per 100 m<sup>2</sup>. So, the cost for 1 m<sup>2</sup> is .

Total cost =

Total cost =

Total cost =

**Final Answer:** The cost of white-washing the curved surface is ₹1155.

### ANSWER

₹1155

## Question 7

### QUESTION

A joker's cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet required to make 10 such caps.

### SOLUTION

This question involves finding the curved surface area of a cone and then multiplying it by 10 to find the total area of the sheet required for 10 such caps.

#### Step 1: Identify the given values

The base radius,  $r$ , of the cone is 7 cm.

The height,  $h$ , of the cone is 24 cm.

#### Step 2: Find the slant height of the cone

The slant height,  $l$ , of a cone is given by the formula:

Substituting the given values:

#### Step 3: Calculate the curved surface area of one cap

The curved surface area (CSA) of a cone is given by the formula:

Substituting the values:

#### Step 4: Calculate the area of the sheet required for 10 caps

Since we need to make 10 caps, the total area of the sheet required will be 10 times the curved surface area of one cap.

Total area =

**Final Answer:** The area of the sheet required to make 10 such caps is 5500 cm<sup>2</sup>.

### ANSWER

5500 cm<sup>2</sup>

## Question 8

### QUESTION

A bus stop is barricaded from the remaining part of the road using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 40 cm and height 1 m. If the outside of each cone is to be painted and painting costs ₹12 per m<sup>2</sup>, find the cost of painting all cones. (Use  $\pi = 3.14$  and  $\sqrt{1.04} \approx 1.02$ )

### SOLUTION

This question involves calculating the curved surface area of cones and then finding the total cost of painting them. We need to find the curved surface area of one cone, multiply it by the number of cones, and then multiply by the cost per square meter.

#### Step 1: Convert units to meters

The diameter is given as 40 cm, so the radius is 20 cm. Convert this to meters: . The height is given as 1 m.

#### Step 2: Calculate the slant height

The slant height of the cone is given by the formula:

Substituting the values, we get:

We are given that , so .

#### Step 3: Calculate the curved surface area of one cone

The curved surface area (CSA) of a cone is given by the formula:

Substituting the values, we get:

#### Step 4: Calculate the total curved surface area of all 50 cones

Total CSA =

#### Step 5: Calculate the total cost of painting

The cost of painting is ₹12 per m<sup>2</sup>. Therefore, the total cost is:

**Final Answer:** The cost of painting all the cones is approximately ₹384.34.

### ANSWER

₹384.34 (approx.)

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## Key Formulas

### Important Formulas for Exercise 11.1

Formula / Concept	Description
Cuboid	A three-dimensional solid shape that has six rectangular faces.
Total Surface Area (TSA) of a Cuboid	The sum of the areas of all six rectangular faces of the cuboid.
$TSA = 2(lb + bh + hl)$	Formula to calculate the Total Surface Area of a cuboid, where 'l' is the length, 'b' is the breadth, and 'h' is the height.
Lateral Surface Area (LSA) of a Cuboid	The sum of the areas of the four vertical faces, excluding the top and bottom faces. It is also known as the area of the four walls of a room.
$LSA = 2h(l + b)$	Formula to calculate the Lateral Surface Area of a cuboid.
Cube	A special type of cuboid where all six faces are identical squares, meaning length, breadth, and height are equal.
Total Surface Area (TSA) of a Cube	The sum of the areas of all six square faces of the cube.
$TSA = 6a^2$	Formula to calculate the Total Surface Area of a cube, where 'a' is the length of an edge.
Lateral Surface Area (LSA) of a Cube	The sum of the areas of the four side faces, excluding the top and bottom faces.
$LSA = 4a^2$	Formula to calculate the Lateral Surface Area of a cube.

## Top FAQs

### Q1. How many questions are in NCERT Solutions Class 9 Maths Chapter 11 Surface Areas and Volumes Exercise 11.1?

Exercise 11.1 of NCERT Solutions for Class 9 Maths Chapter 11 Surface Areas and Volumes contains exactly 8 questions. These questions focus on finding the surface area of cube and cuboid using standard formulas. All 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 9 Maths Chapter 11 Surface Areas and Volumes Exercise 11.1?

You can download the free PDF of NCERT Solutions for Class 9 Maths Chapter 11 Surface Areas and Volumes Exercise 11.1 from official NCERT website and various educational portals. These PDFs contain step by step solutions for all 8 questions and are updated according to CBSE syllabus 2025-26. The solutions are available in both English and Hindi medium for free download.

### Q3. How many marks does Surface Areas and Volumes Chapter 11 carry in CBSE Class 9 Maths board exam 2025-26?

Chapter 11 Surface Areas and Volumes carries approximately 9 marks in CBSE Class 9 Maths board exam 2025-26 under Unit V - Mensuration. This weightage is shared with other mensuration topics, making Exercise 11.1 important for exam preparation. Students should practice all NCERT Solutions thoroughly to score full marks in this chapter.

### Q4. Which is the most difficult question in Exercise 11.1 of NCERT Solutions Class 9 Maths Chapter 11 Surface Areas and Volumes?

Question 8 is considered the most difficult in Exercise 11.1 of NCERT Solutions for Class 9 Maths Chapter 11 Surface Areas and Volumes as it involves application-based problems combining multiple concepts. Students often find word problems requiring conversion of units challenging. Step by step solutions help in understanding the approach for CBSE board exam 2025-26.

### Q5. What are the Surface Area and Volume Formulas for 3D Shapes covered in NCERT Class 9 Maths Chapter 11 Exercise 11.1?

Exercise 11.1 of NCERT Solutions Class 9 Maths Chapter 11 covers formulas for Cuboid ( $TSA = 2(lb+bh+hl)$ ,  $LSA = 2h(l+b)$ ) and Cube ( $TSA = 6a^2$ ,  $LSA = 4a^2$ ). These Surface Area formulas for 3D shapes are fundamental for solving all 8 questions in the exercise. Understanding these formulas is crucial for CBSE board exam 2025-26 and helps in calculating volumes in later exercises.

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