NCERT Solutions Class 9 Maths
Chapter 11: Surface Areas and Volumes
EXERCISE 11.2

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Quick Summary: In NCERT Solutions Class 9 Maths Chapter 11 Exercise 11.2, students learn to calculate surface areas of spheres and hemispheres using fundamental formulas. This exercise covers essential 3D geometry concepts including sphere surface area calculations, hemisphere total surface area problems, and real-world applications like cost calculations, which are frequently tested in CBSE Class 9 examinations.

Key Takeaways:

- Surface area of sphere formula: $4\pi r^2$ where r is the radius
- Total surface area of hemisphere: $3\pi r^2$ (curved surface + flat circular base)
- Converting diameter to radius: $r = (d)/(2)$ before applying surface area formulas
- Practical applications include calculating material costs and ratios of surface areas for different radii

Complete Solutions

Question 1

QUESTION

Find the surface area of a sphere of radius:

(i) 10.5 cm (ii) 5.6 cm (iii) 14 cm

SOLUTION

This question asks us to calculate the surface area of a sphere given different radii. The key concept here is the formula for the surface area of a sphere.

The formula for the surface area of a sphere is: where is the radius of the sphere.

(i) Radius = 10.5 cm

Step 1: Substitute the value of the radius into the formula.

We have cm. Therefore, the surface area is:

Step 2: Use the value of as and simplify.

Step 3: Calculate the surface area.

Therefore, the surface area of the sphere is 1386 cm².

(ii) Radius = 5.6 cm

Step 1: Substitute the value of the radius into the formula.

We have cm. Therefore, the surface area is:

Step 2: Use the value of as and simplify.

Step 3: Calculate the surface area.

Therefore, the surface area of the sphere is 394.24 cm².

(iii) Radius = 14 cm

Step 1: Substitute the value of the radius into the formula.

We have cm. Therefore, the surface area is:

Step 2: Use the value of as and simplify.

Step 3: Calculate the surface area.

Therefore, the surface area of the sphere is 2464 cm².

Final Answer: (i) 1386 cm² (ii) 394.24 cm² (iii) 2464 cm²

ANSWER

(i) 1386 cm² (ii) 394.24 cm² (iii) 2464 cm²

Question 2

QUESTION

Find the surface area of a sphere of diameter:

(i) 14 cm (ii) 21 cm (iii) 3.5 m

SOLUTION

This question tests our understanding of how to calculate the surface area of a sphere given its diameter. We will use the formula for the surface area of a sphere: , where is the radius of the sphere.

(i) Diameter = 14 cm

Step 1: Find the radius

The radius is half of the diameter. Therefore, the radius is:

cm

Step 2: Apply the surface area formula

The surface area of the sphere is given by . Substituting cm and , we get:

Step 3: Simplify and calculate

cm

Final Answer: The surface area of the sphere is 616 cm.

(ii) Diameter = 21 cm

Step 1: Find the radius

The radius is:

cm

Step 2: Apply the surface area formula

Step 3: Simplify and calculate

cm

Final Answer: The surface area of the sphere is 1386 cm.

(iii) Diameter = 3.5 m

Step 1: Find the radius

The radius is:

m

Step 2: Apply the surface area formula

Step 3: Simplify and calculate

m

Final Answer: The surface area of the sphere is 38.5 m.

ANSWER

(i) 616 cm² (ii) 1386 cm² (iii) 38.5 m²

Question 3

QUESTION

Find the total surface area of a hemisphere of radius 10 cm. (Use π = 3.14)

SOLUTION

This question asks us to find the total surface area (TSA) of a hemisphere given its radius. It tests our understanding of the formula for the TSA of a hemisphere.

Step 1: Recall the formula for the total surface area of a hemisphere

The total surface area of a hemisphere is given by the formula:

, where is the radius of the hemisphere.

Step 2: Identify the given values

We are given that the radius, cm, and we are instructed to use .

Step 3: Substitute the values into the formula

Substituting and into the formula, we get:

Step 4: Calculate the square of the radius

So, the formula becomes:

Step 5: Perform the multiplication

First, multiply 3 by 3.14:

Now, multiply 9.42 by 100:

Step 6: State the final answer with correct units

The total surface area of the hemisphere is 942 cm².

Final Answer: 942 cm²

ANSWER

942 cm²

Question 4

QUESTION

The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases.

SOLUTION

This question tests our understanding of the surface area of a sphere and how it changes with the radius. We need to find the ratio of the surface areas of the balloon in the two given cases.

Step 1: Recall the formula for the surface area of a sphere

The surface area of a sphere with radius is given by:

Step 2: Calculate the surface area in the first case

When the radius cm, the surface area is:

square cm.

Step 3: Calculate the surface area in the second case

When the radius cm, the surface area is:

square cm.

Step 4: Find the ratio of the surface areas

The ratio of the surface areas is , which is:

Step 5: Simplify the ratio

We can cancel out from the numerator and denominator:

Now, we simplify the fraction. Notice that , so:

Final Answer:

The ratio of the surface areas of the balloon in the two cases is 1 : 4.

ANSWER

1 : 4

Question 5

QUESTION

A hemispherical bowl made of brass has inner diameter 10.5 cm. Find the cost of tin-plating it on the inside at the rate of ₹16 per 100 cm².

SOLUTION

We are asked to find the cost of tin-plating the inside of a hemispherical bowl, given its inner diameter and the rate of plating.

Step 1: Find the inner radius

The inner diameter is given as 10.5 cm. The radius is half of the diameter.

cm

Step 2: Calculate the inner surface area of the hemispherical bowl

The inner surface area of a hemisphere is given by the formula:

Substituting the value of cm, we get:

cm

Step 3: Calculate the cost of tin-plating

The rate of tin-plating is ₹16 per 100 cm.

So, the cost of plating 1 cm is ₹.

The cost of plating 173.25 cm is ₹.

₹

Final Answer: The cost of tin-plating the inside of the bowl is ₹27.72.

ANSWER

₹27.72

Question 6

QUESTION

Find the radius of a sphere whose surface area is 154 cm².

SOLUTION

We are asked to find the radius of a sphere given its surface area.

Step 1: Recall the formula for the surface area of a sphere

The surface area of a sphere is given by the formula: where is the radius of the sphere.

Step 2: Substitute the given surface area into the formula

We are given that the surface area is 154 cm². Substituting this into the formula, we get:

Step 3: Solve for

We need to isolate . Divide both sides of the equation by :

Step 4: Substitute the value of

We know that . Substituting this value, we get:

Step 5: Simplify the expression

We can simplify the fraction:

Step 6: Solve for

To find , we take the square root of both sides:

Step 7: Convert to decimal form

Converting the fraction to a decimal, we get:

Final Answer: The radius of the sphere is 3.5 cm.

ANSWER

3.5 cm

Question 7

QUESTION

The diameter of the moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface areas.

SOLUTION

This question tests our understanding of the relationship between the diameter and surface area of spheres. We need to find the ratio of the surface area of the moon to the surface area of the Earth, given the relationship between their diameters.

Step 1: Define variables

Let the diameter of the Earth be and the diameter of the Moon be .

Let the radius of the Earth be and the radius of the Moon be .

Let the surface area of the Earth be and the surface area of the Moon be .

Step 2: Express the given relationship

We are given that the diameter of the moon is one-fourth of the diameter of the Earth. This can be written as:

Since the radius is half of the diameter, we also have:

Step 3: Write the formula for the surface area of a sphere

The surface area of a sphere is given by the formula:

Therefore, the surface area of the Earth is and the surface area of the Moon is .

Step 4: Find the ratio of the surface areas

We want to find the ratio . Substituting the formulas for and , we get:

The terms cancel out, leaving:

Now, substitute :

The terms cancel out, leaving:

Step 5: State the final answer

The ratio of the surface area of the Moon to the surface area of the Earth is 1 : 16.

ANSWER

1 : 16

Question 8

QUESTION

A hemispherical bowl is made of steel, 0.25 cm thick. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl.

SOLUTION

This question involves finding the outer curved surface area of a hemispherical bowl, given its thickness and inner radius. We need to calculate the outer radius first and then use the formula for the curved surface area of a hemisphere.

Step 1: Find the outer radius

The inner radius of the hemispherical bowl is given as 5 cm.

The thickness of the steel is 0.25 cm.

Therefore, the outer radius is the sum of the inner radius and the thickness:

cm

Step 2: Calculate the outer curved surface area

The formula for the curved surface area (CSA) of a hemisphere is , where is the radius.

In this case, we need to find the outer curved surface area, so we use the outer radius cm.

Using :

Step 3: Simplify the expression

We can simplify

Step 4: Calculate the final value

Final Answer: The outer curved surface area of the bowl is 173.25 cm².

ANSWER

173.25 cm²

Question 9

QUESTION

A right circular cylinder just encloses a sphere of radius r. Find:

(i) surface area of the sphere

(ii) curved surface area of the cylinder

(iii) ratio of the areas obtained in (i) and (ii)

SOLUTION

This question involves finding the surface area of a sphere and the curved surface area of a cylinder that encloses it, and then calculating the ratio of these areas. The key is understanding the relationship between the sphere's radius and the cylinder's dimensions.

(i) Surface area of the sphere

Step 1: Recall the formula for the surface area of a sphere.

The surface area of a sphere with radius is given by the formula:

Step 2: Apply the formula.

Since the sphere has radius , its surface area is simply .

Answer: The surface area of the sphere is .

(ii) Curved surface area of the cylinder

Step 1: Determine the dimensions of the cylinder.

Since the cylinder just encloses the sphere, the radius of the cylinder is equal to the radius of the sphere, which is . The height of the cylinder is equal to the diameter of the sphere, which is .

Step 2: Recall the formula for the curved surface area of a cylinder.

The curved surface area of a cylinder with radius and height is given by the formula:

Step 3: Substitute the values of and .

In this case, and . Substituting these values into the formula, we get:

Answer: The curved surface area of the cylinder is .

(iii) Ratio of the areas obtained in (i) and (ii)

Step 1: Write the ratio.

The ratio of the surface area of the sphere to the curved surface area of the cylinder is:

Step 2: Simplify the ratio.

Since the numerator and denominator are the same, the ratio simplifies to 1:1.

Answer: The ratio of the areas is 1 : 1.

ANSWER

(i) $4\pi r^2$ (ii) $4\pi r^2$ (iii) 1 : 1

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📝 Key Formulas

Important Formulas for Exercise 11.2

Formula / Concept	Description
Right Circular Cylinder	A three-dimensional solid with two parallel circular bases of equal size connected by a curved surface that is perpendicular to the bases.
Radius (r)	The radius of the circular bases of the cylinder.
Height (h)	The perpendicular distance between the two circular bases of the cylinder.
Curved Surface Area (CSA)	The area of the curved surface between the two circular bases. It is the area of the rectangle formed if the cylinder is unrolled.
CSA = 2 π r h	Formula to calculate the Curved Surface Area of a cylinder.
Area of Circular Bases	A cylinder has two circular bases (top and bottom). The area of each base is calculated using the formula for the area of a circle.
\textArea of one base = π r^2	Formula to calculate the area of one of the circular bases.

Formula / Concept	Description
Total Surface Area (TSA)	The total area of all surfaces of the cylinder, which includes the curved surface area and the area of the two circular bases.
TSA = 2 π r h + 2 π r^2	This formula represents the sum of the curved surface area and the areas of the two circular bases.
TSA = 2 π r (r + h)	A simplified version of the Total Surface Area formula, obtained by factoring out 2 π r.

Top FAQs

Q1. How many questions are in NCERT Solutions for Class 9 Maths Chapter 11 Surface Areas and Volumes Exercise 11.2?

Exercise 11.2 of NCERT Solutions for Class 9 Maths Chapter 11 Surface Areas and Volumes contains exactly 9 questions. These questions focus on calculating the surface area of cylinders and related curved surface area problems. All 9 questions come with step by step solutions 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 11.2?

You can download the free PDF of NCERT Solutions for Class 9 Maths Chapter 11 Exercise 11.2 from the official NCERT website or various educational portals. The free PDF download includes complete step by step solutions for all 9 questions on Surface Areas and Volumes. These solutions are updated according to the CBSE board exam 2025-26 syllabus.

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

Surface Areas and Volumes Chapter 11 carries approximately 9 marks in CBSE Class 9 Maths board exam 2025-26 under Unit V - Mensuration. Exercise 11.2 focusing on cylinder surface area is an important part of this chapter. Students should practice all NCERT Solutions for Class 9 Maths Chapter 11 thoroughly to score well.

Q4. Which is the most difficult question in NCERT Solutions Class 9 Maths Chapter 11 Surface Areas and Volumes Exercise 11.2?

Question 8 and Question 9 in Exercise 11.2 of Class 9 Maths Chapter 11 are considered the most difficult as they involve application-based problems on cylinder surface area. These questions require step by step solutions and proper understanding of surface area and volume formulas for 3D shapes. Practice these questions thoroughly for CBSE board exam 2025-26 preparation.

Q5. What are the Surface Area and Volume Formulas for 3D Shapes covered in NCERT Class 9 Maths Chapter 11 Exercise 11.2?

Exercise 11.2 of NCERT Solutions for Class 9 Maths Chapter 11 specifically covers cylinder formulas: Curved Surface Area (CSA) = $2\pi rh$, Total Surface Area (TSA) = $2\pi r(r+h)$, and Volume = $\pi r^2 h$. These surface area and volume formulas for 3D shapes are essential for solving all 9 questions in this exercise. Understanding these formulas is crucial for CBSE board exam 2025-26.

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