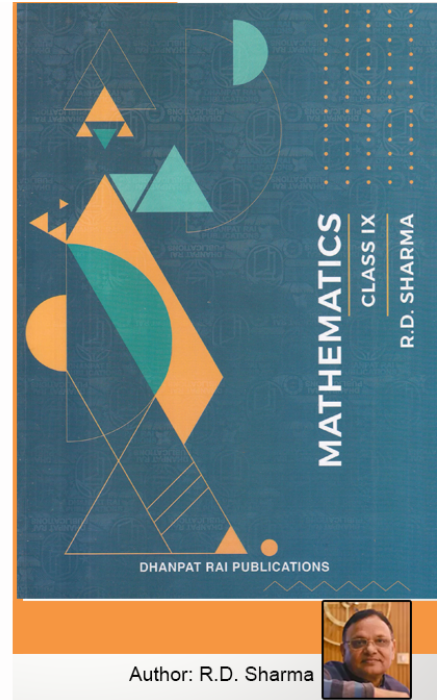


# **Class 9 - Chapter 20 Surface Area and Volume of A Right Circular Cone**



## **RD Sharma Solutions for Class 9 Maths Chapter 20–Surface Area and Volume of A Right Circular Cone**

Class 9: Maths Chapter 20 solutions. Complete Class 9 Maths Chapter 20 Notes.

### **RD Sharma Solutions for Class 9 Maths Chapter 20–Surface Area and Volume of A Right Circular Cone**

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RD Sharma 9th Maths Chapter 20, Class 9 Maths Chapter 20 solutions

**Exercise 20.1 Page No: 20.7**

**Question 1:** Find the curved surface area of a cone, if its slant height is 60 cm and the radius of its base is 21 cm.

Solution:

Slant height of cone ( $l$ ) = 60 cm

Radius of the base of the cone ( $r$ ) = 21 cm

Now,

Curved surface area of the right circular cone =  $\pi rl = 22/7 \times 21 \times 60 = 3960 \text{ cm}^2$

Therefore the curved surface area of the right circular cone is  $3960 \text{ cm}^2$

**Question 2:** The radius of a cone is 5cm and vertical height is 12cm. Find the area of the curved surface.

Solution:

Radius of cone ( $r$ ) = 5 cm

Height of cone ( $h$ ) = 12 cm

Find Slant Height of cone ( $l$ ):

We know,  $l^2 = r^2 + h^2$

$$l^2 = 5^2 + 12^2$$

$$l^2 = 25 + 144 = 169$$

$$\text{Or } l = 13 \text{ cm}$$

Now,

$$\text{C.S.A} = \pi rl = 3.14 \times 5 \times 13 = 204.28$$

Therefore, the curved surface area of the cone is  $204.28 \text{ cm}^2$

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**Question 3 :** The radius of a cone is 7 cm and area of curved surface is  $176 \text{ cm}^2$  .Find the slant height.

**Solution:**

Radius of cone( $r$ ) = 7 cm

Curved surface area(C.S.A)=  $176 \text{ cm}^2$

We know, C.S.A. =  $\pi r l$

$$\Rightarrow \pi r l = 176$$

$$\Rightarrow \frac{22}{7} \times 7 \times l = 176$$

$$\text{or } l = 8$$

Therefore, slant height of the cone is 8 cm.

**Question 4:** The height of a cone 21 cm. Find the area of the base if the slant height is 28 cm.

**Solution:**

Height of cone( $h$ ) = 21 cm

Slant height of cone ( $l$ ) = 28 cm

We know that,  $l^2 = r^2 + h^2$

$$28^2 = r^2 + 21^2$$

$$r^2 = 28^2 - 21^2$$

$$\text{or } r = 7\sqrt{7} \text{ cm}$$

Now,

Area of the circular base =  $\pi r^2$

$$= \frac{22}{7} \times (7\sqrt{7})^2$$

$$= 1078$$

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Therefore, area of the base is  $1078 \text{ cm}^2$ .

**Question 5: Find the total surface area of a right circular cone with radius 6 cm and height 8 cm.**

**Solution:**

Radius of cone ( $r$ ) = 6 cm

Height of cone ( $h$ ) = 8 cm

Total Surface area of the cone (T.S.A)=?

Find slant height of cone:

We know,  $l^2 = r^2 + h^2$

$$= 6^2 + 8^2$$

$$= 36 + 64$$

$$= 100$$

$$\text{or } l = 10 \text{ cm}$$

Now,

Total Surface area of the cone (T.S.A) = Curved surface area of cone + Area of circular base

$$= \pi r l + \pi r^2$$

$$= (22/7 \times 6 \times 10) + (22/7 \times 6 \times 6)$$

$$= 1320/7 + 792/7$$

$$= 301.71$$

Therefore, area of the base is  $301.71 \text{ cm}^2$ .

**Question 6: Find the curved surface area of a cone with base radius 5.25 cm and slant height 10 cm.**

**Solution:**

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Base radius of the cone( $r$ ) = 5.25 cm

Slant height of the cone( $l$ ) = 10 cm

Curved surface area (C.S.A) =  $\pi rl$

$$= \frac{22}{7} \times 5.25 \times 10$$

$$= 165$$

Therefore, curved surface area of the cone is  $165\text{cm}^2$ .

**Question 7: Find the total surface area of a cone, if its slant height is 21 m and diameter of its base is 24 m.**

**Solution:**

Diameter of the cone( $d$ )=24 m

So, radius of the cone( $r$ )= diameter/ 2 =  $24/2$  m = 12m

Slant height of the cone( $l$ ) = 21 m

T.S.A = Curved surface area of cone + Area of circular base

$$= \pi rl + \pi r^2$$

$$= \left(\frac{22}{7} \times 12 \times 21\right) + \left(\frac{22}{7} \times 12 \times 12\right)$$

$$= 1244.57$$

Therefore, total surface area of the cone is  $1244.57\text{ m}^2$ .

**Question 8: The area of the curved surface of a cone is  $60\pi\text{ cm}^2$ . If the slant height of the cone be 8 cm, find the radius of the base.**

**Solution:**

Curved surface area(C.S.A)=  $60\pi\text{ cm}^2$

Slant height of the cone( $l$ ) = 8 cm

We know, Curved surface area(C.S.A )= $\pi rl$

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$$\Rightarrow \pi r l = 60 \pi$$

$$\Rightarrow r \times 8 = 60$$

$$\text{or } r = 60/8 = 7.5$$

Therefore, radius of the base of the cone is 7.5 cm.

**Question 9: The curved surface area of a cone is  $4070 \text{ cm}^2$  and diameter is 70 cm .What is its slant height? (Use  $\pi = 22/7$ )**

**Solution:**

Diameter of the cone(d) = 70 cm

So, radius of the cone(r)= diameter/2 =  $70/2 \text{ cm} = 35 \text{ cm}$

Curved surface area =  $4070 \text{ cm}^2$

Now,

We know, Curved surface area =  $\pi r l$

$$\text{So, } \pi r l = 4070$$

By substituting the values, we get

$$22/7 \times 35 \times l = 4070$$

$$\text{or } l = 37$$

Therefore, slant height of cone is 37 cm.

**Question 10: The radius and slant height of a cone are in the ratio 4:7. If its curved surface area is  $792 \text{ cm}^2$ , find its radius. (Use  $\pi = 22/7$ )**

**Solution:**

Curved surface area =  $792 \text{ cm}^2$

The radius and slant height of a cone are in the ratio 4:7 (Given)

Let  $4x$  be the radius and  $7x$  be the height of cone.

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Now,

Curved surface area (C.S.A.) =  $\pi rl$

So,  $22/7 \times (4x) \times (7x) = 792$

or  $x^2 = 9$

or  $x = 3$

Therefore, Radius =  $4x = 4(3) \text{ cm} = 12 \text{ cm}$

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### Exercise 20.2 Page No: 20.20

**Question 1: Find the volume of the right circular cone with:**

(i) Radius 6cm, height 7cm

(ii) Radius 3.5cm, height 12cm

(iii) Height is 21cm and slant height 28cm

**Solution:**

(i) Radius of cone( $r$ )=6cm

Height of cone( $h$ )=7cm

We know, Volume of a right circular cone =  $\frac{1}{3} \pi r^2 h$

By substituting the values, we get

$$= \frac{1}{3} \times 3.14 \times 6^2 \times 7$$

$$= 264$$

Volume of a right circular cone is  $264 \text{ cm}^3$

(ii) Radius of cone( $r$ )=3.5 cm

Height of cone( $h$ )=12cm

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Volume of a right circular cone =  $\frac{1}{3} \pi r^2 h$

By substituting the values, we get

$$= \frac{1}{3} \times 3.14 \times 3.5^2 \times 12$$

$$= 154$$

Volume of a right circular cone is  $154 \text{ cm}^3$

(iii) Height of cone(h)=21 cm

Slant height of cone(l) = 28 cm

Find the measure of r:

We know,  $l^2 = r^2 + h^2$

$$28^2 = r^2 + 21^2$$

$$\text{or } r = 7\sqrt{7}$$

Now,

Volume of a right circular cone =  $\frac{1}{3} \pi r^2 h$

By substituting the values, we get

$$= \frac{1}{3} \times 3.14 \times (7\sqrt{7})^2 \times 21$$

$$= 7546$$

Volume of a right circular cone is  $7546 \text{ cm}^3$

**Question 2: Find the capacity in litres of a conical vessel with:**

(i) radius 7 cm, slant height 25 cm

(ii) height 12 cm, slant height 13 cm.

**Solution:**

(i) Radius of the cone(r) =7 cm

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Slant height of the cone ( $l$ ) = 25 cm

As we know that,  $l^2 = r^2 + h^2$

$$25^2 = 7^2 + h^2$$

$$\text{or } h = 24$$

Now, Volume of a right circular cone =  $\frac{1}{3} \pi r^2 h$

By substituting the values, we get

$$= \frac{1}{3} \times 3.14 \times (7)^2 \times 24$$

$$= 1232$$

Volume of a right circular cone is 1232 cm<sup>3</sup> or 1.232 litres [1 cm<sup>3</sup> = 0.01 liter]

(ii) Height of cone ( $h$ ) = 12 cm

Slant height of cone ( $l$ ) = 13 cm

As we know that,  $l^2 = r^2 + h^2$

$$13^2 = r^2 + 12^2$$

$$\text{or } r = 5$$

Now, Volume of a right circular cone =  $\frac{1}{3} \pi r^2 h$

By substituting the values, we get

$$= \frac{1}{3} \times 3.14 \times (5)^2 \times 12$$

$$= 314.28$$

Volume of a right circular cone is 314.28 cm<sup>3</sup> or 0.314 litres. [1 cm<sup>3</sup> = 0.01 liters]

**Question 3: Two cones have their heights in the ratio 1:3 and the radii of their bases in the ratio 3:1. Find the ratio of their volumes.**

**Solution:**

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Let the heights of the cones be  $h$  and  $3h$  and radii of their bases be  $3r$  and  $r$  respectively. Then, their volumes are

$$\text{Volume of first cone (V1)} = \frac{1}{3} \pi (3r)^2 h$$

$$\text{Volume of second cone (V2)} = \frac{1}{3} \pi r^2 (3h)$$

$$\text{Now, } V1/V2 = 3/1$$

Ratio of two volumes is 3:1.

**Question 4: The radius and the height of a right circular cone are in the ratio 5:12. If its volume is 314 cubic meter, find the slant height and the radius. (Use  $\pi=3.14$ ).**

**Solution:**

Let us assume the ratio of radius and the height of a right circular cone to be  $x$ .

Then, radius be  $5x$  and height be  $12x$

$$\text{We know, } l^2 = r^2 + h^2$$

$$= (5x)^2 + (12x)^2$$

$$= 25x^2 + 144x^2$$

$$\text{or } l = 13x$$

Therefore, slant height is 13 m.

$$\text{Now it is given that volume of cone} = 314 \text{ m}^3$$

$$\Rightarrow \frac{1}{3} \pi r^2 h = 314$$

$$\Rightarrow \frac{1}{3} \times 3.14 \times (25x^2) \times (12x) = 314$$

$$\Rightarrow x^3 = 1$$

$$\text{or } x = 1$$

$$\text{So, radius} = 5 \times 1 = 5 \text{ m}$$

Therefore ,

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Answer: Slant height = 13m

Radius = 5m

**Question 5: The radius and height of a right circular cone are in the ratio 5 : 12 and its volume is 2512 cubic cm. Find the slant height and radius of the cone. (Use  $\pi=3.14$ ).**

**Solution:**

Let the ratio of radius and height of a right circular cone be y.

Radius of cone(r) = 5y

Height of cone (h) = 12y

Now we know,  $l^2 = r^2 + h^2$

$$= (5y)^2 + (12y)^2$$

$$= 25y^2 + 144y^2$$

$$\text{or } l = 13y$$

Now, volume of the cone is given  $2512\text{cm}^3$

$$\Rightarrow \frac{1}{3}\pi r^2 h = 2512$$

$$\Rightarrow \frac{1}{3} \times 3.14 \times (5y)^2 \times 12y = 2512$$

$$\Rightarrow y^3 = (2512 \times 3) / (3.14 \times 25 \times 12) = 8$$

$$\text{or } y = 2$$

Therefore,

$$\text{Radius of cone} = 5y = 5 \times 2 = 10\text{cm}$$

$$\text{Slant height (l)} = 13y = 13 \times 2 = 26\text{cm}$$

**Question 6: The ratio of volumes of two cones is 4 : 5 and the ratio of the radii of their bases is 2 : 3. Find the ratio of their vertical heights.**

**Solution:**

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Let the ratio of the radius be  $x$  and ratio of the volume be  $y$ .

Then, Radius of 1st cone ( $r_1$ ) =  $2x$

Radius of 2nd cone ( $r_2$ ) =  $3x$

Volume of 1st cone ( $V_1$ ) =  $4y$

Volume of 2nd cone ( $V_2$ ) =  $5y$

We know formula for volume of a cone =  $\frac{1}{3}\pi r^2 h$

Let  $h_1$  and  $h_2$  be the heights of respective cones.

$$\frac{V_1}{V_2} = \frac{4}{5} = \frac{\frac{1}{3}\pi r_1^2 h_1}{\frac{1}{3}\pi r_2^2 h_2} = \frac{4}{5} = \frac{4h_1}{9h_2} = \frac{4}{5} = \frac{h_1}{h_2} = \frac{9}{5}$$

Therefore, heights are in the ratio of 9 : 5.

**Question 7: A cylinder and a cone have equal radii of their bases and equal heights. Show that their volumes are in the ratio 3:1.**

**Solution:**

We are given, a cylinder and a cone are having equal radii of their bases and heights.

Let, radius of the cone = radius of the cylinder =  $r$  and

Height of the cone = height of the cylinder =  $h$

Now,

$$\frac{\text{volume of cylinder}}{\text{volume of the cone}} = \frac{\pi r^2 h}{\frac{1}{3}\pi r^2 h} = \frac{3}{1}$$

Therefore, ratio of their volumes is 3:1.

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**Exercise VSAQs Page No: 20.23**

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**Question 1: The height of a cone is 15 cm. If its volume is  $500\pi \text{ cm}^3$ , then find the radius of its base.**

**Solution:**

Height of a cone = 15 cm

Volume of cone =  $500 \pi \text{ cm}^3$

We know, Volume of cone =  $\frac{1}{3} \pi r^2 h$

So,  $500\pi = \frac{1}{3} \pi r^2 \times 15$

$$r^2 = 100$$

$$\text{or } r = 10$$

Radius of base is 10 cm.

**Question 2: If the volume of a right circular cone of height 9 cm is  $48\pi \text{ cm}^3$ , find the diameter of its base.**

**Solution:**

Height of a cone = 9 cm

Volume of cone =  $48 \pi \text{ cm}^3$

We know, Volume of cone =  $\frac{1}{3} \pi r^2 h$

So,  $48\pi = \frac{1}{3} \pi r^2 \times 9$

$$r^2 = 16$$

$$\text{or } r = 4$$

Radius of base  $r = 4 \text{ cm}$

Therefore, Diameter = 2 Radius =  $2 \times 4 \text{ cm} = 8 \text{ cm}$ .

**Question 3: If the height and slant height of a cone are 21 cm and 28 cm respectively. Find its volume.**

**Solution:**

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Height of cone (h) = 21 cm

Slant height of cone (l) = 28 cm

Find radius of cone:

We know,  $l^2 = r^2 + h^2$

$$28^2 = r^2 + 21^2$$

$$\text{or } r = 7\sqrt{7} \text{ cm}$$

Now,

We know, Volume of cone =  $\frac{1}{3} \pi r^2 h$

$$= \frac{1}{3} \times \pi \times (7\sqrt{7})^2 \times 21$$

$$= 2401 \pi$$

Therefore, Volume of cone is  $2401 \pi \text{ cm}^3$ .

**Question 4: The height of a conical vessel is 3.5 cm. If its capacity is 3.3 litres of milk. Find the diameter of its base.**

**Solution:**

Height of a conical vessel = 3.5 cm and

Capacity of conical vessel is 3.3 litres or  $3300 \text{ cm}^3$

Now,

We know, Volume of cone =  $\frac{1}{3} \pi r^2 h$

$$3300 = \frac{1}{3} \times \frac{22}{7} \times r^2 \times 3.5$$

$$\text{or } r^2 = 900$$

$$\text{or } r = 30$$

So, radius of cone is 30 cm

Hence, diameter of its base = 2 Radius =  $2 \times 30 \text{ cm} = 60 \text{ cm}$

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# About RD Sharma

*RD Sharma isn't the kind of author you'd bump into at lit fests. But his bestselling books have helped many CBSE students lose their dread of maths. Sunday Times profiles the tutor turned internet star*

He dreams of algorithms that would give most people nightmares. And, spends every waking hour thinking of ways to explain concepts like 'series solution of linear differential equations'. Meet Dr Ravi Dutt Sharma — mathematics teacher and author of 25 reference books — whose name evokes as much awe as the subject he teaches. And though students have used his thick tomes for the last 31 years to ace the dreaded maths exam, it's only recently that a spoof video turned the tutor into a YouTube star.

R D Sharma had a good laugh but said he shared little with his on-screen persona except for the love for maths. "I like to spend all my time thinking and writing about maths problems. I find it relaxing," he says. When he is not writing books explaining mathematical concepts for classes 6 to 12 and engineering students, Sharma is busy dispensing his duty as vice-principal and head of department of science and humanities at Delhi government's Guru Nanak Dev Institute of Technology.

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