

Mathematics

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(Chapter -11) (Surface Areas and Volumes) (Exercise 11.3)

(Class - 9)

Question 1:

Find the volume of the right circular cone with

(i) radius 6 cm, height 7 cm

(ii) radius 3.5 cm, height 12 cm

Answer 1:

(i) Radius of cone $r = 6$ cm and height $h = 7$ cm

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

$$= \frac{1}{3} \times \frac{22}{7} \times 6 \times 6 \times 7 = 264 \text{ cm}^3$$

Hence, the volume of right circular cone is 264 cm^3 .

(ii) Radius of cone $r = 3.5$ cm and height $h = 12$ cm

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

$$= \frac{1}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 12 = 154 \text{ cm}^3$$

Hence, the volume of right circular cone is 154 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

Answer 2:

(i) Radius of conical vessel $r = 7$ cm and slant height $l = 25$ cm.

Let, the height of conical vessel = h cm

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

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

$$\Rightarrow 625 = 49 + h^2 \Rightarrow h^2 = 625 - 49 = 576$$

$$\Rightarrow h = \sqrt{576} = 24 \text{ cm}$$

$$\text{Capacity of conical vessel} = \frac{1}{3}\pi r^2 h$$

$$= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 24 = 1232 \text{ cm}^3 = \frac{1232}{1000} = 1.232 \text{ litres}$$

Hence, the capacity of conical vessel is 1.232 litres.

(ii) Height of conical vessel $h = 12$ cm and slant height $l = 13$ cm

Let, the radius of conical vessel = r cm

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

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

$$\Rightarrow 169 = 144 + r^2$$

$$\Rightarrow r^2 = 169 - 144 = 25$$

$$\Rightarrow r = \sqrt{25} = 5 \text{ cm}$$

$$\text{Capacity of conical vessel} = \frac{1}{3}\pi r^2 h$$

$$= \frac{1}{3} \times \frac{22}{7} \times 5 \times 5 \times 12 = \frac{2200}{7} \text{ cm}^3$$

$$= \frac{2200}{7 \times 1000} = \frac{11}{35} \text{ litres}$$

Hence, the capacity of conical vessel is $\frac{11}{35}$ litres.

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Question 3:

The height of a cone is 15 cm. If its volume is 1570 cm^3 , find the radius of the base. (Use $\pi = 3.14$)

Answer 3:

Volume of cone $V = 1570 \text{ cm}^3$ and height $h = 15 \text{ cm}$

Let, the radius of base of cone = $r \text{ cm}$

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

$$\Rightarrow 1570 = \frac{1}{3} \times 3.14 \times r^2 \times 15 \Rightarrow 1570 = 3.14 \times r^2 \times 5 \Rightarrow r^2 = \frac{1570}{3.14 \times 5} = 100$$

$$\Rightarrow r = \sqrt{100} = 10 \text{ cm}$$

Hence, the radius of base of cone is 10 cm.

Question 4:

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

Answer 4:

Volume of cone $V = 48\pi \text{ cm}^3$ and height $h = 9 \text{ cm}$

Let, the radius of base of cone = $r \text{ cm}$

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

$$\Rightarrow 48\pi = \frac{1}{3} \times \pi \times r^2 \times 9 \Rightarrow 48\pi = \pi \times r^2 \times 3 \Rightarrow r^2 = \frac{48\pi}{\pi \times 3} = 16$$

$$\Rightarrow r = \sqrt{16} = 4 \text{ cm}$$

Therefore, the diameter of base = $2 \times 4 = 8 \text{ cm}$

Hence, the diameter of base of cone is 8 cm.

Question 5:

A conical pit of top diameter 3.5 m is 12 m deep. What is its capacity in kilolitres?

Answer 5:

Radius of pit $r = 3.5/2 = 1.75 \text{ m}$ and height $h = 12 \text{ m}$.

Volume of pit = $\frac{1}{3}\pi r^2 h$

$$= \frac{1}{3} \times \frac{22}{7} \times 1.75 \times 1.75 \times 12 = 38.5 \text{ m}^3$$

$$= 38.5 \text{ Kilolitres} \quad [\because 1 \text{ m}^3 = 1 \text{ kilolitres}]$$

Hence, the capacity of pit is 38.5 kilolitres.

Question 6:

The volume of a right circular cone is 9856 cm^3 . If the diameter of the base is 28 cm, find

(i) height of the cone (ii) slant height of the cone (iii) curved surface area of the cone

Answer 6:

(i) Volume of cone $V = 9856 \text{ cm}^3$ and radius $r = 28/2 = 14 \text{ cm}$

Let, the height of cone be $h \text{ cm}$, therefore volume of cone = $\frac{1}{3}\pi r^2 h$

$$\Rightarrow 9856 = \frac{1}{3} \times \frac{22}{7} \times 14 \times 14 \times h \Rightarrow 9856 = \frac{1}{3} \times 22 \times 2 \times 14 \times h$$

$$\Rightarrow h = \frac{9856 \times 3}{22 \times 2 \times 14} \Rightarrow h = 48 \text{ cm}$$

Hence, the height of cone is 48 cm.

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(ii) Height of cone $h = 48$ cm and radius $r = 14$ cm

Let, the slant height of cone = l cm

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

$$\Rightarrow l^2 = 48^2 + 14^2 \quad \Rightarrow l^2 = 2304 + 196 \quad \Rightarrow l^2 = 2500 \quad \Rightarrow l = \sqrt{2500} = 50 \text{ cm}$$

Hence, the slant height of cone is 50 cm.

(iii) Slant height of cone $l = 50$ cm and radius $r = 14$ cm

$$\text{Curved surface area of cone} = \pi r l = \frac{22}{7} \times 14 \times 50 = 22 \times 2 \times 50 = 2200 \text{ cm}^2$$

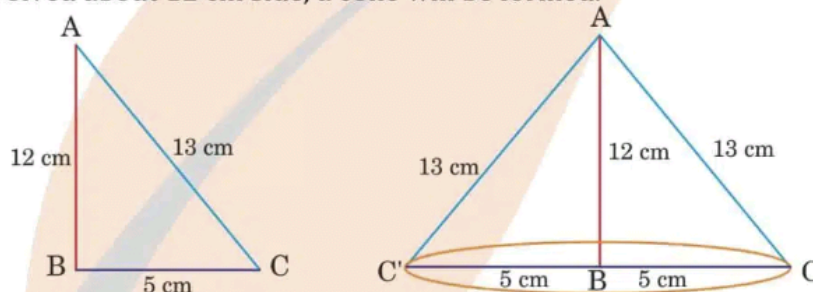
hence, the curved surface area of cone is 2200 cm^2 .

Question 7:

A right triangle ABC with sides 5 cm, 12 cm and 13 cm is revolved about the side 12 cm. Find the volume of the solid so obtained.

Answer 7:

If the triangle is revolved about 12 cm side, a cone will be formed.



Therefore, the radius of cone $r = 5$ cm, height $h = 12$ cm and slant height $l = 13$ cm.

$$\text{Volume of solid (cone)} = \frac{1}{3} \pi r^2 h = \frac{1}{3} \times \pi \times 5 \times 5 \times 12 = 100\pi \text{ cm}^3$$

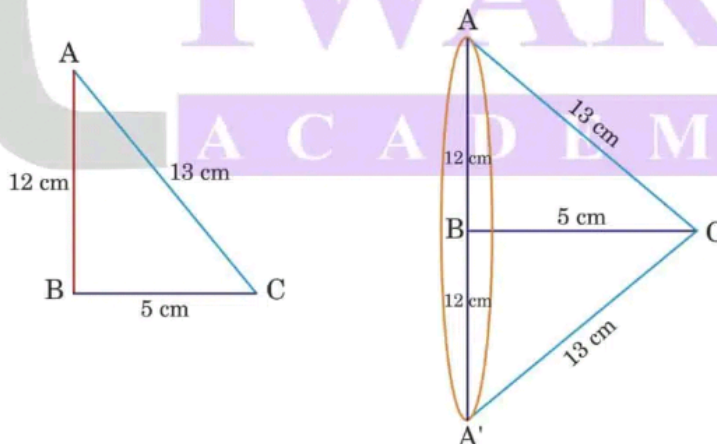
Hence, the volume of solid is $100\pi \text{ cm}^3$.

Question 8:

If the triangle ABC in the Question 7 above is revolved about the side 5 cm, then find the volume of the solid so obtained. Find also the ratio of the volumes of the two solids obtained in Questions 7 and 8.

Answer 8:

If the triangle is revolved about 5 cm side, a cone will be formed with radius $r = 12$ cm, height $h = 5$ cm slant height $l = 13$ cm.



$$\text{Volume of solid} = \frac{1}{3} \pi r^2 h = \frac{1}{3} \times \pi \times 12 \times 12 \times 5 = 240\pi \text{ cm}^3$$

Hence, the volume of solid is $240\pi \text{ cm}^3$.

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Question 9:

A heap of wheat is in the form of a cone whose diameter is 10.5 m and height is 3 m. Find its volume. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required.

Answer 9:

Radius of heap of wheat $r = 10.5/2 = 5.25$ m and height $h = 3$ m

$$\text{Volume of heap of wheat} = \frac{1}{3}\pi r^2 h$$

$$= \frac{1}{3} \times \frac{22}{7} \times 5.25 \times 5.25 \times 3$$

$$= 22 \times 0.75 \times 5.25$$

$$= 86.625 \text{ m}^3$$

Hence, the volume of heap of wheat is 86.625 m^3 .

Let, the slant height of heap of wheat = l m

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

$$\Rightarrow l^2 = 3^2 + (5.25)^2$$

$$\Rightarrow l^2 = 9 + 27.5625$$

$$\Rightarrow l^2 = 36.5625$$

$$\Rightarrow l = \sqrt{36.5625} = 6.05 \text{ m (approx.)}$$

Required area of canvas = $\pi r l$

$$= \frac{22}{7} \times 5.25 \times 6.05$$

$$= 22 \times 0.75 \times 6.05$$

$$= 99.825 \text{ m}^2$$

Hence, the required area of canvas to protect wheat is 99.825 m^2 .

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