EXERCISE 13.7

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1. Find the volume of the right circular cone with

(i) radius 6cm, height 7 cm (ii) radius 3.5 cm, height 12 cm (Assume $\pi = 22/7$)

Solution:

Volume of cone = $(1/3)\pi r^2 h$ cube units

Where r be radius and h be the height of the cone

(i) Radius of the cone, r = 6 cm

Height of the cone, h = 7cm

Ley V be the volume of the cone, so we have

$V = (1/3)\times(22/7)\times36\times7$

$= (12\times22)$

$= 264$

The volume of the cone is 264 cm^3.

(ii) Radius of the cone, r = 3.5cm

Height of the cone, h = 12cm

Volume of the cone = $(1/3)\times(22/7)\times3.5^2\times7 = 154$

Hence,

The volume of the cone is 154 cm^3.

2. Find the capacity in litres of a conical vessel with

(i) radius 7cm, slant height 25 cm (ii) height 12 cm, slant height 13 cm

(Assume $\pi = 22/7$)

Solution:

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

Slant height of the cone, l = 25 cm

$$\text{Height of cone, h} = \sqrt{l^2 - r^2}$$
$$\text{h} = \sqrt{25^2 - 7^2}$$
$$\text{h} = \sqrt{625 - 49}$$

or h = 24

Height of the cone is 24 cm

Now,

Volume of the cone, V = (1/3) $\pi r^2 h$ (formula)

V = (1/3)×(22/7) $\times 7^2 \times 24$

= (154×8)

= 1232

So, the volume of the vessel is 1232 cm^3

Therefore, the capacity of the conical vessel = (1232/1000) liters (because 1L = 1000 cm^3)

= 1.232 Liters.

(ii) Height of the cone, h = 12 cm

Slant height of the cone, l = 13 cm

$$\text{Radius of cone, r} = \sqrt{l^2 - h^2}$$
$$\text{r} = \sqrt{13^2 - 12^2}$$
$$\text{r} = \sqrt{169 - 144}$$

r = 5

Hence, the radius of the cone is 5 cm.

Now, Volume of the cone, V = (1/3)$\pi r^2 h$

V = (1/3)×(22/7)×52×12 cm^3

= 2200/7

Volume of the cone is 2200/7 cm^3

Now, Capacity of the conical vessel= 2200/7000 litres (1L = 1000 cm^3)

= 11/35 litres

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

Solution:

Height of the cone, h = 15 cm

Volume of cone =1570 cm^3

Let r be the radius of the cone

As we know, volume of the cone, V = (1/3) πr^{2}h

So, (1/3) πr^{2}h = 1570

(1/3)×3.14×r^2 ×15 = 1570

r^2 = 100

r = 10

Radius of the base of the cone 10 cm.

4. If the volume of a right circular cone of height 9cm is 48πcm^3, find the diameter of its base.

Solution:

Height of cone, h = 9cm

Volume of cone =48π cm^3

Let r be the radius of the cone.

As we know, volume of the cone, V = (1/3) πr^{2}h

So, 1/3 π r^2(9) = 48 π

r^2 = 16

r = 4

Radius of the cone is 4 cm.

So, diameter = 2×Radius = 8

Thus, diameter of the base is 8cm.

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

(Assume π = 22/7)

Solution:

Diameter of conical pit = 3.5 m

Radius of conical pit, r = diameter/ 2 = (3.5/2)m = 1.75m

Height of pit, h = Depth of pit = 12m

Volume of cone, V = (1/3) $\pi r^2 h$

V = (1/3)×(22/7) ×$(1.75)^2$×12 = 38.5

Volume of the cone is 38.5 m^3

Hence, capacity of the pit = (38.5×1) kiloliters = 38.5 kiloliters.

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

(i) height of the cone

(ii) slant height of the cone

(iii) curved surface area of the cone

(Assume π = 22/7)

Solution:

Volume of a right circular cone = 9856 cm^3

Diameter of the base = 28 cm

(i) Radius of cone, r = (28/2) cm = 14 cm

Let the height of the cone be h

Volume of cone, V = (1/3) $\pi r^2 h$

(1/3) $\pi r^2 h$ = 9856

(1/3)×(22/7) ×14×14×h = 9856

h = 48

The height of the cone is 48 cm.

(ii) Slant height of cone, $l = \sqrt{r^2 + h^2}$

$l = \sqrt{14^2 + 48^2} = \sqrt{196 + 2304} = 50$

Slant height of the cone is 50 cm.

(iii) curved surface area of cone = πrl

= (22/7)×14×50

= 2200

Curved surface area of the cone is 2200 cm^2.

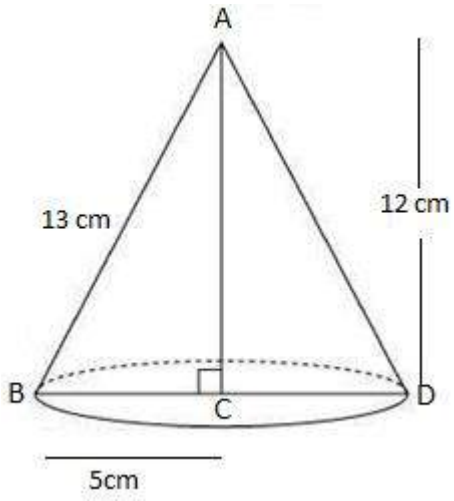
7. A right triangle ABC with sides 5cm, 12cm and 13cm is revolved about the side 12 cm. Find the volume of the solid so obtained.

Solution:

Height (h)= 12 cm

Radius (r) = 5 cm, and

Slant height (l) = 13 cm



Volume of cone, V = (1/3) $\pi r^2 h$

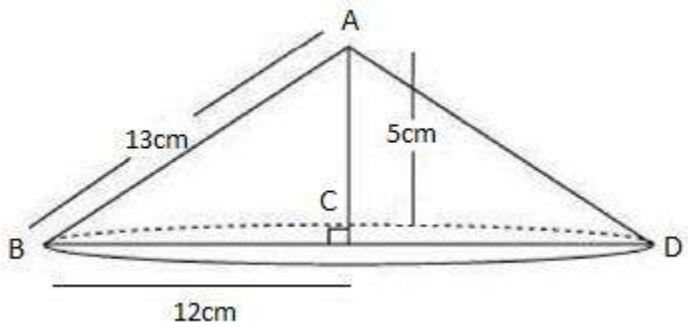
V = (1/3)×π×5^2×12

= 100π

Volume of the cone so formed is 100π cm^3.

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

Solution:



A right-angled ΔABC is revolved about its side 5cm, a cone will be formed of radius as 12 cm, height as 5 cm, and slant height as 13 cm.

Volume of cone = (1/3) $\pi r^2 h$, where r is the radius and h is the height of the cone.

= (1/3)×π×12×12×5

= 240 π

The volume of the cones formed is 240π cm^3.

So, the required ratio = (the result of question 7) / (the result of question 8) = (100π)/(240π) = 5/12 = 5:12.

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.

(Assume π = 22/7)

Solution:

Radius (r) of heap = (10.5/2) m = 5.25

Height (h) of heap = 3m

Volume of heap = (1/3)$\pi r^2 h$

= (1/3)×(22/7)×5.25×5.25×3

= 86.625

The volume of the heap of wheat is 86.625 m^3.

Again,

Area of canvas required= CSA of cone = πrl, where $l = \sqrt{r^2 + h^2}$
After substituting the values, we have
CSA of cone = $[\frac{22}{7} \times 5.25 \times \sqrt{(5.25)^2 + 3^2}]$

= (22/7)×5.25×6.05

= 99.825

Therefore, the area of the canvas is 99.825 m^2.