Exercise 13.7 Page No: 233

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 cone, r = 6 cm
Height of cone, h = 7cm
Say, V be the volume of the cone, 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 cone, r = 3.5cm
Height of cone, h = 12cm

Volume of 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 cone, r =7 cm
Slant height of cone, l = 25 cm

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

or h = 24
Height of the cone is 24 cm
Now,

Volume of cone, V = $(1/3)\ \pi r^2 h$ (formula)
$V = (1/3)\times(22/7)\times7^2\times24)$
$= (154\times8)$
$= 1232$

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

Therefore, capacity of the conical vessel = (1232/1000) liters (because 1L = 1000 cm^3)
= 1.232 Liters.

(ii) Height of cone, h = 12 cm
Slant height of cone, l = 13 cm

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

r = 5
Hence, the radius of cone is 5 cm.

Now, Volume of cone, V = $(1/3)\pi r^2 h$
V = $(1/3)\times(22/7)\times52\times12$ cm^3
= 2200/7
Volume of 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 cone, V = $(1/3)\ \pi r^2 h$
So, $(1/3)\ \pi r^2 h = 1570$
$(1/3)\times3.14\times r^2\times15 = 1570$
$r^2 = 100$
r = 10
Radius of the base of 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 cone, V = (1/3) $\pi r^2 h$
So, 1/3 π r^2(9) = 48 π
r^2 = 16
r = 4
Radius of cone is 4 cm.
So, diameter = 2×Radius = 8
Thus, diameter of base is 8cm.

5. A conical pit of top diameter 3.5m is 12m deep. What is its capacity in kiloliters? (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 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, $l = \sqrt{r^2 + h^2}$

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

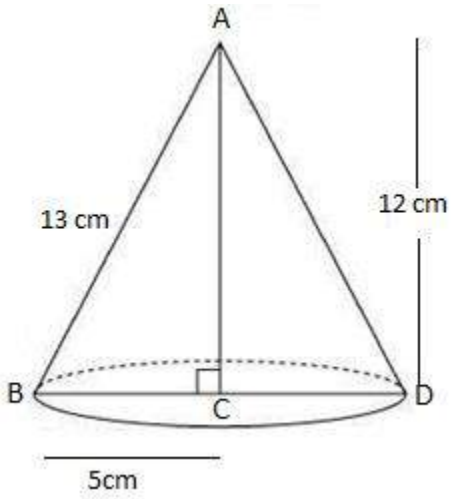
Slant height of the cone is 50 cm.

(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



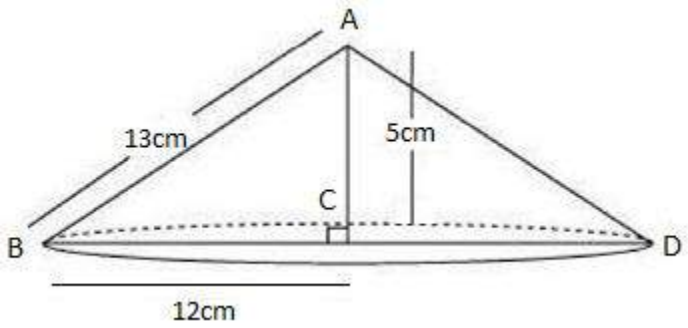
Volume of cone, V = (1/3) $\pi r^2 h$

V = (1/3)×π×5^2×12)
= 100π

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

8. If the triangle ABC in the 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 be the height of cone
= (1/3)×π×12×12×5
= 240 π
The volume of the cones of formed is 240π cm^3.
So, required ratio = (result of question 7) / (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.