Q 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:

It is given that:

Slant height of cone \( l \) = 60 cm
Radius of the base of the cone \( r \) = 21 cm
Curved surface area (C.S.A) = ?
C.S.A = \pi rl = \frac{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

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

Solution:

It is given that:

Radius of cone (r) = 5 cm

Height of the cone (h) = 12 cm

Slant Height of tent (l) = ?

Curved surface area (C.S.A) = ?

Now we know we that,

\[ l = \sqrt{r^2 + h^2} \]

\[ l^2 = r^2 + h^2 \]

\[ l^2 = 5^2 + 12^2 \]

\[ l^2 = 25 + 144 \]

\[ => l = 13 \text{ cm} \]

Now,

C.S.A = \pi rl = \frac{22}{7} \times 5 \times 12 = 204.28\text{cm}^2

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

Q 3: The radius of a cone is 7 cm and area of curved surface is 176cm^2. Find the slant height.

Solution:

It is given that:

Radius of cone (r) = 7 cm

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

Slant Height of tent (l) = ?

Now we know,

C.S.A = \pi rl

\[ => \pi rl = 176 \]

\[ => \frac{22}{7} \times 7 \times l = 176 \]

\[ => l = \frac{176 \times 7}{22} = 8 \text{ cm} \]

Therefore the slant height of the cone is 8 cm.

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

Solution:

It is given that:

Height of the traffic cone (h) = 21 cm

Slant height of the traffic cone (l) = 28 cm

Now we know that,

\[ l^2 = r^2 + h^2 \]

\[ 28^2 = r^2 + 21^2 \]

\[ r^2 = 28^2 - 21^2 \]

\[ r = 7\sqrt{7} \text{ cm} \]

Area of the circular base = \pi r^2

\[ = \frac{22}{7} \times (7\sqrt{7})^2 = 1078 \text{ cm}^2 \]

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

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

Solution:
It is given that:

Radius of the cone (r) = 6 cm
Height of the cone (h) = 8 cm

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

\[ l^2 = r^2 + h^2 \]
\[ = 6^2 + 8^2 \]
\[ = 36 + 64 = 100 \]
\[ => l = 10 \text{ cm} \]

\[ \text{T.S.A} = \text{Curved surface area of cone} + \text{Area of circular base} \]
\[ = \pi r l + \pi r^2 \]
\[ = \left( \frac{22}{7} \times 6 \times 10 \right) + \left( \frac{22}{7} \times 6 \times 6 \right) \]
\[ = \frac{1220 + 792}{7} \]
\[ = 301.71 \text{ cm}^2. \]

Therefore, the area of the base is 301.71 cm$^2$.

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

Solution:

It is given that:

Base radius of the cone (r) = 5.25 cm
Slant height of the cone (l) = 10 cm

Curved surface area (C.S.A) = \( \pi rl \)
\[ = \frac{22}{7} \times 5.25 \times 10 = 165 \text{ cm}^2. \]

Therefore, the curved surface area of the cone is 165 cm$^2$.

Q 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:

It is given that:

Diameter of the cone (d) = 24 m
Radius of the cone (r) = \( \frac{d}{2} = 12 \) m
Slant height of the cone (l) = 21 m

\[ \text{T.S.A} = \text{Curved surface area of cone} + \text{Area of circular base} \]
\[ = \pi r l + \pi r^2 \]
\[ = \frac{22}{7} \times 12 \times 21 + \frac{22}{7} \times 12 \times 12 = 1244.57 \text{ m}^2. \]

Therefore, the total surface area of the cone is 1244.57 m$^2$.

Q 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:

It is given that:

Curved surface area (C.S.A) = 60 \( \pi \text{ cm}^2 \)
Slant height of the cone (l) = 8 cm
Radius of the cone (r) = ?

Now we know,

\[ \text{Curved surface area (C.S.A)} = \pi rl \]
\[ => \pi rl = 60 \pi \text{ cm}^2 \]
\[ => r \times 8 = 60 \]
\[ => r = 7.5 \text{ cm} \]

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

Q 9: The curved surface area of a cone is 4070 \( \text{ cm}^2 \) and diameter is 70 cm. What is its slant height?
Solution:
Diameter of the cone(d) = 70 cm
Radius of the cone(r) = \( \frac{d}{2} = 35 \text{ cm} \)
Slant height of the cone(l) is ?

Now,
Curved surface area = \( 4070 \text{ cm}^2 \)

\( \Rightarrow \pi rl = 4070 \)

Where, \( r \) = radius of the cone
\( l \) = slant height of the cone

Therefore \( \pi rl = 4070 \)

\( \Rightarrow \frac{22}{7} \times 35 \times l = 4070 \)

\( \Rightarrow l = \frac{4070 \times 7}{22 \times 35} = 37 \text{ cm} \)

Therefore slant height of the cone is 37 cm.

Q 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.

Solution:
It is given that
Curved surface area = \( \pi rl = 792 \)
Let the radius(r) = 4x
Height(h) = 7x

Now,

C.S.A = 792

\( \frac{22}{7} \times 4x \times 7x = 792 \)

\( \Rightarrow 88x^2 = 792 \)

\( \Rightarrow x^2 = \frac{792}{88} = 9 \)

\( \Rightarrow x = 3 \)

Therefore Radius = 4x = 4 \times 3 = 12 \text{ cm} 

Q 11: A joker's cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet required to make 10 such caps.

Solution:
Given that,
Radius of conical cap(r) = 7 cm
Height of the conical cap(h) = 24 cm

Slant height(l) of conical cap = \( \sqrt{r^2 + h^2} \)
= \( \sqrt{7^2 + 24^2} \) cm = 25 cm

C.S.A of 1 conical cap = \( \pi rl \)
= \( \frac{22}{7} \times 7 \times 25 \)
= 550 \( \text{ cm}^2 \)

Curved surface area of 0 such conical caps = 5500 \( \text{ cm}^2 \)

Thus, 5500 \( \text{ cm}^2 \) sheet will be required for making 10 caps.

Q 12: Find the ratio of the curved surface area of two cones if their diameter of the bases are equal and slant heights are in the ratio 4:3.

Solution:
Given that,
Diameter of two coins are equal.
Therefore their radius are equal.
Let \( r_1 = r_2 = r \)
Let ratio be $x$

Therefore slant height $l_1$ of 1st cone = 4x

Similarly slant height $l_2$ of 2nd cone = 3x

Therefore \[
\frac{C.S.A_1}{C.S.A_2} = \frac{\pi r_1 l_1}{\pi r_2 l_2} = \frac{4x}{3x} = \frac{4}{3}
\]

Hence ratio is 4:3

Q 13: There are two cones. The curved surface area of one is twice that of the other. The slant height of the later is twice that of the former. Find the ratio of their radii.

Solution:

Let the curved surface area of 1st cone = 2x

C.S.A of 2nd cone = x

Slant height of 1st cone = h

Slant height of 2nd cone = 2h

Therefore \[
\frac{2x}{x} = \frac{C.S.A of 1st cone}{C.S.A of 2nd cone}
\]

\[
\frac{r_1}{r_2} = \frac{4}{1}
\]

Therefore ratio of $r_1 and r_2 is 4:1.$

Q 14: The diameters of two cones are equal. If their slant height are in the ratio 5:4, find the ratio of their curved surfaces.

Solution:

It is given that

Diameters of two cones are equal

Therefore their radius are also equal i.e

\[ r_1 = r_2 \]

Let the ratio of slant height be $x$

Therefore \[
l_1 = 5x
\]

\[ l_2 = 4x
\]

Therefore Ratio of curved surface area $= \frac{C_1}{C_2}$

\[
\frac{C_1}{C_2} = \frac{\pi r_1 l_1}{\pi r_2 l_2} = \frac{5x}{4x} = \frac{5}{4}
\]

\[ \therefore \text{ Ratio of curved surface area is } 5:4. \]

Q 15: Curved surface area of a cone is 308 $cm^2$ and its slant height is 14cm. Find the radius of the base and total surface area of the cone.

Solution:

(1) It is given that

Slant height of cone = 14cm

Let radius of circular end of cone = r

Curved surface area of cone $= \pi rl$

\[ \Rightarrow 308 \; cm^2 = \frac{22}{7} \times r \times 14 \]

\[ \Rightarrow r = \frac{308}{44} = 7cm \]

Thus radius of circular end of cone = 7 cm.
We know that total surface area of a cone = curved surface area of a cone + area of base = \( \pi r l + \pi r^2 \) = \( [308 \times \frac{22}{7} + 7^2 \] \) = 308 + 154 = 462 cm\(^2\)

Thus total surface area of the cone is 462 cm\(^2\).

Q 16: The slant height and base diameter of a conical tomb are 25 m and 14 m respectively. Find the cost of white washing its curved surface area at the rate of Rs 210 per 100 m\(^2\).

Solution:
It is given that
Slant height of conical tomb (l) = 25 m
Base radius (r) of tomb = \( \frac{14}{2} = 7 \) m
Curved surface area of conical length tomb = \( \pi rl \) = \( \frac{22}{7} \times 7 \times 25 \) = 550 m\(^2\)

Cost of white washing 100 m\(^2\) area = Rs 210

Cost of white washing 550 m\(^2\) area = Rs \( \frac{210 \times 550}{100} \) = Rs 1155

Therefore the cost of white washing the whole tomb is Rs 1155.

Q 17: A conical tent is 10 m high and the radius of it base is 24 m. Find the slant height of the tent. If the cost of 1 m\(^2\) canvas is Rs 70, find the cost of canvas required for the tent.

Solution:
It is given that
Height of the conical tent (h) = 10 m
Radius of conical tent (r) = 24 m
Let slant height of conical tent be l
\[ l^2 = h^2 + r^2 \]
= \( 10^2 + 24^2 = 100 + 576 \)
= 676 m\(^2\)
\[ \Rightarrow l = 26 \] m

Thus, the slant height of the conical tent is 26 m.

(ii) It is given that:
Radius (r) = 24 m
Slant height (l) = 26 m
C.S.A of tent = \( \pi rl \)
= \( \frac{22}{7} \times 24 \times 26 \)
= \( \frac{1356}{7} m^2 \)

Cost of 1 m\(^2\) canvas = Rs 70
Cost of \( \frac{1356}{7} m^2 \) canvas = Rs \( \frac{1356}{7} \times 70 \) = Rs 1,37,280

Thus the cost of canvas required to make the tent is Rs 1,37,280.

Q 18: A tent is in the form of a right circular cylinder surmounted by a cone. The diameter of cylinder is 24 m. The height of the cylindrical portion is 11 m while the vertex of the cone is 16 m above the ground. Find the area of the canvas required for the tent.

Solution:
It is given that
Diameter of cylinder = 24 m

Therefore radius = \( \frac{\text{diameter}}{2} \)

= \( \frac{24}{2} \) = 12 cm

Also radius of cone = 12 m

Height of cylinder = 11 m

Height of cone = 16 - 11 = 5 m

Slant height of cone

= \( \sqrt{h^2 + r^2} \)

= \( \sqrt{5^2 + 12^2} \)

= 13 m

Therefore area of canvas required for the tent = \( \pi rl + 2\pi rh \)

= \( \frac{22}{7} [(12 \times 13) + (2 \times 12 \times 11)] \)

= 490.286 + 829.714

= 1320 m²

Q19. A circus tent is cylindrical to a height of 3 m and conical above it. If its diameter is 105 m and the slant height of the conical portion is 53 m, calculate the length of the canvas 5 m wide to make the required tent.

Solution:

Given diameter = 105 m,
Radius = \( \frac{105}{2} \) = 52.5 m

Therefore curved surface area of circus tent = \( \pi rl + 2\pi rh \)

= \( \frac{22}{7} [52.5 \times 13] + (2 \times \frac{22}{7} \times 52.5 \times 3) \)

= 8745 + 990 = 9735 m²

Therefore length of the canvas required for tent

Area of canvas

Width of canvas

= \( \frac{9735}{8} \) m = 1947 m

Q20. The circumference of the base of a 10 m height conical tent is 44 m, calculate the length of canvas used in making the tent if width of canvas is 2 m.

Solution:

We know that

C.S.A of cone = \( \pi rl \)

Given circumference = 2\( \pi r \)

\( \Rightarrow 2 \times \frac{22}{7} \times r = 44 \)

\( \Rightarrow \frac{22}{7} \times r = 1 \)

\( \Rightarrow r = 7 \) m

Therefore \( l = \sqrt{r^2 + h^2} \)

= \( \sqrt{7^2 + 10^2} \)

= 11 m

Therefore C.S.A of tent = \( \pi rl \)

= \( \frac{22}{7} \times 1 \times \sqrt{149} \)

= 22\sqrt{149} m

Therefore the length of canvas used in making the tent

= \( \frac{area \ of \ canvas}{width \ of \ canvas} \)

= \( \frac{22}{2\sqrt{149}} \)

= 11\sqrt{149} m

= 134.2 m
Q 21: What length of tarpaulin 4 m wide will be required to make a conical tent of height 8 m and base radius 6 m? Assume that the extra length of material will be required for stitching margins and wastage in cutting is approximately 20 cm.

Solution:
Given that,
Height of conical tent(h) = 8m
Radius of base of tent(r) = 6m
Slant height(l) = \sqrt{r^2 + h^2} = \sqrt{6^2 + 8^2} = \sqrt{100} = 10m
C.S.A of conical tent = \pi rl = (3.14 * 6 * 10) m^2 = 188.4 m^2

Let the length of tarpaulin sheet required be l
As 20 cm will wasted, so effective
Length will be (l - 0.2 m)
Breadth of tarpaulin = 3m
Area of sheet = C.S.A of sheet

\[ l \times 0.2 \times 3 = 188.4 \, m^2 \]

Accounting extra for wastage:
\[ l = 63 \, m \]
Thus the length of the tarpaulin sheet will be = 63 m

Q 22: A bus stop is barricaded from the remaining part of the road, by using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 40 cm and height 1 m. If the outer side of each of the cones is to be painted and the cost of painting is Rs 12 per m^2, what will be the cost of painting all these cones?

Solution:
The area to be painted is the curved surface area of each cone.
The formula of the curved surface area of a cone with base radius and slant height is given as
Curved Surface Area = \pi rl
For each cone, we're given that the base diameter is 0.40 m.
Hence the base radius r = 0.20 m.
The vertical height l = 1 m.
To find the slant height 'l' to be used in the formula for Curved Surface Area we use the following relation
Slant height,
\[ l = \sqrt{r^2 + h^2} = \sqrt{0.2^2 + 1^2} = \sqrt{1.04} = 1.02 \, m \]
Now substituting the values of r = 0.2 m and slant height l = 1.02 m and using π = 3.14 in the formula of C.S.A.
We get Curved Surface Area = (3.14)(0.2)(1.02) = 0.64056 m^2
This is the curved surface area of a single cone.
Since we need to paint 50 such cones the total area to be painted is,
Total area to be painted = (0.64056)(50) = 32.028 m^2
The cost of painting is given as Rs. 12 per m^2
Hence the total cost of painting = (12)(32.028) = 384.336
Hence, the total cost that would be incurred in the painting is Rs. 384.336

Q 23. A cylinder and a cone have equal radii of their base and equal heights. If their curved surface area are in the ratio 8:5, show that the radius of each is to the height of each as 3:4.
Solution:

It is given that the base radius and the height of the cone and the cylinder are the same.

So let the base radius of each is 'r' and the vertical height of each is 'h'.

Let the slant height of the cone be 'l'.

The curved surface area of the cone = \( \pi r l \)

The curved surface area of the cylinder = \( \pi r h \)

It is said that the ratio of the curved surface areas of the cylinder to that of the cone is 8:5

So,

\[
\frac{2\pi rh}{\pi rl} = \frac{8}{5}
\]

\[
\frac{2h}{l} = \frac{8}{5}
\]

\[
\frac{h}{l} = \frac{4}{5}
\]

But we know that \( l = \sqrt{r^2 + h^2} \)

\[
\frac{h^2}{\sqrt{r^2 + h^2}} = \frac{4}{5}
\]

Squaring on both sides we get:

\[
\frac{h^2}{r^2 + h^2} = \frac{16}{25}
\]

\[
\frac{h^2}{r^2} + 1 = \frac{25}{16}
\]

\[
\frac{h^2}{r^2} = \frac{25}{16} - 1
\]

\[
\frac{r^2}{h^2} = \frac{9}{16}
\]

\[
\frac{r}{h} = \frac{3}{4}
\]

Hence it is shown that the ratio of the radius to the height of the cone as well as the cylinder is: 3 : 4
Q1. Find the volume of the right circular cone with the following dimensions:

(a) Radius is 6cm and the height of the cone is 7cm
(b) Radius is 3.5cm and height is 12cm
(c) Slant height is 21cm and height is 28cm

Solution:

(a) It is given that
Radius of the cone(r)=6cm
Height of the cone(h)=7cm

Volume of a right circular cone
\[ = \frac{1}{3} \pi r^2 h \]
\[ = \frac{1}{3} \times 3.14 \times 6^2 \times 7 \]
\[ = 264 \text{ cm}^3 \]

(b) It is given that:
Radius of the cone(r)=3.5 cm
Height of the cone(h)=12cm

Volume of a right circular cone
\[ = \frac{1}{3} \pi r^2 h \]
\[ = \frac{1}{3} \times 3.14 \times 3.5^2 \times 12 \]
\[ = 154 \text{ cm}^3 \]

(c) It is given that:
Height of the cone(h)=28 cm
Slant height of the cone(l)=21 cm

As we know that,
\[ l^2 = r^2 + h^2 \]
\[ r = \sqrt{l^2 - h^2} \]
\[ r = \sqrt{21^2 - 7^2} = 7\sqrt{7} \]

Volume of a right circular cone:
\[ = \frac{1}{3} \pi r^2 h \]
\[ = \frac{1}{3} \times 3.14 \times (7\sqrt{7})^2 \times 18 \]
\[ = 7546 \text{ cm}^3 \]

Q2. Find the volume of a conical tank with the following dimensions in liters:
(a) Radius is 7 cm and the slant height of the cone is 25 cm
(b) Slant height is 12 cm and height is 13 cm

Solution:
(a) It is given that
Radius of the cone(r) = 7 cm
Slant height of the cone (l) = 25 cm

As we know that,
\[ l^2 = r^2 + h^2 \]
\[ h = \sqrt{l^2 - r^2} \]
\[ h = \sqrt{25^2 - 7^2} \]
\[ h = \sqrt{625 - 49} = 24 \text{ cm} \]

Volume of a right circular cone
\[ = \frac{1}{3} \pi r^2 h \]
\[ = \frac{1}{3} \times 3.14 \times 7^2 \times 24 \]
\[ = 1232 \text{ cm}^3 = 1.232 \text{ litres} \] [1 cm^3=0.01litres]

(c) It is given that:
Height of the cone(h)=12 cm
Slant height of the cone(l)=13 cm

As we know that,
\[ l^2 = r^2 + h^2 \]
\[ r = \sqrt{l^2 - h^2} \]
\[ r = \sqrt{1.3^2 - 12^2} \]
\[ = r = \sqrt{169 - 144} = \sqrt{25} = 5 \text{cm} \]

**Volume of a right circular cone:**
\[ \frac{1}{3} \pi r^2 h \]
\[ = \frac{1}{3} \times 3.14 \times 5^2 \times 10 = 314.85 \text{cm}^3 = 0.307 \text{litres} \quad [1 \text{ cm}^3 = 0.01 \text{litre}] \]

Q3. 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:**

Let ratio of the height of the cone be \( h_x \)

height of the 1st cone = \( h_x \)

height of the 2nd cone = \( 3h_x \)

Let the ratio of the radius of the base of the cone = \( r_x \)

radius of the 1st cone = \( 3r_x \)

radius of the 2nd cone = \( r_x \)

The ratio of the volumes = \( \frac{v_1}{v_2} \)

Where \( v_1 = \text{volume of 1st cone} \)

\( v_2 = \text{volume of 2nd cone} \)

\[ \frac{v_1}{v_2} = \frac{\frac{1}{3} \pi r_1^2 h_1}{\frac{1}{3} \pi r_2^2 h_2} \]

\[ = \frac{3 \times h_x^2}{r_x^2 h_x} \]

\[ = \frac{3 \times h_x}{r_x} \]

\[ = \frac{3 \times h_x}{r_x} \]

\[ = \frac{3}{1} \]

\[ \Rightarrow \frac{v_1}{v_2} = \frac{3}{1} \]

Q4. 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 to be \( y \)

Radius (\( r \)) = \( 5y \)

Height (\( h \)) = \( 12y \)

We know that

\[ l^2 = r^2 + h^2 \]

\[ = 25y^2 + 144y^2 \]

\[ = 169y^2 = 13y \]

Now it is given that volume = \( 314m^3 \)

\[ \Rightarrow \frac{1}{3} \pi r^2 h = 314m^3 \]

\[ \Rightarrow \frac{1}{3} \times 3.14 \times 25y^2 \times 12y = 314m^3 \]

\[ \Rightarrow y^3 = 1 \]

\[ \Rightarrow y = 1 \]

Therefore,

Slant height(\( l \)) = \( 13y = 13 \text{m} \)

Radius = \( 5y = 5 \text{m} \)

Q5. 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 be \( y \)

The radius of the cone \( r = 5y \)
Height of the cone = \( 12y \)

Now we know,

\[ \text{Slant height} = \sqrt{r^2 + h^2} \]
\[ = \sqrt{(5y)^2 + (12y)^2} \]
\[ = 13y \]

Now the volume of the cone is given as \( 2512 \text{ cm}^3 \)

\[ \Rightarrow \frac{1}{3} \pi r^2 h = 2512 \]
\[ \Rightarrow \frac{1}{3} \times 3.14 \times 5^2 \times 12y = 2512 \]
\[ \Rightarrow y = 2 \]

Therefore,

\[ \text{Slant height} = 13y = 13 \times 2 = 26 \text{ cm} \]
Radius of cone = \( 5y = 5 \times 2 = 10 \text{ cm} \)

Q6. 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:
Let the ratio of the radius be \( x \)
Radius of 1st cone = \( 2x \)
Radius of 2nd cone = \( 3x \)

Let the ratio of the volume be \( y \)
Volume of 1st cone = \( 4y \)
Volume of 2nd cone = \( 5y \)

\[ \frac{4y}{5y} = \frac{4}{5} \]
\[ \Rightarrow \frac{1}{3} \pi r^2 h_1 = \frac{4}{5} \]
\[ \Rightarrow \frac{h_1 \times (2x)^2}{h_2 \times (3x)^2} = \frac{4}{5} \]
\[ \Rightarrow \frac{h_1 \times 4x^2}{h_2 \times 9x^2} = \frac{4}{5} \]
\[ \Rightarrow \frac{h_1}{h_2} = \frac{36}{30} = \frac{6}{5} \]

Therefore the heights are in the ratio of 6:5.

Q7. 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:
It’s given that

A cylinder and a cone are having equal radii of their bases and heights

Let the radius of the cone = radius of the cylinder = \( r \)
Height of the cone = height of the cylinder = \( h \)

Let the volume of cone = \( v_c \)
Volume of cylinder = \( v_y \)

\[ \frac{v_c}{v_y} = \frac{\frac{1}{3} \pi r^2 h}{\pi r^2 h} = \frac{1}{3} \]
\[ \Rightarrow \frac{v_c}{v_y} = \frac{3}{1} \]

Therefore the ratio of their volumes is 3:1.
Q8. If the radius of the base of a cone is halved, keeping the height same, what is the ratio of the volume of the reduced cone to that of the original cone?

Solution:

Let the radius of the cone be \( r_x \) and height be \( h_x \) 

Then the volume of cone \( v_x = \frac{1}{3} \pi r_x^2 h_x \) 

Now,

Radius of the reduced cone = \( \frac{r_x}{2} \) 

Therefore volume of reduced cone \( v_y \)

\[ \frac{v_y}{v_x} = \left( \frac{\frac{r_x}{2}}{r_x} \right)^2 \times h_x \]

\[ = \frac{1}{12} \pi \times \frac{r_x^2}{2} \times h_x \]

\[ = \frac{1}{3} \pi r_x^2 \]

\[ \times \frac{1}{2} \times \frac{h_x}{3} \]

\[ = \frac{1}{4} \]

Therefore the ratio between the volumes of the reduced and the original cone is \( 1:4 \).

Q9. A heap of wheat is in the form of a cone of diameter 9 m and height 3.5 m. Find its volume. How much is canvas cloth required to just cover the heap? (Use \( \pi = 3.14 \)).

Solution:

It is given that 
Diameter of heap \( d = 9 \) m 
Therefore, Radius of the heap \( r = \frac{d}{2} \)

\[ = \frac{9}{2} = 4.5 \) m 

Height of the heap \( h = 3.5 \) m 
Therefore, Volume of the heap \( \frac{1}{3} \pi r^2 h \)

\[ = \frac{1}{3} \times 3.14 \times 4.5^2 \times 3.5 \]

\[ = 74.18 \) m \(^3 \)

Now, 

\[ l = \sqrt{r^2 + h^2} \]

\[ = \sqrt{4.5^2 + 3.5^2} = 5.70 \) m 

Area to be covered by the cloth = Curved surface area of the heap 

\[ = \pi rl = 3.14 \times 4.5 \times 5.70 = 80.54 \) m \(^2 \)

Q10. Find the weight of a solid cone whose base is of diameter 14 cm and vertical height 51 cm, supposing the material of which it is made weighs 10 grams per cubic cm.

Solution:

It is given that: 
Diameter \( d = 14 \) cm 
Height of the cone \( h = 51 \) cm 
Radius of the cone \( r = \frac{d}{2} \)

\[ = \frac{14}{2} = 7 \) cm 

Therefore, Volume of cone \( V = \frac{1}{3} \pi r^2 h = \)

\[ = \frac{1}{3} \times 3.14 \times 7^2 \times 51 = 2618 \) cm \(^3 \)

Now it is given that \( 1 \) cm \(^3 \) material weighs \( 10 \) gm.

Therefore, \( 2618 \) cm \(^3 \) weighs \( 2618 \times 10 = 26180 \) grams.

Q11. A right angled triangle of which the sides containing the right angle are 6.3 cm and 10 cm in length, is made to turn round on the longer side. Find the volume of the solid, thus generated. Also, find its curved surface area.

Solution:
It is given that
Radius of cone(r) = 6.3 cm
Height of the cone(h) = 10 cm
We know that
Slant height(l) = \( l = \sqrt{r^2 + h^2} \)
= \( l = \sqrt{6.3^2 + 10^2} = 11.819 \) cm
Therefore Volume of cone(v) = \( \frac{1}{3}\pi r^2 h \)
= \( \frac{1}{3} \times 3.14 \times 6.3 \times 10 = 415.8 \) cm\(^3\)
Curved surface area of cone = \( \pi rl \)
= \( 3.14 \times 6.3 \times 11.819 = 234.01 \) cm\(^2\)

Q12 Find the volume of the largest right circular cone that can be fitted in a cube whose edge is 14 cm.
Solution:
Radius of the base of the largest cone = \( \frac{1}{2} \) * edge of the cube
= \( \frac{1}{2} \times 14 = 7 \) cm
Height of the cone = edge of the cube = 14 cm
Therefore, Volume of cone(v) = \( \frac{1}{3}\pi r^2 h \)
= \( \frac{1}{3} \times 3.14 \times 7^2 \times 14 = 718.66 \) cm\(^3\)

Q13 The volume of a right circular cone is 9856 cm\(^3\). If the diameter of the base is 28 cm. Find:
(a) Height of the cone
(b) Slant height of the cone
(c) Curved surface area of the cone
Solution:
(a) It is given that diameter of the cone(d) = 28 cm
Radius of the cone(r) = \( \frac{d}{2} \)
= \( \frac{28}{2} = 14 \) cm
Height of the cone = ?
Now, Volume of the cone(v) = \( \frac{1}{3}\pi r^2 h = 9856 \) cm\(^3\)
= \( \frac{1}{3} \times 3.14 \times 14^2 \times h = 9856 \)
\( h = \frac{9856 \times 3}{3.14 \times 14 \times 14} = 48 \) cm
Therefore the height of the cone is 48 cm
(b) It is given that
Radius of the cone(r) = 14 cm
Height of the cone = 48 cm
Slant height (l) = ?
Now we know that \( l = \sqrt{r^2 + h^2} \)
= \( \sqrt{14^2 + 48^2} = \sqrt{2500} = 50 \) cm
Therefore the slant height of the cone is 50 cm.
(c) Radius of the cone(r) = 14 cm
Slant height of the cone(l) = 50 cm
Curved surface area(C.S.A) = ?
Curved surface area of a cone(C.S.A) = \( \pi l \)
= \( 3.14 \times 14 \times 50 = 2200 \) cm\(^2\)
Therefore curved surface of the cone is 2200 cm\(^2\)
Q14. A conical pit of top diameter 3.5m is 12m deep. What is its capacity in kilolitres?

Solution:

It is given that:

Diameter of the conical pit(d)=3.5m
Height of the conical pit(h)=12m
Radius of the conical pit(r)=?
Volume of the conical pit(v)=?

Radius of the conical pit(r)=\( \frac{d}{2} = \frac{3.5}{2} = 1.75m \)

Volume of the cone(v)=\( \frac{1}{3} \pi r^2 h \)

=\( \frac{1}{3} \times 3.14 \times 1.75^2 \times 12 = 38.5m^3 \)

Capacity of the pit =(38.5\( \times 1 \)) kilolitres = 38.5 kilolitres

Q15. Monica has a piece of Canvas whose area is 551 m\(^2\). She uses it to have a conical tent made, with a base radius of 7m. Assuming that all the stitching margins and wastage incurred while cutting amounts to approximately 1 m\(^2\). Find the volume of the tent that can be made with it.

Solution:

It is given that:

Area of the canvas= 551 m\(^2\)
Area that is wasted=1 m\(^2\)
Radius of tent=7 m , Volume of tent(v)=?

Therefore the Area of available for making the tent=(551-1)=550 m\(^2\)

Surface area of tent=550 m\(^2\)

=>\( \pi rl = 550 \)

=>\( l= \frac{550}{\pi \times 7} = 25m \)

Slant height(l)=25 m

We know that,

\( l^2 = r^2 + h^2 \)

25\(^2\) = 7\(^2\) + \( h^2 \)

=>625-49=\( h^2 \)

=>576=\( h^2 \)

\( h=24m \)

Height of the tent is 24m.

Now, volume of cone =\( \frac{1}{3} \pi r^2 h \)

=\( \frac{1}{3} \times 3.14 \times 7^2 \times 24 = 1232 m^3 \)

Therefore the volume of the conical tent is 1232 m\(^3\).