

Al Moattassem International School - Jubail

Revision 3 - chapter 12 - Volume & Surface Area

Part 1

Fill in the Blanks:

1. Volume of Prism = base area x height
2. Volume of Pyramid = 1/3 x Volume of corresponding prism
3. Total Surface Area of Pyramid = total area of all faces
4. Volume of Sphere = 2/3 x volume of cylinder

Part 2

Solve the Following:

1. A Pyramid has a square base of length 12 m. Given that the slant height of the Pyramid is 15m, and draw its net hence find its total surface area.

Given: Square base of length = 12 m

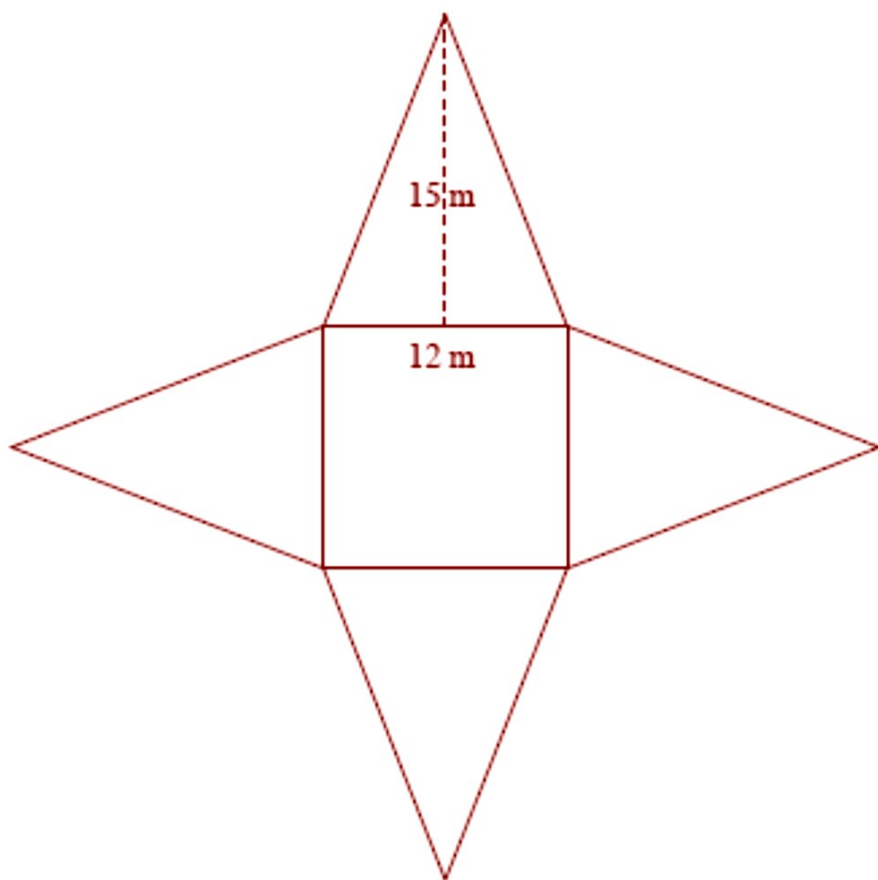
$$\text{Square base area} = 12 \times 12 = 144\text{m}^2$$

$$\text{Slant height (l)} = 15 \text{ m}$$

To find:

- i) Draw its net
- ii) Find its total surface area

Solution:



$$\begin{aligned}\text{Area of each triangular face} &= \frac{1}{2} \times 12 \times 15 \\ &= 90 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\text{Area of square base} &= 12 \times 12 \\ &= 144 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\therefore \text{Total surface area of pyramid} &= 4 \times \text{area of each triangular face} + \text{area of square base} \\ &= 4 \times 90 + 144 \\ &= 504 \text{ m}^2\end{aligned}$$

2) OABC is a triangular pyramid with a base area of 15 cm^2 and a height of 4 cm. Find the volume of the triangular pyramid.

Given: base area = 15 cm^2

Height = 4 cm

To Find: Volume of the triangular pyramid = ?

Solution:

$$\begin{aligned}\text{Volume of triangular pyramid} &= \frac{1}{3} \times \text{base area} \times \text{height} \\ &= \frac{1}{3} \times 15 \times 4 \\ &= 20 \text{ cm}^3\end{aligned}$$

3. A Cone has a circular base of radius 8 cm and a height of 17 cm. Find the volume of the cone.

Given: Radius (r) = 8cm

Height (h) = 17 cm

To find: Volume of the cone = ?

Solution:

$$\begin{aligned}\text{Volume of cone} &= \frac{1}{3} \pi r^2 h \\ &= \frac{1}{3} \times \pi \times 8^2 \times 17 \\ &= \frac{1088}{3} \times \frac{22}{7} \\ &= 1140 \text{ cm}^3\end{aligned}$$

4.A Cone has a circular base of radius 9 cm and a slant height of 5 cm. Find the total Surface Area of the Cone. (Take $\pi = 3.142$)

Given: radius (r) = 9 cm

Slant height (l) = 5 cm

To Find: Total Surface Area of the Cone = ?

Solution:

$$\begin{aligned}\text{Total surface area of cone} &= \pi r l + \pi r^2 \\ &= \pi \times 9 \times 5 + \pi \times 9^2 \\ &= 45\pi + 81\pi \\ &= 126\pi \\ &= 396 \text{ cm}^2\end{aligned}$$

5. Find the volume of each of the Sphere with the radius of 8 cm.

Given: Radius = 8 cm

To find: Volume of the Sphere = ?

Solution:

$$\begin{aligned}\text{Volume of sphere} &= \frac{4}{3} \pi r^3 \\ &= \frac{4}{3} \times \pi \times 8^3 \\ &= 2146 \text{ cm}^3\end{aligned}$$

6. Find the surface area of the Sphere with the radius of 12 cm.

Given: Radius(r)= 12 cm

To Find: Surface Area of the Sphere = ?

Solution:

$$\begin{aligned}\text{Surface area of sphere} &= 4\pi r^2 \\ &= 4 \times \pi \times 12^2 \\ &= 576\pi \\ &= 1810 \text{ cm}^2\end{aligned}$$

7. Find the Total Surface Area of a hemisphere of radius 7cm

(Take $\pi = 3.142$)

Given: Radius = 7cm

To Find: Total Surface Area of a Hemisphere = ?

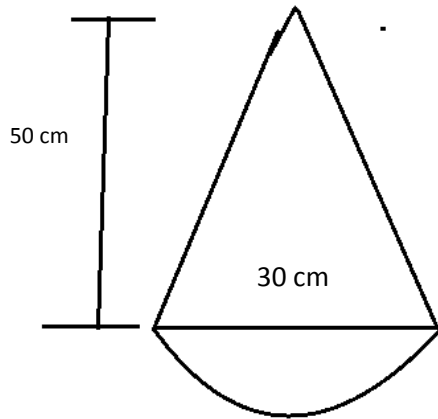
Solution:

$$\begin{aligned}\text{Total surface area of hemisphere} &= \pi r^2 + \frac{1}{2} \times 4\pi r^2 \\ &= 3\pi r^2 \\ &= 3 \times \pi \times 7^2 \\ &= 147\pi \\ &= 147 \times 3.142 \\ &= 462 \text{ cm}^2\end{aligned}$$

8. A Solid consists of a cone and a hemisphere which share a common base. The Solid has a height of 50cm and the hemisphere has a diameter of 30cm.

Find

- i) The volume
- ii) Total Surface Area of the Solid.



Given: Height = 50 cm

Diameter = 30 cm

To Find:

- i) The Volume
- ii) Total Surface Area of the Solid

Solution:

(i) Radius of hemisphere = $30 \div 2$
= 15 cm

Height of cone = $50 - 15$
= 35 cm

Volume of solid = volume of cone + volume of hemisphere
= $\frac{1}{3} \times \pi \times 15^2 \times 35 + \frac{1}{2} \times \frac{4}{3} \times \pi \times 15^3$
= $2625\pi + 2250\pi$
= 4875π
= 15321 cm^3

(ii) Using Pythagoras' Theorem,

Slant height of cone = $\sqrt{15^2 + 35^2}$
= 38.08 cm

Total surface area of solid
= curved surface area of cone
+ curved surface area of hemisphere
= $\pi \times 15 \times 38.08 + 2 \times \pi \times 15^2$
= $571.2\pi + 450\pi$
= 1021.2π
= 3210 cm^2