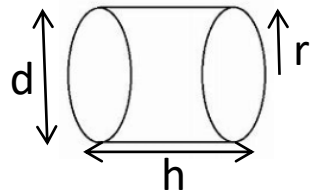


VOLUME AND SURFACE AREAS OF CYLINDERS

Key Concepts

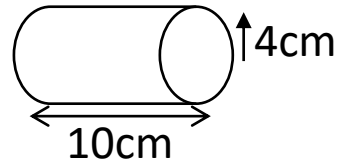
A **cylinder** is a **prism** with the cross section of a circle.



The **volume** of a cylinder is calculated by $\pi r^2 h$ and is the space inside the 3D shape

The **surface area** of a cylinder is calculated by $2\pi r^2 + \pi dh$ and is the total of the areas of all the faces on the shape.

From the diagram calculate:



a) **Volume**

$$V = \pi \times r^2 \times h$$

$$V = \pi \times 4^2 \times 10$$

$$V = 160\pi$$

$$\text{Or} = 502.65\text{cm}^3$$

Examples

b) **Surface Area** – You can use the net of the shape to help you

Area of two circles

$$= 2 \times \pi \times r^2$$

$$= 2 \times \pi \times 4^2$$

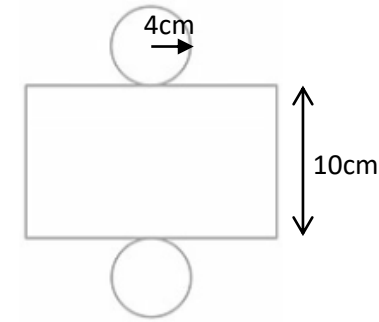
$$= 32\pi$$

Area of rectangle

$$= \pi \times d \times h$$

$$= \pi \times 8 \times 10$$

$$= 80\pi$$



$$\text{Surface Area} = 32\pi + 80\pi$$

$$= 112\pi$$

$$\text{or} = 351.86\text{cm}^3$$

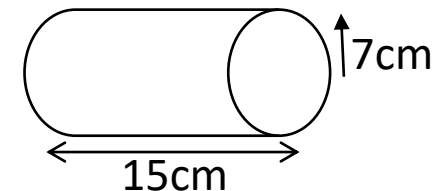
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572, 586

Key Words

Cylinder
Surface Area
Radius
Diameter
Pi
Volume
Prism

Calculate the volume and surface area of this cylinder

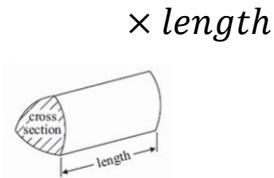


VOLUME AND SURFACE AREA OF PRISMS

Key Concept

The **volume** of an object is the amount of space that it occupies. It is measured in units cubed e.g. cm^3 .

To calculate the volume of any prism we use:

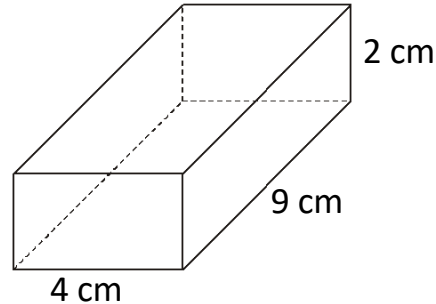


A **prism** is a 3D shape which has a continuous cross-section.

The **surface area** of an object is the sum of all of its faces. It is measured in units squared e.g. cm^2 .

Examples

$$\begin{aligned} \text{Volume} &= 4 \times 9 \times 2 \\ &= 72\text{cm}^3 \end{aligned}$$

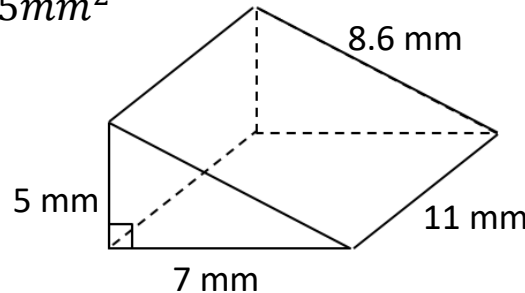


Surface area:

$$\begin{aligned} \text{Front} &= 4 \times 2 = 8 \\ \text{Back} &= 4 \times 2 = 8 \\ \text{Side 1} &= 9 \times 2 = 18 \\ \text{Side 2} &= 9 \times 2 = 18 \\ \text{Bottom} &= 4 \times 9 = 36 \\ \text{Top} &= 4 \times 9 = 36 \\ \text{Total} &= 126\text{cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of triangle} &= \frac{5 \times 7}{2} \\ &= 17.5\text{mm}^2 \end{aligned}$$

$$\begin{aligned} \text{Volume} &= 17.5 \times 11 \\ &= 192.5\text{mm}^3 \end{aligned}$$



Surface area:

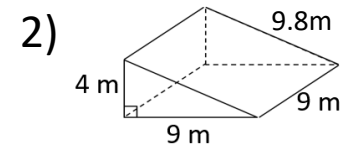
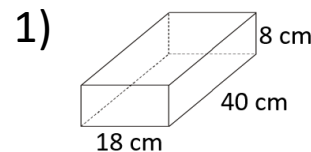
$$\begin{aligned} \text{Front} &= \frac{7 \times 5}{2} = 17.5 \\ \text{Back} &= \frac{7 \times 5}{2} = 17.5 \\ \text{Side} &= 5 \times 11 = 55 \\ \text{Bottom} &= 7 \times 11 = 77 \\ \text{Top} &= 11 \times 8.6 = 94.6 \\ \text{Total} &= 261.6\text{cm}^2 \end{aligned}$$

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568-571, 584-586

Key Words

Volume
Capacity
Prism
Surface area
Face

Find the volume and surface area of each of these prisms:



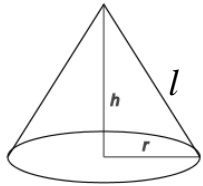
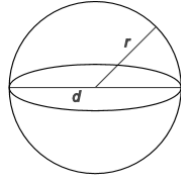
VOLUME AND SURFACE AREA OF CONES, SPHERES AND PYRAMIDS

Key Concepts

In your exam you will be **given** the following formulae to use:

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

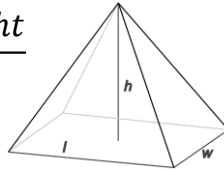


$$\text{Volume of a cone} = \frac{\pi r^2 h}{3}$$

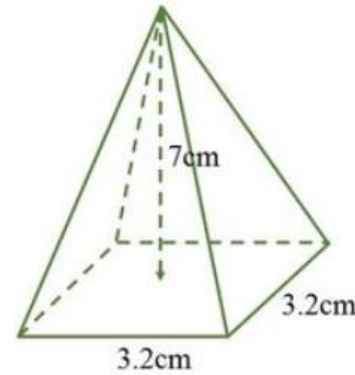
$$\text{Surface area of a cone} = \pi r^2 + \pi r l$$

In your exam you will **need to know** the following formulae:

$$\text{Volume of a pyramid} = \frac{\text{base area} \times \text{height}}{3}$$



Examples



$$\text{Volume of a pyramid} = \frac{(3.2 \times 3.2) \times 7}{3}$$

$$= 23.89\text{cm}^3$$

$$\text{Surface area} = \text{base} + 4 \text{ triangles}$$

$$3.2 \times 3.2 = 10.24\text{cm}^2$$

We will need to find the slanted height to be able to calculate the area of our triangles.

$$\text{Area of 4 triangles} =$$

$$4 \left(\frac{3.2 \times \sqrt{51.56}}{2} \right) = 45.96\text{cm}^2$$

$$\text{Slanted height} = \sqrt{7^2 + 1.6^2} = \sqrt{51.56}\text{cm}$$

$$\text{Surface area} = 10.24 + 45.96 = 56.20\text{cm}^2$$

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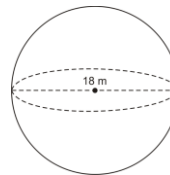
576-579, 587

Key Words

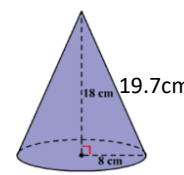
Surface Area
Volume
Sphere
Cone
Pyramid
Radius
Height
Slanted length

Calculate the volume and surface area of:

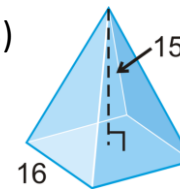
1)



2)



3)



ANSWERS: 1) V = 3053.6cm³ SA = 1017.9cm² 2) V = 1206.4cm³ SA = 696.2cm² 3) V = 1280cm³ SA = 800cm²