SURFACE AREAS AND VOLUMES

Module 2 of 4

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INTRODUCTION

In previous module, we have discussed about the total surface area of a solid formed by the combinations of two more solids.

In this section, we will learn to determine the volume of a solid formed by the combinations of two more solids. The volume of solid formed by the combinations of two more solids is the sum of the volumes of the individual solids involved in the combination process. This is based on the principle of conservation of volumes.

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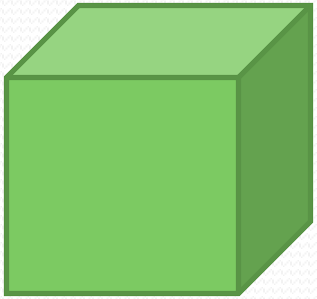
The formulae of volume of some solids are given below.

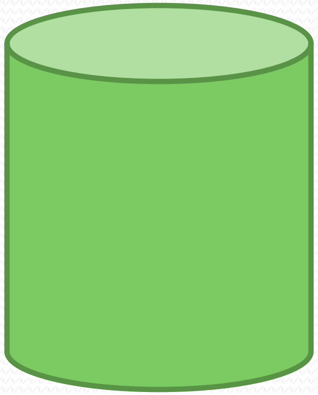
CUBE



Side = a

Volume = a^3

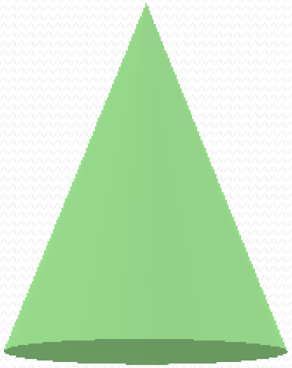
CYLINDER



Radius = r, Height = h

Volume = $\pi r^2 h$

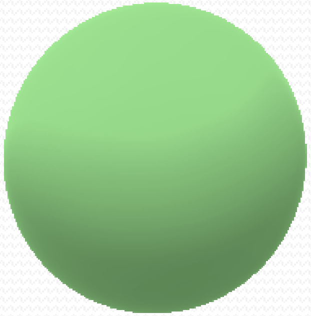
CONE



Radius = r, Height = h

Volume $= \frac{1}{3}\pi r^2 h$

SPHERE



Radius = r,

Volume $= \frac{4}{3}\pi r^3$

HEMISPHERE

Radius = r,

Volume $= \frac{2}{3}\pi r^3$

VOLUME OF COMBINATIONS OF SOLIDS

Consider the above solid which consists of cylinder with two hemispheres stuck at either ends.

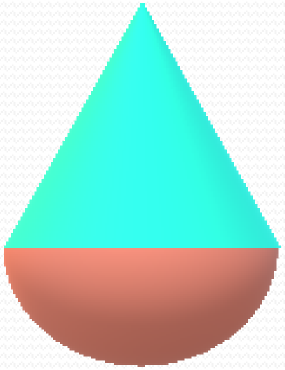
The total volume of this solid is the sum of volumes of each solid i.e. cylinder and hemispheres.

Volume of solid = volume of hemisphere +
volume of cylinder + volume
of hemisphere

$= \frac{2}{3}\pi r^3 + \pi r^2 h + \frac{2}{3}\pi r^3$

$= \frac{4}{3}\pi r^3 + \pi r^2 h$

$= \pi r^2 (\frac{4}{3} r + h)$



Let us consider this wooden toy which is made up of a cone fixed upon a hemisphere having same radius.

So, the total volume is the sum of volume of cone and volume of hemisphere.

Volume of toy = volume of Cone + volume of Hemisphere

$$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$$

$$= \frac{1}{3}\pi r^2 (h + 2r)$$

Thus, we can find the volume of the given solid by splitting them into basic solids.

NOTE: The required volume is the sum of individual volumes of the solids.

THANK YOU