

MATHLETE



(अक्सर पूछा करते हैं.....)

Classes – 9th to 10th

Series

4



MATHEMATICAL LITERACY GROUP- CHANDIGARH

World Around Us





Problem solving skills in mathematics especially contextual mathematics problems require mathematisation. It is not only used when someone makes a model or a mathematical representation of a problem with a real-life context but also when the process of solving the problem and interpreting it into a real-life context.

This module will help learners to formulate, employ and interpret a given problem and relate to real life situations and find solutions.

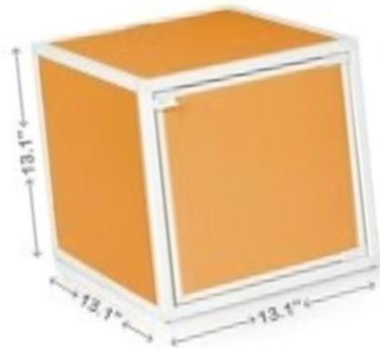


Mensuration

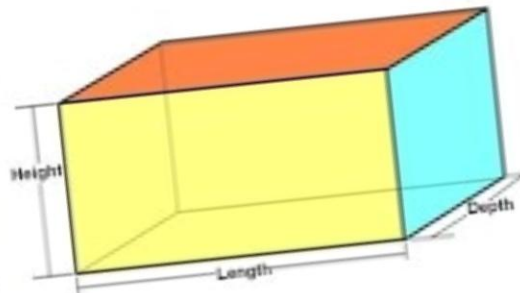
Mensuration is the branch of mathematics that studies the measurement of the geometric figures and their parameters like length, volume, shape, surface area, lateral surface area, etc. These shapes exist in 2 dimensions or 3 dimensions. Using this mensuration formula, it will be easy to solve the mensuration problems.



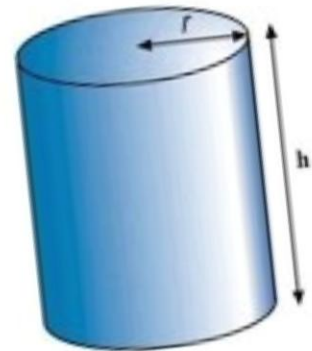
Surface Area



CUBE

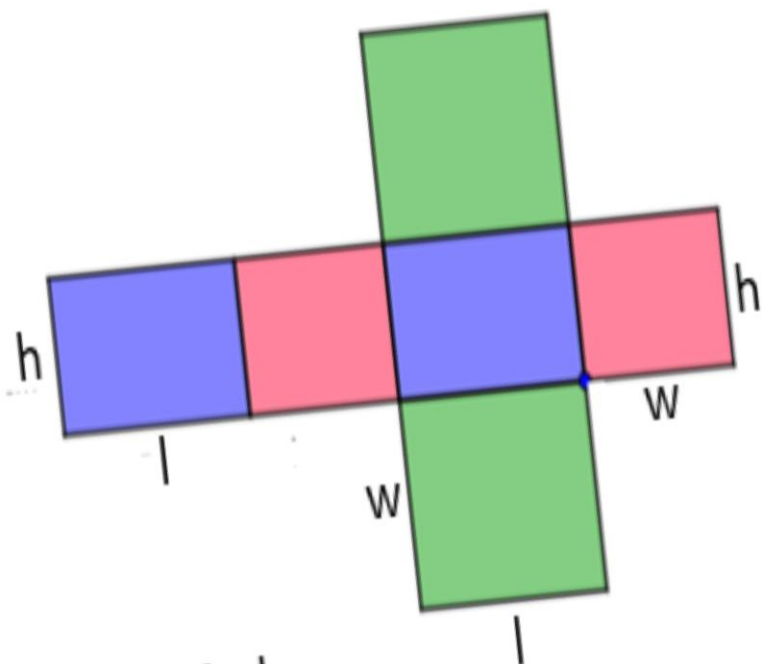
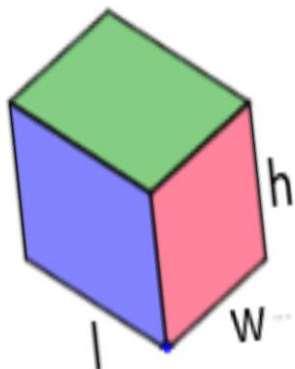


CUBOID



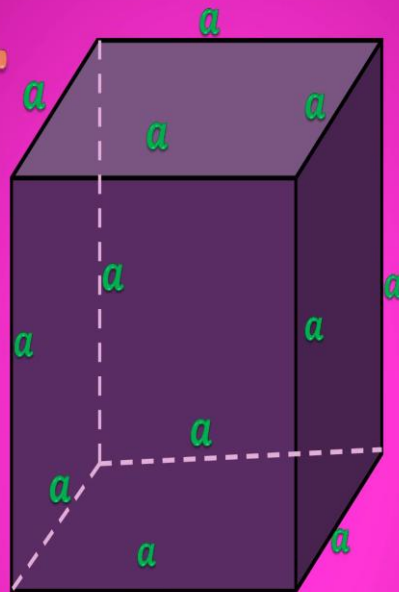
CYLINDER

Surface Area of Cuboid or Rectangular Prism



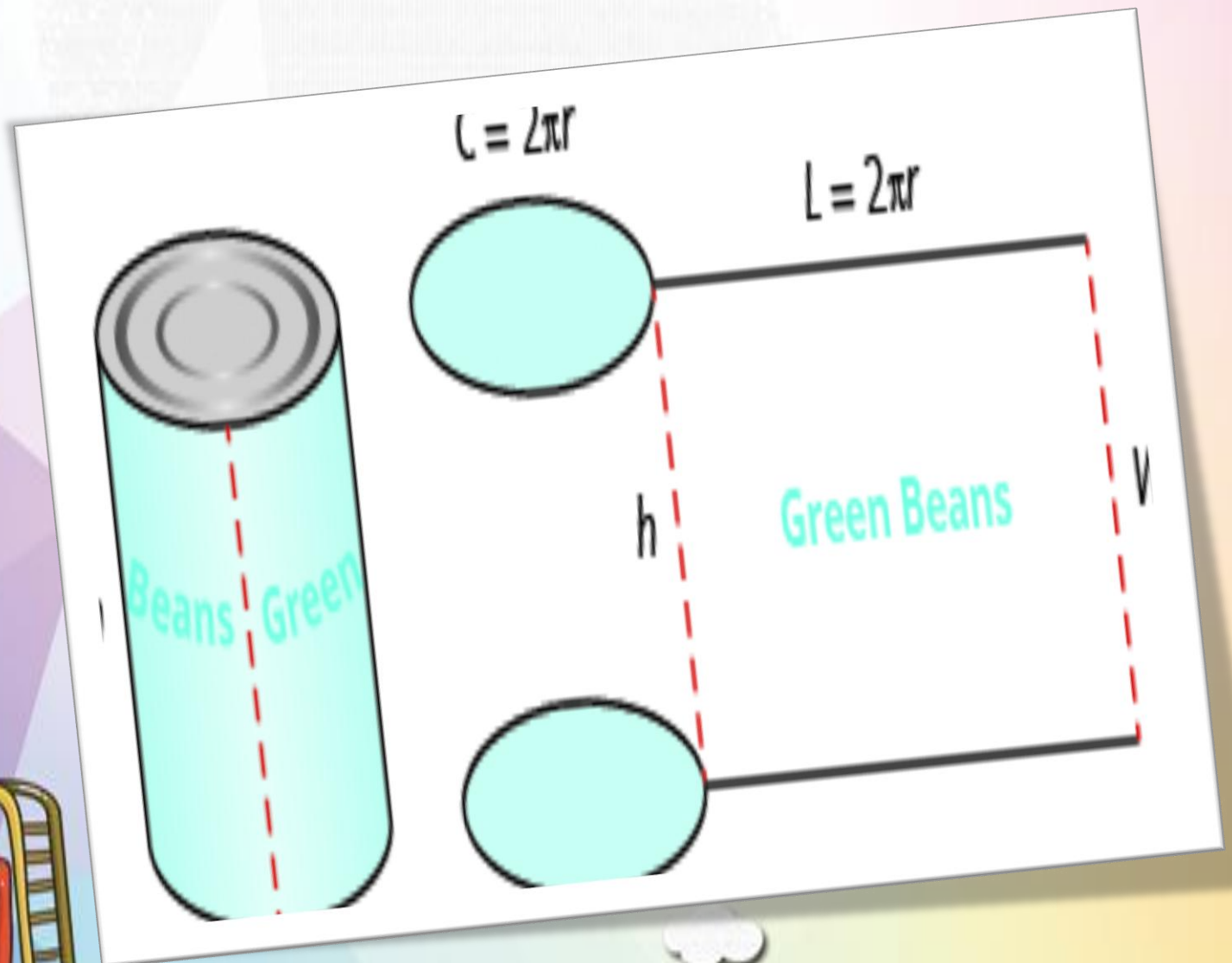
$$\text{Surface Area} = 2lw + 2lh + 2wh$$

FINDING THE SURFACE AREA OF CUBE.



$$\begin{aligned} &= (a \times a) + (a \times a) + (a \times a) + (a \times a) + (a \times a) + (a \times a) \\ &= 6(a \times a) \\ &= 6a^2 \end{aligned}$$

Curved Surface Area of Cylinder = $2\pi rh$



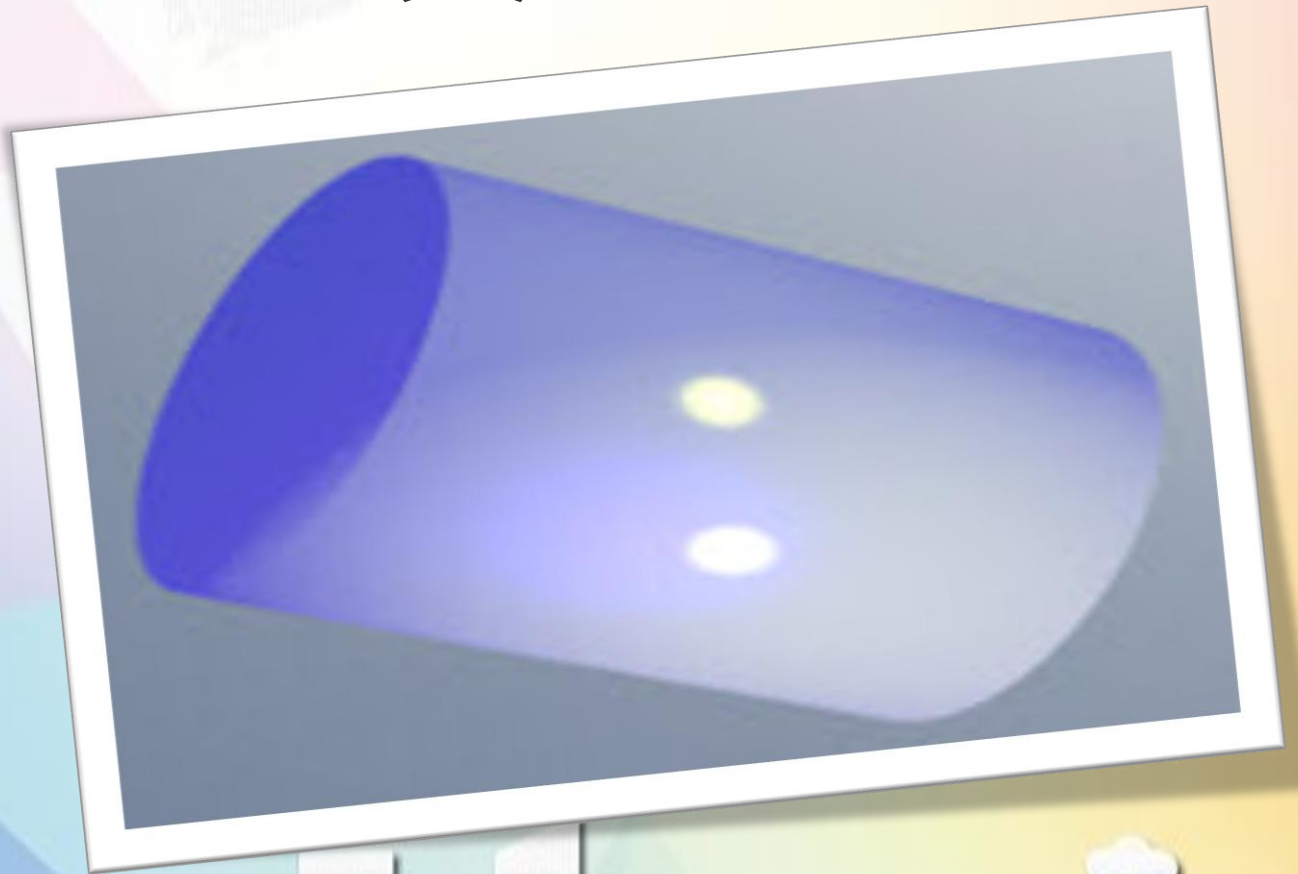
Surface Area of a Cylinder

The Surface Area has these parts:

- ***Surface Area of Both Ends*** = $2 \times \pi \times r^2$
- ***Surface Area of Curved Portion*** = $2 \times \pi \times r \times h$

Which together make:

$$\text{Surface Area} = 2 \times \pi \times r \times (r+h)$$



Try it yourself: Cut some paper so it fits around a cylinder, then unwrap and measure it.

It will be h high and $2\pi r$ (the circumference of a circle) long:



Don't forget the two end bits:



Total Surface Area

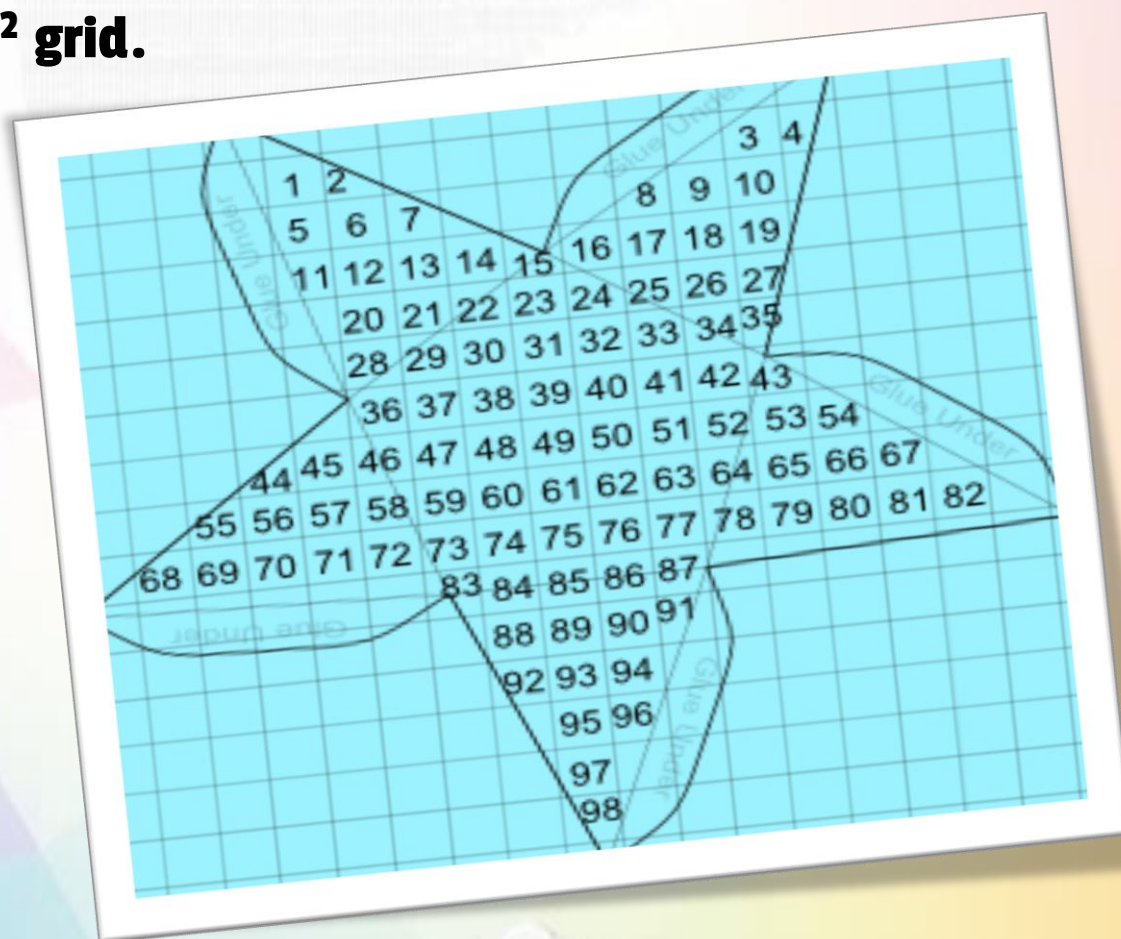
$$\begin{aligned} &= 2(\pi r^2) + 2\pi rh \\ &= 2\pi r(r+h) \end{aligned}$$

Surface Areas

To estimate the surface areas, we could just use a grid and count squares.

Example: Pentagonal Pyramid

We have used a 1 cm^2 grid.



We estimate the surface area of the pentagonal pyramid to be about 98cm^2

Use the same method to estimate the surface area of each of your solids.

Complete the following table: Take that particular 3 D shape , unfold it and find its area using the method explained above. Verify the answer by calculating area using their formulae.



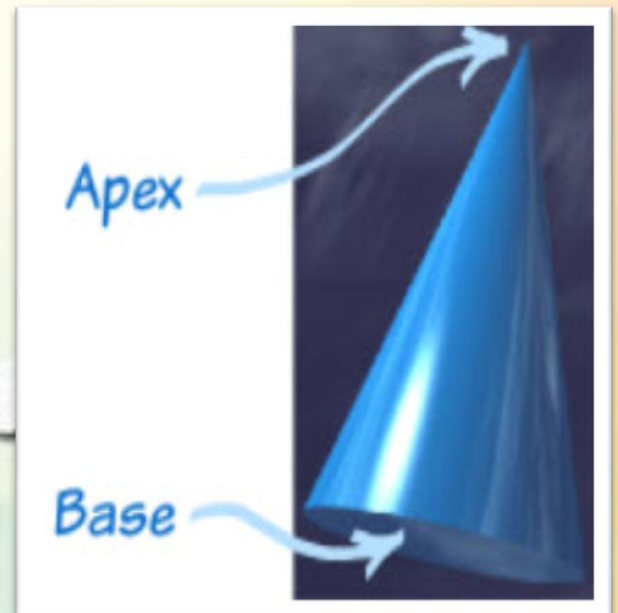
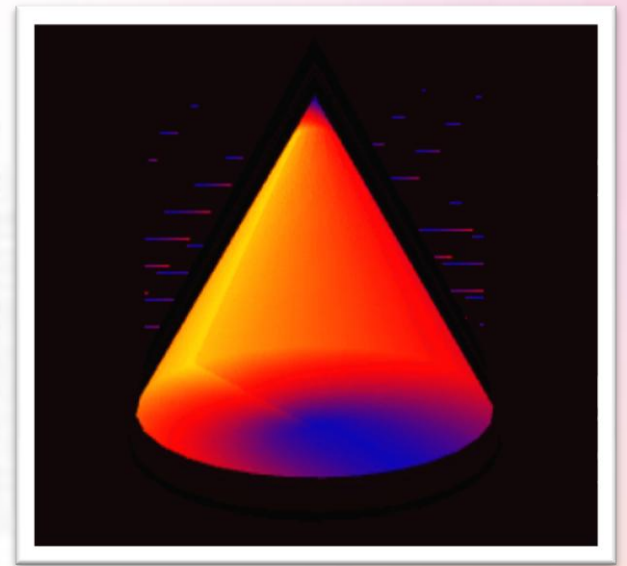
Solid		Estimate of surface area (cm ²)
Cuboid		
Cube		

CONE

**It has a circle at one end
And a point at the other end
And a curved side**

It is not a polyhedron as it has curved surface

**The pointy end of a cone is called the apex
The flat part is the base**

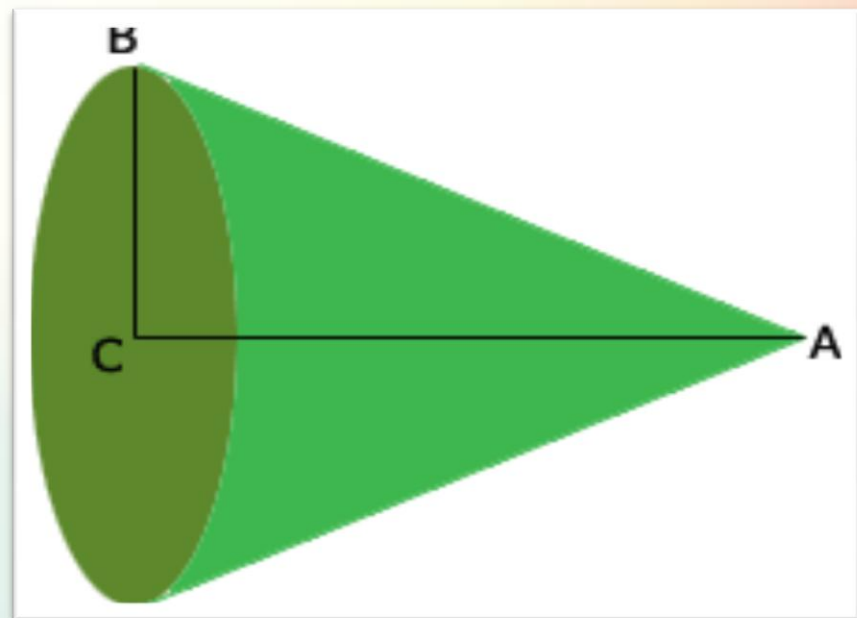


A Cone is a rotated triangle

A cone can be made by rotating a triangle!

The triangle is a right-angled triangle, and it gets rotated around one of its two short sides.

The side it rotates around is the axis of the cone.



Surface Area of a Cone

The Surface Area has two parts:

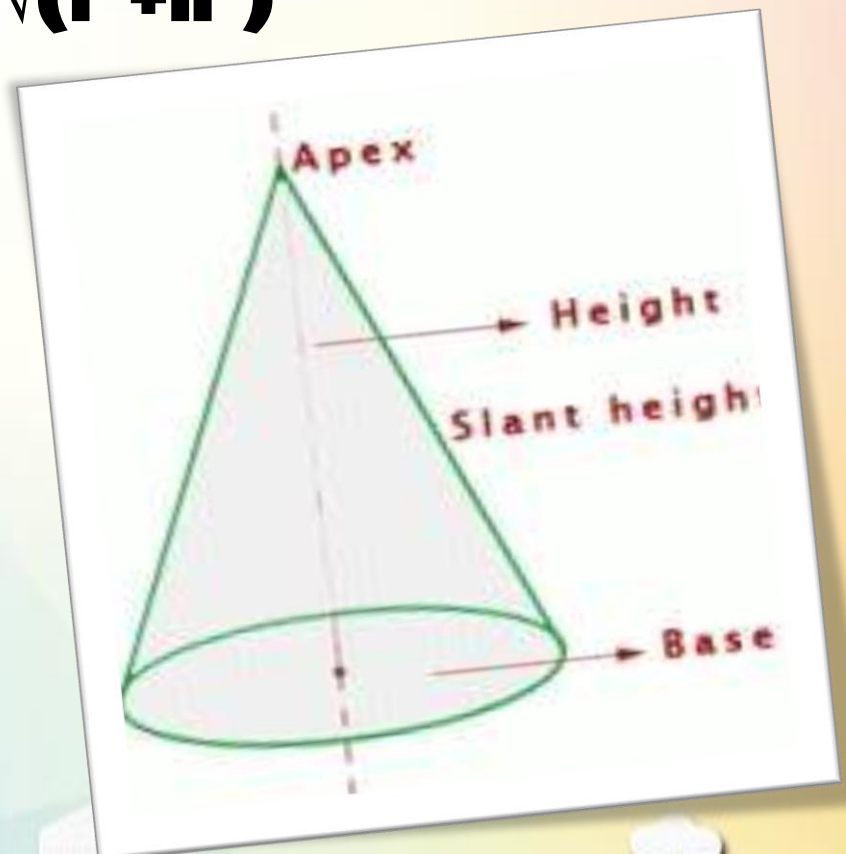
The *Base Area* = $\pi \times r^2$

The *Side Area* = $\pi \times r \times l$

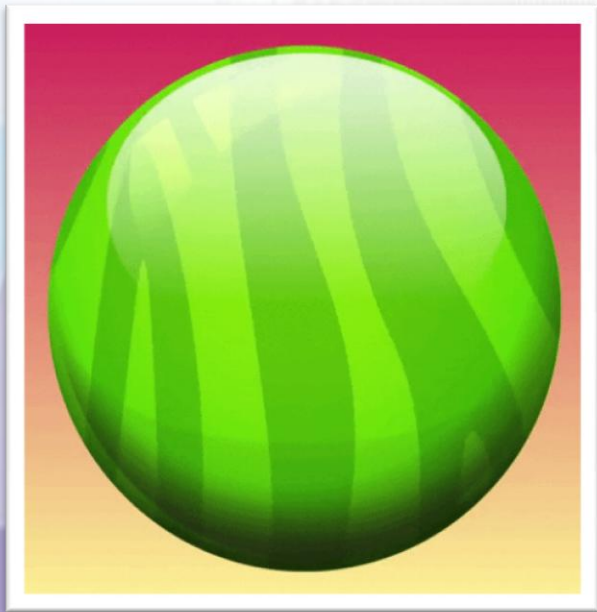
Which together makes:

Surface Area = $\pi \times r \times (r + l)$

Note: we can calculate $l = \sqrt{(r^2 + h^2)}$



SPHERE



It is perfectly symmetrical

All points on the surface are the same distance "r" from the center

It has no edges or vertices (corners)

It has one surface (not a "face" as it isn't flat)

It is not a polyhedron

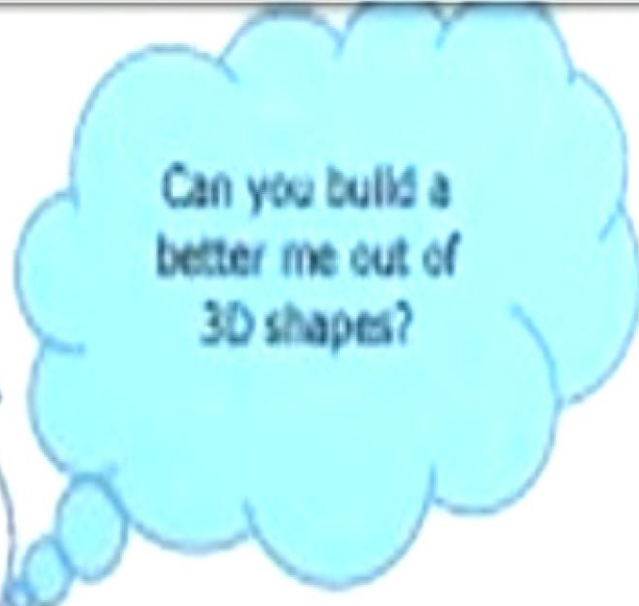
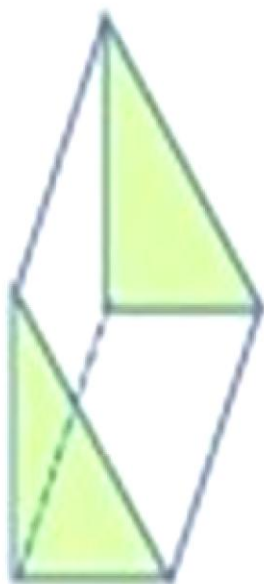
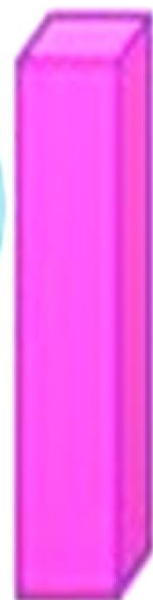
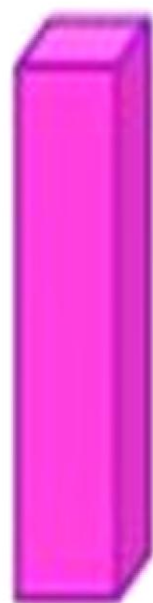
Surface Area = $4 \times \pi \times r^2$



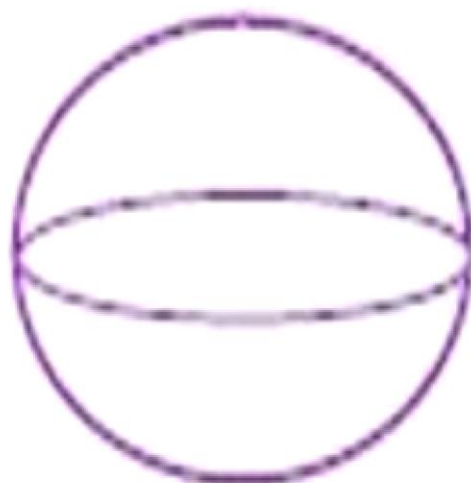
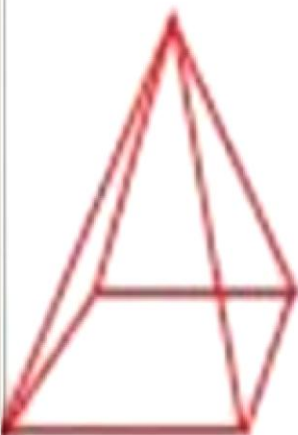
In Nature

The sphere appears in nature when a surface wants to be as small as possible. Examples include bubbles and water drops. Can you think of more?





Can you build a better me out of 3D shapes?



FUN TIME

**CREATING YOUR OWN SANTA CLAUS THIS CHRISTMAS
AND CALCULATING THE AMOUNT OF MATERIAL USED
IN MAKING IT . (USING DIFFERENT METHODS OF
FINDING OUT AREA OF REGULAR AND IRREGULAR
SURFACES)**



The LENGTH AND BREADTH OF RECTANGULAR HALL IN A MODEL ARE 0.4m AND 30 cm RESPECTIVELY. WHAT IS THE DISTANCE BETWEEN THE OPPOSITE CORNERS OF THE WALL IN THE MODEL ?



THE LENGTH OF A ROOM IS 50% MORE THAN ITS BREADTH. THE COST OF CARPETING THE ROOM AT THE RATE OF Rs.38.50 m² IS Rs. 924 AND THE COST OF PAPERING THE WALLS Rs. 3.30 m² IS Rs. 214.50. IF THE ROOM HAS ONE DOOR OF DIMESNIONS 1 mx1.5m, FIND THE DIMESNIONS OF THE ROOM .



SQUARES EACH OF SIDE 6CM ARE CUT OFF FROM THE FOUR COMERS OF A SHEET OF TIN MEASURING 42 CM BY 30CM. THE REMAINING PORTION OF THE TIN SHEET IS MADE INTO AN OPEN BOX BY FOLDING UP THE FLAPS. FIND THE CAPACITY OF THE BOX.





Aryan is celebrating his birthday party. His sister made birthday caps for him and his friends, The radius of cap is 14 cm and slant height is 35 cm. How much sheet will be required to make 20 such caps.

Measured Sizes

Use a Measuring Cup to measure how many milliliters (ml) fit into each of your cups or glasses.



A measuring cup showing 150ml

Pouring a cup into a measuring cup.



What if the cup is larger than the measuring cup?