

MINISTRY OF EDUCATION
SECONDARY ENGAGEMENT PROGRAMME
CHRISTMAS TERM 2020/2021

GRADE 9

SUBJECT: MATHEMATICS

WEEK 8

Lesson #1

Topic: Measurement

Sub-Topic: Volume of solids

Objective:

Students will:

- ✓ Show interest in calculating the volume of solids.

Content:

Volume of Solids:

Volume is the quantity of three-dimensional space enclosed by a closed surface, for example, the space that a substance (solid, liquid, gas, or plasma) or shape occupies or contains.

Cube: A cube is a prism with squares for sides and faces.

- It has 6 Faces.
- Each face has 4 edges, and is actually a square.
- It has 12 Edges.

It has 8 Vertices (corner points) and at each vertex 3 edges meet.

The volume of a cube is found by multiplying the length thrice.

Volume of cube = length³ / $V = L^3$

Example: find the volume of a cube with length 2 cm.

$$V = 2^3$$

$$V = 2 * 2 * 2$$

$$V = 8\text{cm}^3$$

Cuboid: A cuboid is a prism with rectangular faces.

- It has six flat sides and all angles are right angles.
- All of its faces are rectangles.
- It is also a prism because it has the same cross-section along a length.
- In fact it is a rectangular prism.

Volume of a cuboid = length * breadth * height

Example: Given the length of a cuboid as 6cm, breadth as 2cm and height as 3cm, find the volume of such cuboid.

$$V = 6\text{cm} * 2\text{cm} * 3\text{cm}$$

$$V = 36\text{cm}^3$$

Cone

Surface Area

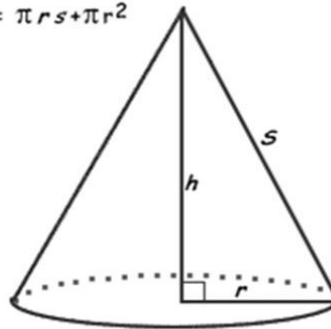
We will need to calculate the surface area of the cone and the base.

Area of the cone is $\pi r s$

Area of the base is πr^2

Therefore the Formula is:

$$SA = \pi r s + \pi r^2$$



Volume

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

Cylinder

Surface Area

We will need to calculate the surface area of the top, base and sides.

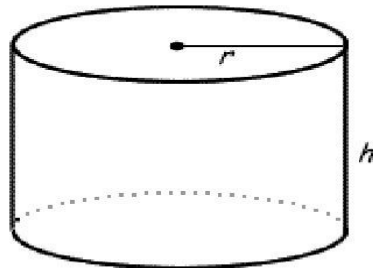
Area of the top is πr^2

Area of the bottom is πr^2

Area of the side is $2\pi r h$

Therefore the Formula is:

$$A = 2\pi r^2 + 2\pi r h$$



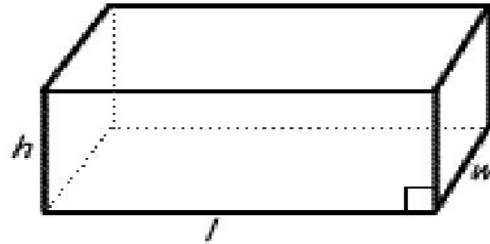
Volume

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

Rectangular Prism

Surface Area

$$A = 2 (wh + lw + lh)$$



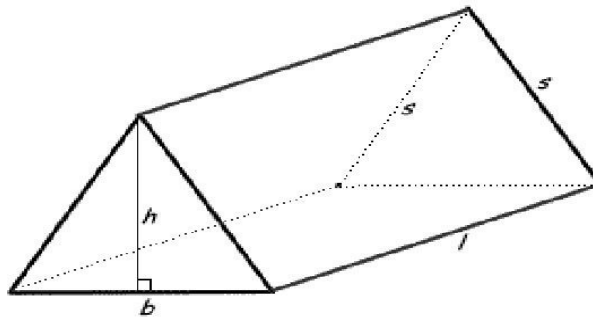
Volume

$$V = lwh$$

Isosceles Triangular Prism

Surface Area

$$A = bh + 2ls + lb$$

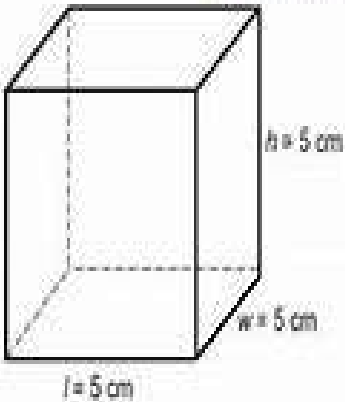


Volume $V = \frac{1}{2} (bh) l$

Example 1: $V = A \times H$

Volume of Rectangular Prisms

Volume (V) = length (l) \times width (w) \times height (h)

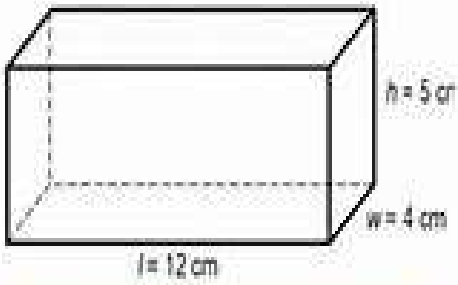


$l = 5 \text{ cm}$

$h = 5 \text{ cm}$

$w = 5 \text{ cm}$

Volume (V) = $5 \text{ cm} \times 5 \text{ cm} \times 5 \text{ cm} = 125 \text{ cm}^3$



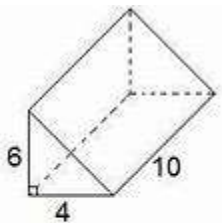
$l = 12 \text{ cm}$

$h = 5 \text{ cm}$

$w = 4 \text{ cm}$

Volume (V) = $12 \text{ cm} \times 4 \text{ cm} \times 5 \text{ cm} = 240 \text{ cm}^3$

Example 2:

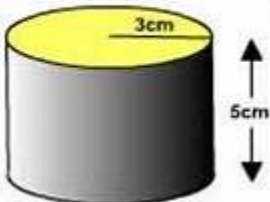


The volume = area \times height

$$= \frac{1}{2} \times 4 \times 6 \times 10$$
$$= 120 \text{ cm}^3$$

Example 3:

Volume of cylinders



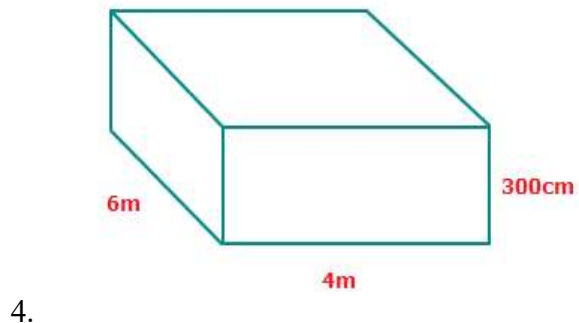
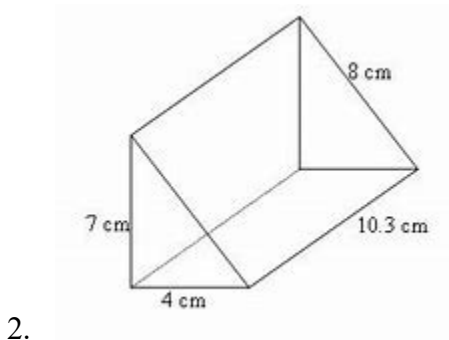
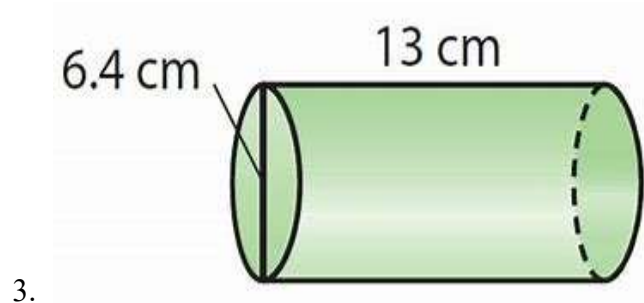
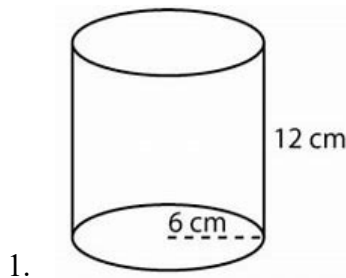
Volume = $\pi r^2 h$

$$= \pi \times 3^2 \times 5$$
$$= \pi \times 9 \times 5$$
$$= 141.37 \text{ cm}^3$$

Review

Exercise:

Calculate the volume for each of the following:



Solution:

1. 1357.71cm^3 .
2. 418.377cm^3
3. 144.2cm^3
4. 72cm^3

Reference:

<https://www.thoughtco.com/surface-area-and-volume-2312247>