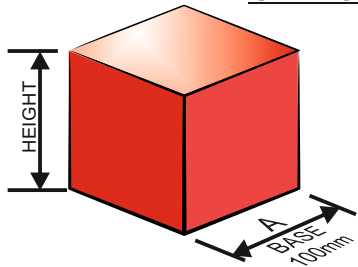


# MATHEMATICS - VOLUMES - REVISION CARDS

## HOW TO CALCULATE THE VOLUME OF A CUBE



**DEFINITION:** A cube is a solid object, composed of six equal squares, with a 90 degree angle between adjacent sides.

All the sides of a cube are the same measurement. There are two similar formulas for calculating a cube's volume.

$$\text{VOLUME (V)} = A \times A \times A$$

$$\text{OR } A^3$$

### EXAMPLE 1

If the measurement of one side is 100mm:

$$\text{VOLUME} = 100\text{mm} \times 100\text{mm} \times 100\text{mm}$$

$$\text{VOLUME} = 1000000\text{mm}^3 \text{ or } 1000\text{cm}^3$$

### EXAMPLE 2

If the measurement of one side is 320mm:

$$\text{VOLUME} = 320\text{mm} \times 320\text{mm} \times 320\text{mm}$$

$$\text{VOLUME} = 32768000\text{mm}^3 \text{ or } 32768\text{cm}^3$$

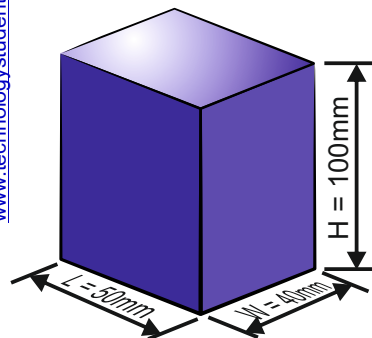
## HOW TO CALCULATE THE VOLUME OF A RECTANGULAR PRISM

**DEFINITION:** A rectangular prism is a solid object, composed of six rectangles, with a 90 degree angle between adjacent sides. Opposite sides of a rectangular prism are equal and parallel.

Unlike a cube, the area of the sides of a rectangular prism / cuboid are not the same, consequently the formula for calculating the volume is as follows:

$$\text{VOLUME} = \text{LENGTH} \times \text{WIDTH} \times \text{HEIGHT}$$

$$V = L \times W \times H$$



**EXAMPLE:** What is the volume of the rectangular prism shown opposite?

$$V = L \times W \times H$$

$$V = 50 \times 40 \times 100$$

$$V = 200000\text{mm}^3$$

or

$$V = 200\text{cm}^3$$

## HOW TO CALCULATE THE VOLUME OF A CYLINDER

**DEFINITION:** A three dimensional geometrical shape, that has a circle at each end of a single curved surface.

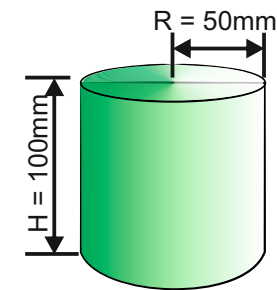
$$\text{FIRST, AREA OF A CIRCLE} = \pi \times R^2$$

$$\text{CIRCUMFERENCE} = 2 \times \pi \times R$$

In order to calculate the volume of a cylinder, the height and radius of the circular top /bottom must be known. The following formula is used to calculate the volume.

$$\pi (\text{pi}) = 3.14 \quad v = \pi r^2 h$$

$$\text{volume (v)} = \text{pi} \times \text{radius}^2 \times \text{height}$$



$$v = 3.14 \times 50\text{mm} \times 50\text{mm} \times 100\text{mm}$$

$$v = 785000\text{mm}^3$$

or

$$v = 785\text{cm}^3$$

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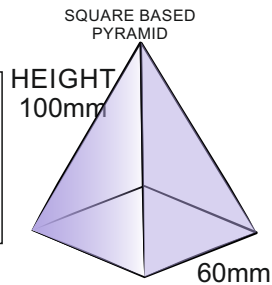
## HOW TO CALCULATE THE VOLUME OF A REGULAR SQUARE PYRAMID

**DEFINITION:** A Regular Square Pyramid has a square base with triangular sides. The apex (highest point), is in line with the centre of the square base.

### FORMULA

$$\text{Volume} = \frac{1}{3} \times \text{Base} \times \text{Height}$$

$$V = \frac{1}{3} \times B \times H$$



### CALCULATE THE AREA OF BASE FIRST

$$\text{AREA OF BASE} = \text{LENGTH}^2$$

$$\text{AREA OF BASE} = 60\text{mm} \times 60\text{mm} = 3600\text{mm}^2$$

### THEN APPLY THE FOLLOWING FORMULA

$$\text{Volume} = \frac{1}{3} \times \text{Base} \times \text{Height}$$

$$V = \frac{1}{3} \times 3600\text{mm} \times 100\text{mm}$$

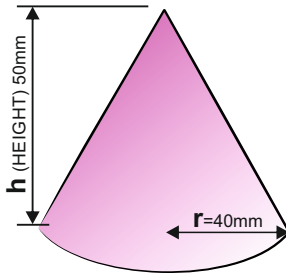
$$V = \frac{1}{3} \times 360000\text{mm}$$

$$V = \frac{360000\text{mm}}{3} = 120000\text{mm}^3$$

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## HOW TO CALCULATE THE VOLUME OF A CONE

**DEFINITION:** A cone has one surface with a circular base. The vertex is directly above the centre of the circular base.



### FORMULA

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

$$\text{the same as } v = \frac{\pi r^2 h}{3}$$

pi ( $\pi$ ) is 3.14

If the height (h) is 50mm and the radius is 40mm

Then:

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

$$v = \frac{1}{3} \times 3.14 \times (40 \times 40) \times 50$$

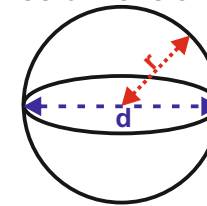
$$v = \frac{1}{3} \times 251200$$

$$v = \frac{25177}{3} = 83733.33\text{mm}^3$$

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## HOW TO CALCULATE THE VOLUME OF A SPHERE

**DEFINITION:** A sphere is an object that is absolutely symmetrical about its centre. From any angle it appears to be a circle, but it is a true three dimensional object.



### FORMULA

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

### EXAMPLE CALCULATION

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

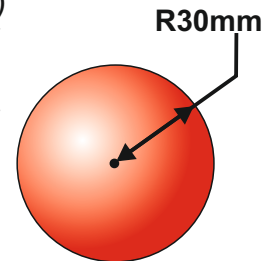
$$v = \frac{4}{3} \times \frac{3.14 \times (30 \times 30 \times 30)}{1}$$

$$v = \frac{4}{3} \times \frac{3.14 \times (27000)}{1}$$

$$v = \frac{4}{3} \times \frac{84780}{1}$$

$$v = \frac{339120}{3}$$

$$v = 113040\text{mm}^3$$



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