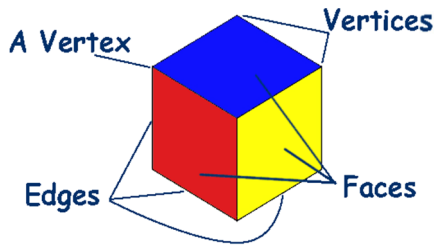


1. Keywords

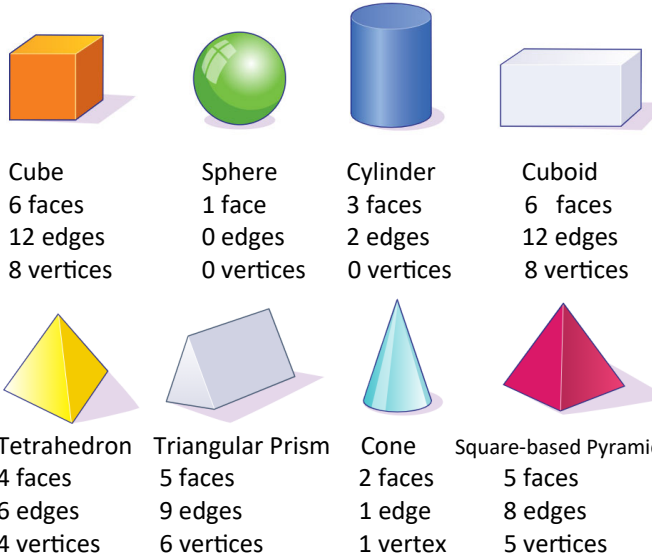


Face: the flat surface of a 3D shape

Edge: the sides where faces come together

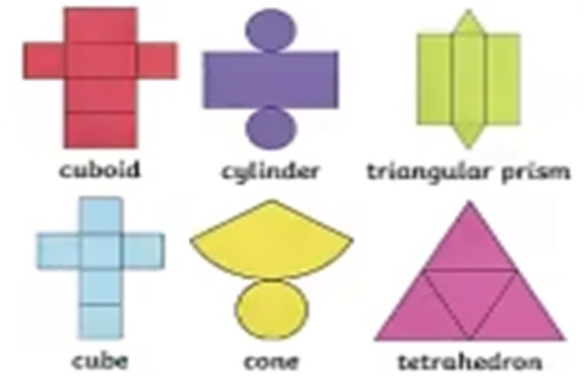
Vertex: the point where edges meet

2. Properties of 3D shapes



3. Nets

The **net** of a **3D shape** is what it looks like if it is opened out flat.



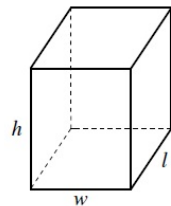
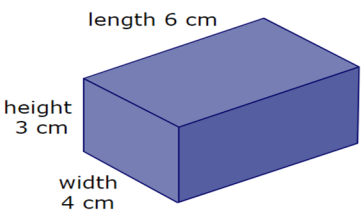
Maths, Y8 - 3D Shapes

5. Volume

Volume is a measure of the **amount of space there is inside a 3D object**.

A. Volume of Cubes and Cuboids

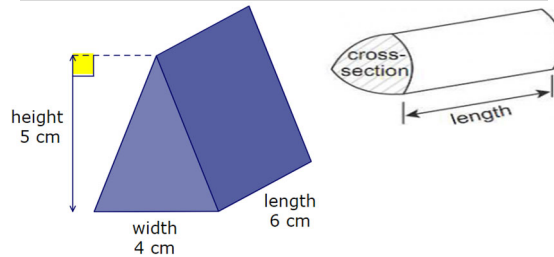
$$\text{Volume} = l \times w \times h$$



$$V = 6 \times 4 \times 3 = 72 \text{ cm}^3$$

B. Volume of a Prism

$$\text{Volume} = \text{area of cross section} \times \text{length}$$



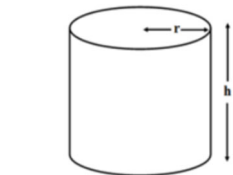
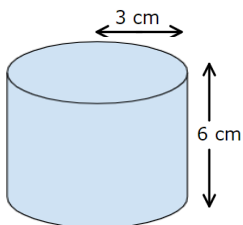
The cross-section is a triangle.

$$\begin{aligned} \text{area} &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times 4 \text{ cm} \times 5 \text{ cm} \\ &= \frac{1}{2} \times 20 \text{ cm}^2 \\ &= 10 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{volume} &= 10 \text{ cm}^2 \times 6 \\ &= 60 \text{ cm}^3 \end{aligned}$$

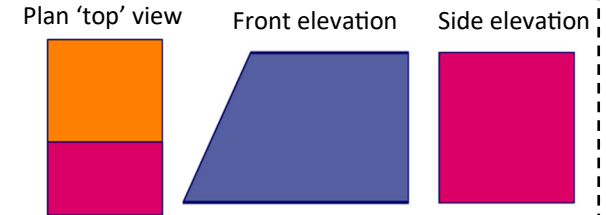
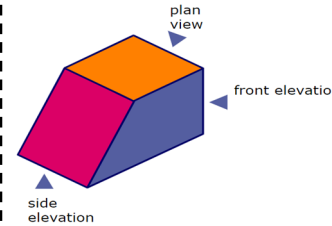
C. Volume of Cylinders

$$\text{Volume} = \pi r^2 h$$



$$\begin{aligned} V &= \pi r^2 h \\ &= \pi \times 3^2 \times 6 \\ &= 54\pi \\ &= 169.65 \text{ cm}^3 \end{aligned}$$

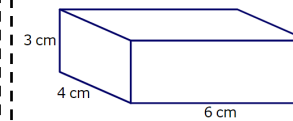
4. Plans and Elevations



6. Surface Area

Surface area is the **total sum** of the **areas of all of the faces** of a 3D shape.

A. Surface area of a cuboid



Find the surface area of this cuboid.

first pair: Top & bottom

$$\begin{aligned} 6 \times 4 &= 24 \text{ cm}^2 \\ 2 \times 24 &= 48 \text{ cm}^2 \end{aligned}$$

second pair: Sides

$$\begin{aligned} 3 \times 4 &= 12 \text{ cm}^2 \\ 2 \times 12 &= 24 \text{ cm}^2 \end{aligned}$$

third pair: Front & back

$$\begin{aligned} 6 \times 3 &= 18 \text{ cm}^2 \\ 2 \times 18 &= 36 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{surface area} &= 48 + 24 + 36 \\ &= 108 \text{ cm}^2 \end{aligned}$$

B. Surface area of a prism

triangle faces:

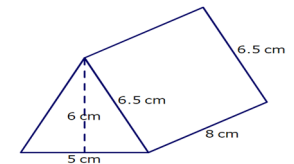
$$\begin{aligned} \frac{1}{2} \times 5 \times 6 &= 15 \text{ cm}^2 \\ 2 \times 15 &= 30 \text{ cm}^2 \end{aligned}$$

outer rectangle faces:

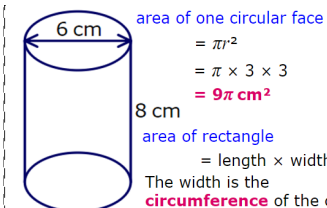
$$\begin{aligned} 8 \times 6.5 &= 52 \text{ cm}^2 \\ 2 \times 52 &= 104 \text{ cm}^2 \end{aligned}$$

Base, a rectangle face:

$$5 \times 8 = 40 \text{ cm}^2 \quad \text{surface area} = 30 + 104 + 40 = 174 \text{ cm}^2$$



C. Surface area of a cylinder



area of one circular face

$$\begin{aligned} &= \pi r^2 \\ &= \pi \times 3 \times 3 \\ &= 9\pi \text{ cm}^2 \end{aligned}$$

area of rectangle

$$\begin{aligned} &= \text{length} \times \text{width} \\ &= 8 \times 6 \\ &= 48\pi \text{ cm}^2 \end{aligned}$$

The width is the circumference of the circle.

$$\begin{aligned} &= \pi \times d \\ &= \pi \times 6 \\ &= 6\pi \text{ cm} \end{aligned}$$

area of rectangle

$$\begin{aligned} &= 8 \times 6\pi \\ &= 48\pi \text{ cm}^2 \end{aligned}$$

total surface area

$$\begin{aligned} &= 2 \text{ circles and rectangle} \\ &= 2 \times 9\pi \text{ cm}^2 + 48\pi \text{ cm}^2 \\ &= 207 \text{ cm}^2 \end{aligned}$$

(to the nearest cm²)