

Key definitions

Area=the amount of space inside a 2D shape

Surface area=the area of all the faces of a 3D shape added together

Volume=the amount of space inside a solid



Year 10 foundation topic 17 Perimeter, area and volume

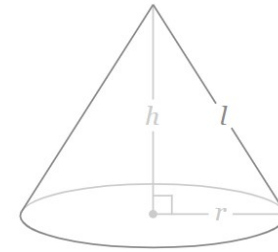
What careers would use these skills?

Gardeners, builders, architects, decorator, farmer, carpet fitter, engineer.

Volume of a cone

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

(h is the vertical height)



Surface area of a cone

Curved surface area = $\pi r l$

(l is the slant height)

$$\text{Total SA} = \pi r l + \pi r^2$$

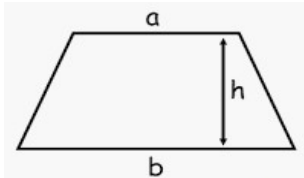
Area of rectangles, triangles, parallelograms, trapezium and circles

Rectangle = length x width

Triangle = $\frac{\text{base} \times \text{height}}{2}$

Parallelogram = base x perpendicular height

Trapezium = $\frac{1}{2} (a+b) h$

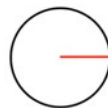


Area of a circle

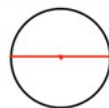
$$A = \pi r^2$$

Circumference of a circle

$$C = \pi d$$



Radius



Diameter

Volume of a cylinder

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

Surface area of a cylinder

Curved SA = $\pi d h$

$$\text{Total surface area} = 2 \pi r^2 + \pi d h$$

Surface area of a sphere

$$SA = 4 \pi r^2$$

SA of a hemisphere

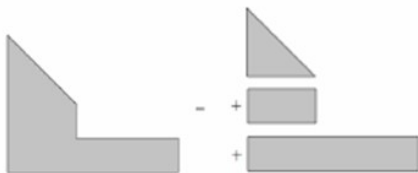
1. Find the surface area of the sphere
2. Half it
3. Add on the circle



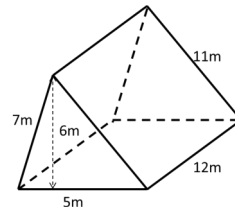
Area of compound shapes

Split your shape into smaller shapes that are easier to calculate. Calculate them separately and then add them together.

Eg. Split this shape into two rectangles and a triangle.



Triangular prism surface area



$$\begin{aligned} \text{Area of Triangles} &= \frac{1}{2} \times 5 \times 6 \\ &= 15\text{m}^2 \\ &= 15 \times 2 \\ &= 30\text{m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of Rectangle 1} &= 12 \times 11 \\ &= 132\text{m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of Rectangle 2} &= 5 \times 12 \\ &= 60\text{m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of Rectangle 3} &= 12 \times 7 \\ &= 84\text{m}^2 \end{aligned}$$

$$\begin{aligned} \text{Total Surface Area} &= 30 + 132 + 60 + 84 \\ &= 306\text{m}^2 \end{aligned}$$

Triangular prism volume

Example 1

$$\begin{aligned} \text{Area of triangle} &= \frac{1}{2} \times 8 \times 6 \\ &= \frac{1}{2} \times 48 \\ &= 24\text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Volume} &= \text{area} \times \text{length} \\ &= 24 \times 7 \\ &= 168\text{ cm}^3 \end{aligned}$$

