

# Area and Volume

You will be able to

- use the correct unit for different measurements.
- use formula to find the area of shapes.
- find the volume of a prism.



**Remember:** The perimeter of a shape is a measure of **distance** around the outside.



The **area** of a shape is a measure of the **surface/space** contained within its **perimeter**.

## Units of distance

mm

cm

m

km

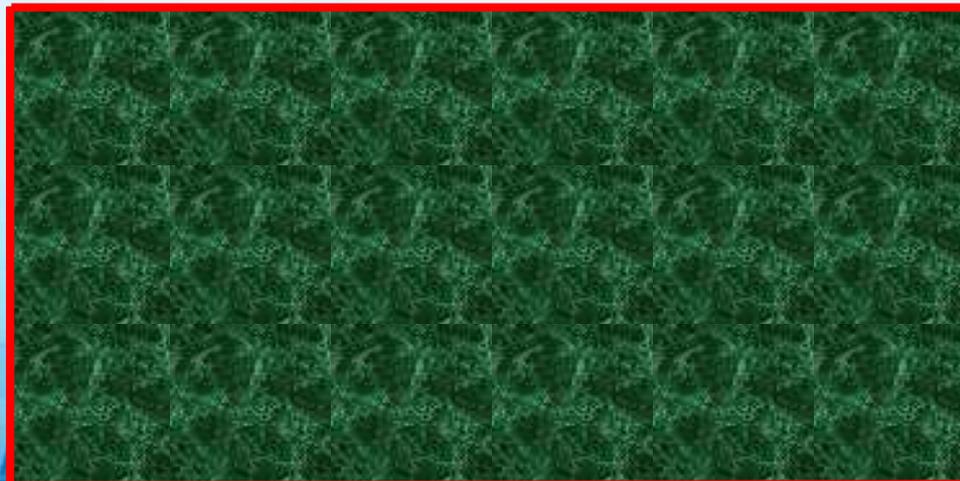
inches

feet

yards

miles

Area is measured in units<sup>2</sup>



## Units of area

mm<sup>2</sup>

cm<sup>2</sup>

m<sup>2</sup>

km<sup>2</sup>

inches<sup>2</sup>

feet<sup>2</sup>

yards<sup>2</sup>

miles<sup>2</sup>

Metric

Metric

Imperial

Imperial



Remember: The perimeter of a shape is a measure of **distance** around the outside.



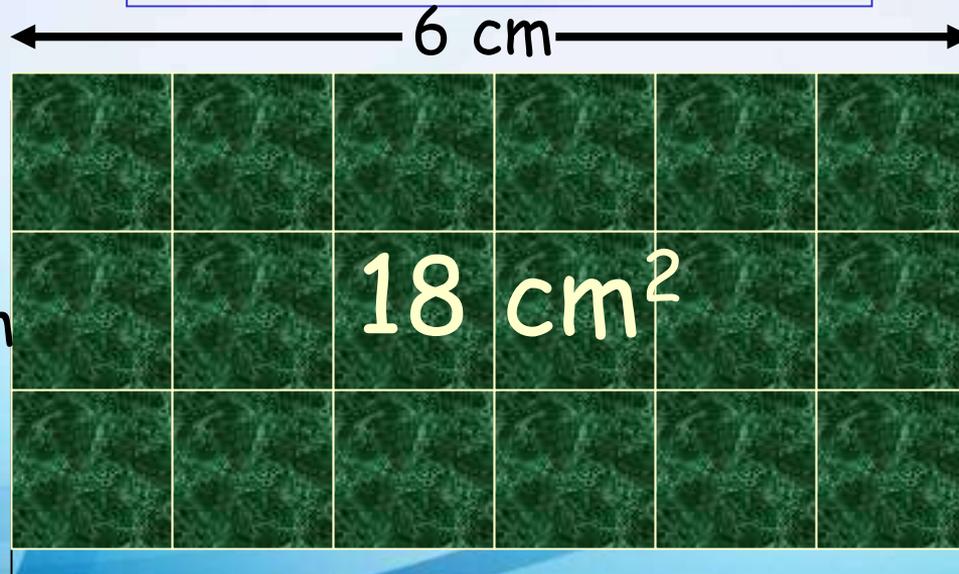
The **area** of a shape is a measure of the **surface/space** contained within its **perimeter**.

### Units of distance

Area is measured in units<sup>2</sup>

### Units of area

- Metric
- mm
  - cm
  - m
  - km
- Imperial
- inches
  - feet
  - yards
  - miles

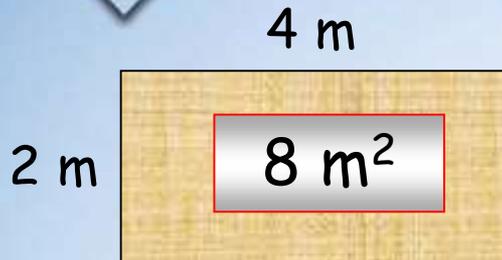


Area = 6 cm x 3 cm = 18 cm<sup>2</sup>

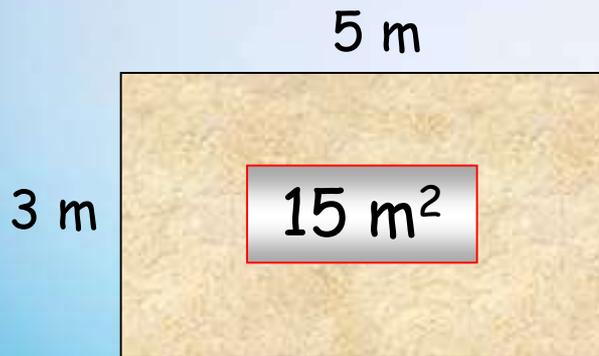
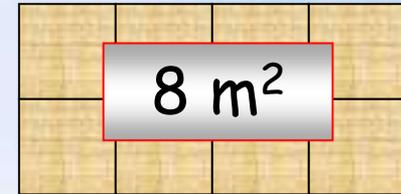
- mm<sup>2</sup>
  - cm<sup>2</sup>
  - m<sup>2</sup>
  - km<sup>2</sup>
  - inches<sup>2</sup>
  - feet<sup>2</sup>
  - yards<sup>2</sup>
  - miles<sup>2</sup>
- Metric
- Imperial



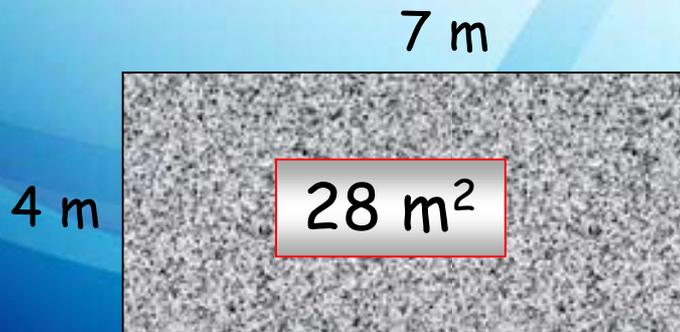
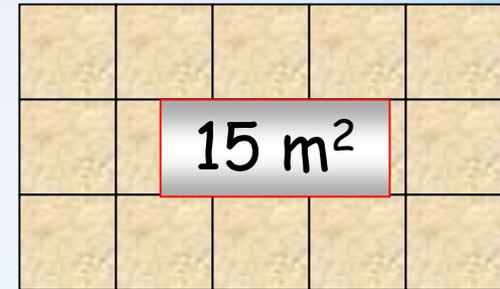
## Area



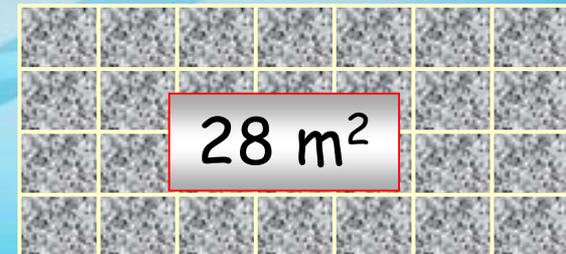
2 rows of 4 or  
4 columns of 2  
2 × 4 or 4 × 2



3 rows of 5 or  
5 columns of 3  
3 × 5 or 5 × 3



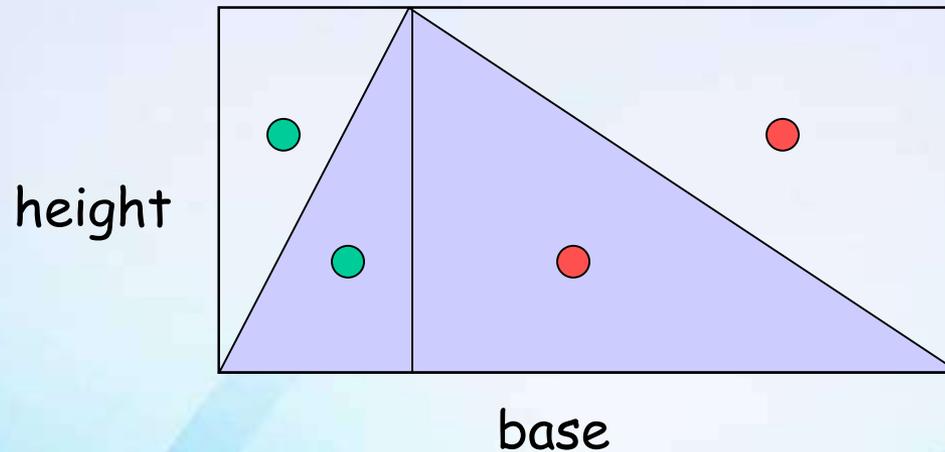
4 rows of 7 or  
7 columns of 4  
4 × 7 or 7 × 4





## Area of a Triangle

The area of a triangle =  $\frac{1}{2}$  the area of the surrounding rectangle/parallelogram



$$\text{rectangle area} = 2\text{●} + 2\text{●}$$

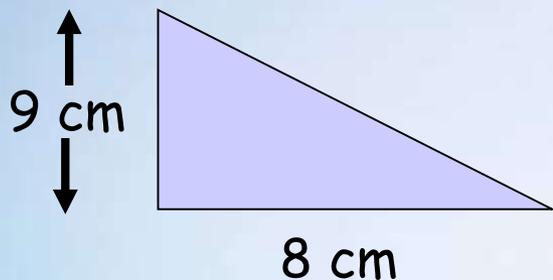
$$\text{triangle area} = \frac{1}{2} \text{rectangle area}$$

$$\text{Area of a triangle} = \frac{1}{2} \text{base} \times \text{height}$$

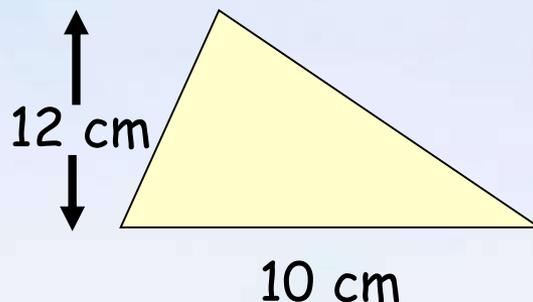


Find the area of the following triangles.

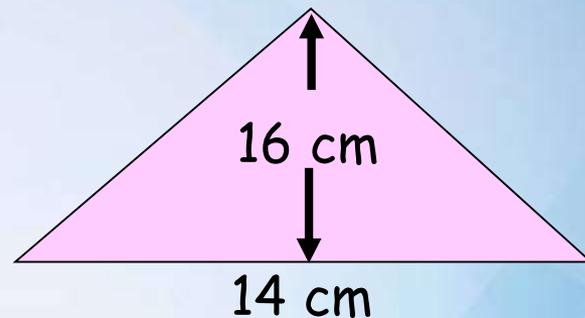
$$\text{Area} = \frac{1}{2} b \times h$$



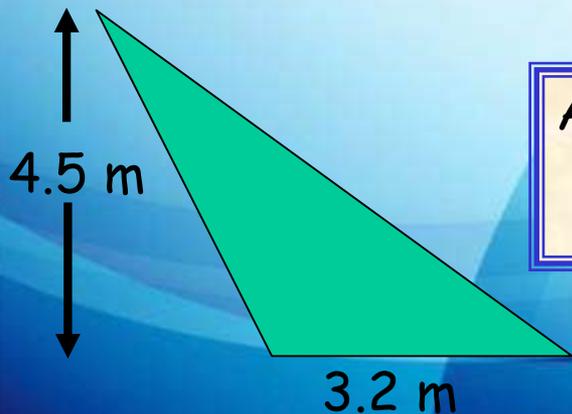
$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 8 \times 9 \\ &= 36 \text{ cm}^2 \end{aligned}$$



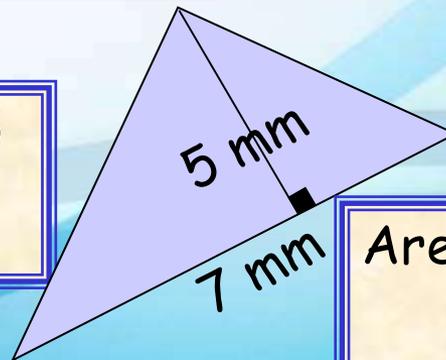
$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 10 \times 12 \\ &= 60 \text{ cm}^2 \end{aligned}$$



$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 14 \times 16 \\ &= 112 \text{ cm}^2 \end{aligned}$$



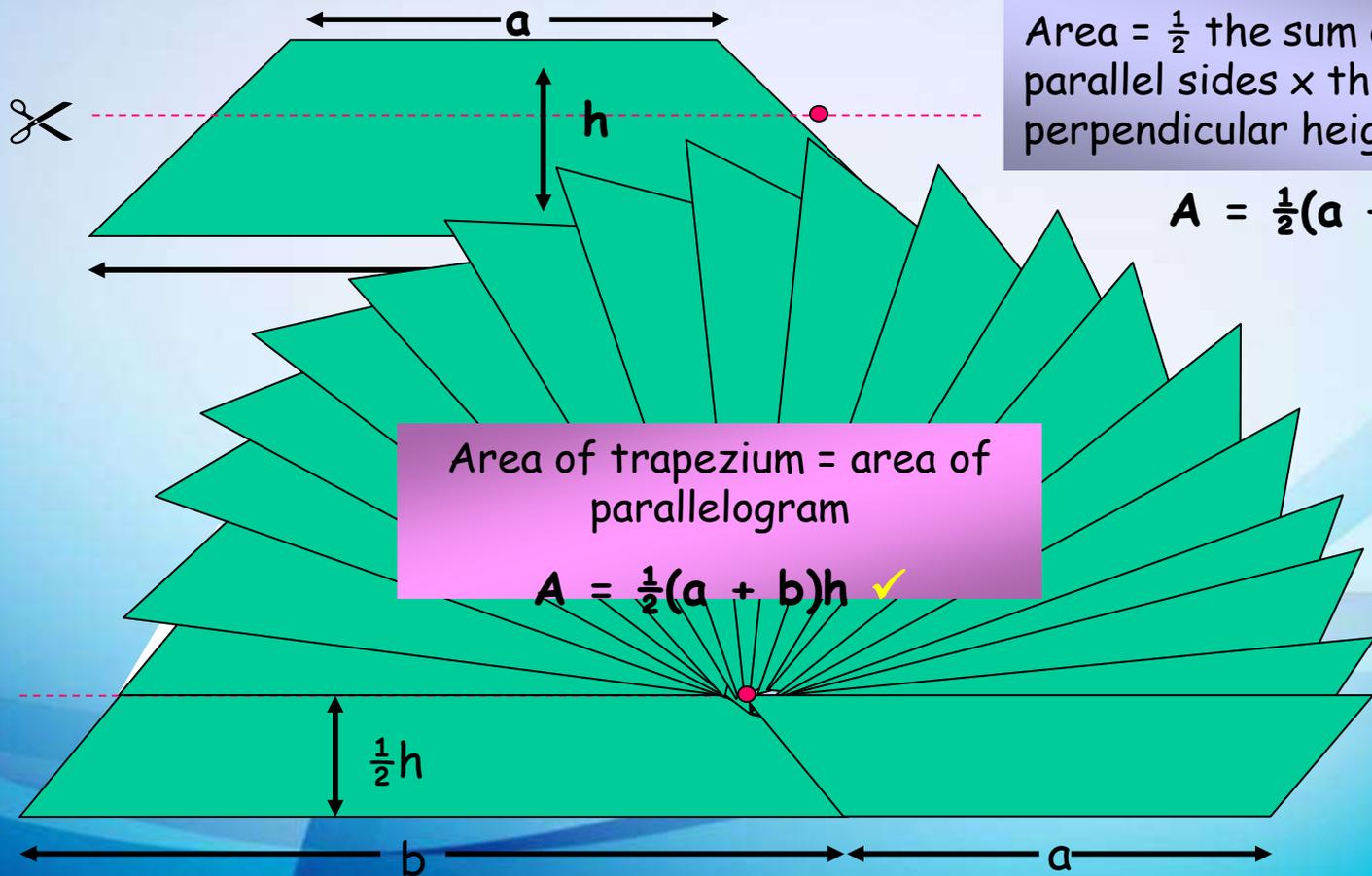
$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 3.2 \times 4.5 \\ &= 7.2 \text{ m}^2 \end{aligned}$$



$$\begin{aligned} \text{Area} &= \frac{1}{2} \times 7 \times 5 \\ &= 17.5 \text{ mm}^2 \end{aligned}$$



## The Area of a Trapezium



Area =  $\frac{1}{2}$  the sum of the parallel sides  $\times$  the perpendicular height

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

Area of trapezium = area of parallelogram

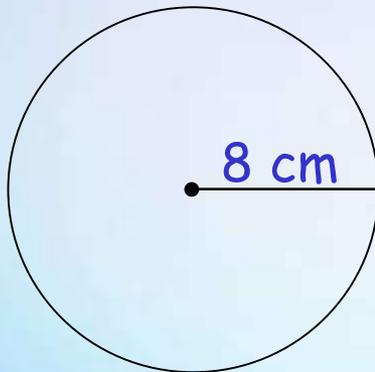
$$A = \frac{1}{2}(a + b)h \checkmark$$



## The Area of a Circle

Find the area of the following circles.

1

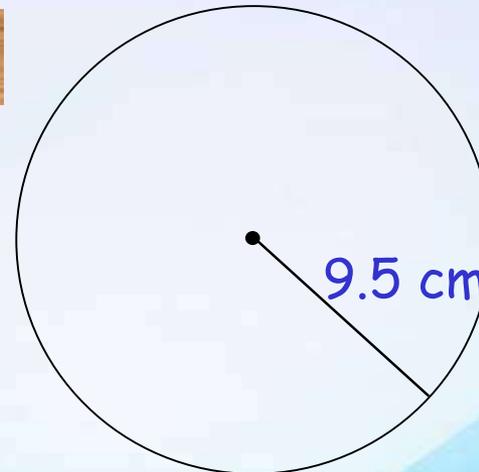


$$A = \pi r^2$$

$$A = \pi \times 8^2$$

$$A = \underline{201.1 \text{ cm}^2} \text{ (1 dp)}$$

2



$$A = \pi r^2$$

$$A = \pi \times 9.5^2$$

$$A = \underline{283.5 \text{ cm}^2} \text{ (1 dp)}$$

A purple circle with a center point. A radius line is drawn from the center to the circumference. The formula  $A = \pi r^2$  is written inside the circle.



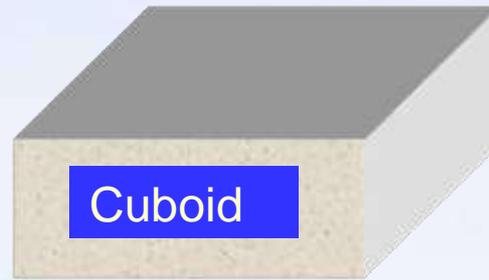
## Volume of a Prism

### Remember:

Prisms are 3 dimensional shapes that have a constant cross-sectional area.

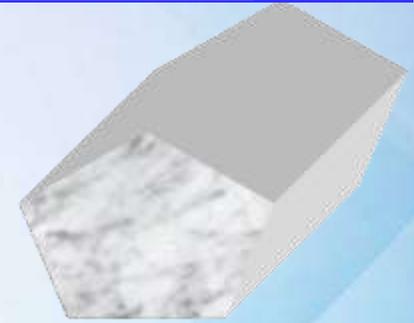


Triangular-based prism

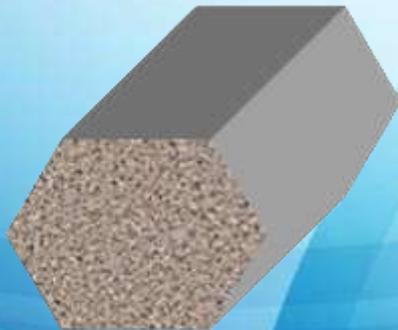


Cuboid

Rectangular-based prism



Pentagonal-based prism

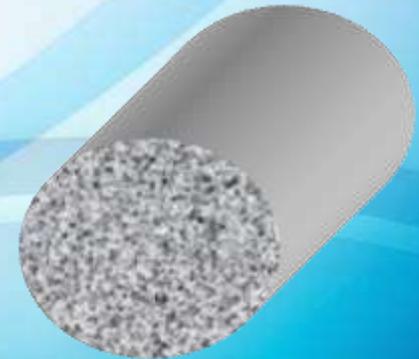


Hexagonal-based prism



Cylinder

Octagonal-based prism



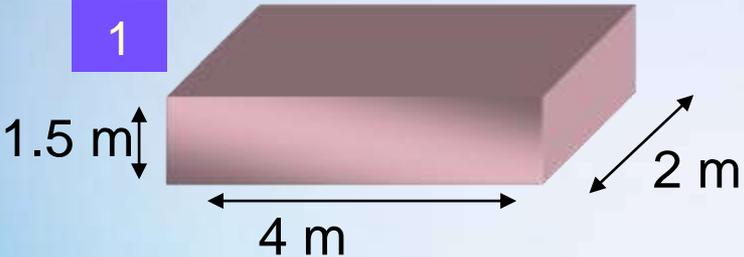
Circular-based prism



## Find the volume of the following prisms.

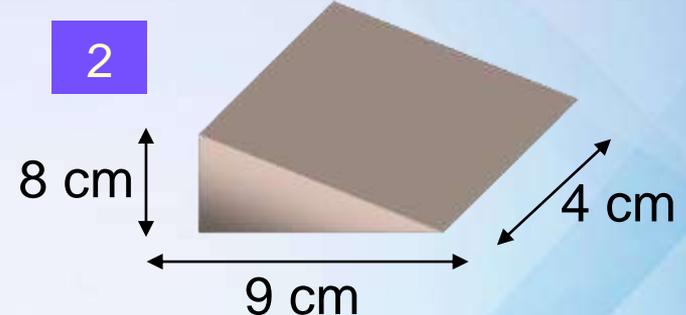
In each of the following examples the cross-sectional ends have to be calculated.

1



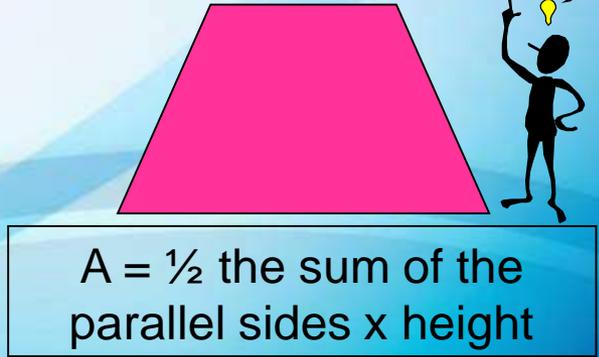
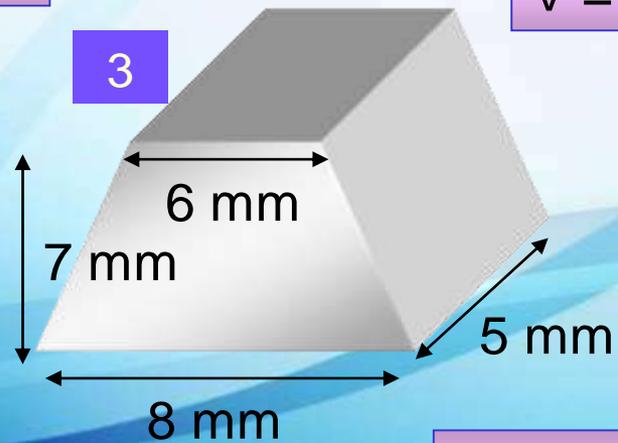
$$V = 4 \times 1.5 \times 2 = 12 \text{ m}^3$$

2



$$V = \frac{1}{2} (9 \times 8) \times 4 = 144 \text{ cm}^3$$

3



$A = \frac{1}{2}$  the sum of the parallel sides  $\times$  height

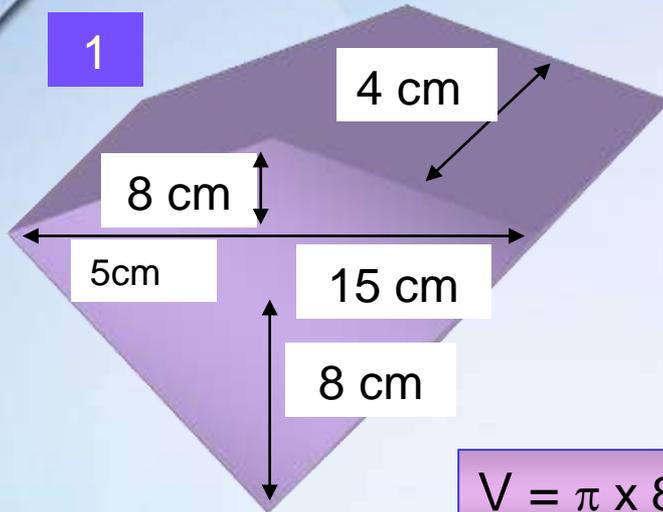
$$V = \frac{1}{2} (8 + 6) \times 7 \times 5 = 245 \text{ mm}^3$$



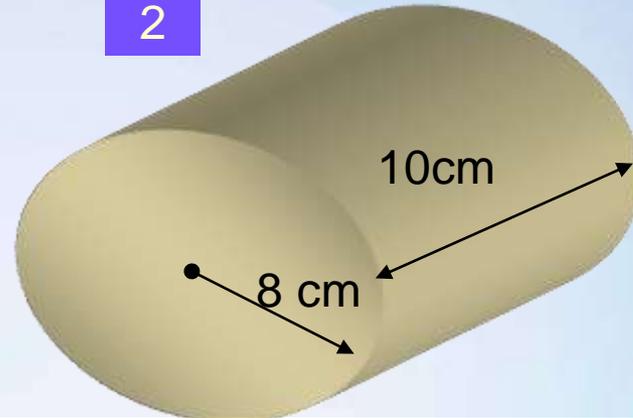
Remember:  $A = \frac{1}{2}$  base  $\times$  height



1

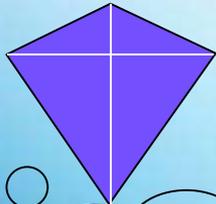


2

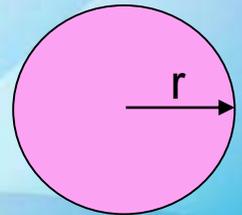


$$V = \pi \times 8^2 \times 10 = 3.142 \times 64 \times 10 = 2010 \text{ cm}^3 \text{ (nearest cm}^3\text{)}$$

$$V = \frac{1}{2} \times 20 \times 16 \times 4 = 640 \text{ cm}^3$$



Remember:  
 $A = \frac{1}{2}$  product of diagonals



Remember:  
Area =  $\pi r^2$

# Remember!

- to write down the units.
- to memorise the formulae.
- to show your working out.



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# The End

## Thanks