

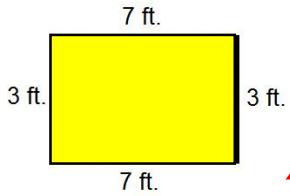


Knowledge Organiser: Perimeter, Area and Volume

What you need to know:

Perimeter

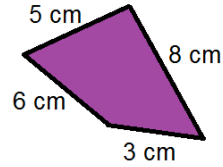
Perimeter: This is the total distance around the outside of the shape.



$$7 + 3 + 7 + 3 = 20$$

The perimeter is 20 feet.

We must remember to include all of the sides.



$$5 + 8 + 3 + 6 = 22$$

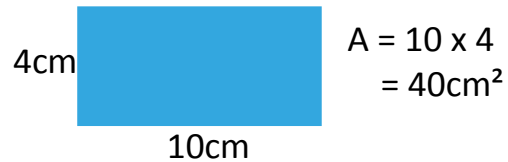
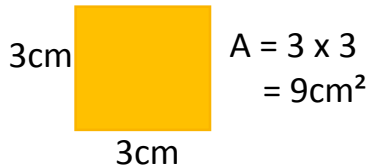
The perimeter is 22 cm.

Area

Area: This is the space that a 2D shape takes up.

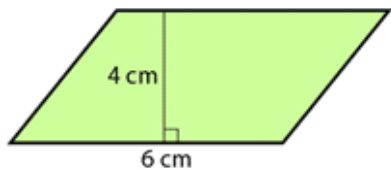
Squares and rectangles:

The formula is the same for both shapes: **A = Length x Width**



Parallelograms:

The formula is similar to a rectangle but instead of width we use the height. **A = Length x Height**



$$A = 6 \times 4 = 24\text{cm}^2$$

Sometimes the length is referred to as the base.

Key Terms:

Perimeter: The total distance around the outside of a shape.

Area: The space inside a 2D shape.

Length: How long a shape is.

Width: How wide a shape is.

Height: How high a shape is.

Base: The bottom of a shape.

Face: The flat part of a 3D solid.

Edge: Where 2 faces meet.

Vertices: Angular points of shapes.

Parallel: Two lines that never meet.

Volume: The amount of space that an object occupies.

Capacity: The amount of space that a liquid occupies.

Prism: A prism is a solid object with identical ends and flat faces. and the same cross section all along its length.

Cross section: A cross section is the shape made by cutting straight across an object.

Hegarty maths clip numbers

Perimeter: 548 - 552

Area: 554 - 559

Volume: 568 - 571, 584, 585

3D solids: 829 - 831



You need to be able to:

- Calculate the perimeter of a shape.
- Calculate the area of a square, rectangle, triangle, parallelogram and trapezium.
- Calculate the area of a compound shape.
- Calculate the surface area of a cube and cuboid.
- Calculate the surface area of a triangular prism.
- Identify the number of faces, edges and vertices of a 3D solid.
- Calculate the volume of a cube or cuboid.
- Calculate the volume of a triangular prism.

Knowledge Organiser: Perimeter, Area and Volume

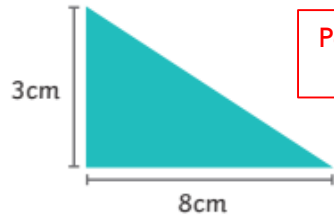
What you need to know:

Area

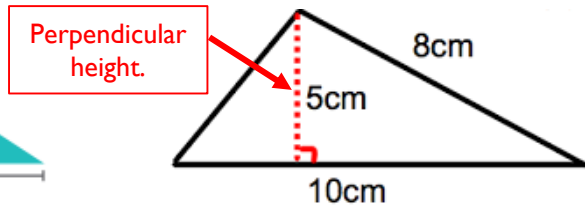
Triangles: To find the area of a triangle we use the following formula:

$$\text{Area} = \frac{\text{Base} \times \text{perpendicular height}}{2}$$

The formula is very similar to a rectangle but we must divide by 2 because a triangle is half the size of a rectangle.



$$\begin{aligned} \text{Area} &= \frac{8 \times 3}{2} \\ &= 12\text{cm}^2 \end{aligned}$$

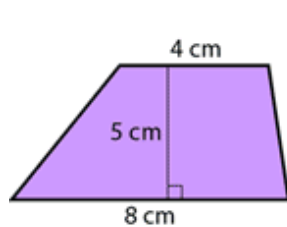


$$\begin{aligned} \text{Area} &= \frac{10 \times 5}{2} \\ &= 25\text{cm}^2 \end{aligned}$$

Trapeziums: To find the area of a trapezium we use the following formula:

$$\text{Area} = \frac{(a+b)}{2} \times h$$

Where a and b are the parallel sides and h is the height.



$$\text{Area} = 4 + 8 = 12$$

$$12 \div 2 = 6$$

$$6 \times 5 = 30\text{cm}^2$$

Add the parallel sides.

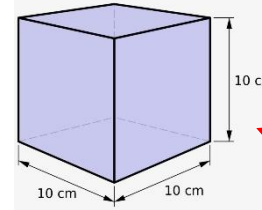
Divide the total by 2.

Multiply by the height.

Surface Area

Surface area: This is the area of all of the faces of a 3D solid added together.

Cubes: Find the area of one of the faces and then multiply by 6. This is because all of the faces of a cube are the same size.

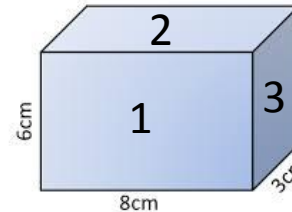


$$\text{Area of 1 face} = 10 \times 10 = 100\text{cm}^2$$

$$\text{Total surface area} = 100 \times 6 = 600\text{cm}^2$$

There are 6 faces with the same area.

Cuboids: They have 3 pairs of faces. We need to find the area of each of the faces we can see, add them together and then double.



$$\text{Face 1} = 8 \times 6 = 48\text{cm}^2$$

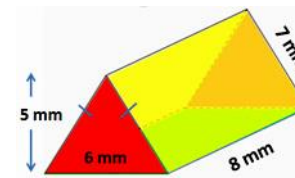
$$\text{Face 2} = 8 \times 3 = 24\text{cm}^2$$

$$\text{Face 3} = 3 \times 6 = 18\text{cm}^2$$

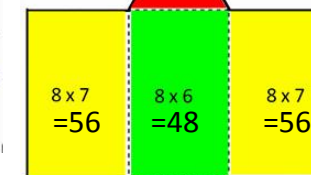
$$\text{Total} = 90\text{cm}^2$$

$$\text{Surface area} = 2 \times 90 = 180\text{cm}^2$$

Triangular prism: They have a pair of triangular sides and 3 rectangular sides



$$\frac{6 \times 5}{2} = 15$$



$$\begin{aligned} \text{Surface area} &= 15 + 15 + 56 + 56 + 48 \\ &= 190\text{mm}^2 \end{aligned}$$










$$\frac{6 \times 5}{2} = 15$$

Find the area of each face and then add together.

Knowledge Organiser: Perimeter, Area and Volume

What you need to know:

3D solids: They have 3 dimensions – length, width and depth. Here are the main 3D solids that you need to be familiar with.

Cube  6 square faces 12 edges 8 vertices	Tetrahedron  4 triangular faces 6 edges 4 vertices	Sphere  1 curved surface 0 edges 0 vertices
Cuboid  6 faces 12 edges 8 vertices	Octahedron  8 faces 12 edges 6 vertices	Triangular prism  5 faces 9 edges 6 vertices
Square-based pyramid  5 faces 8 edges 5 vertices	Cone  1 circular face 1 curved surface 1 curved edge 1 apex	Cylinder  2 circular faces 1 curved surface 2 curved edges 0 vertices

You especially need to know the names of these solids.

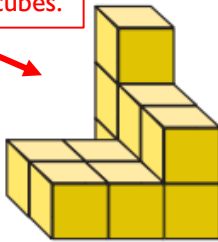
Volume

Volume: This is the amount of space that a 3D object occupies. Sometimes an object is made up of cubes, we can count them to calculate the volume.

This is made up of 11 cubes.

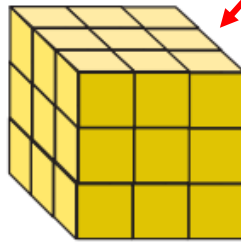


= 1cm³



11cm³

This is made up of 27 cubes.

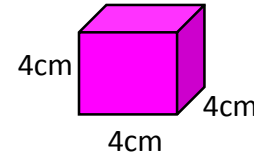


27cm³

This is made up of 1 cube.

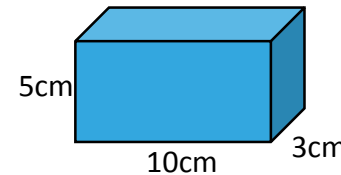
Cubes and cuboids: To calculate the volume of a cube and cuboid we use the following formula:

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height}$$



$$\text{Volume} = 4 \times 4 \times 4 = 64\text{cm}^3$$

The units are cubic for volume.



$$\text{Volume} = 10 \times 3 \times 5 = 150\text{cm}^3$$

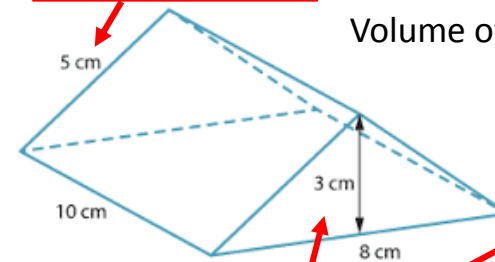
It doesn't matter which order you multiply in.

Prism: A prism is a solid object with identical ends and flat faces.

The general formula for the volume of a prism is:

$$\text{Volume} = \text{Area of the cross section} \times \text{Length}$$

We do not need this.



Volume of triangular prism = Area of a triangle x length

$$\text{Area of triangle} = \frac{3 \times 8}{2} = 12$$

$$\text{Volume} = 12 \times 10 = 120\text{cm}^3$$

Area of the cross section.

Multiply the area of the cross section by 10 which is the length.