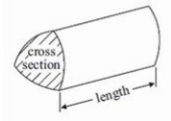
THREE DIMENSIONAL SHAPES

Key Concept

The **volume** of an object is the amount of space that it occupies. It is measured in units cubed e.g. cm^3.

To calculate the volume of any prism we use:

$$area\ of\ cross\ section \times length$$



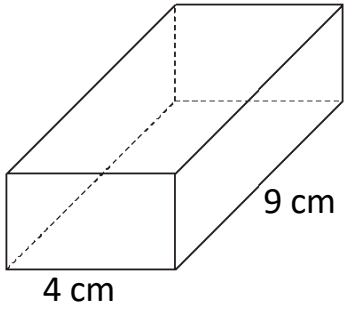
A **prism** is a 3D shape which has a continuous cross-section.

The **surface area** of an object is the sum of the area of all of its faces. It is measured in units squared e.g. cm^2.

Examples

$$\boldsymbol{Volume} = 4 \times 9 \times 2$$

$$= \boldsymbol{72cm^3}$$



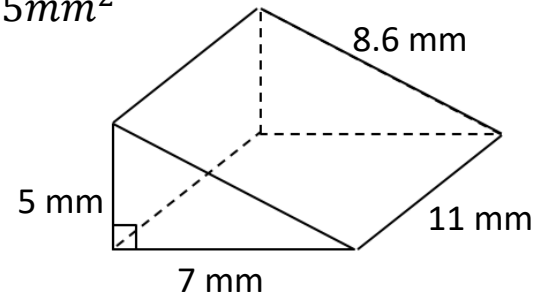
$$\boldsymbol{Surface\ area}:$$
$$Front = 4 \times 2 = 8$$
$$Back = 4 \times 2 = 8$$
$$Side\ 1 = 9 \times 2 = 18$$
$$Side\ 2 = 9 \times 2 = 18$$
$$Bottom = 4 \times 9 = 36$$
$$Top = 4 \times 9 = 36$$
$$Total = \boldsymbol{124cm^2}$$

$$Area\ of\ triangle = \frac{5 \times 7}{2}$$

$$= 17.5mm^2$$

$$\boldsymbol{Volume} = 17.5 \times 11$$

$$= \boldsymbol{192.5mm^3}$$



$$\boldsymbol{Surface\ area}:$$
$$Front = \frac{7 \times 5}{2} = 17.5$$
$$Back = \frac{7 \times 5}{2} = 17.5$$
$$Side = 5 \times 11 = 55$$
$$Bottom = 7 \times 11 = 77$$
$$Top = 11 \times 8.6 = 94.6$$
$$Total = \boldsymbol{261.6cm^2}$$

sparx

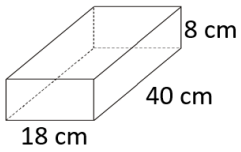
M765, M722, M534, M661, M936

Key Words

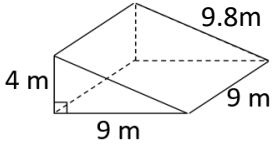
Volume
Capacity
Prism
Surface area
Face

Find the volume and surface area of each of these prisms:

1)



2)

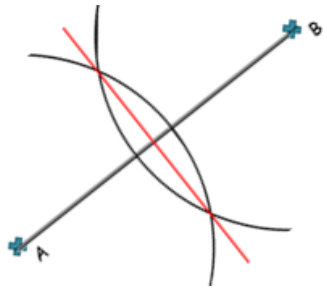


ANSWERS: 1)Volume = 5760 cm^3 Surface area = 2368 cm^2 2) Volume = 162 m^3 Surface area = 241.2m^2

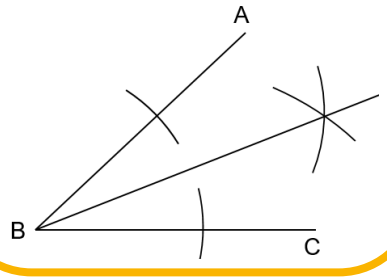
CONSTRUCTIONS

Key Concept

Line Bisector



Angle Bisector



Key Words

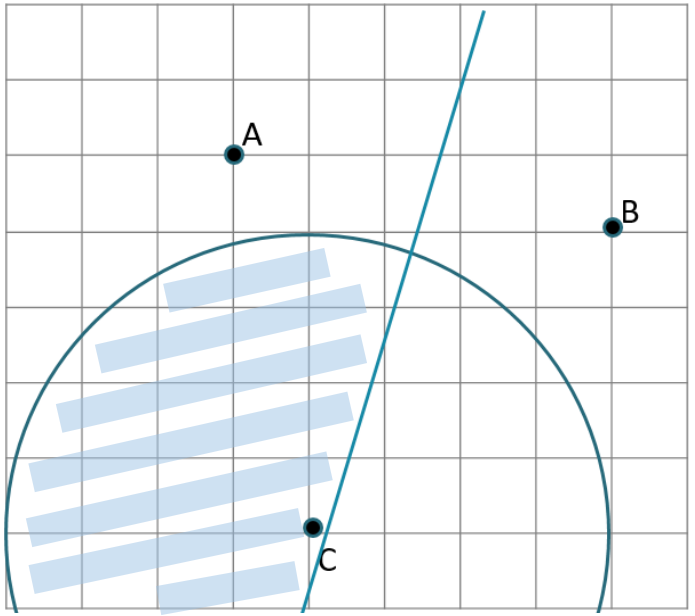
Construction: To draw a shape, line or angle accurately using a compass and ruler.
Loci: Set of points with the same rule.
Parallel: Two lines which never intersect.
Perpendicular: Two lines that intersect at 90°.
Bisect: Divide into two parts.
Equidistant: Equal distance.

Examples

Shade the region that is:
- closer to A than B
- less than 4 cm from C

Line bisector of A and B

Circle with radius 4cm



sparx

M253,U820

Tip

Watch for scales.

For a scale of:
1 cm = 4 km.

20 km = 5 cm
6 cm = 24 km

Questions

1) Draw these angles then bisect them using constructions:
a) 46° b) 18° c) 124°
2) Draw these lines and bisect them: a) 6cm b) 12cm

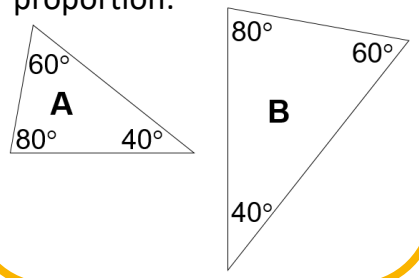
ENLARGEMENT, SIMILARITY & CONGRUENCE

Key Concept

Properties of similar shapes:

- The corresponding angles will be the same if shapes are similar.

- Corresponding edges must remain in proportion.



sparx

U110, U630
M139

Key Words

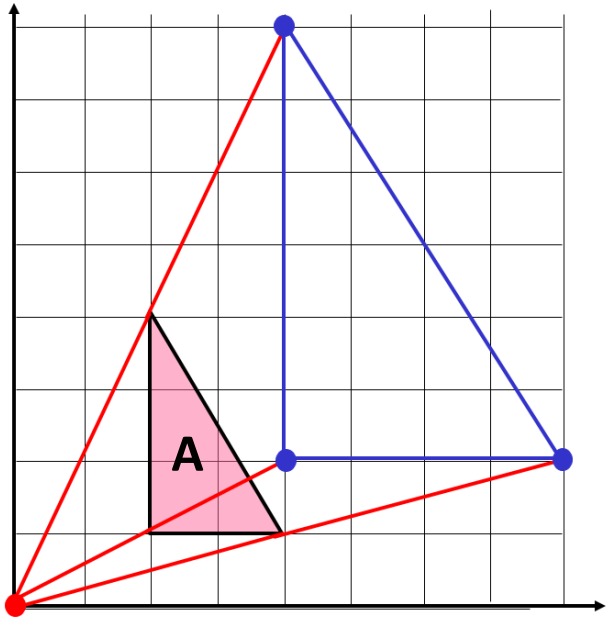
Transformation: This means something about the shape has 'changed'.
Reflection: A shape has been flipped.
Rotation: A shape has been turned.
Translation: A movement of a shape.
Enlargement: A change in size, either bigger or smaller.
Congruent: These shapes are the same shape and same size but can be in any orientation.
Similar: Two shapes are mathematically similar if one is an enlargement of the other.

Tip

To find the centre of enlargement connect the corresponding vertices.

Examples

Enlarge shape A, scale factor 2, centre (0, 0).



Scale factor 2 - Double the distance between each vertex and the centre of enlargement.

Questions

1) A triangle has lengths 3cm, 4cm and 5cm. What will they be if enlarged scale factor 3.
2) Rectangle A measures 3cm by 5cm, B measures 15cm by 25cm. What is the scale factor of enlargement?

ANSWERS: 1) 9cm, 12cm and 15cm 2) 5.