

3D Shapes

Volumes & Surface Areas

Question Paper 11

Level	IGCSE
Subject	Maths (0580)
Exam Board	Cambridge International Examinations (CIE)
Paper Type	Extended
Topic	Mensuration (Perimeters, Areas & Volumes)
Sub-Topic	3D Shapes: Volumes & Surface Areas
Booklet	Question Paper 11

Time Allowed: 63 minutes

Score: /52

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1

NOT TO SCALE

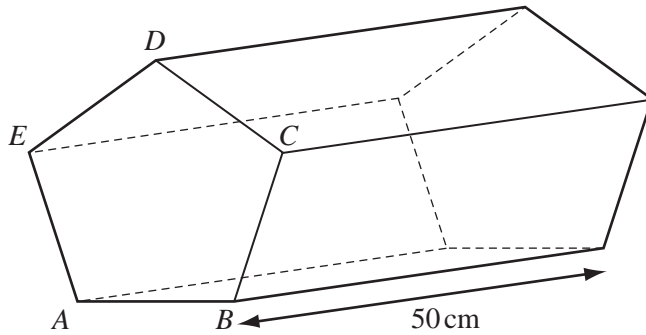


Diagram 1

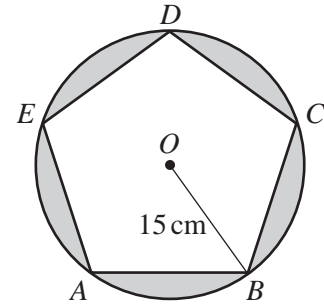


Diagram 2

Diagram 1 shows a solid wooden prism of length 50 cm.

The cross-section of the prism is a regular pentagon $ABCDE$.

The prism is made by removing 5 identical pieces of wood from a solid wooden cylinder.

Diagram 2 shows the cross-section of the cylinder, centre O , radius 15 cm.

- (a) Find the angle AOB . [1]
- (b) Calculate
- (i) the area of triangle AOB , [2]
 - (ii) the area of the pentagon $ABCDE$, [1]
 - (iii) the volume of wood removed from the cylinder. [4]
- (c) Calculate the total surface area of the prism. [4]

2 [The surface area of a sphere of radius r is $4\pi r^2$ and the volume is $\frac{4}{3}\pi r^3$.]

(a) A solid metal sphere has a radius of 3.5 cm.

One cubic centimetre of the metal has a mass of 5.6 grams.

Calculate

(i) the surface area of the sphere, [2]

(ii) the volume of the sphere, [2]

(iii) the mass of the sphere. [2]

(b)

NOT TO SCALE

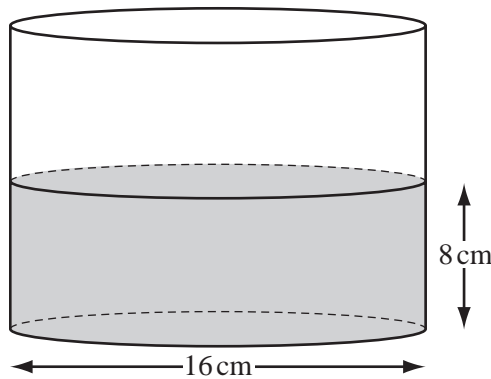


Diagram 1

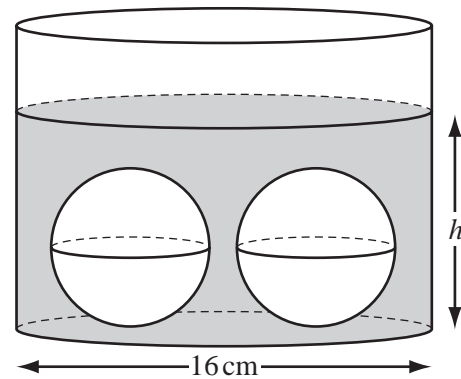


Diagram 2

Diagram 1 shows a cylinder with a **diameter** of 16 cm.

It contains water to a depth of 8 cm.

Two spheres identical to the sphere in **part (a)** are placed in the water. This is shown in Diagram 2.

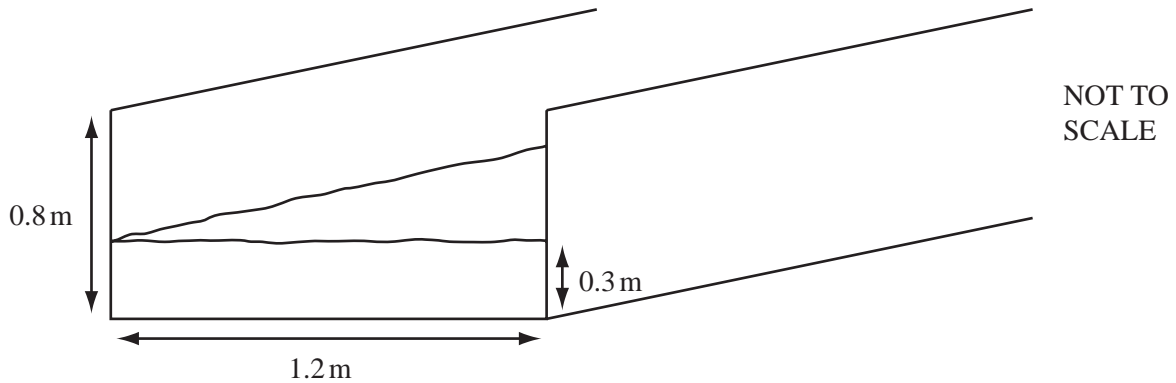
Calculate h , the new depth of water in the cylinder. [4]

(c) A different metal sphere has a mass of 1 kilogram.

One cubic centimetre of this metal has a mass of 4.8 grams.

Calculate the radius of this sphere. [3]

3



The diagram shows water in a channel.

This channel has a rectangular cross-section, 1.2 metres by 0.8 metres.

- (a) When the depth of water is 0.3 metres, the water flows along the channel at 3 metres/**minute**.

Calculate the number of cubic metres which flow along the channel in one hour.

[3]

- (b) When the depth of water in the channel increases to 0.8 metres, the water flows at 15 metres/minute.

Calculate the percentage increase in the number of cubic metres which flow along the channel in one hour.

[4]

- (c) The water comes from a cylindrical tank.

When 2 cubic metres of water leave the tank, the level of water in the tank goes down by 1.3 **millimetres**.

Calculate the radius of the tank, in **metres**, correct to one decimal place.

[4]

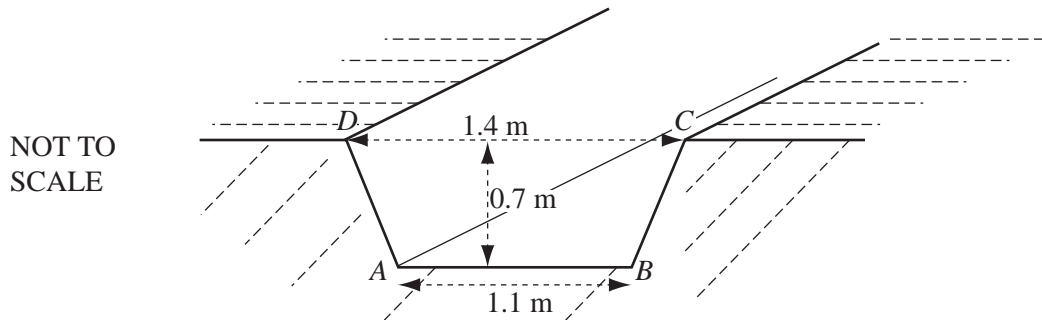
- (d) When the channel is empty, its **interior** surface is repaired.

This costs \$0.12 per square metre. The total cost is \$50.40.

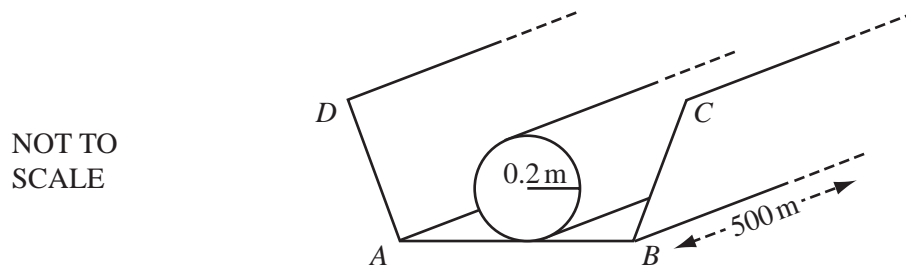
Calculate the length, in metres, of the channel.

[4]

- 4 Workmen dig a trench in level ground.



- (a) The cross-section of the trench is a trapezium $ABCD$ with parallel sides of length 1.1 m and 1.4 m and a vertical height of 0.7 m.
Calculate the area of the trapezium. [2]
- (b) The trench is 500 m long.
Calculate the volume of soil removed. [2]
- (c) One cubic metre of soil has a mass of 4.8 tonnes.
Calculate the mass of soil removed, giving your answer in tonnes and in standard form. [2]
- (d) Change your answer to **part (c)** into grams. [1]



- (e) The workmen put a cylindrical pipe, radius 0.2 m and length 500 m, along the bottom of the trench, as shown in the diagram.
Calculate the volume of the cylindrical pipe. [2]
- (f) The trench is then refilled with soil.
Calculate the volume of soil put back into the trench as a percentage of the original amount of soil removed. [3]