Perimeters, Area and Volumes Difficulty: Medium

Question Paper 4

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Perimeters, Area and Volumes
Paper	Paper 4
Difficulty	Medium
Booklet	Question Paper 4

Time allowed: **108 minutes**

Score: **/94**

Percentage: **/100**

Grade Boundaries:

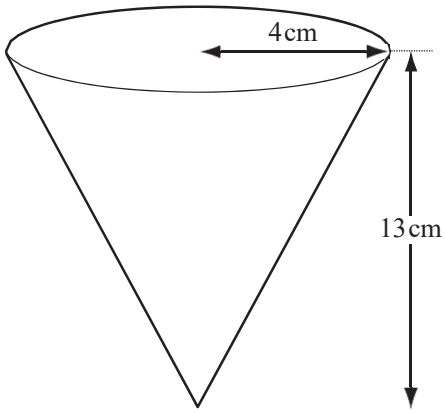
CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

(a)



NOT TO SCALE

The diagram shows a cone of radius 4 cm and height 13 cm.
It is filled with soil to grow small plants.
Each cubic centimetre of soil has a mass of 2.3g.

(i) Calculate the volume of the soil inside the cone.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.] [2]

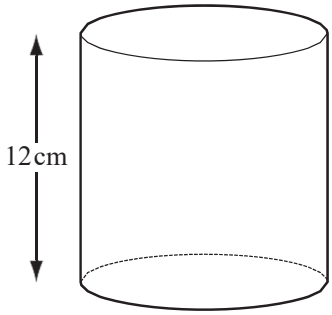
(ii) Calculate the mass of the soil. [1]

(iii) Calculate the greatest number of these cones which can be filled **completely** using 50 kg of soil. [2]

(b) A **similar** cone of height 32.5 cm is used for growing larger plants.

Calculate the volume of soil used to fill this cone. [3]

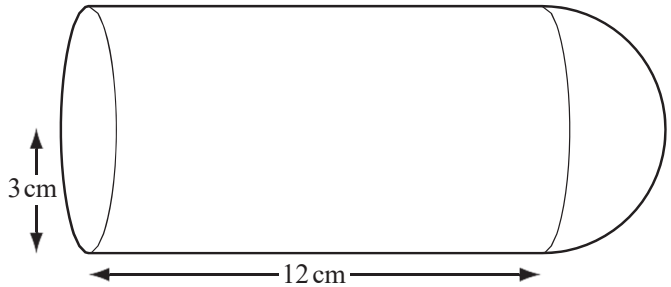
(c)



NOT TO SCALE

Some plants are put into a cylindrical container with height 12 cm and volume 550 cm^3.

Calculate the radius of the cylinder. [3]



NOT TO SCALE

The diagram shows a solid made up of a hemisphere and a cylinder.
The radius of both the cylinder and the hemisphere is 3 cm.
The length of the cylinder is 12 cm.

(a) (i) Calculate the volume of the solid.

[The volume, V, of a **sphere** with radius r is $V = \frac{4}{3}\pi r^3$.] [4]

(ii) The solid is made of steel and 1 cm^3 of steel has a mass of 7.9 g.
Calculate the mass of the solid.
Give your answer in kilograms. [2]

(iii) The solid fits into a box in the shape of a cuboid, 15 cm by 6 cm by 6 cm.
Calculate the volume of the box **not** occupied by the solid.

[2]

(b) (i) Calculate the total surface area of the solid.
You must show your working.
[The surface area, A, of a **sphere** with radius r is $A = 4\pi r^2$.]

[5]

(ii) The surface of the solid is painted.
The cost of the paint is \$0.09 per millilitre.
One millilitre of paint covers an area of 8 cm^2.
Calculate the cost of painting the solid.

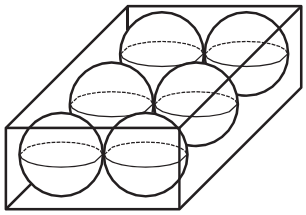
[2]

A spherical ball has a radius of 2.4 cm.

(a) Show that the volume of the ball is 57.9 cm^3, correct to 3 significant figures.

[The volume V of a sphere of radius r is $V = \frac{4}{3}\pi r^3$.] [2]

(b)



NOT TO SCALE

Six spherical balls of radius 2.4 cm fit exactly into a **closed** box.
The box is a cuboid.

Find

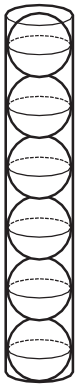
(i) the length, width and height of the box, [3]

(ii) the volume of the box, [1]

(iii) the volume of the box **not** occupied by the balls, [1]

(iv) the surface area of the box. [2]

(c)



NOT TO SCALE

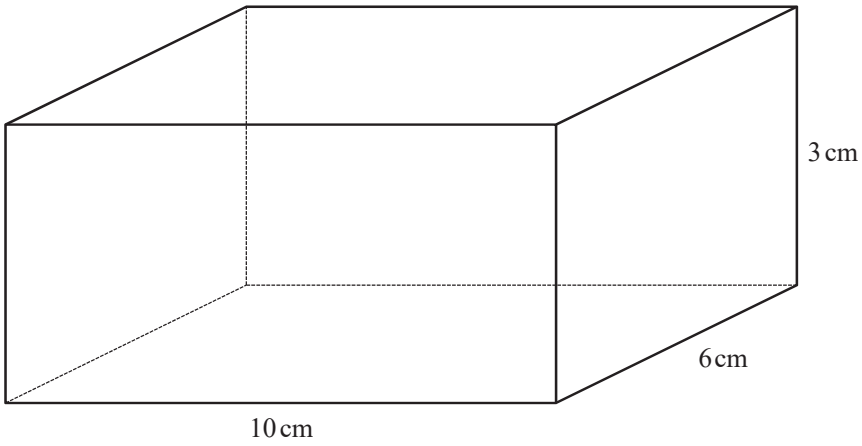
The six balls can also fit exactly into a **closed** cylindrical container, as shown in the diagram.

Find

(i) the volume of the cylindrical container, [3]

(ii) the volume of the cylindrical container **not** occupied by the balls, [1]

(iii) the surface area of the cylindrical container. [3]



A solid metal cuboid measures 10 cm by 6 cm by 3 cm.

(a) Show that 16 of these solid metal cuboids will fit exactly into a box which has internal measurements 40 cm by 12 cm by 6 cm. [2]

(b) Calculate the volume of one metal cuboid. [1]

(c) One cubic centimetre of the metal has a mass of 8 grams.
The box has a mass of 600 grams.

Calculate the **total** mass of the 16 cuboids **and** the box in

(i) grams, [2]

(ii) kilograms. [1]

(d) (i) Calculate the surface area of **one** of the solid metal cuboids. [2]

(ii) The surface of each cuboid is painted. The cost of the paint is $25 per **square metre**.

Calculate the cost of painting all 16 cuboids. [3]

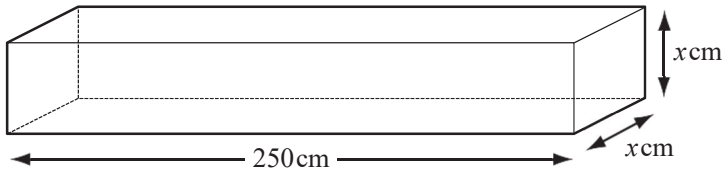
(e) One of the solid metal cuboids is melted down.
Some of the metal is used to make 200 identical solid spheres of radius 0.5 cm.

Calculate the volume of metal from this cuboid which is **not** used.

[The volume, V, of a sphere of radius r is $V = \frac{4}{3}\pi r^3$.] [3]

(f) 50 cm^3 of metal is used to make 20 identical solid spheres of radius r.

Calculate the radius r. [3]



NOT TO SCALE

A solid metal bar is in the shape of a cuboid of length of 250 cm.
The cross-section is a square of side x cm.
The volume of the cuboid is 4840 cm^3.

(a) Show that $x = 4.4$. [2]

(b) The mass of 1 cm^3 of the metal is 8.8 grams.
Calculate the mass of the whole metal bar in kilograms. [2]

(c) A box, in the shape of a cuboid measures 250 cm by 88 cm by h cm.
120 of the metal bars fit exactly in the box.
Calculate the value of h. [2]

(d) One metal bar, of volume 4840 cm^3, is melted down to make 4200 identical small spheres.

All the metal is used.

(i) Calculate the radius of each sphere. Show that your answer rounds to 0.65 cm, correct to 2 decimal places.
[The volume, V, of a sphere, radius r, is given by $V = \frac{4}{3}\pi r^3$.]

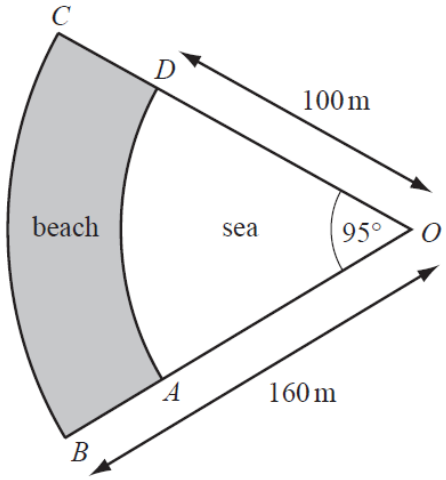
Answer(d)(i) [4]

(ii) Calculate the surface area of each sphere, using 0.65 cm for the radius.
[The surface area, A, of a sphere, radius r, is given by $A = 4\pi r^2$.] [1]

(iii) Calculate the total surface area of all 4200 spheres as a percentage of the surface area of the metal bar. [4]

The shaded area shows a beach.
AD and BC are circular arcs, centre O.
$OB = 160\,\text{m}$, $OD = 100\,\text{m}$ and angle $AOD = 95°$.

NOT TO SCALE



(a) Calculate the area of the beach $ABCD$ in square metres. [3]

(b) The beach area is covered in sand to a depth of 1.8 m.

Calculate the volume of the sand in cubic metres. [1]

(c) Write both the following answers in standard form.

(i) Change your answer to part(b) into cubic millimetres. [1]

(ii) Each grain of sand has a volume of 2 mm^3 correct to the nearest mm^3.

Calculate the maximum possible number of grains of sand on the beach. [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

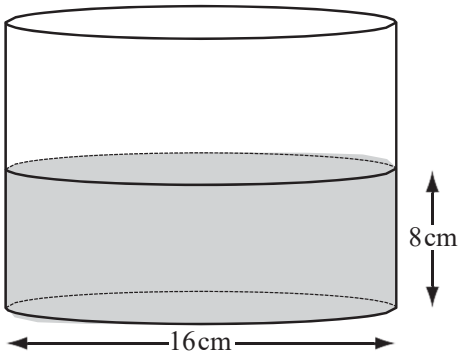


Diagram 1

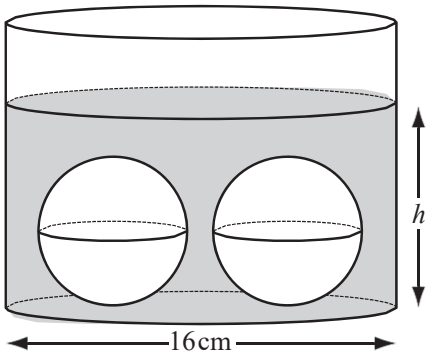


Diagram 2

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]