3D Shapes

Volumes & Surface Areas

Question Paper 3

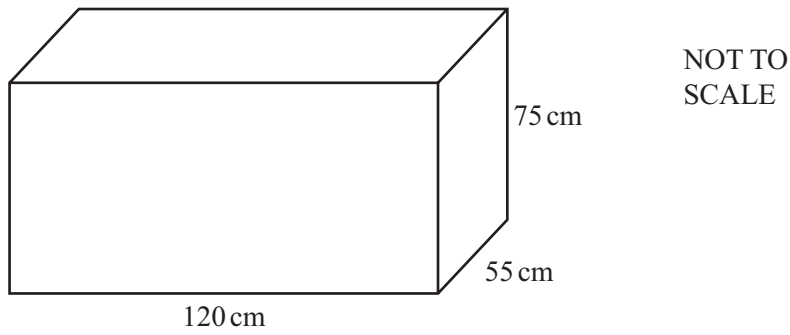| Level	IGCSE
Subject	Maths (0580)
Exam Board	Cambridge International Examinations (CIE)
Paper Type	Extended
Topic	Mensuration (Perimeters, Areas & Volumes)
Sub-Topic	3D Shapes: Volumes & Surface Areas
Booklet	Question Paper 3

Time Allowed: 56 minutes

Score: /46

Percentage: /100

Grade Boundaries:

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

1

NOT TO SCALE

75 cm

55 cm

120 cm

The diagram shows a water tank in the shape of a cuboid measuring 120 cm by 55 cm by 75 cm.
The tank is filled completely with water.

**(a)** Show that the capacity of the water tank is 495 litres.

Answer(a)

[2]

(b) The water from the tank flows into an empty cylinder at a uniform rate of 750 millilitres per second.

Calculate the length of time, in minutes, for the water to be completely emptied from the tank.
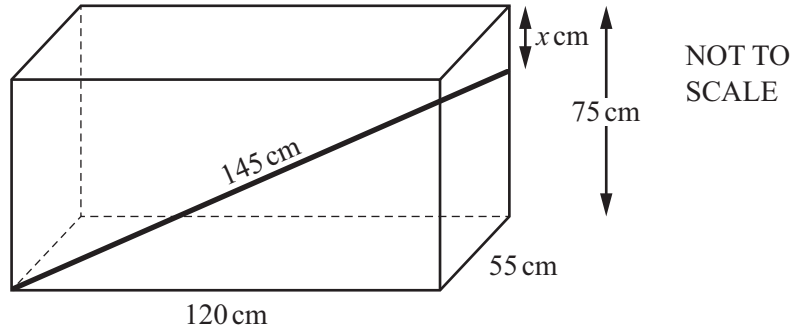
Answer(b)(i) .... min [2]

(ii) When the tank is completely empty, the height of the water in the cylinder is 112 cm.

NOT TO SCALE

112 cm
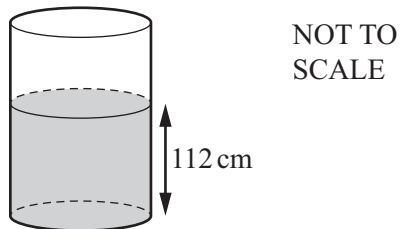
Calculate the radius of the cylinder.

Answer(b)(ii) .... cm [3]

(c)

A rod of length 145 cm is placed inside the water tank.
One end of the rod is in the bottom corner of the tank as shown.
The other end of the rod is x cm below the top corner of the tank as shown.
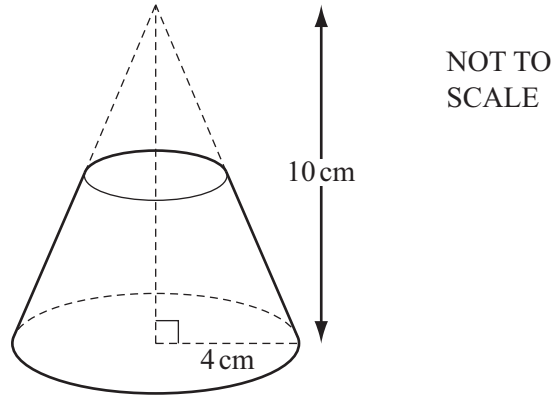
Calculate the value of x.

Answer(c) x = ... [4]

(d) Calculate the angle that the rod makes with the base of the tank.

Answer(d) .... [3]

2

NOT TO SCALE

10 cm

4 cm

A **solid** cone has base radius 4 cm and height 10 cm.
A mathematically similar cone is removed from the top as shown in the diagram.
The volume of the cone that is removed is $\frac{1}{8}$ of the volume of the original cone.

(a) Explain why the cone that is removed has radius 2 cm and height 5 cm.

Answer(a)

[2]

(b) Calculate the volume of the remaining solid.

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

Answer(b) .... cm^3 [4]

3 **(a)** The running costs for a papermill are $75 246.
This amount is divided in the ratio   labour costs : materials = 5 : 1.

Calculate the labour costs.

Answer(a) $ .... [2]

(b) In 2012 the company made a profit of $135 890.
In 2013 the profit was $150 675.

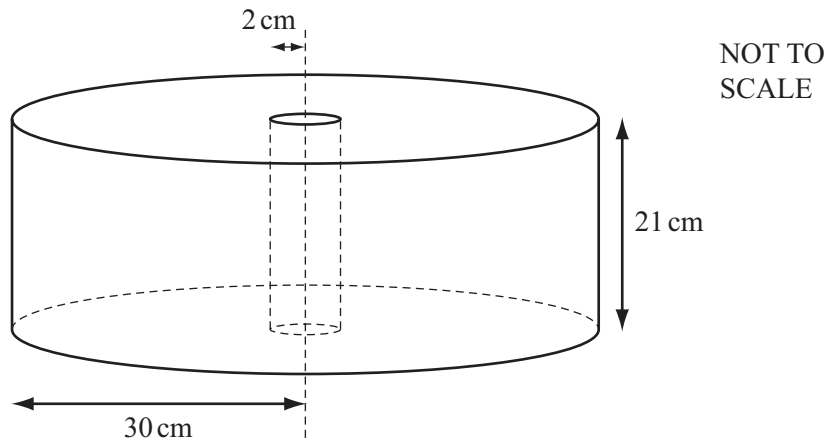Calculate the percentage increase in the profit from 2012 to 2013.

Answer(b) .... % [3]

(c) The profit of $135 890 in 2012 was an increase of 7% on the profit in 2011.

Calculate the profit in 2011.

Answer(c) $ .... [3]

(d)

2 cm

NOT TO
SCALE

21 cm

30 cm

Paper is sold in cylindrical rolls.
There is a wooden cylinder of radius 2 cm and height 21 cm in the centre of each roll.
The outer radius of a roll of paper is 30 cm.

(i) Calculate the volume of paper in a roll.

Answer(d)(i) .... cm³ [3]

(ii) The paper is cut into sheets which measure 21 cm by 29.7 cm.
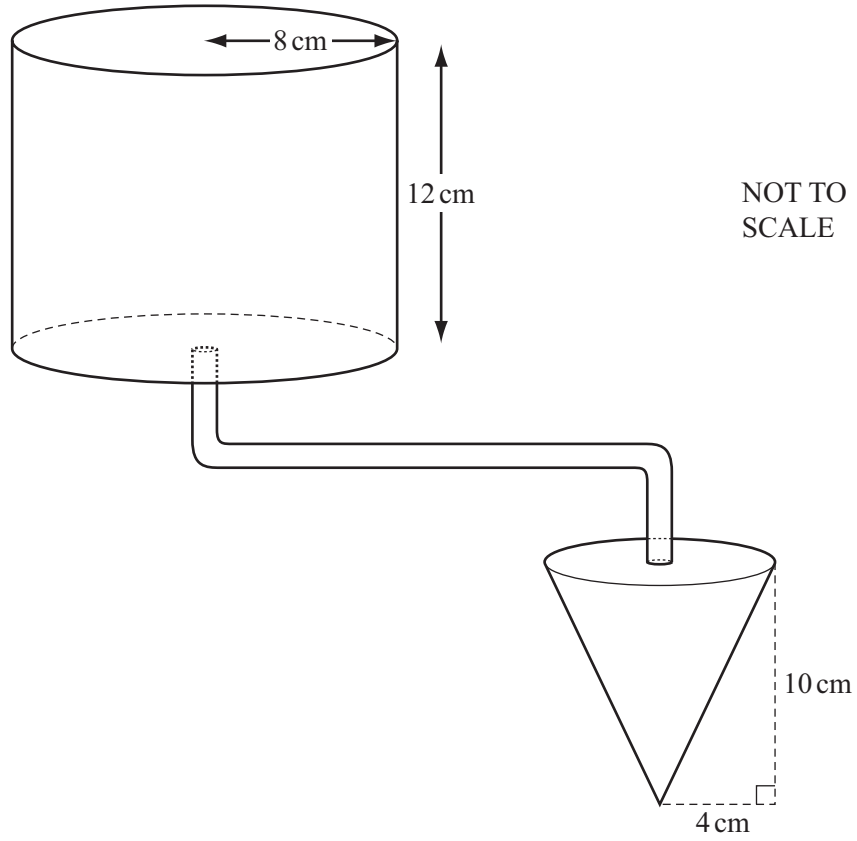The thickness of each sheet is 0.125 mm.

(a) Change 0.125 millimetres into centimetres.

Answer(d)(ii)(a) .... cm [1]

(b) Work out how many whole sheets of paper can be cut from a roll.

Answer(d)(ii)(b) .... [4]

4

The diagram shows a cylinder with radius 8 cm and height 12 cm which is full of water.
A pipe connects the cylinder to a cone.
The cone has radius 4 cm and height 10 cm.

(a)   Calculate the volume of water in the cylinder.
          Show that it rounds to 2410 cm³ correct to 3 significant figures.

Answer(a)(i)

[2]

(ii)   Change 2410 cm³ into litres.

Answer(a)(ii) .... litres [1]

(b) Water flows from the cylinder along the pipe into the cone at a rate of $2\,cm^3$ per second.

Calculate the time taken to fill the empty cone.
Give your answer in minutes and seconds correct to the nearest second.

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

Answer(b) .... min .... s [4]

(c) Find the number of empty cones which can be filled completely from the full cylinder.

Answer(c) .... [3]