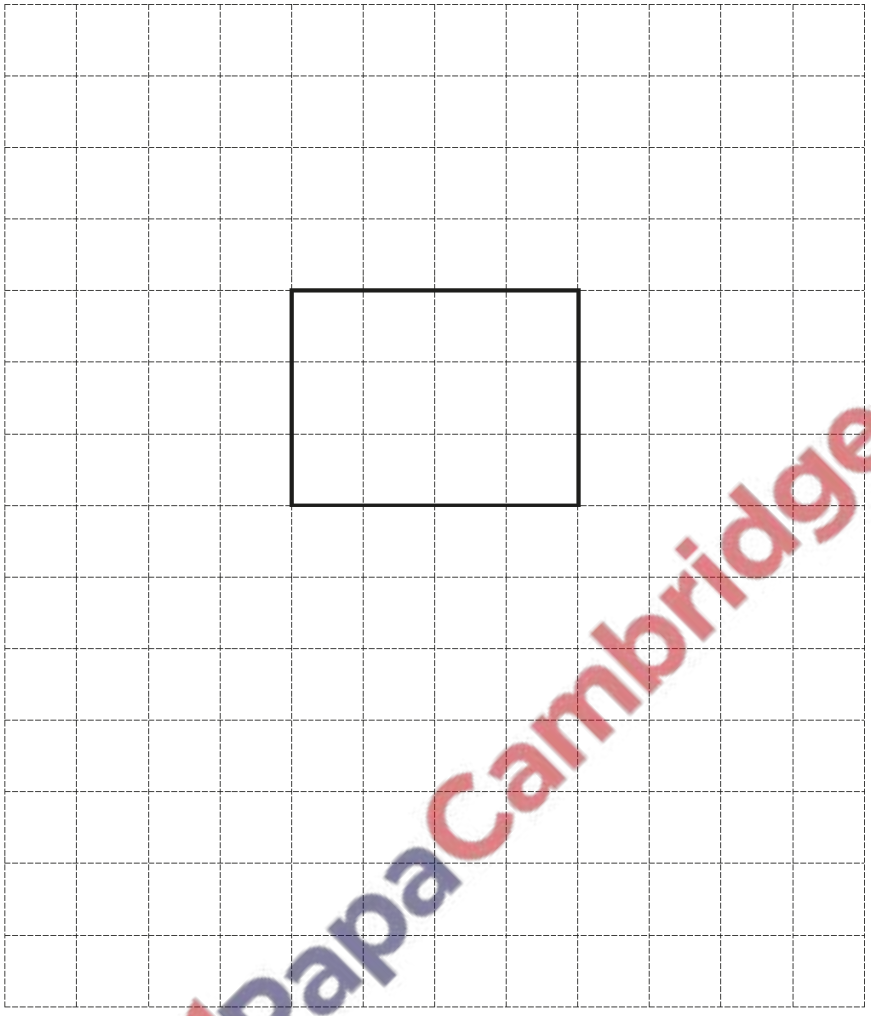
Mensuration – 2023 IGCSE 0580

1. March/2023/Paper_0580/12/No.10

The diagram shows one face of a cuboid on a 1 cm^2 grid.

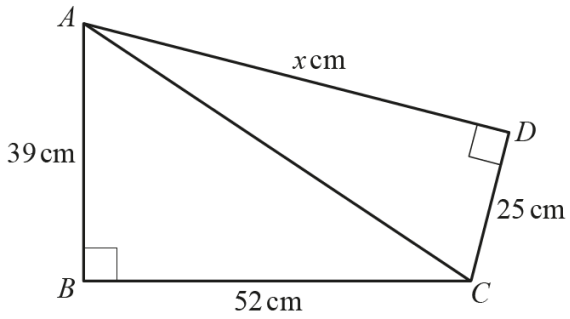


The cuboid has a volume of 24 cm^3.

Complete a net of this cuboid.

[3]

2. March/2023/Paper_0580/12/No.25



NOT TO SCALE

The diagram shows two right-angled triangles, ABC and ACD.

Work out the value of x.

$x =$ ..... [4]

3. March/2023/Paper_0580/12/No.26

A circle has an area of $25\pi\,\text{cm}^2$.

(a) Work out the circumference of the circle.
Give your answer in terms of π.

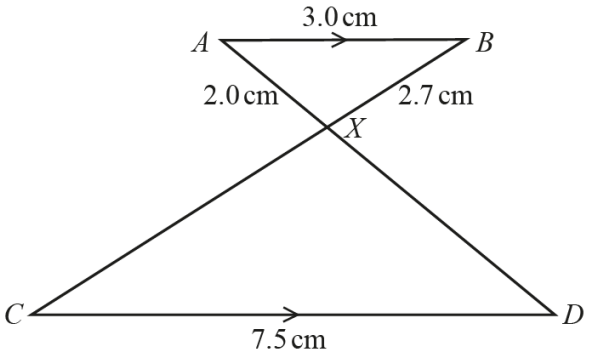
..... cm [3]

(b) Two of the circles are used as the ends of a cylinder, with height h cm.
The total surface area of the cylinder is $170\pi\,\text{cm}^2$.

Work out the value of h.

$h =$ ..... [3]

4. March/2023/Paper_0580/22/No.10



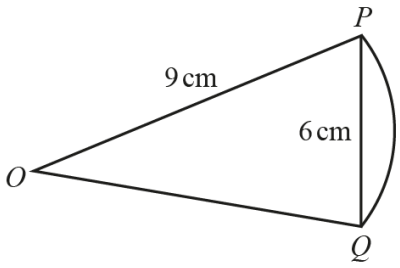
NOT TO SCALE

In the diagram, AB and CD are parallel.
The lines CB and AD intersect at X.
$AB = 3.0$ cm, $AX = 2.0$ cm, $BX = 2.7$ cm and $CD = 7.5$ cm.

Find the length of BC.

$BC =$ ..... cm [3]

5. March/2023/Paper_0580/22/No.14



NOT TO SCALE

The diagram shows a sector of a circle with centre O and radius 9 cm.
The length of the chord PQ is 6 cm.

Calculate the length of the arc PQ.

..... cm [3]

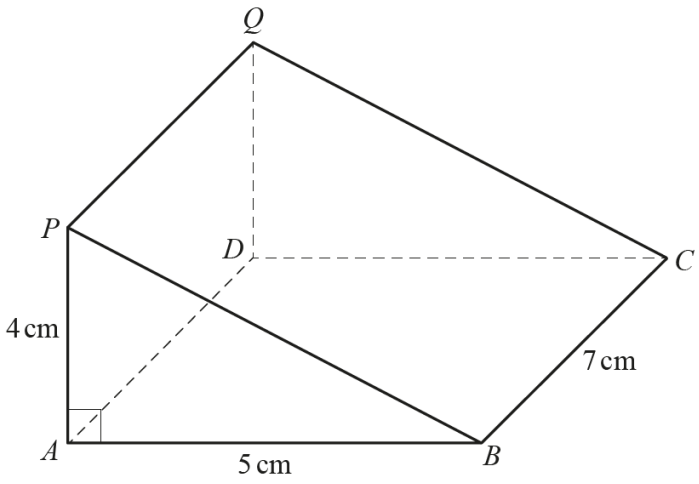
6. March/2023/Paper_0580/22/No.18

Two solids are mathematically similar and have volumes $81\,cm^3$ and $24\,cm^3$.
The surface area of the smaller solid is $44\,cm^2$.

Calculate the surface area of the larger solid.

..... cm^2 [3]

7. March/2023/Paper_0580/22/No.22



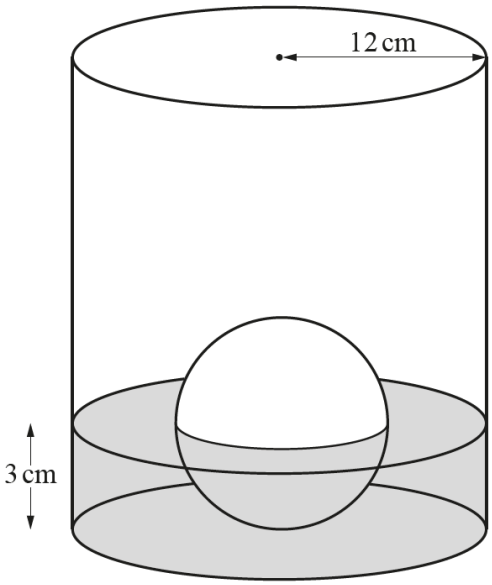
NOT TO SCALE

The diagram shows a triangular prism $ABCDQP$ of length 7 cm.
The cross-section is triangle PAB with $PA = 4$ cm, $AB = 5$ cm and angle $PAB = 90°$.

Calculate the angle between the line PC and the base $ABCD$.

..... [4]

8. March/2023/Paper_0580/42/No.3



NOT TO SCALE

The diagram shows a cylinder containing water.
There is a solid metal sphere touching the base of the cylinder.
Half of the sphere is in the water.

The radius of the cylinder is 12 cm and the radius of the sphere is 3 cm.

(a) The sphere is removed from the cylinder and the level of the water decreases by h cm.

Show that $h = 0.125$.
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

[3]

(b) The water in the cylinder is poured into another cylinder of radius R cm.
The depth of the water in this cylinder is 18 cm.

Calculate the value of R.

$R =$ ..... [3]

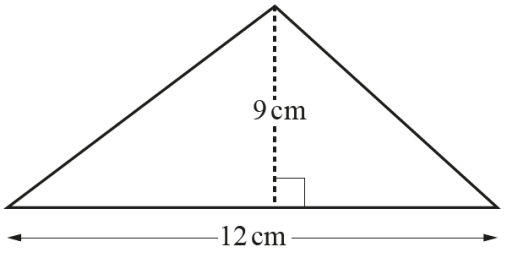
(c) The sphere is melted down and some of the metal is used to make 30 cubes with edge length 1.5 cm.

Calculate the percentage of metal **not** used.
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

..... % [3]

9. March/2023/Paper_0580/42/No.8

(a)

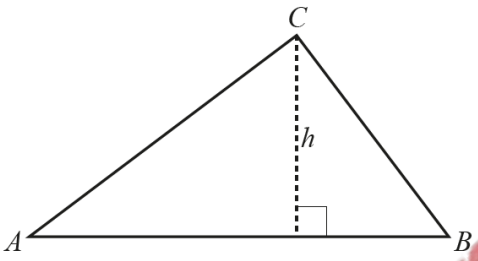


NOT TO SCALE

Calculate the area of the triangle.

..... cm^2 [2]

(b)



NOT TO SCALE

$AB = (2x+3)$ cm and $h = (x+5)$ cm.
The area of triangle $ABC = 50\,cm^2$.

Find the value of x, giving your answer correct to 2 decimal places.
You must show all your working.

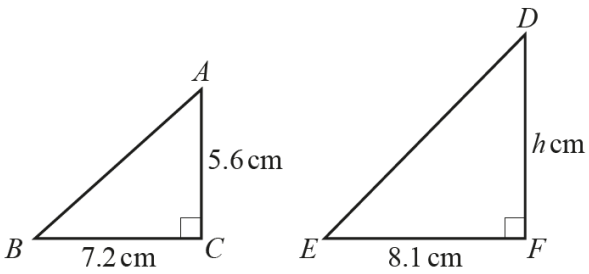
$x =$ ..... [6]

10. June/2023/Paper_0580/11/No.13

Calculate the volume of a sphere with diameter 4.8 cm.

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

..... cm^3 [2]



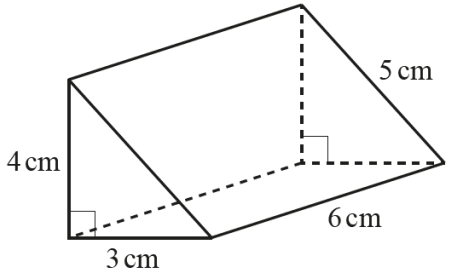
NOT TO SCALE

Triangle ABC is similar to triangle DEF.

Calculate the value of h.

$h =$ ..... [2]

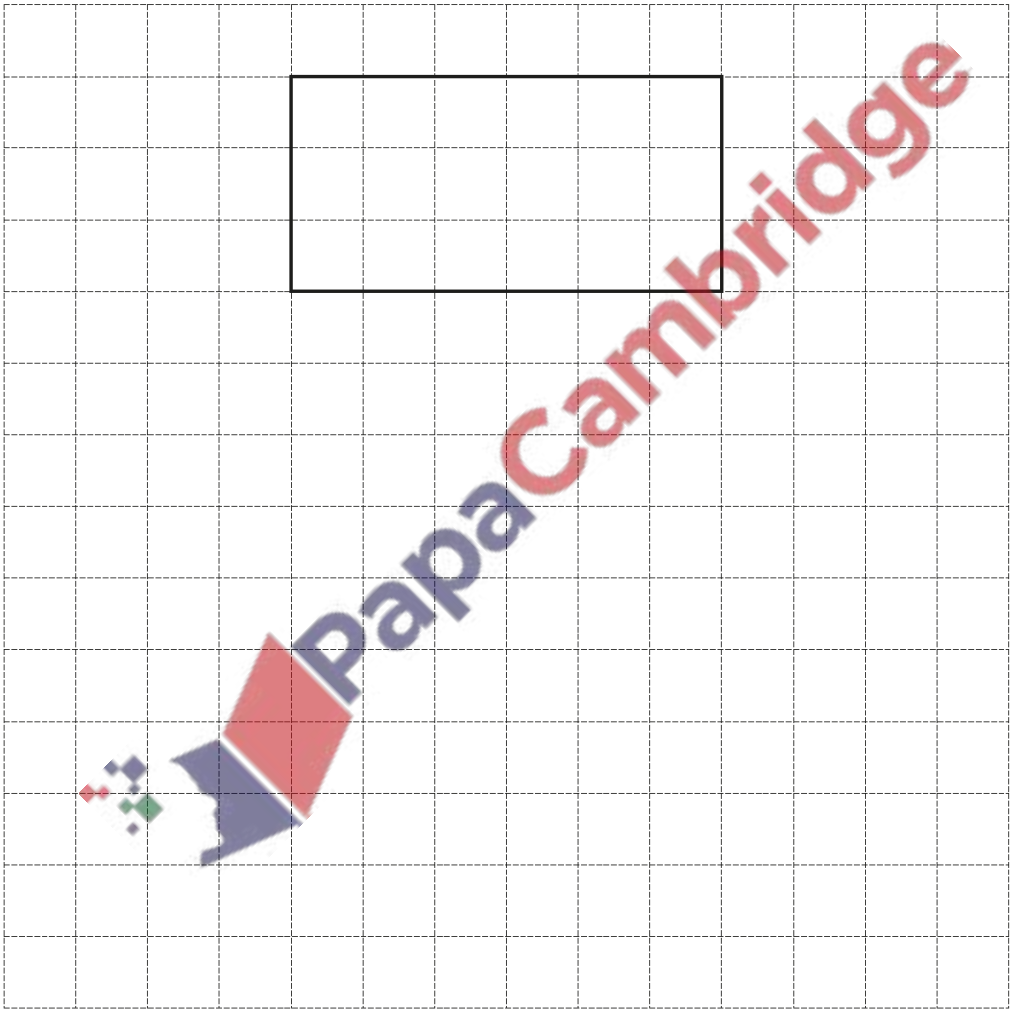
12. June/2023/Paper_0580/12/No.10



NOT TO SCALE

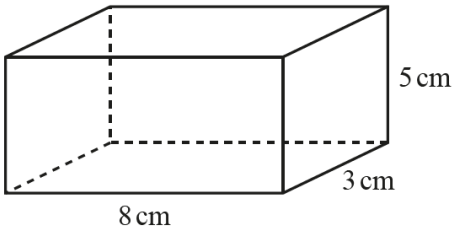
The diagram shows a right-angled triangular prism.

On the 1 cm^2 grid, complete the net of this prism.
One face has been drawn for you.



[3]

13. June/2023/Paper_0580/13/No.8

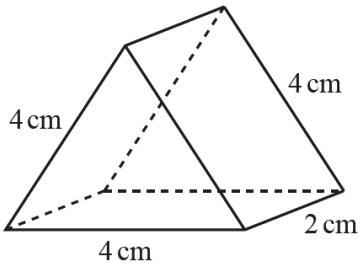


NOT TO SCALE

Find the total surface area of the cuboid.

..... cm^2 [3]

14. June/2023/Paper_0580/13/No.9



NOT TO SCALE

The diagram shows a triangular prism.

On the 1 cm^2 grid, draw a net of the prism.

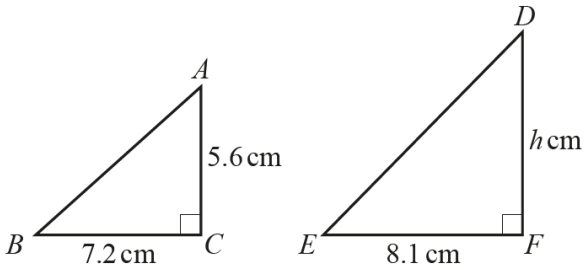
[3]

15. June/2023/Paper_0580/21/No.6

Calculate the volume of a sphere with diameter 4.8 cm.

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

..... cm^3 [2]



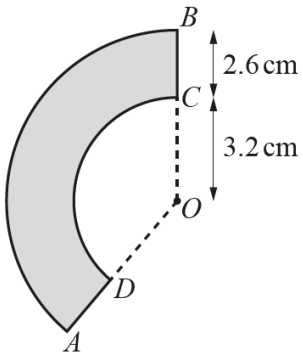
NOT TO SCALE

Triangle ABC is similar to triangle DEF.

Calculate the value of h.

$h =$ ..... [2]

17. June/2023/Paper_0580/22/No.11



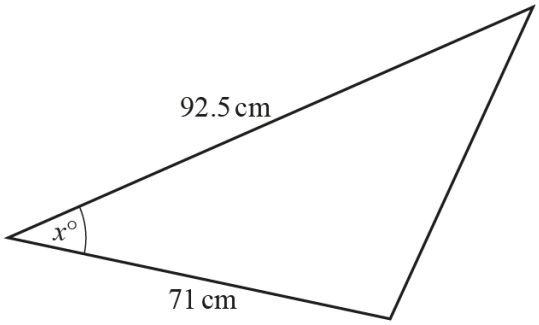
NOT TO SCALE

The diagram shows a shape, $ABCD$, formed by the sectors of two circles with the same centre O.
Both sector angles are 140°, $OC = 3.2$ cm and $CB = 2.6$ cm.
The area of the shape is $k\pi$ cm^2.

Find the value of k.

$k =$ ..... [3]

18. June/2023/Paper_0580/22/No.17

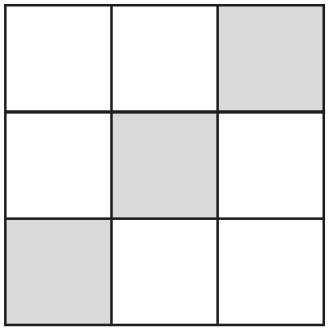


NOT TO SCALE

The diagram shows a triangle with an acute angle marked $x°$.
The area of the triangle is $2143\,cm^2$.

Work out the value of x.

$x =$ ..... [2]

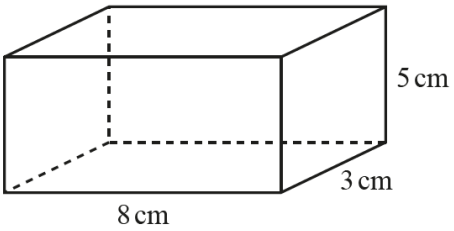


(a) Complete the statement.

The diagram has rotational symmetry of order ..... . [1]

(b) On the diagram, draw all the lines of symmetry. [2]

20. June/2023/Paper_0580/23/No.3



NOT TO SCALE

Find the total surface area of the cuboid.

..... cm^2 [3]

21. June/2023/Paper_0580/23/No.16

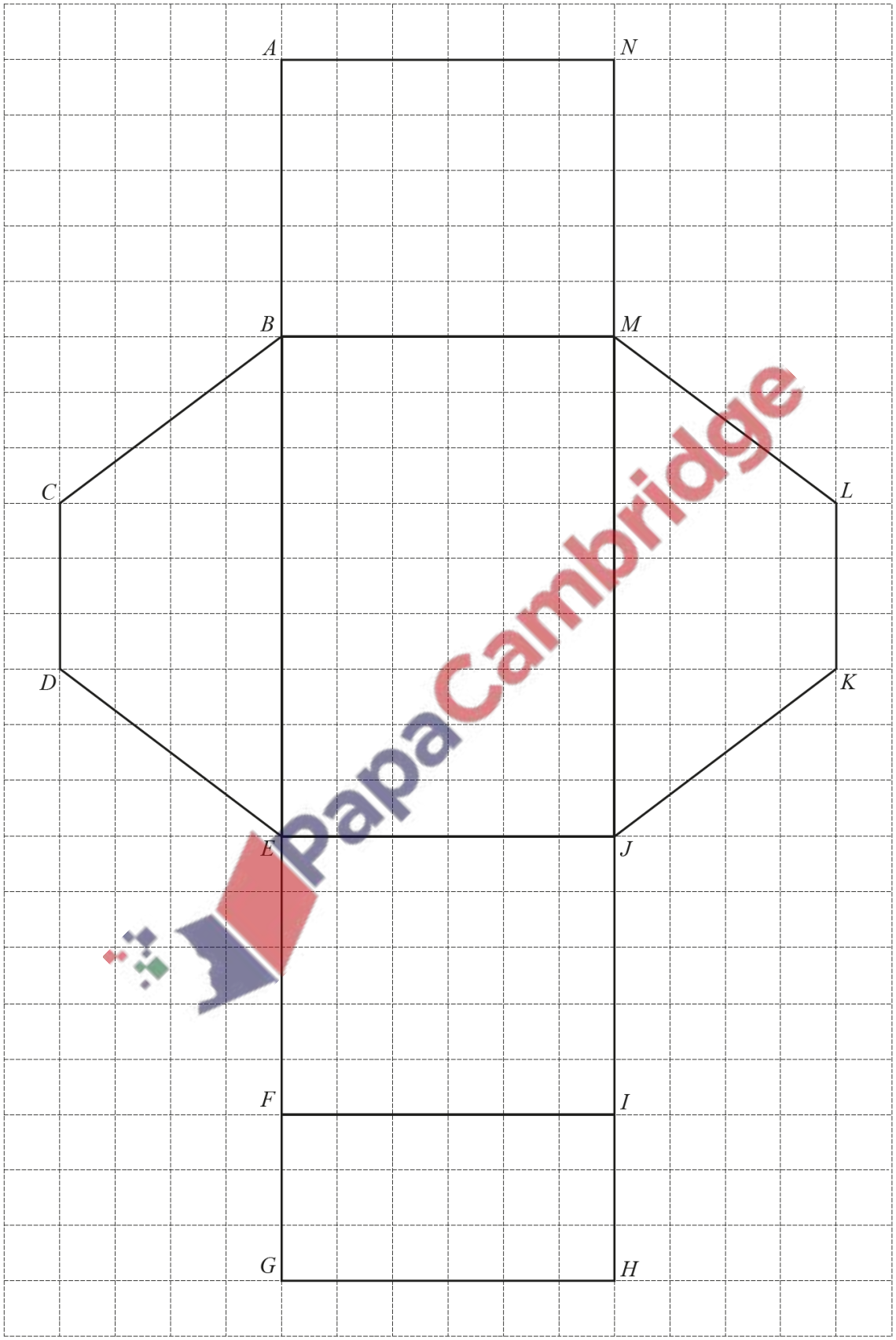
The volume of a cylinder is 1970 cm^3.
The height of the cylinder is 12.8 cm.

Calculate the radius of the cylinder.

..... cm [3]

22. June/2023/Paper_0580/31/No.4

(a) The diagram shows the net of a solid on a 1 cm^2 grid.



(i) When the net is folded to make the solid, point C will join with point A.

Write down which other point will join with point A.

..... [1]

(ii) Calculate the total surface area of the solid.

..... cm^2 [3]

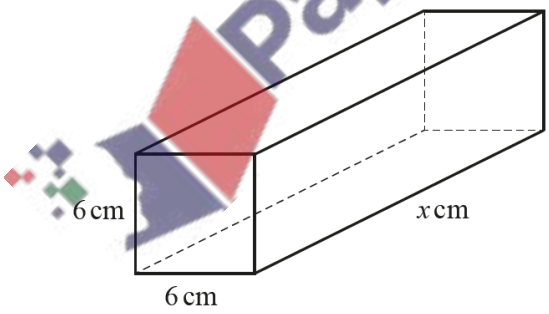
(iii) Complete this statement.

The solid is a ..... with the cross-section in the shape of a ..... [2]

(iv) Draw a sketch of the solid.

[1]

(b)



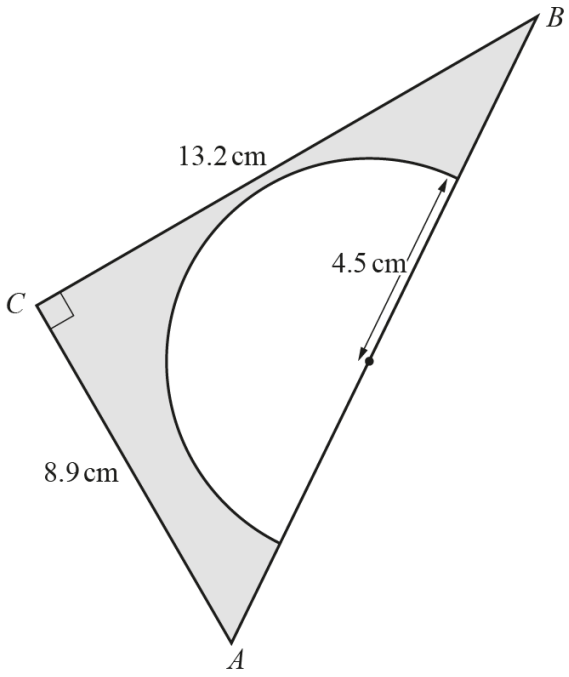
NOT TO SCALE

The diagram shows a cuboid.
The volume of the cuboid is 540 cm^3.

Calculate the value of x.

$x =$ ..... [2]

23. June/2023/Paper_0580/31/No.10



NOT TO SCALE

The diagram shows a right-angled triangle, ABC, and a semicircle.
The radius of the semicircle is 4.5 cm.
$AC = 8.9$ cm and $BC = 13.2$ cm.

(a) Calculate the shaded area.
Give the units of your answer.

.... [5]

(b) Calculate AB.

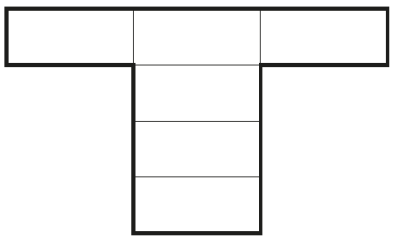
$AB =$ ..... cm [2]

24. June/2023/Paper_0580/32/No.5

(a)

NOT TO SCALE

This rectangle has an area of 12 cm^2 and a perimeter of 16 cm.



NOT TO SCALE

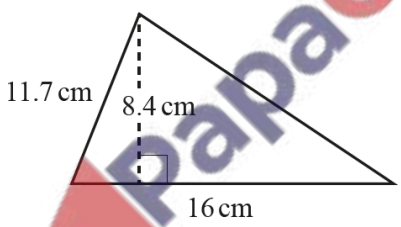
This shape is made from six of these rectangles.

Find the area and perimeter of this shape.

Area = ... cm^2

Perimeter = ... cm [4]

(b)



NOT TO SCALE

Find the area of this triangle.

..... cm^2 [2]

(c) A circle has a circumference of 28 cm.

Work out the radius of the circle.

..... cm [2]

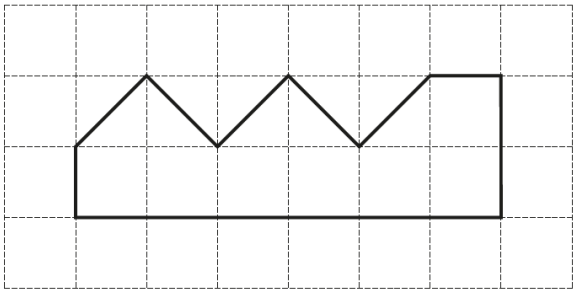
(d) A cube has a volume of 125 m^3.

Work out the surface area of the cube.

..... m^2 [3]

25. June/2023/Paper_0580/33/No.3

(a) The diagram shows a shape on a 1 cm^2 grid.



Work out the area of the shape.

..... cm^2 [1]

(b)

NOT TO SCALE

Work out the perimeter of the rectangle.

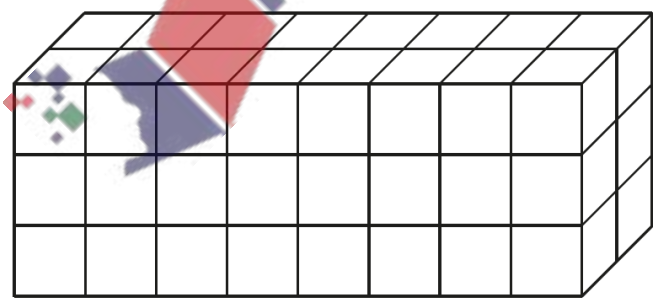
..... cm [1]

(c) A square has an area of 841 cm^2.

Work out the length of one side of the square.

..... cm [1]

(d) The diagram shows a cuboid made from 1 cm^3 cubes.



NOT TO SCALE

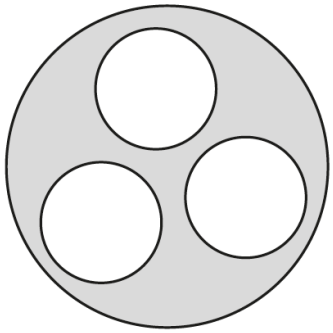
(i) Work out the volume of the cuboid.

..... cm^3 [1]

(ii) Write down the dimensions of a different cuboid that can be made using all of the cubes.

..... cm by ..... cm by ..... cm [1]

(e)



NOT TO SCALE

The diagram shows three small circles and one large circle.
The large circle has radius 20 cm.
The small circles each have radius 4 cm.

Work out the shaded area.
Give your answer in terms of π.

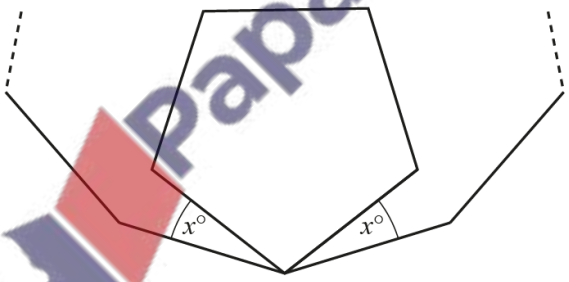
..... cm^2 [3]

(f) The exterior angle of a 9-sided regular polygon is 40°.

(i) Work out the size of the interior angle of this polygon.

..... [1]

(ii)



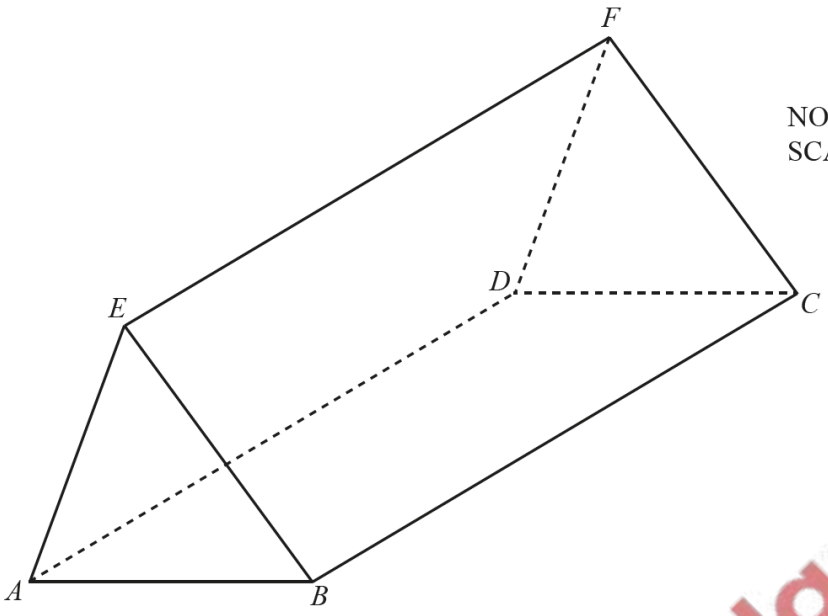
NOT TO SCALE

The diagram shows a regular pentagon inside part of a regular 9-sided polygon.

Work out the value of x.

x = ... [4]

26. June/2023/Paper_0580/41/No.2



The diagram shows a solid triangular prism $ABCDEF$ of length 15 cm.
$AB = 6.4$ cm, $EB = 5.7$ cm and the volume of the prism is 145 cm^3.

(a) Show that angle $EBA = 32°$, correct to the nearest degree.

[3]

(b) Find the length of EA.

..... cm [3]

(c) Calculate the shortest distance from E to AB.

..... cm [3]

(d) Calculate the angle BF makes with the base, $ABCD$, of the prism.

..... [4]

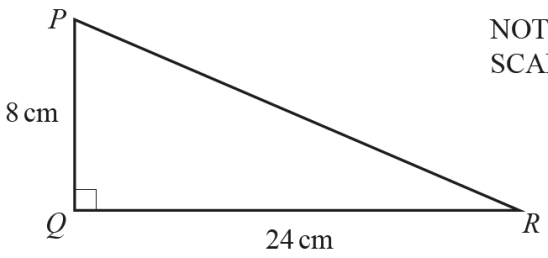
(e) The prism is made of plastic with density $938\,kg/m^3$.

Calculate the mass of the prism in **grams**.
[Density = mass ÷ volume]

..... g [3]

27. June/2023/Paper_0580/41/No.4

(a)



NOT TO SCALE

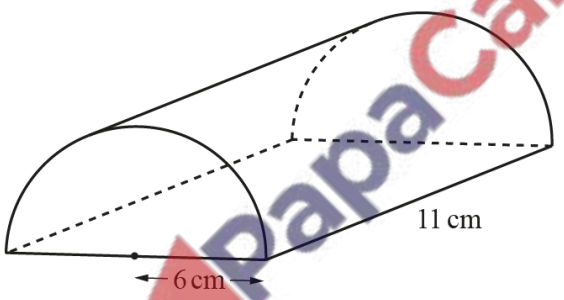
(i) Calculate the area of triangle PQR.

..... cm^2 [2]

(ii) Calculate angle PRQ.

Angle PRQ = ... [2]

(b)



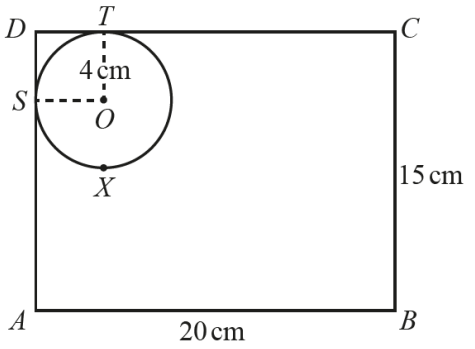
NOT TO SCALE

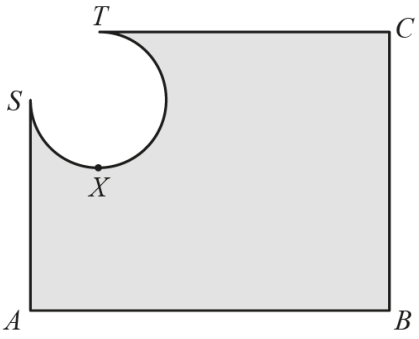
The diagram shows a half-cylinder of radius 6 cm and length 11 cm.

Calculate the volume of the half-cylinder.

..... cm^3 [2]

(c)





NOT TO SCALE

(i) $ABCD$ is a rectangle with $AB = 20$ cm and $BC = 15$ cm.
S, X and T are points on a circle centre O, such that DSA and DTC are tangents to the circle.
The radius of the circle is 4 cm and TX is a diameter of the circle.
The shape $DSXT$ is removed from the corner of the rectangle, leaving the shaded shape shown in the second diagram.

Calculate the area of the shaded shape.

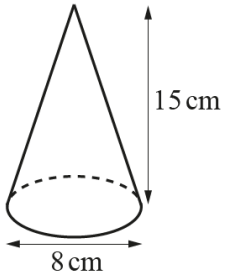
..... cm^2 [5]

(ii) Calculate the perimeter of the shaded shape.

..... cm [3]

28. June/2023/Paper_0580/42/No.5

(a)



NOT TO SCALE

A cone has base diameter 8 cm and perpendicular height 15 cm.

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

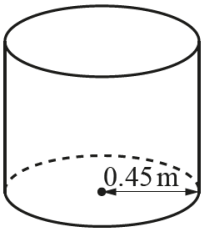
..... cm^3 [2]

(ii) A label completely covers the curved surface area of the cone.

Calculate the area of the label as a percentage of the **total** surface area of the cone.
[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.]

..... % [5]

(b)



NOT TO SCALE

An empty cylindrical container has radius 0.45 m.
300 litres of water is poured into the container at a rate of 375 ml per second.

(i) Find the time taken, in minutes and seconds, for all the water to be poured into the container.

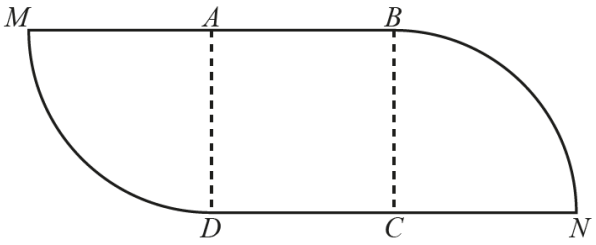
..... min ..... s [3]

(ii) Calculate the height of the water in the container.

..... m [3]

29. June/2023/Paper_0580/43/No.9

(a)



NOT TO SCALE

The diagram shows a shape made from a square *ABCD* and two equal sectors of a circle.
The square has side 11 cm.
MAB and *DCN* are straight lines.

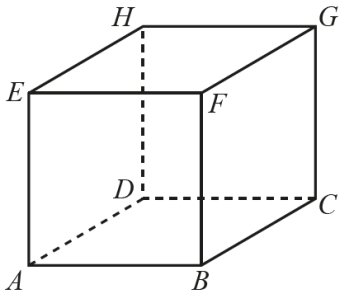
(i) Calculate the area of the shape.

..... cm^2 [3]

(ii) Calculate the perimeter of the shape.

..... cm [3]

(b)



NOT TO SCALE

The diagram shows a cube $ABCDEFGH$ of edge 7 cm.

Calculate the angle between AG and the base of the cube.

..... [4]