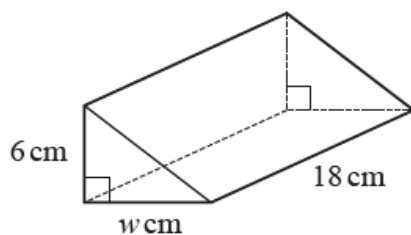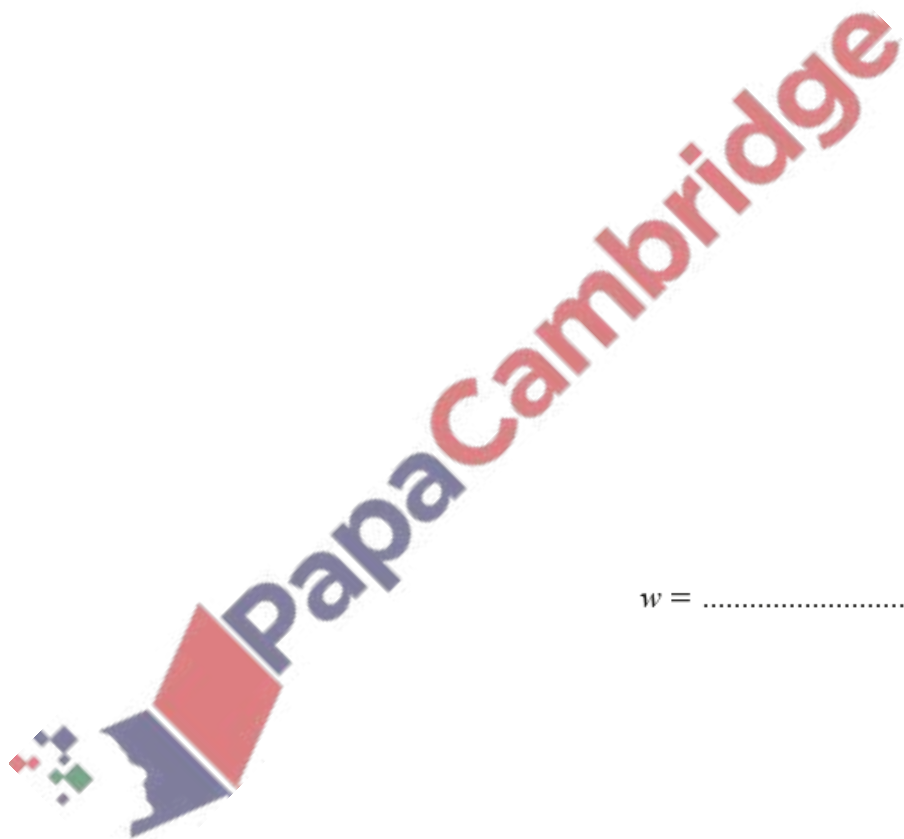1. Nov/2022/Paper_0580_12/No.18
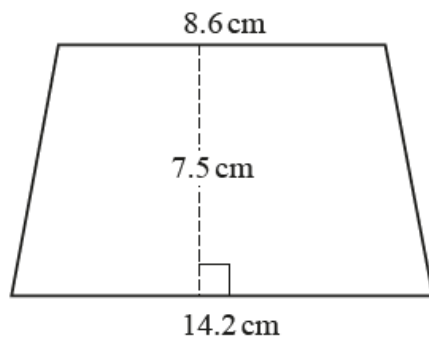
NOT TO SCALE

6 cm

18 cm

w cm

The right-angled triangular prism has height 6 cm, width w cm and length 18 cm.
The volume of the prism is 810 cm^3.

Find the value of w.

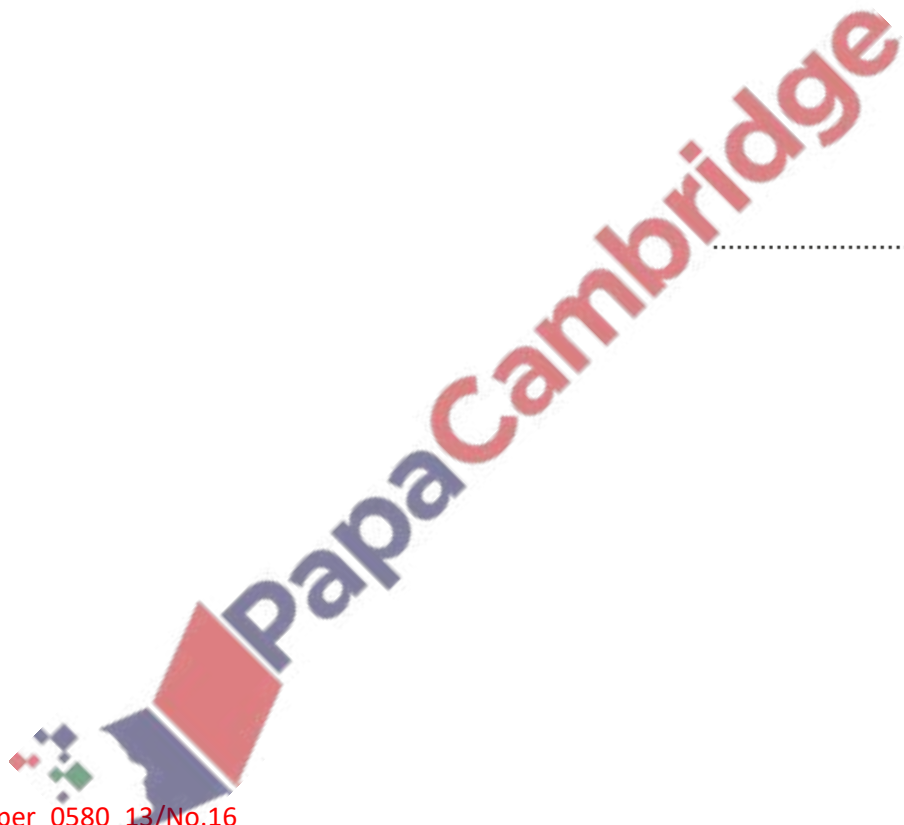$w =$ .... [3]

2.

8.6 cm

7.5 cm

14.2 cm

NOT TO
SCALE

Work out the area of the trapezium.

.... cm^2 [2]

3.

The circumference of a circular pond is 130 cm.

Calculate the radius of the pond.

.... cm [2]

4.

The perimeter of a sector of a circle with radius 8 cm is 26 cm.

Calculate the angle of this sector.

.... [3]
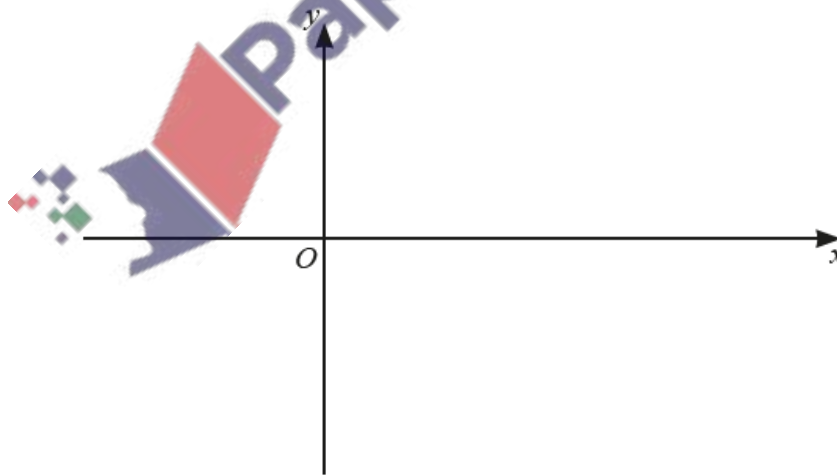
5.

The graph of a cubic function has two turning points.
When $x < 0$ and when $x > 4$ the gradient of the graph is positive.
When $0 < x < 4$ the gradient of the graph is negative.
The graph passes through the origin.
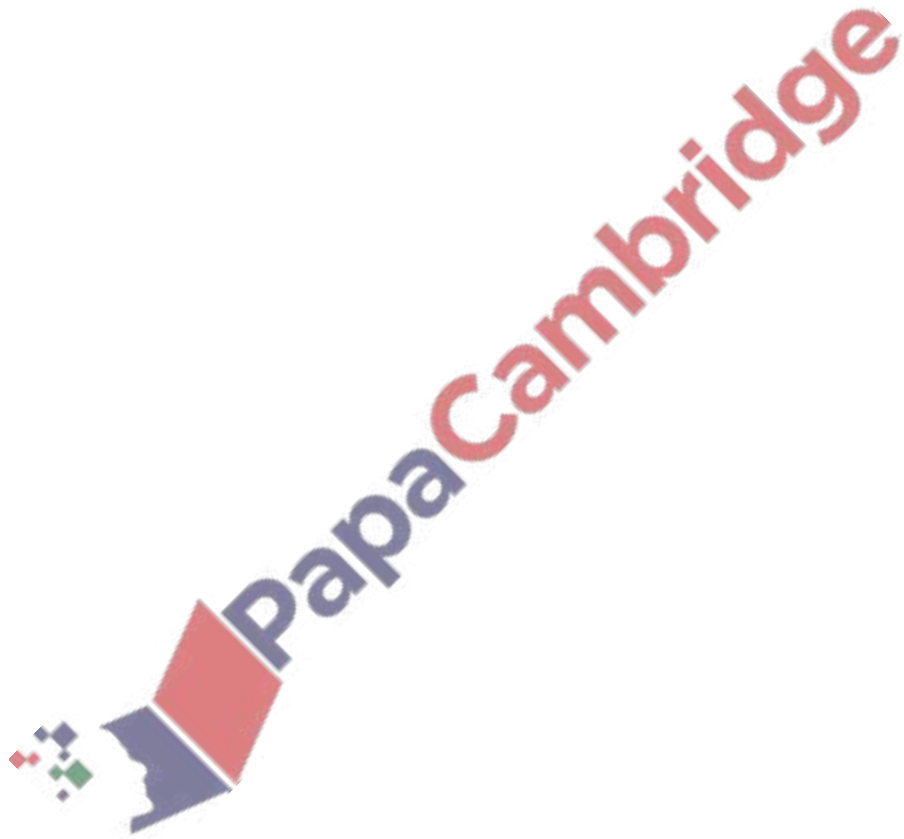
Sketch the graph.

[2]

(c) Miguel has a closed box of pens.
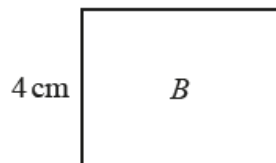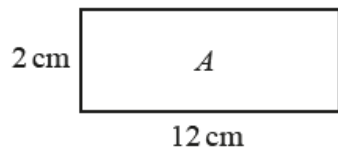The box is in the shape of a cuboid measuring 20 cm by 12 cm by 7 cm.

Calculate the surface area of the box.

.... cm^2 [3]

(a)

2 cm ▢ A
12 cm

4 cm ▢ B

NOT TO SCALE

The area of rectangle A is equal to the area of rectangle B.

Work out which rectangle has the greater perimeter and by how much.

Rectangle .... has the greater perimeter by .... cm **[4]**

(b) A circle has an area of $150 \, cm^2$.

Calculate the radius of this circle.

.... cm **[3]**

(c)

NOT TO SCALE

16 cm   16 cm
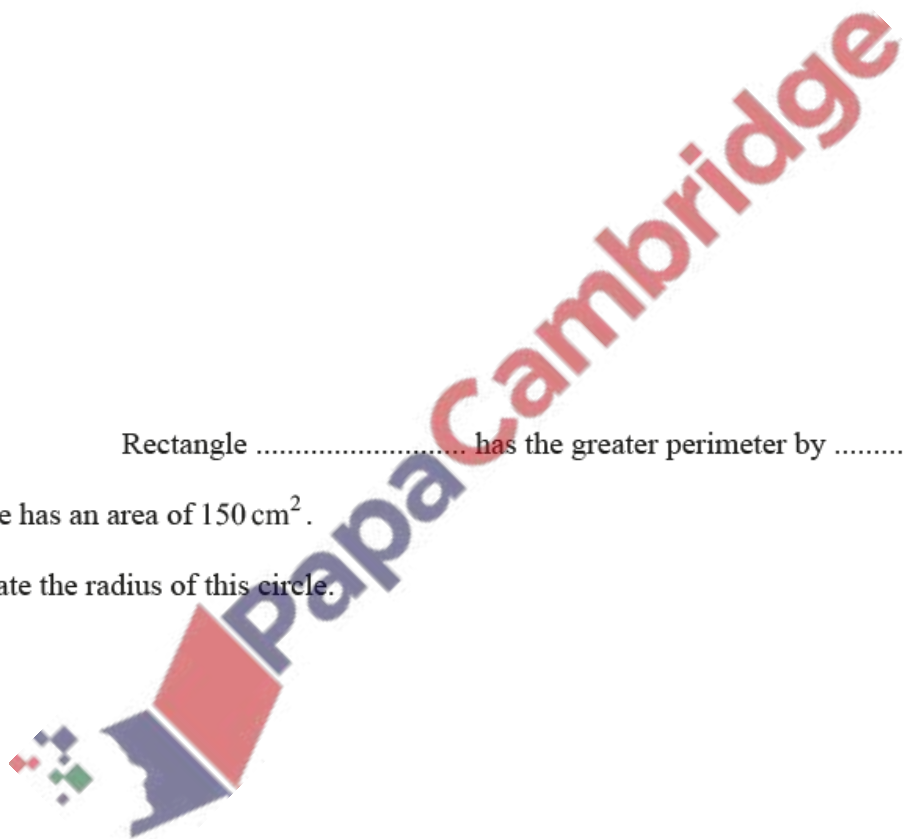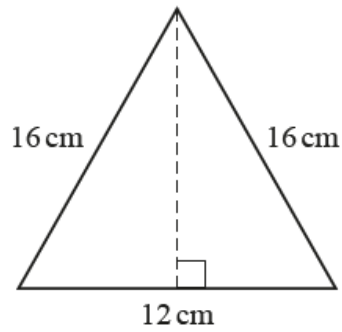
12 cm

An isosceles triangle has base 12 cm and sides 16 cm.

Find the area of this triangle.
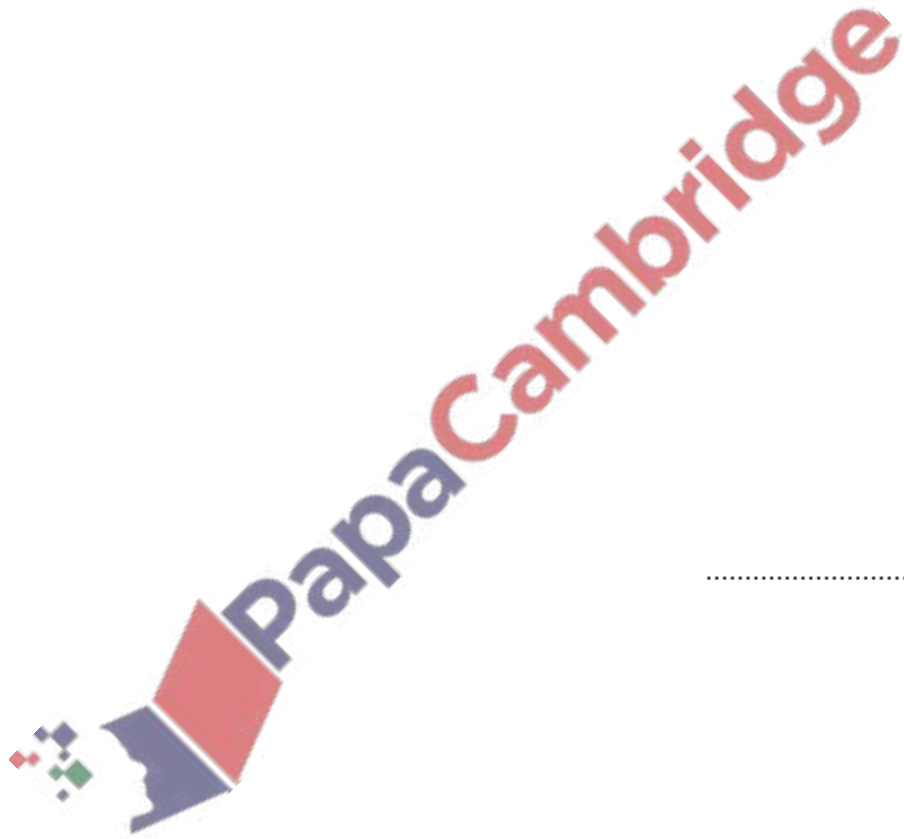
.... cm^2 [5]

(a) In this part, all measurements are in centimetres.
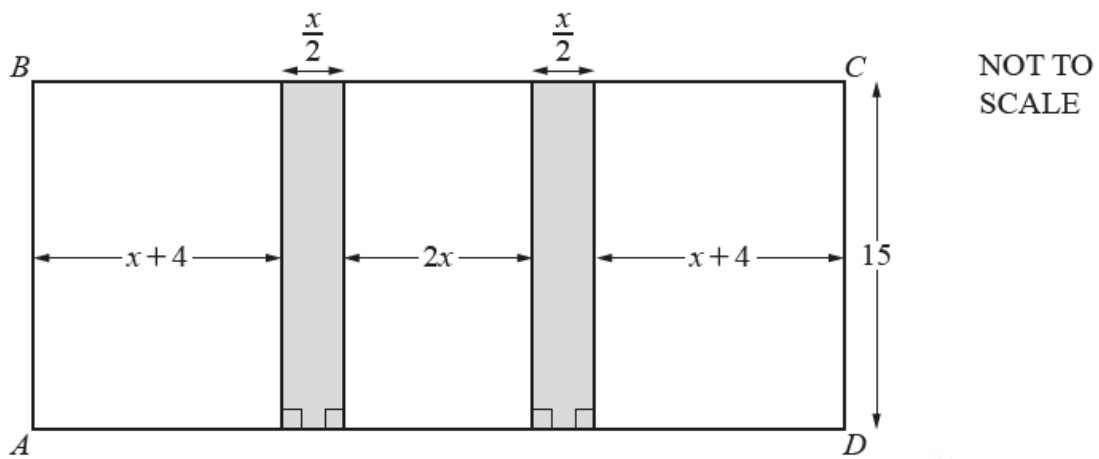
NOT TO SCALE

The diagram shows a rectangle, $ABCD$.

(i) Show that the length AD is $5x + 8$.

[1]

(ii) The area of $ABCD$ is $360\,\text{cm}^2$.

Work out the value of x.

$x =$ .... [4]

(iii) Find the total shaded area.

.... cm^2 [1]

(b)

NOT TO SCALE

18 cm

65 cm

30 cm

Rectangular box

6 cm

15 cm   15 cm
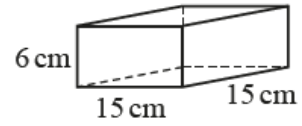
Cuboid

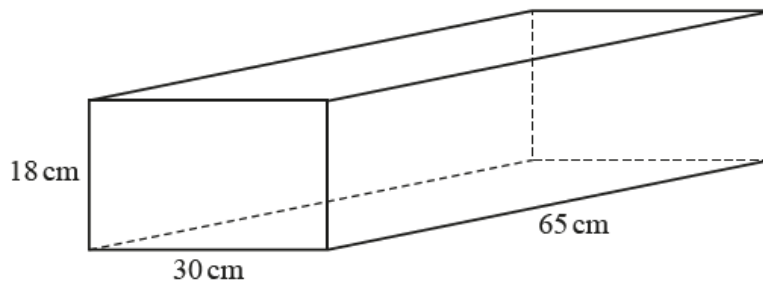The diagram shows an open rectangular box and a solid cuboid.

(i) Show that a maximum of 24 of these cuboids will fit inside the box.

[1]

(ii) 24 of these cuboids are placed inside the box.

Calculate the volume of empty space in the box.
Give the units of your answer.

.... [4]

(c)

NOT TO SCALE

x cm
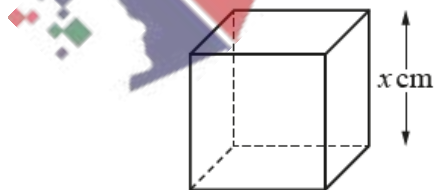
The diagram shows a solid cube with side x cm.
The total surface area of the cube is $486 \, \text{cm}^2$.

Calculate the value of x.

$x =$ .... [2]

8

(a) Calculate the volume of

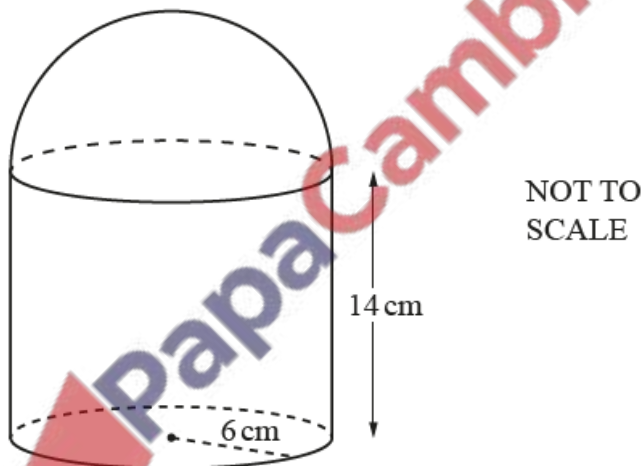(i) a solid cylinder with radius 6 cm and height 14 cm,

.... cm^3 [2]

(ii) a solid hemisphere with radius 6 cm.
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

.... cm^3 [2]

(b)

NOT TO SCALE

14 cm

6 cm

The cylinder and hemisphere in **part (a)** are joined to form the solid in the diagram.
The solid is made of steel and 1 cm^3 of steel has a mass of 7.85 g.

(i) Show that 1 cm^3 of steel has a mass of 0.007 85 kg.

[1]

(ii) Calculate the total mass of the solid.

.... kg [2]

(c) $2000\,\text{cm}^3$ of iron is melted down and some of it is used to make 50 spheres with radius $2\,\text{cm}$.

    (i) Calculate the percentage of iron that is left over.
        [The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

                                                                   .... % [3]

    (ii) The iron left over is then made into a cube.

        Calculate the length of an edge of the cube.

                                                                       .... cm [1]

(d) A solid cone has radius $3R\,\text{cm}$ and slant height $9R\,\text{cm}$.
    A solid cylinder has radius $x\,\text{cm}$ and height $7x\,\text{cm}$.
    The **total** surface area of the cone is equal to the **total** surface area of the cylinder.

    Given that $R = kx$, find the value of k.
    [The curved surface area, A, of a cone with radius r and slant height l is $A = \pi r l$.]

                                             $k =$ .... [4]
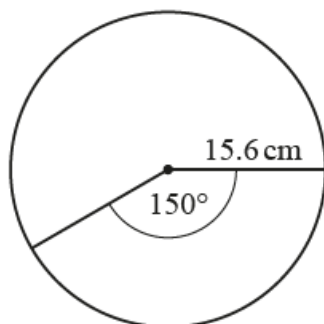
(a) The lengths of the sides of a triangle are 11.4 cm, 14.8 cm and 15.7 cm, all correct to 1 decimal place.

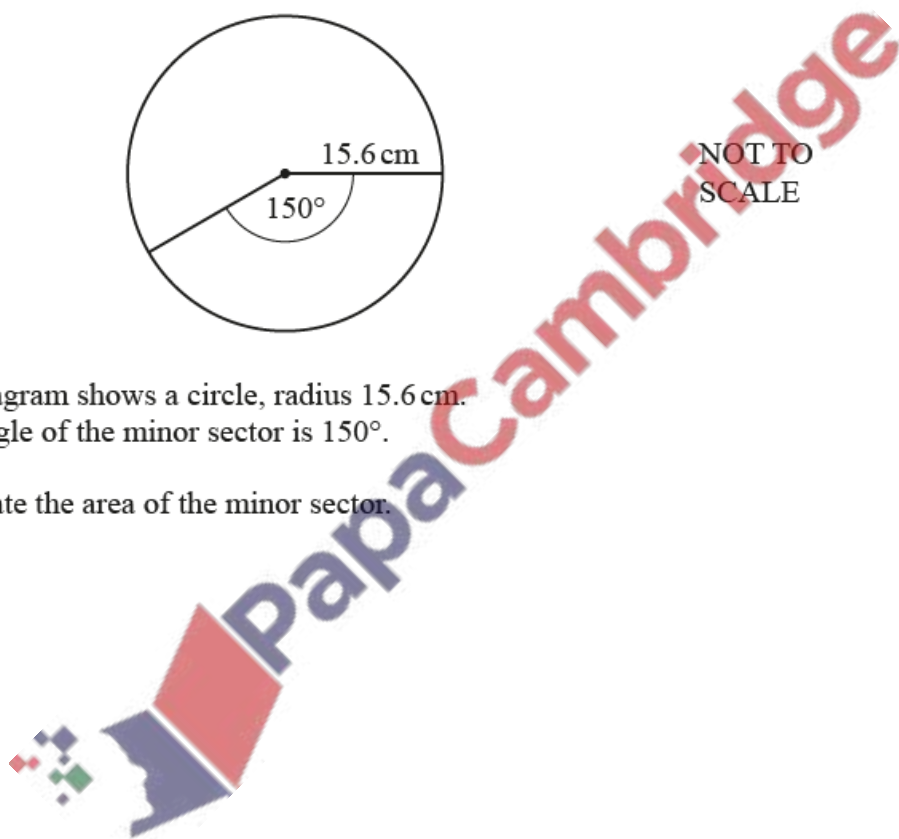Calculate the upper bound of the perimeter of the triangle.
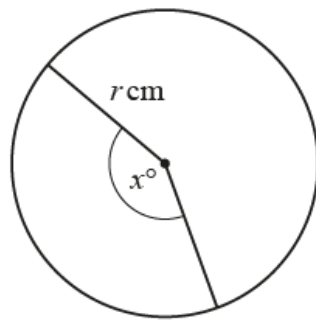
.... cm [2]

(b)

The diagram shows a circle, radius 15.6 cm.
The angle of the minor sector is 150°.

Calculate the area of the minor sector.

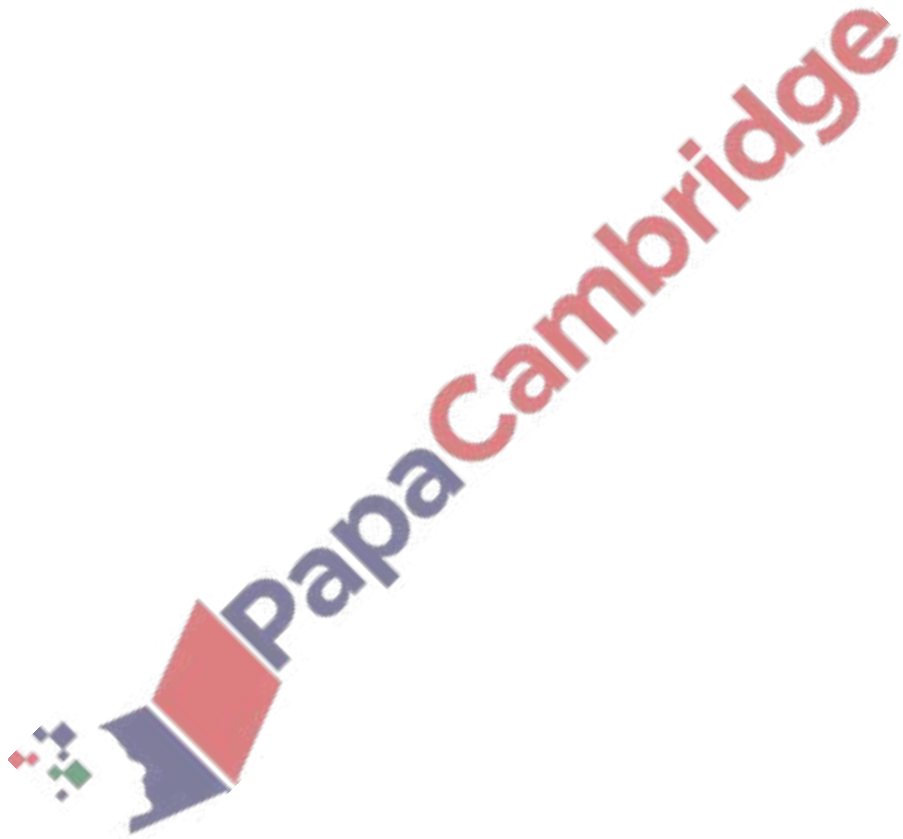... cm^2 [2]

(c)

NOT TO
SCALE
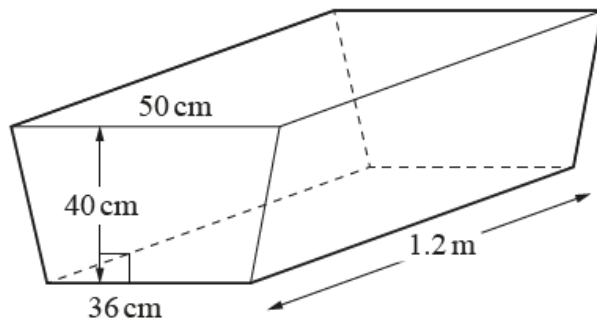
The diagram shows a circle, radius r cm and minor sector angle $x°$.
The **perimeter** of the major sector is three times the **perimeter** of the minor sector.

Show that $x = \dfrac{90(\pi - 2)}{\pi}$.

[4]

NOT TO
SCALE

The diagram shows a water trough in the shape of a prism.
The prism has a cross-section in the shape of an isosceles trapezium.
The trough is completely filled with water.

(a) Show that the volume of water in the trough is 206.4 litres.

[3]

(b) The water from the trough is emptied at a rate of 600 ml per second.

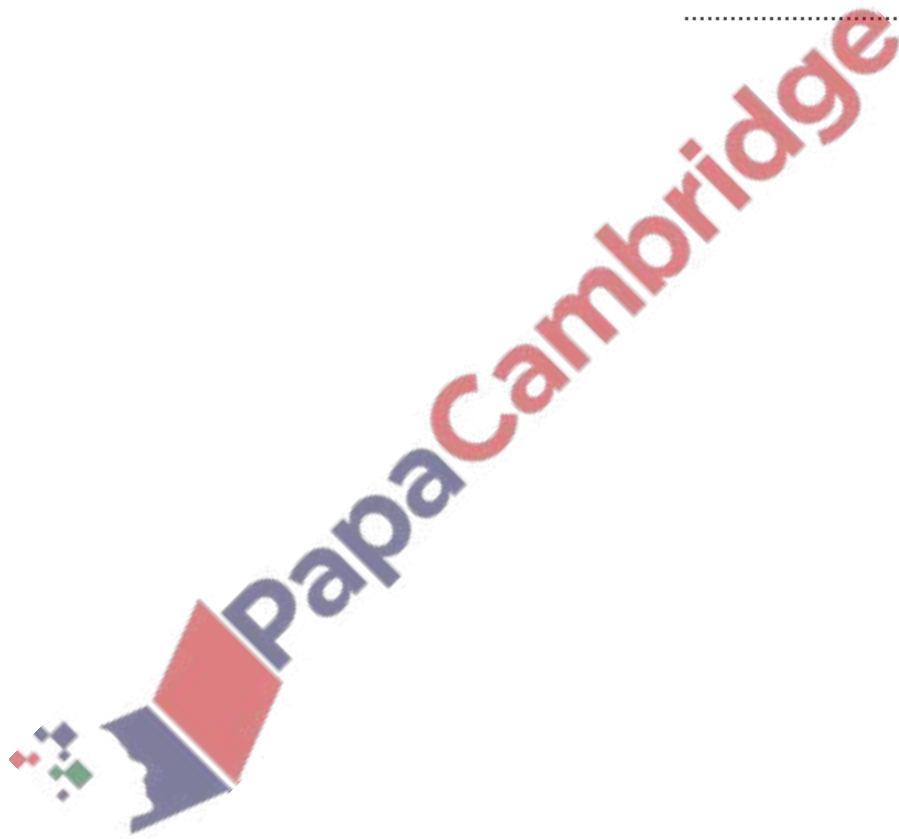Calculate the time taken, in minutes and seconds, for the trough to be emptied.

.... minutes .... seconds [3]

(c) All the water from the trough is emptied into a vertical cylindrical tank.
The depth of the water in the tank is 84 cm.
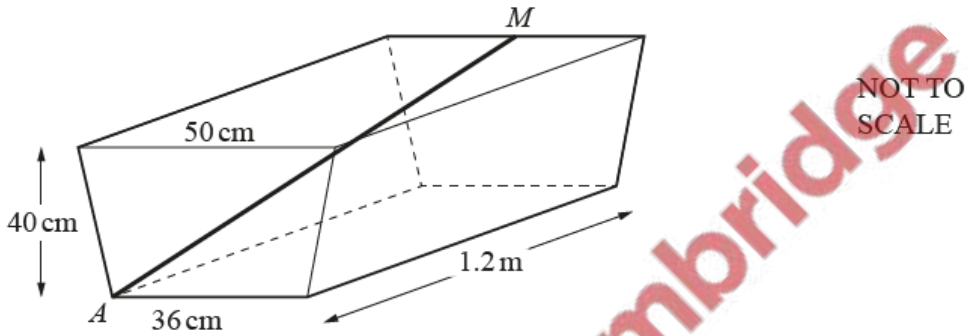
(i) Calculate the radius of the tank.

.... cm [3]

(ii) The tank is 60% full.

Calculate the height of the tank.
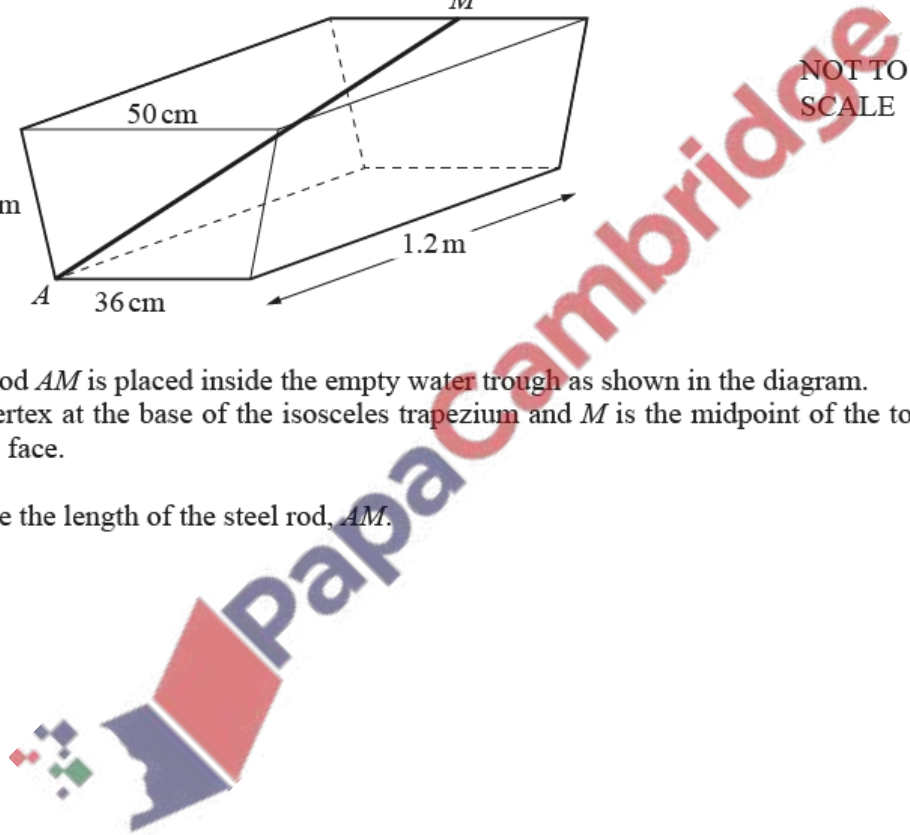
.... cm [2]

(d)

A steel rod *AM* is placed inside the empty water trough as shown in the diagram.
A is a vertex at the base of the isosceles trapezium and *M* is the midpoint of the top edge on the opposite face.

Calculate the length of the steel rod, *AM*.

AM = ... cm [4]