Mensuration – 2023 O Level Math D 4024

1. Nov/2023/Paper_ 4024/11/No.8

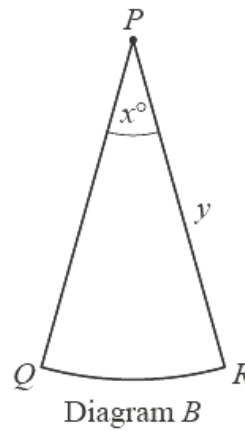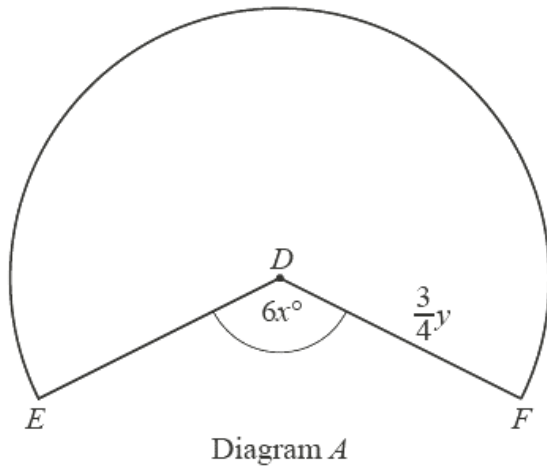   **(a)** Convert 78 mm to cm.

                                               .... cm [1]

   (b) Convert $3\,\mathrm{m}^2$ to cm^2.

                                               .... cm^2 [1]

1. Nov/2023/Paper_ 4024/11/No.8

1

2. Nov/2023/Paper_ 4024/12/No.21

Diagram A

Diagram B

NOT TO SCALE

Diagram A shows a sector of a circle, centre D and radius $\frac{3}{4}y$ cm.
The obtuse angle $EDF = 6x°$.

Diagram B shows a sector of a circle, centre P and radius y cm.
The sector angle is $x°$.

(a) The length of the major arc EF is 9 times the length of the arc QR.
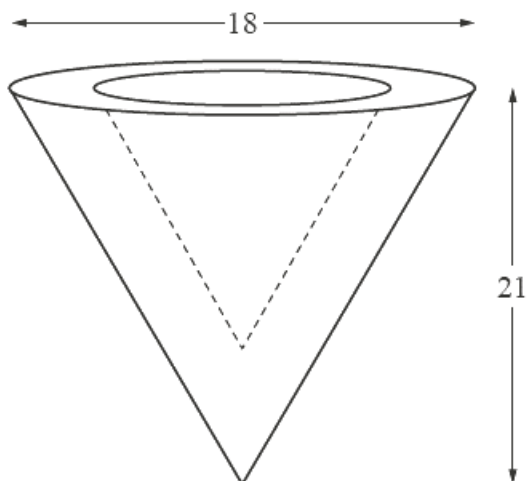
Show that $x = 20$.

[3]

(b) Find the value of y when the area of sector QPR is equal to $2\pi \, \text{cm}^2$.

$y =$ .... [2]

2

3. Nov/2023/Paper_ 4024/22/No.10

(a) [Volume of a cone $= \frac{1}{3}\pi r^2 h$]

[Curved surface area of a cone $= \pi r l$]

A solid is formed from a large cone with a small cone removed from the centre.
The small cone is mathematically similar to the large cone.
The vertex of the large cone is vertically below the vertex of the small cone.

The height of the large cone is 21 cm and the diameter of the top is 18 cm.
The height of the small cone is 14 cm.

(i) Show that the volume of the solid is $399\pi \, \text{cm}^3$.

[3]

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

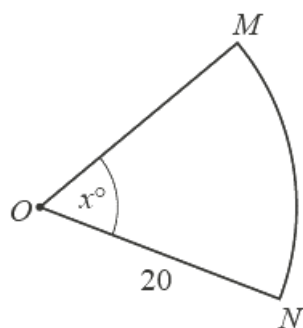   .... cm^2 [6]

(b) The height of a cylinder is 13 cm, correct to the nearest centimetre.
The radius of the base of the cylinder is 4.5 cm, correct to the nearest 0.1 centimetre.

Calculate the upper bound of the volume, in cm^3, of the cylinder.

                                                                     .... cm^3 [3]

4. June/2023/Paper_ 4024/11/No.16

OMN is a sector of a circle, centre O.
$ON = 20$ cm and the area of the sector is 30π cm^2.

Find the value of x.

$x =$ .... [3]

5. June/2023/Paper_ 4024/11/No.21

The diagram shows two rectangles.
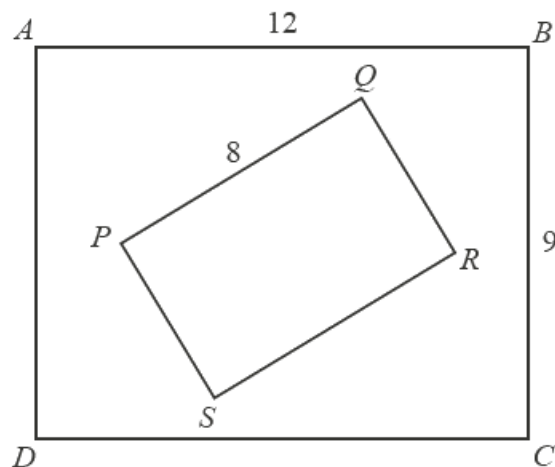
NOT TO SCALE

Rectangle *ABCD* is mathematically similar to rectangle *PQRS*.
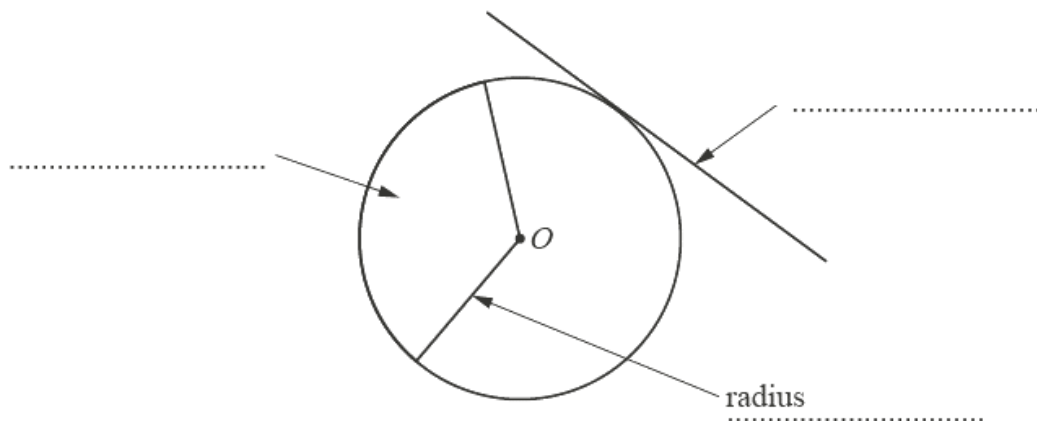$AB = 12$ cm, $BC = 9$ cm and $PQ = 8$ cm.

Find the shaded area.

.... cm^2 [3]

5. June/2023/Paper_ 4024/11/No.21
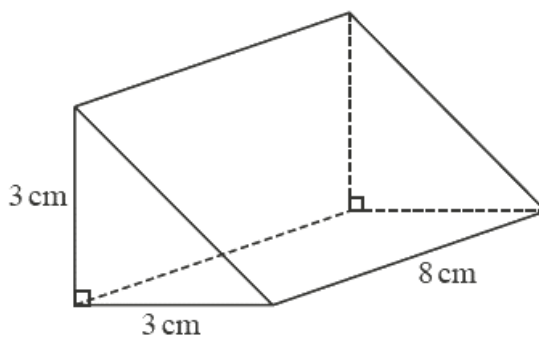
6. June/2023/Paper_ 4024/12/No.2

The diagram shows a circle with centre O.
A straight line touches the circle.

Complete each label with the correct mathematical name.
A radius has been labelled for you.

....

....

radius
....

[2]

7. June/2023/Paper_ 4024/12/No.9

3 cm

3 cm

8 cm

The diagram shows a triangular prism.
The cross-section is a right-angled isosceles triangle.

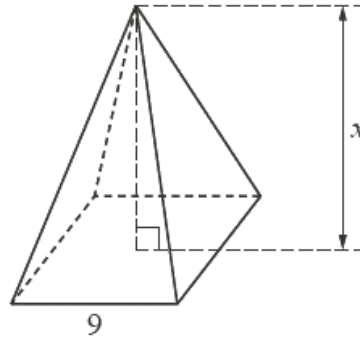**(a)** Write down the number of planes of symmetry of the prism.

.... [1]

(b) Work out the volume of the prism.

.... cm^3 [2]

8. June/2023/Paper_ 4024/21/No.1(d)

(d) [Volume of pyramid $= \frac{1}{3} \times$ base area $\times$ height]

The diagram shows a pyramid with a square base of side length 9 cm.
The pyramid has height x cm and volume y cm^3.

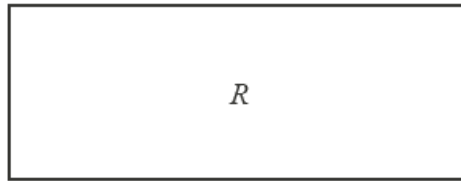(i) Show that the equation for the volume of the pyramid is $y = 27x$.

[1]

(ii) By drawing a suitable straight line on the grid on page 2, find the height of the pyramid when the pyramid and the cuboid have the same volume.

.... cm [3]

9. June/2023/Paper_ 4024/22/No.8

(a)

NOT TO SCALE

The length of the rectangle R is twice its width.
Rectangle R has a perimeter of 20.4 cm.

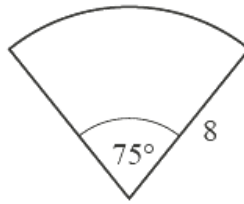(i) Find the length and width of the rectangle R.

length = ... cm

width = ... cm [2]

(ii) Rectangle S is mathematically similar to rectangle R.
Rectangle S has a perimeter of 30.6 cm.

Calculate the length of rectangle S.

length = ... cm [2]
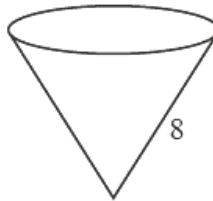
(b)

NOT TO SCALE

A piece of card is a sector of a circle with sector angle 75° and radius 8 cm.

(i) Find an expression, in terms of π, for the arc length of the sector.
Give your answer in its simplest form.

.... cm [2]

(ii) [Volume of a cone $= \frac{1}{3}\pi r^2 h$]

The piece of card forms the curved surface area of a cone.
The cone is filled to the top with water.

Calculate the volume of water in the cone.

.... cm³ [5]