Radians

Q1

Fig. 1 below shows a baseball court in a children's playground.

Fig. 1

The dimensions of the court are shown in **Fig. 2** below.

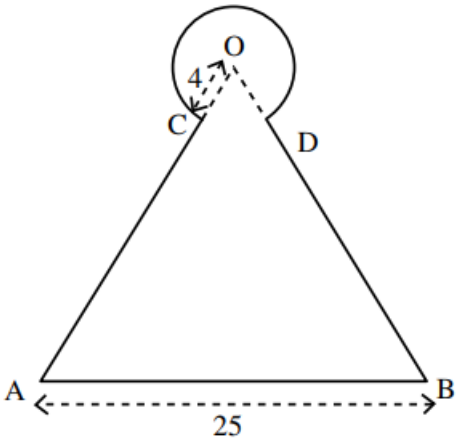

Fig. 2

O is the centre of a circle, radius 4 m.
OA = OB = AB = 25 m.
Angle COD = $\frac{\pi}{3}$ radians.
Find:

(i) the perimeter of the baseball court, [4]

(ii) the area of the baseball court. [5]

Q2

Fig. 2 below shows the semicircular end ABC of a tunnel tent which is pitched on horizontal ground.
A guy rope is attached to the tent at G and pegged to the ground at P.

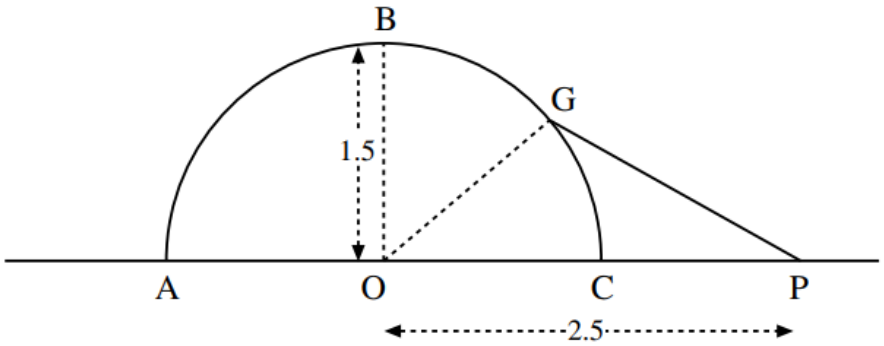

Fig. 2

O is the midpoint of AC.

OP = 2.5 m, OB = 1.5 m and $\hat{BOC} = \frac{\pi}{2}$ radians.

The arc length BG is 1 m.

(i) Show that $\hat{BOG} = \frac{2}{3}$ radians. [3]

(ii) Find the length of GP. [4]

(iii) Find the angle between the guy rope and the ground. [3]

Q3

A front door is to be made for a new house. It consists of a sector of a circle and two congruent right-angled triangles as shown in **Fig. 2** below.

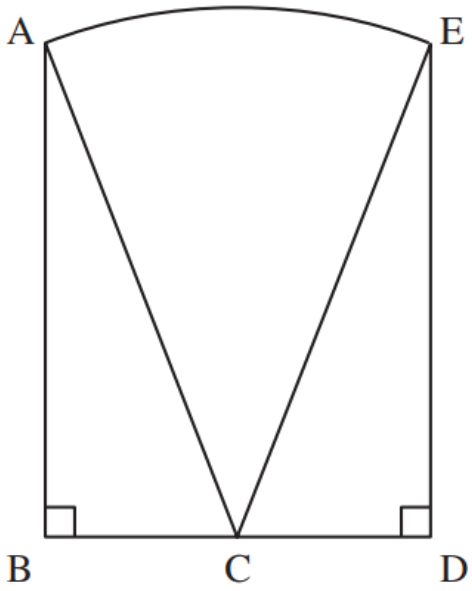

Fig. 2

$AB = 2\,m \qquad BD = 1.5\,m$

Find

(i) AC, [2]

(ii) $A\hat{C}B$ in radians, [2]

(iii) the perimeter of the door, [4]

(iv) the area of the door. [4]

Q4

Shown in **Fig. 1** below is the javelin-throwing zone CAB in an athletics arena.
CAB is a sector of a circle of radius 100 m and centre C.
Angle ACB = 1.4 radians.

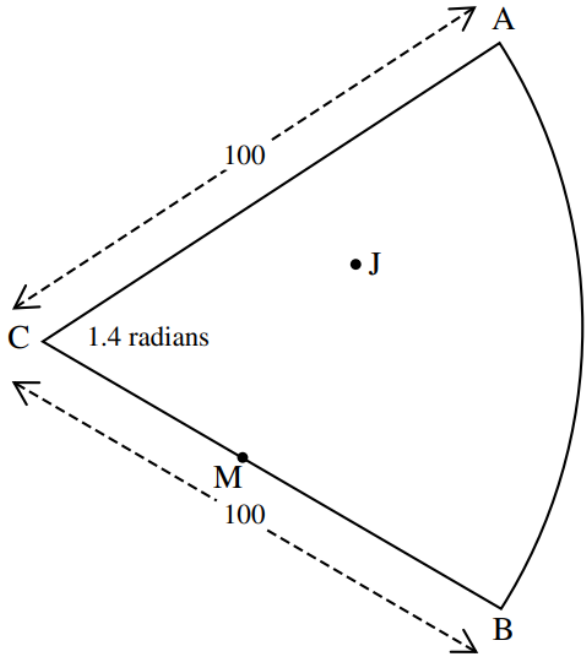

Fig. 1

(i) Find the area of the zone. [2]

A javelin is thrown from C and lands in the zone at point J.
Angle JAC = 0.5 radians and AJ = 50 m.

(ii) Find the distance of J from C. [3]

(iii) Find in radians the angle CJ makes with the line CA. [3]

Spectators stand all along the edge CB of the zone.
The spectator standing at point M on CB is closest to J.

(iv) Find the distance of M from J. [4]

Q5

A silver medal is divided into two parts by a line AB.
The medal is in the shape of a circle, centre O, as shown in **Fig. 3** below.

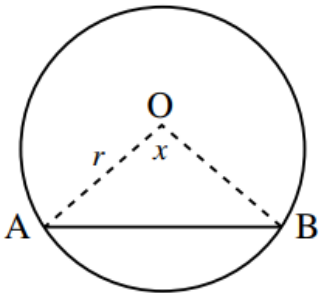

Fig. 3

The radius of the circle is r and the angle AOB is x radians.

(i) Write down the area of the minor sector OAB. [1]

(ii) Write down the area of the triangle AOB. [1]

The areas of the two parts of the medal divided by the line AB are in the ratio 5 : 1

(iii) Show that

$$\sin x = x - \frac{\pi}{3}$$ [8]