1. Arrowline Enterprises is considering two possible logos:

![Diagram of logos](image)

**Fig. 10.1** and **Fig. 10.2**

(i) Fig. 10.1 shows the first logo ABCD. It is symmetrical about AC.

Find the length of AB and hence find the area of this logo.

(ii) Fig. 10.2 shows a circle with centre O and radius 12.6 cm. ST and RT are tangents to the circle and angle SOR is 1.82 radians. The shaded region shows the second logo.

Show that ST = 16.2 cm to 3 significant figures.

Find the area and perimeter of this logo.
Fig. 4 shows sector OAB with sector angle 1.2 radians and arc length 4.2 cm. It also shows chord AB.

(i) Find the radius of this sector.  

(ii) Calculate the perpendicular distance of the chord AB from O.
In a concert hall, seats are arranged along arcs of concentric circles, as shown in Fig. 13.1. As shown in Fig. 13.2, the stage is part of a sector ABO of radius 11 m. Fig. 13.2 also gives the dimensions of the stage.

(i) Show that angle COD = 1.55 radians, correct to 2 decimal places. Hence find the area of the stage. [6]

(ii) There are four rows of seats, with their backs along arcs, with centre O, of radii 7.4 m, 8.6 m, 9.8 m and 11 m. Each seat takes up 80 cm of the arc.

(A) Calculate how many seats can fit in the front row. [4]

(B) Calculate how many more seats can fit in the back row than the front row. [2]
Charles has a slice of cake; its cross-section is a sector of a circle, as shown in Fig. 9. The radius is \( r \) cm and the sector angle is \( \frac{\pi}{6} \) radians.

He wants to give half of the slice to Jan. He makes a cut across the sector as shown.

Show that when they each have half the slice, \( a = r\sqrt{\frac{\pi}{6}} \). \[4\]

A sector of a circle has area 8.45 cm\(^2\) and sector angle 0.4 radians. Calculate the radius of the sector. \[3\]
Fig. 11.1

Fig. 11.1 shows the surface ABCD of a TV presenter’s desk. AB and CD are arcs of circles with centre O and sector angle 2.5 radians. OC = 60 cm and OB = 140 cm.

(A) Calculate the length of the arc CD. [2]

(B) Calculate the area of the surface ABCD of the desk. [4]

(ii) The TV presenter is at point P, shown in Fig. 11.2. A TV camera can move along the track EF, which is of length 3.5 m.

Fig. 11.2

When the camera is at E, the TV presenter is 1.6 m away. When the camera is at F, the TV presenter is 2.8 m away.

(A) Calculate, in degrees, the size of angle EFP. [3]

(B) Calculate the shortest possible distance between the camera and the TV presenter. [2]