1 Fig. 11.1 shows a village green which is bordered by 3 straight roads AB, BC and CA. The road AC runs due North and the measurements shown are in metres.

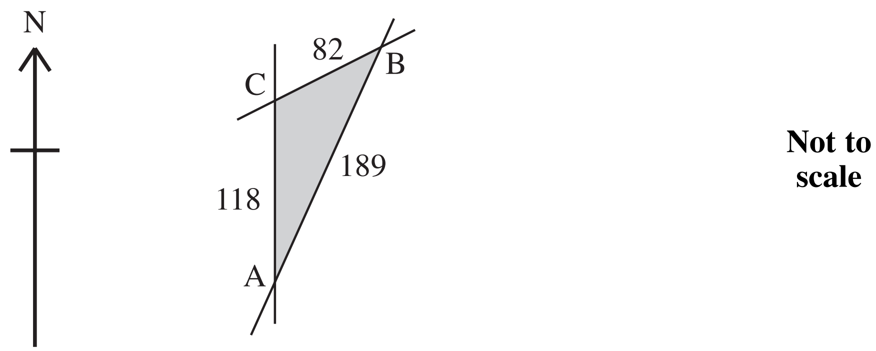


Fig. 11.1

(i) Calculate the bearing of B from C, giving your answer to the nearest 0.1°. [4]

(ii) Calculate the area of the village green. [2]

The road AB is replaced by a new road, as shown in Fig. 11.2. The village green is extended up to the new road.

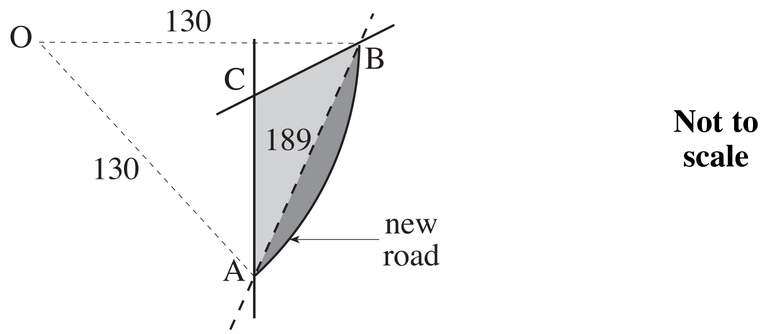


Fig. 11.2

The new road is an arc of a circle with centre O and radius 130 m.

(iii) (*A*) Show that angle AOB is 1.63 radians, correct to 3 significant figures. [2]

(*B*) Show that the area of land added to the village green is 5300 m^2 correct to 2 significant figures. [4]

2

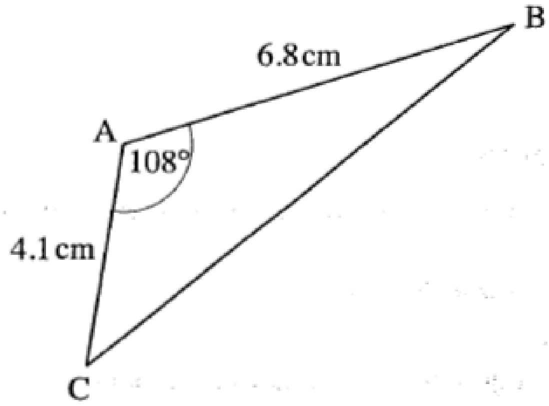


Fig. 4

For triangle ABC shown in Fig. 4, calculate

(i) the length of BC, [3]

(ii) the area of triangle ABC. [2]

3 **(a)**

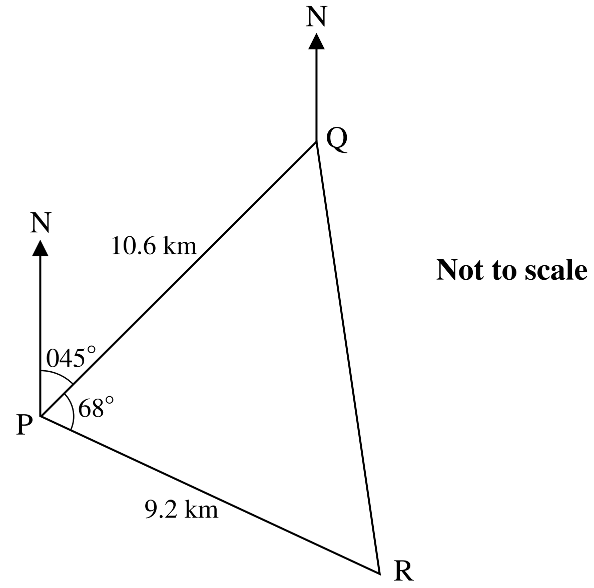


Fig. 11.1

A boat travels from P to Q and then to R. As shown in Fig. 11.1, Q is 10.6 km from P on a bearing of 045°. R is 9.2 km from P on a bearing of 113°, so that angle QPR is 68°.

Calculate the distance and bearing of R from Q. **[5]**

(b) Fig. 11.2 shows the cross-section, EBC, of the rudder of a boat.

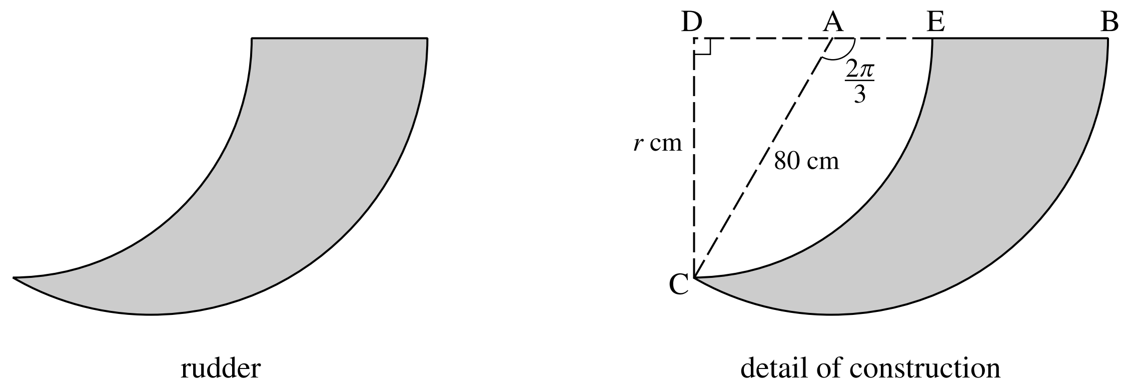


Fig. 11.2

BC is an arc of a circle with centre A and radius 80 cm. Angle CAB = $\frac{2\pi}{3}$ radians.

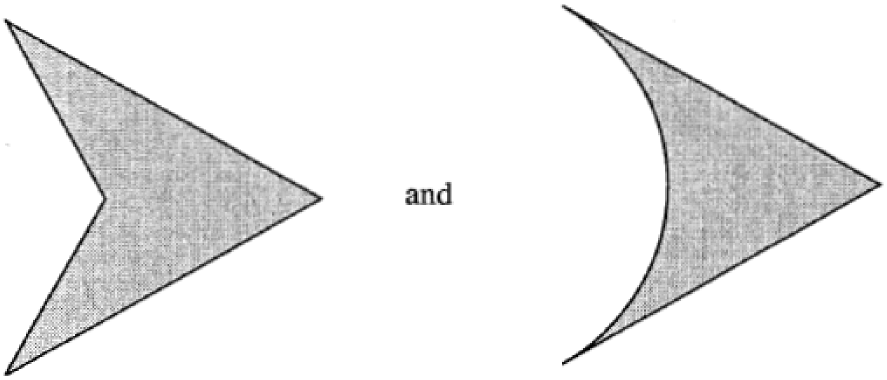
EC is an arc of a circle with centre D and radius r cm. Angle CDE is a right angle.

(i) Calculate the area of sector ABC. **[2]**

(ii) Show that $r = 40\sqrt{3}$ and calculate the area of triangle CDA. **[3]**

(iii) Hence calculate the area of cross-section of the rudder. **[3]**

4 *Arrowline Enterprises* is considering two possible logos:



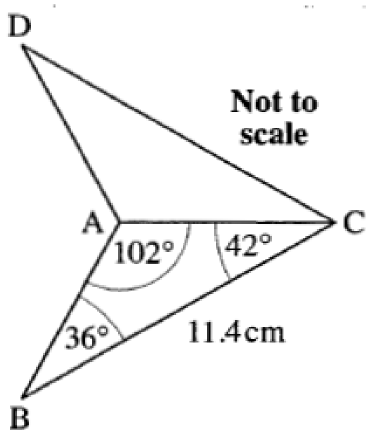


Fig. 10.1

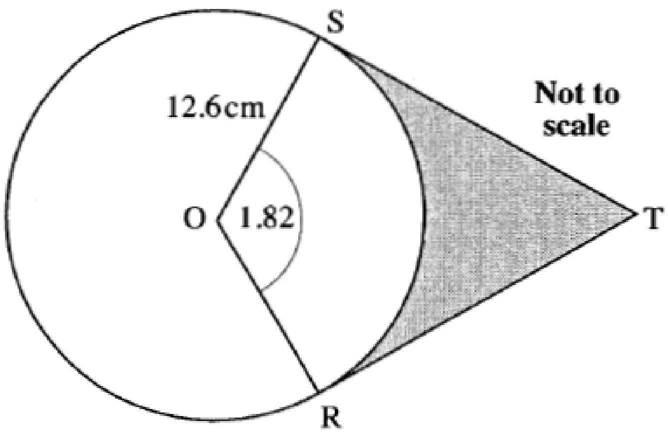


Fig. 10.2

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

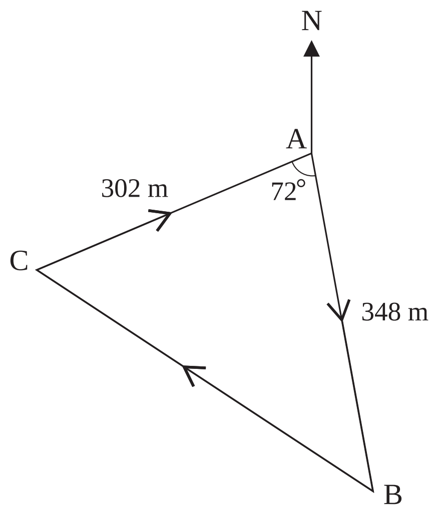
Find the length of AB and hence find the area of this logo. [4]

(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. [8]

5 **(i)** The course for a yacht race is a triangle, as shown in Fig. 11.1. The yachts start at A, then travel to B, then to C and finally back to A.



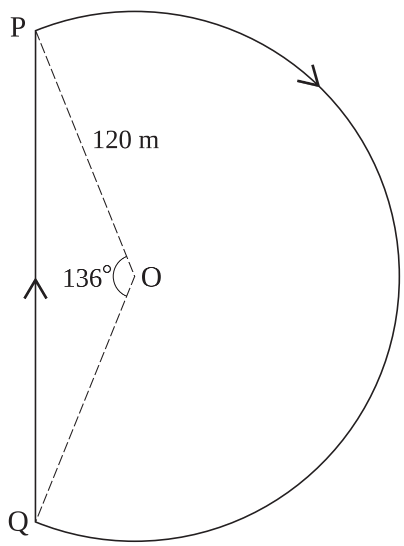
Not to scale

Fig. 11.1

(*A*) Calculate the total length of the course for this race. [4]

(*B*) Given that the bearing of the first stage, AB, is 175°, calculate the bearing of the second stage, BC. [4]

(ii) Fig. 11.2 shows the course of another yacht race. The course follows the arc of a circle from P to Q, then a straight line back to P. The circle has radius 120 m and centre O; angle POQ = 136°.



Not to scale

Fig. 11.2

Calculate the total length of the course for this race. [4]