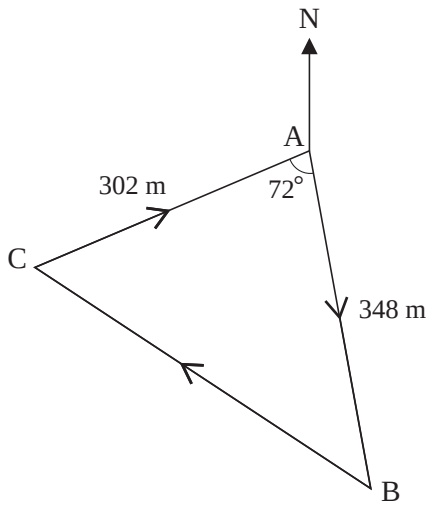
**1** **(i)** The course for a yacht race is a triangle, as shown in Fig. 11.1. The yachts start at A, then travel to B, then to C and finally back to A.




**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°.

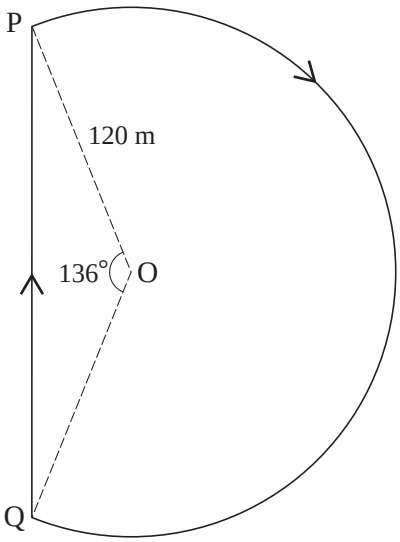



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**Fig. 11.2**

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

**2** Given that $140° = k\pi$ radians, find the exact value of $k$. [2]

**3** In Fig. 7, A and B are points on the circumference of a circle with centre O.

Angle AOB = 1.2 radians.

The arc length AB is 6 cm.

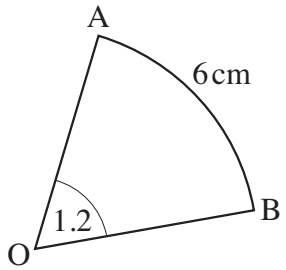


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**Fig. 7**

**(i)** Calculate the radius of the circle. [2]

**(ii)** Calculate the length of the chord AB. [3]

**4**

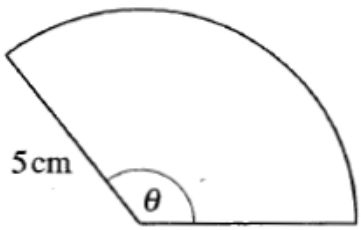


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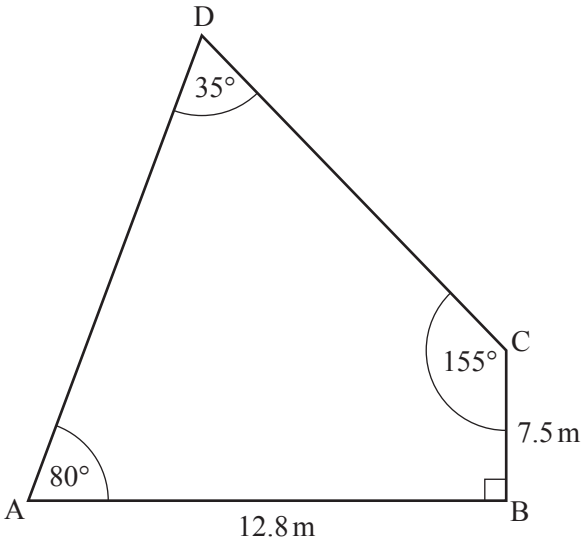
**Fig. 7**

Fig. 7 shows a sector of a circle of radius 5 cm which has angle $\theta$ radians. The sector has area 30 $cm^2$.

**(i)** Find $\theta$. [3]

**(ii)** Hence find the perimeter of the sector. [2]

**5** Fig. 10.1 shows Jean's back garden. This is a quadrilateral ABCD with dimensions as shown.



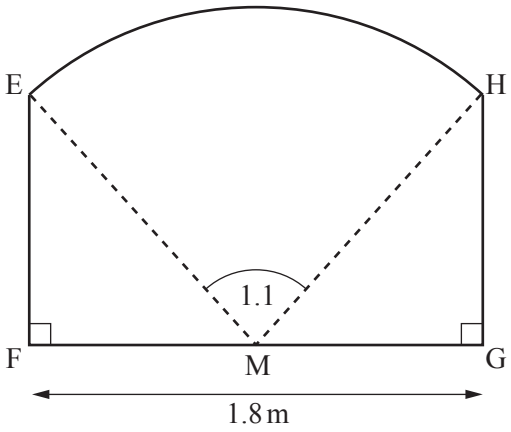

**Not to scale**

**Fig. 10.1**

**(i)** (*A*) Calculate AC and angle ACB. Hence calculate AD. **[6]**

(*B*) Calculate the area of the garden. **[3]**

**(ii)** The shape of the fence panels used in the garden is shown in Fig. 10.2. EH is the arc of a sector of a circle with centre at the midpoint, M, of side FG, and sector angle 1.1 radians, as shown. FG = 1.8 m.




**Not to scale**

**Fig. 10.2**

Calculate the area of one of these fence panels. **[5]**

**6 (i)**

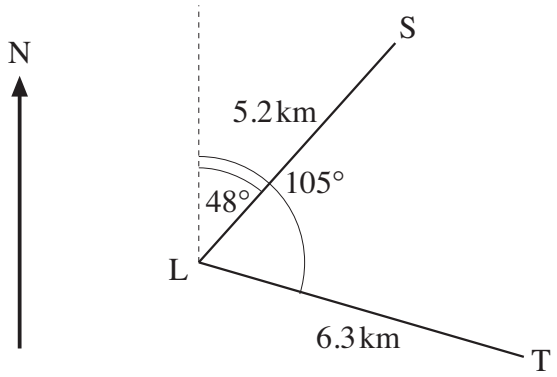



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**Fig. 10.1**

At a certain time, ship S is 5.2 km from lighthouse L on a bearing of 048°. At the same time, ship T is 6.3 km from L on a bearing of 105°, as shown in Fig. 10.1.

For these positions, calculate

(*A*) the distance between ships S and T, [3]

(*B*) the bearing of S from T. [3]

**(ii)**

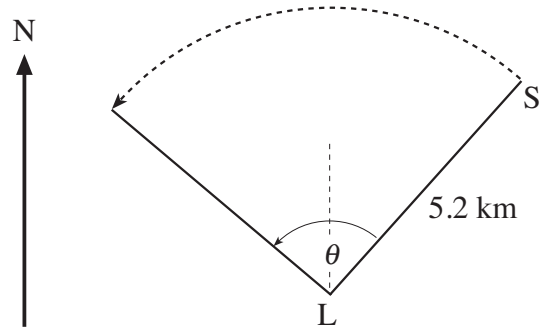


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**Fig. 10.2**

Ship S then travels at 24 km h $^{1}$ anticlockwise along the arc of a circle, keeping 5.2 km from the lighthouse L, as shown in Fig. 10.2.

Find, in radians, the angle $\theta$ that the line LS has turned through in 26 minutes.

Hence find, in degrees, the bearing of ship S from the lighthouse at this time. [5]

**7** 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.

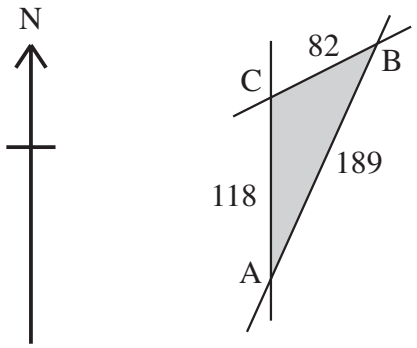


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**Fig. 11.1**

**(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.

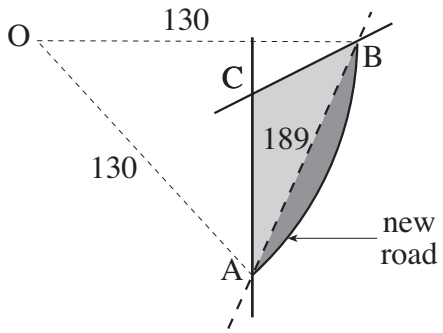


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**Fig. 11.2**

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]