PRACTICE Angles of Elevation and Depression and Arc Length

* Full, worked solutions can be found in the folder linked on the Course Website ☺

*** Try the problems CIRCLED IN RED first …**

Exercise 1I

1 The angle of depression from the top of a cliff to a boat at sea is 17°. The boat is 450 m from the shore.

- **a** Draw a diagram representing the situation.
- **b** Find the height of the cliff, giving your answer rounded to the nearest metre.

2 Your family wants to buy an awning for a French window that will be long enough to keep out the sun when it is at its highest point in the sky. The height of the French window is 2.80 m. The angle of elevation of the sun from this point is 70°. Find how long the awning should be. Write down your answer correct to 2 dp.

3 Scientists measure the depths of lunar craters by measuring the length of the shadow cast by the edge of the crater using photos. In a photograph, the length of the shadow cast by the edge of the Moltke crater is about 606 metres, given to the nearest metre. The sun's angle of elevation is 65°. Find the depth of the crater, giving your answer rounded to the nearest metre.

4 The height of a building is 72 m. Find the angle of elevation from a point on ground level that is 55 m away from the base of the building.

5 From a boat 160 m out at sea, the angle of elevation to the coast is 18°. The angle of elevation to the top of a lighthouse on the coast is 22°.

- **a** Draw a diagram representing the situation.
- **b** Find the height of the lighthouse.

Arc Length problems on next page ☐

Exercise 1J

1 Determine the length of each arc with radius r and central angle α given below.

Give your answer correct to 2 dp.

a $r = 5\,\text{cm}$, $\alpha = 70°$

b $r = 4\,\text{cm}$, $\alpha = 45°$

c $r = 10.5\,\text{cm}$, $\alpha = 130°$

2 A clock is circular in shape with diameter 25 cm. Find the length of the arc between the markings 12 and 5, rounded to the nearest tenth of a centimetre.

3 The London Eye is a giant Ferris wheel in London. It is the tallest Ferris wheel in Europe, with a diameter of 120 m. The passenger capsules are attached to the circumference of the wheel, and the wheel rotates at 26 cm per second.

Find:

a the length that a passenger capsule would travel if the wheel makes a rotation of 200°

b the time, in minutes, that it would take for a passenger capsule to make a rotation of 200°

c the time, to the nearest whole minute, that it would take for a passenger capsule to make a full revolution.

4 A door with width 4.20 m has an arc as shown in the diagram. Find:

a the radius of the arc, to the nearest cm

b the length of the arc, to the nearest cm.