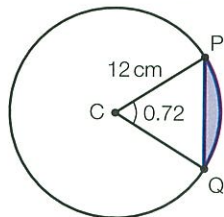## 6.7 GEOMETRY OF TRIANGLES AND CIRCLES

WORKED EXAMPLE 6.7

The diagram shows a circle with centre C and radius 12 cm. Points P and Q are on the circumference on the circle and $\widehat{PCQ} = 0.72$ radians.

(a) Find the length of the chord PQ.

(b) Find the area of the shaded region.

(a) Using the cosine rule in triangle PCQ:

$$PQ^2 = 12^2 + 12^2 - 2 \times 12 \times 12 \cos 0.72$$
$$= 71.5$$
$$\therefore PQ = 8.45 \, cm$$

> CP = CQ = 12 since CP and CQ are both radii. As we don't have an angle and its opposite side, we need to use the cosine rule.

> 🖩 Make sure your calculator is in radian mode.

(b) Area of sector PCQ:

$$\frac{1}{2}r^2\theta = \frac{1}{2} \times 12^2 \times 0.72 = 51.84$$

Area of triangle PCQ:

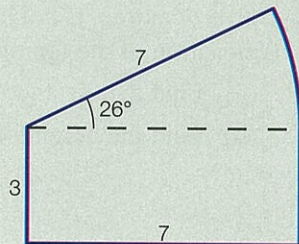$$\frac{1}{2}ab\sin C = \frac{1}{2}(12)(12)\sin 0.72 = 47.5$$

Shaded area = 51.84 − 47.5 = 4.36 cm²

> We can find the area of the shaded region by subtracting the area of the triangle from the area of the sector.

Practice questions 6.7

23. A sector of a circle with angle 0.65 radians has area 14.8 cm². Find the radius of the circle.

24. The diagram shows a rectangle and a sector of a circle. Find the perimeter.

25. A vertical cliff BT, of height 50 m, stands on horizontal ground. The angle of depression of the top of a lighthouse, L, from the top of the cliff is 20°. The angle of elevation of L from the bottom of the cliff is 15°. Find the height of the lighthouse.
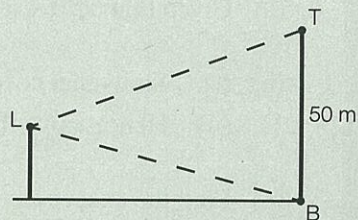
> ⚠ The angle of elevation is the angle above the horizontal.
> The angle of depression is the angle below the horizontal.