

Angles, Circles and Symmetry - Lesson 3

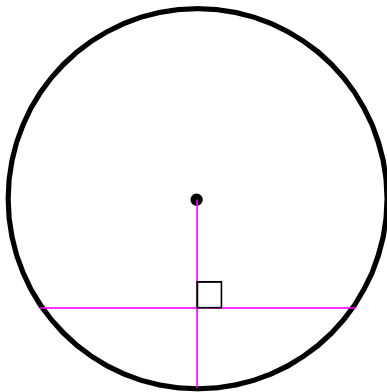
Using Pythagoras' Theorem and Trigonometry in a Circle

LI

- Use Pythagoras' Theorem and trigonometry to find missing lengths in a circle.

SC

- Property of a chord bisecting a radius.

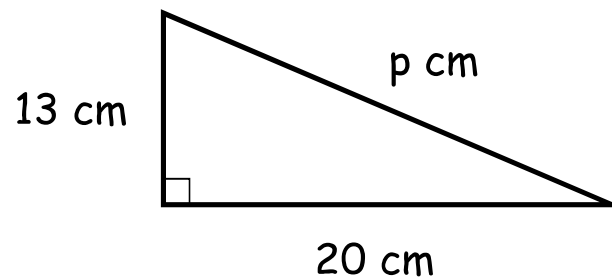
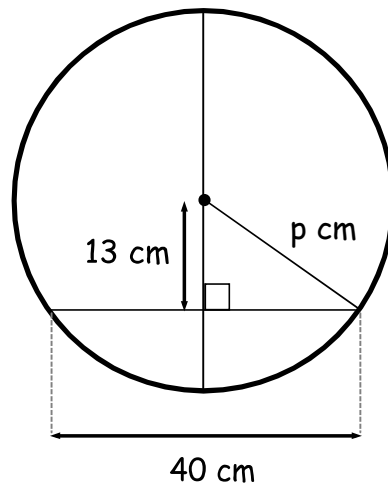


If a **chord** and a **radius** meet at 90° ,
the chord is **bisected**

If a **radius** **bisects** a **chord**, then the
diameter and chord are at
 90° to each other

Example 1

Calculate p to 1 d.p..



$$p^2 = 13^2 + 20^2$$

$$p^2 = 169 + 400$$

$$p^2 = 569$$

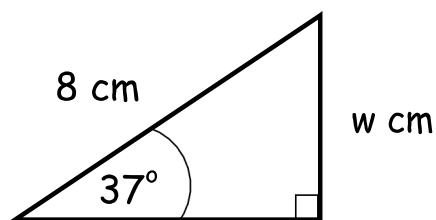
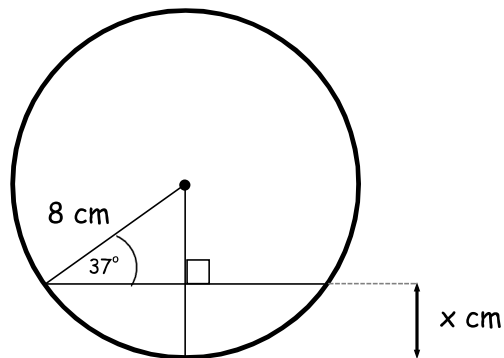
$$p = \sqrt{569}$$

$$p = 23.853 \dots$$

$$p = 23.9 \text{ cm (1 d.p.)}$$

Example 2

Calculate x to 1 d.p..



SOH	CAH	TOA
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$$\sin \theta = \frac{O}{H}$$

$$\sin 37^\circ = \frac{w}{8}$$

$$w = 8 \times \sin 37^\circ$$

$$w = 4.81 \dots$$

$$x = 8 - w$$

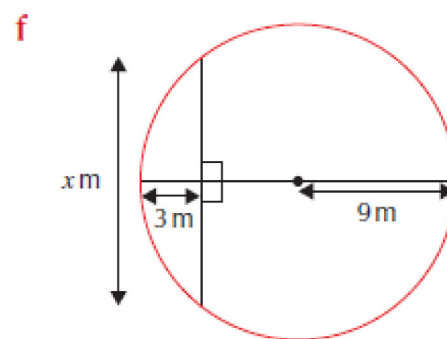
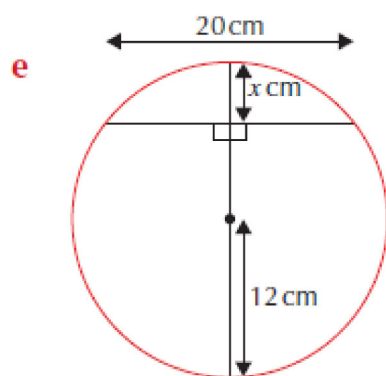
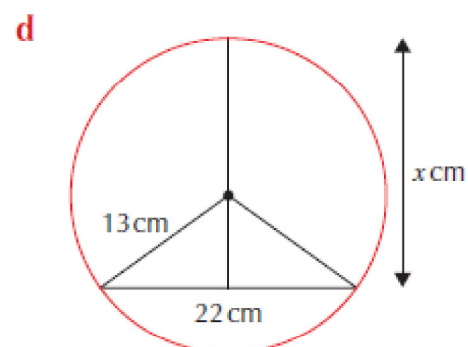
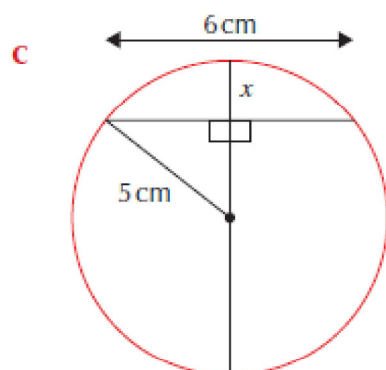
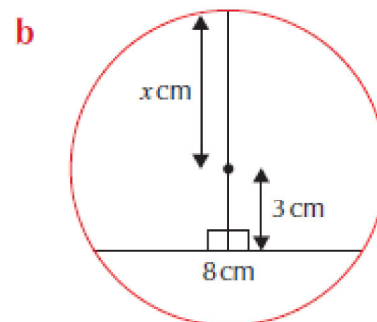
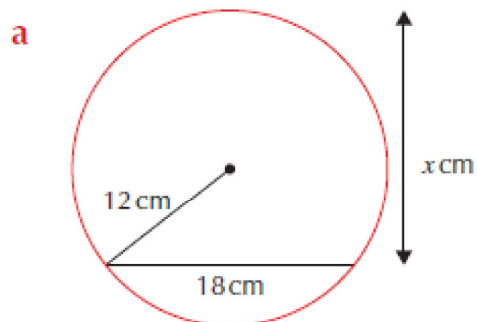
$$x = 8 - 4.81 \dots$$

$$x = 3.18 \dots$$

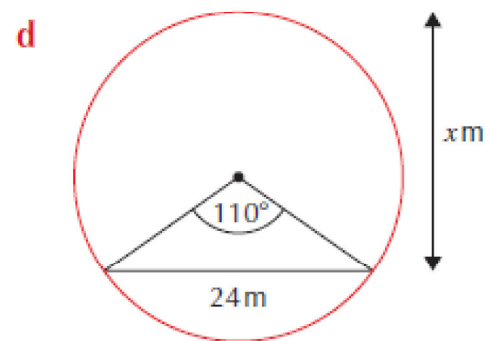
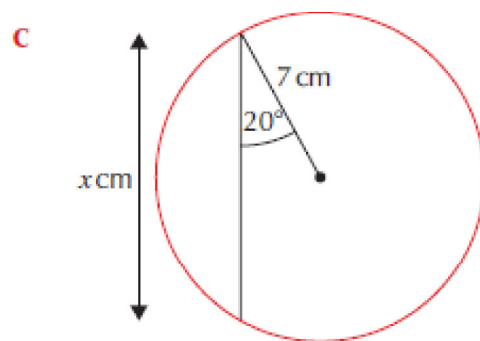
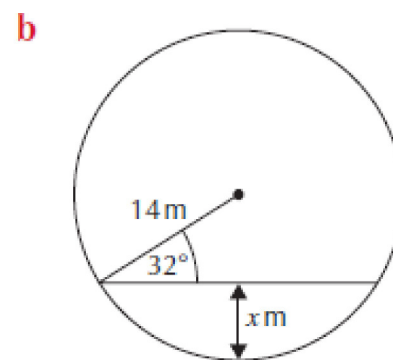
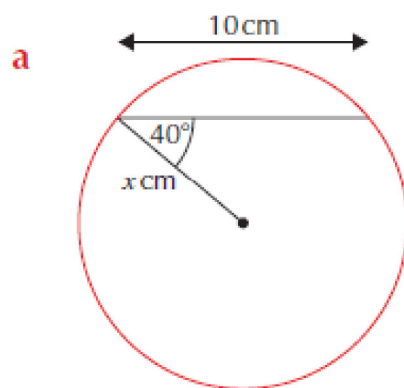
$$x = 3.2 \text{ cm (1 d.p.)}$$

Questions

1 Calculate the value of x . Give your answers to 2 decimal places where necessary.



2 Find the value of x .



Answers

1 a $x = 19.94 \text{ cm}$

b $x = 5 \text{ cm}$

c $x = 1 \text{ cm}$

d $x = 19.93 \text{ cm}$

e $x = 5.37 \text{ cm}$

f $x = 13.42 \text{ m}$

2 a $x = 6.53 \text{ cm}$

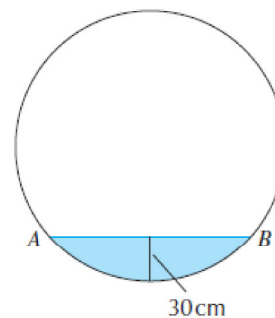
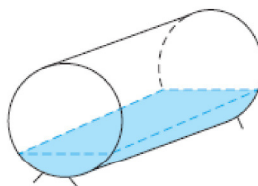
b $x = 6.58 \text{ m}$

c $x = 13.16 \text{ cm}$

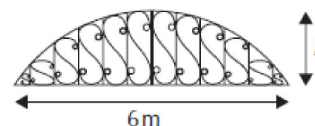
d $x = 23.05 \text{ m}$

Questions

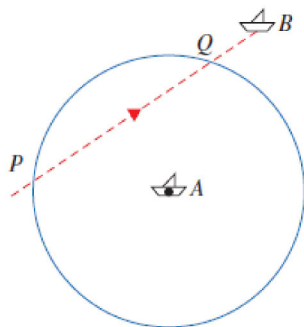
- 1 A cylindrical water tank with diameter 140 cm is partly filled with water. The depth of the water is 30 cm. Calculate the width of AB .



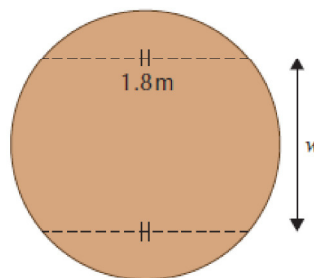
- 2 A set of park gates form part of a circle with radius 4 m. The width of the gates is 6 m. Calculate the height h of the gates.



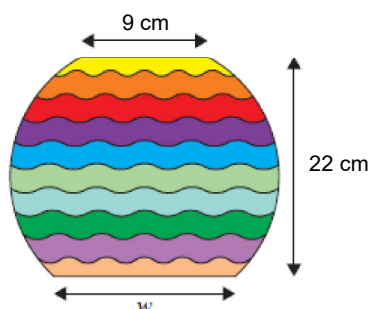
- 3 A radar on ship A covers a radius of 60 km. Ship B travels on a straight course through the points P and Q . The length of PQ is 100 km. Ship A has a warning alarm which is activated if another ship passes within 30 km of it. Will the alarm be activated as ship B passes?



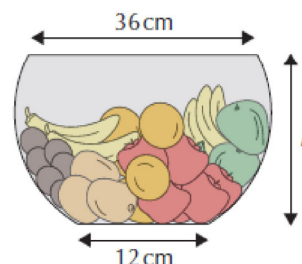
- 4 A circular table with diameter 2 m has foldable sides as shown in the diagram. When the sides are folded, the table sides are 1.8 m in length. What is its width w ?



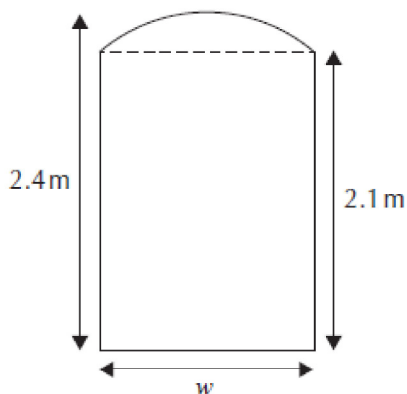
- 5 The cross-section of a lampshade is part of a circle with radius 15 cm. The width of the top is 9 cm and the height is 22 cm. What is the width w of the bottom?



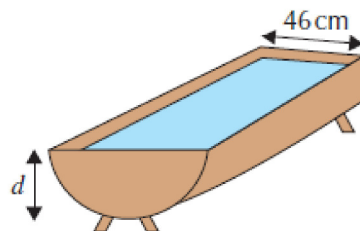
- ★ 6 A fruit bowl is part of the cross-section of a circle with radius 20 cm. The width of the top is 36 cm and the width of the base is 12 cm. Calculate the height h of the bowl.



- 7 A doorway is made from a rectangle and part of a circle with radius 70 cm. Calculate its width w .



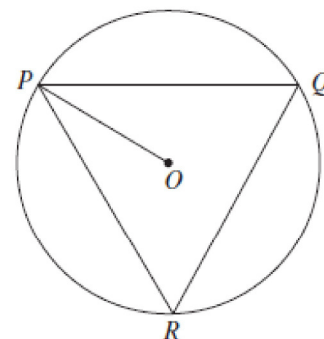
- 8 A drinking trough is part of the cross-section of a circle with diameter 70 cm. The width of the top is 46 cm. What is the depth d of the water when the trough is full?



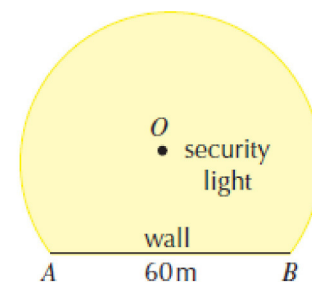
- 9 A badge for employees of Beta Corp is shown.

The badge is made from an equilateral triangle, with sides of length 3 cm, which touches the circumference of the circle at P , Q and R .

- Calculate the size of angle OPQ .
- Calculate the length of the radius of the circle OP .



- 10 A factory security light positioned at point O covers a distance of 40 m in all directions. The length of the factory wall AB is 60 m. Calculate the size of angle AOB .



Answers

- 1** $AB = 114.9\text{ cm}$
- 2** $h = 1.35\text{ m}$
- 3** Ship B passes within 33.17 km , so alarm will not be activated.
- 4** $w = 0.872\text{ m}$
- 5** $w = 25.76\text{ cm}$
- 6** $h = 27.80\text{ cm}$
- 7** $w = 114.89\text{ cm}$
- 8** $d = 8.62\text{ cm}$
- 9** **a** $OPQ = 30^\circ$
b $OP = 1.732\text{ cm}$
- 10** $AOB = 97.18^\circ$