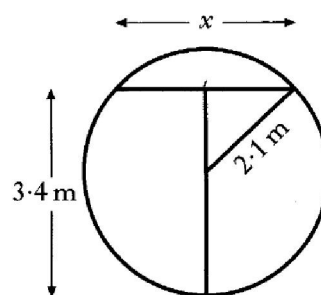
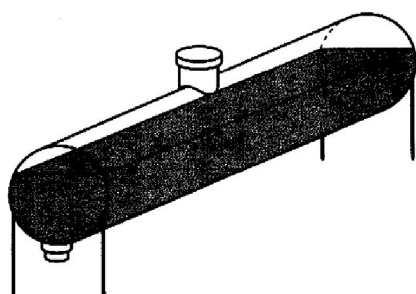


CIRCLE PROPERTIES. A Mixture of questions, that primarily focus on 'Perpendicular bisectors of chords'. You should also be secure at finding arc lengths, areas of sectors and the two other circle properties of:

1. Angles in a semi-circle are 90 degrees
2. A tangent meets the radius at 90 degrees.

6. An oil tank has a circular cross-section of radius 2.1 metres.  
It is filled to a depth of 3.4 metres.

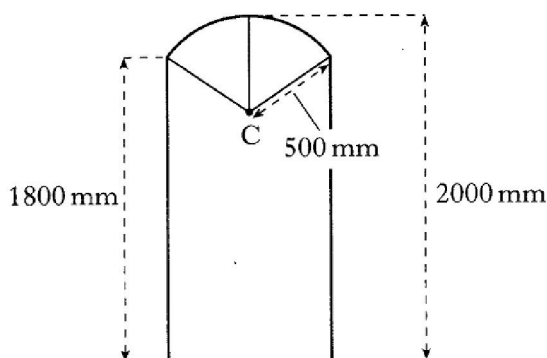
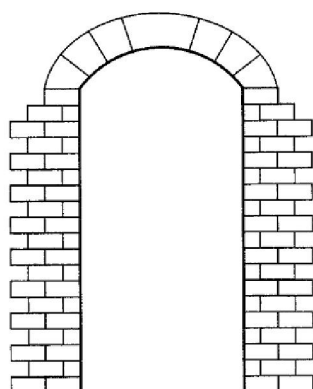


- (a) Calculate  $x$ , the width in metres of the oil surface.  
(b) What other depth of oil would give the same surface width?

3

1

8. The curved part of a doorway is an arc of a circle with radius 500 millimetres and centre C.  
The height of the doorway to the top of the arc is 2000 millimetres.  
The vertical edge of the doorway is 1800 millimetres.



Calculate the width of the doorway.

5

10. A sheep shelter is part of a cylinder as shown in Figure 1.

It is 6 metres wide and 2 metres high.

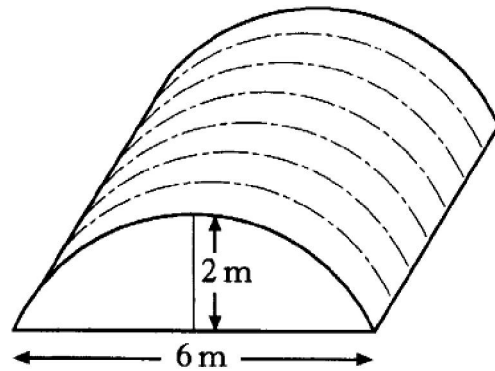


Figure 1

The cross-section of the shelter is a segment of a circle with centre  $O$ , as shown in Figure 2.

$OB$  is the radius of the circle.

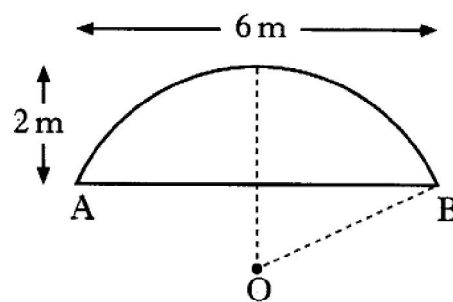


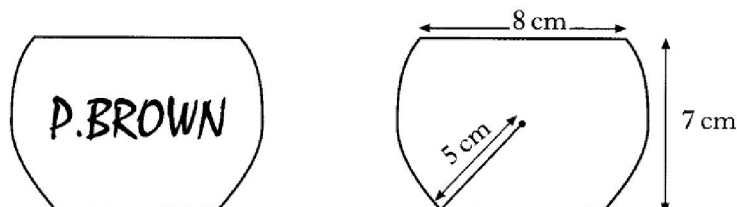
Figure 2

Calculate the length of  $OB$ .

10. A badge is made from a circle of radius 5 centimetres.

Segments are taken off the top and the bottom of the circle as shown.

The straight edges are parallel.

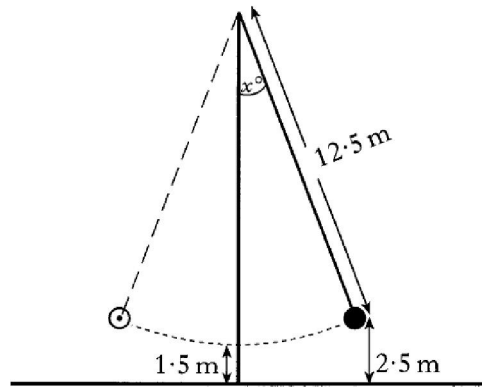


The badge measures 7 centimetres from the top to the bottom.

The top is 8 centimetres wide.

Calculate the width of the base.

10. The chain of a demolition ball is 12.5 metres long.  
When vertical, the end of the chain is 1.5 metres from the ground.



It swings to a maximum height of 2.5 metres above the ground on both sides.

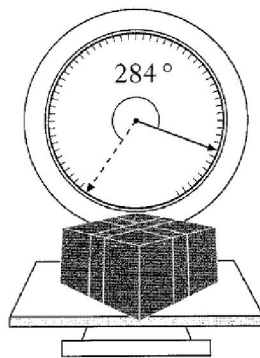
- (a) At this maximum height, show that the angle  $x^\circ$ , which the chain makes with the vertical, is approximately  $23^\circ$ .
- (b) Calculate the maximum length of the arc through which the end of the chain swings. Give your answer **to 3 significant figures**.

4

4

8. A set of scales has a circular dial.  
The pointer is 9 centimetres long.

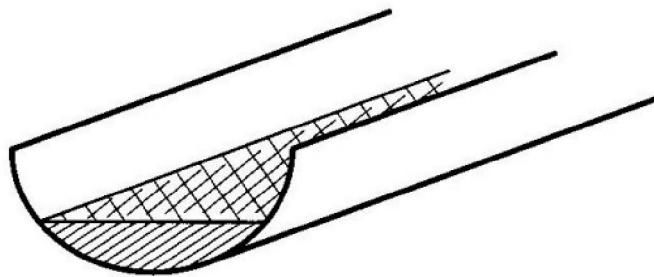
The tip of the pointer moves through an arc of 2 centimetres for each 100 grams of weight on the scales.



A parcel, placed on the scales, moves the pointer through an angle of  $284^\circ$ .  
Calculate the weight of the parcel.

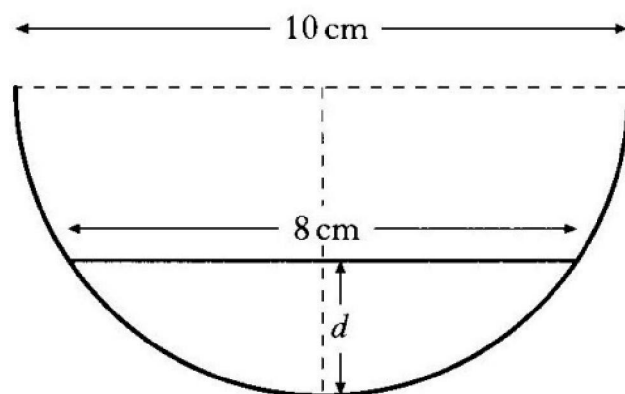
4

- 12.** The diagram shows water lying in a length of roof guttering.



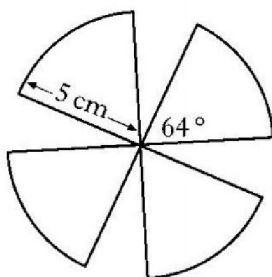
The cross-section of the guttering is a semi-circle with diameter 10 centimetres.

The water surface is 8 centimetres wide.



Calculate the depth,  $d$ , of water in the guttering.

7. A fan has four identical plastic blades.

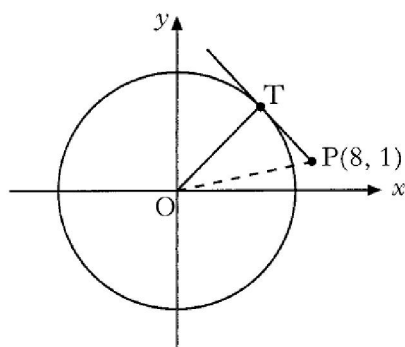


Each blade is a sector of a circle of radius 5 centimetres.

The angle at the centre of each sector is  $64^\circ$ .

Calculate the **total** area of plastic required to make the blades.

5. A circle, centre the origin, is shown.  
P is the point (8, 1).



- (a) Calculate the length of OP.

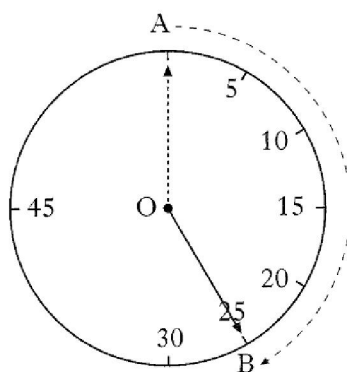
2

The diagram also shows a tangent from P which touches the circle at T.  
The radius of the circle is 5 units.

- (b) Calculate the length of PT.

2

9. Contestants in a quiz have 25 seconds to answer a question.  
This time is indicated on the clock.  
The tip of the clock hand moves through the arc AB as shown.



- (a) Calculate the size of angle AOB.

1

- (b) The length of arc AB is 120 centimetres.  
Calculate the length of the clock hand.

4