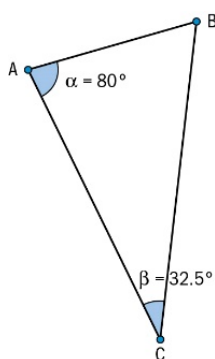


## 2 Representing space: non-right angled trigonometry and volumes

- 1 The diameter of the Moon is 3,474 km.
  - a Find the circumference of the Moon. Assume that the Moon is a perfect sphere.  
Give your answer correct to 2 dp.
  - b Write down your answer in part a correct to the nearest hundred.
  - c Write down your answer to part b in the form  $a \times 10^k$ , where  $1 \leq a < 10$ , where  $k$  is an integer.
- 2 Tomi is making a right-angled triangular table to place in one of the corners of his room. The three sides of a triangle have lengths of 16 cm, 19 cm, and 30 m.
  - a Show that this triangle is not right-angled.
  - b Determine how to correct one of the sides so that the table becomes a right-angled one.
- 3 An arc of a circle with radius 8 cm has a central angle  $22^\circ$ .
  - a Find the length of the arc.
  - b Find the area of the sector with central angle  $22^\circ$ .
- 4 Bambi has a triangular orchard, ABC. The length of side AB is 124.5 m, and the length of side BC is 230.8 m. The angle between side AB and side BC is  $128^\circ$ . Find the area of Bambi's orchard.
  - a Give your answer correct to the nearest integer.
  - b Give your answer correct to 1dp.
- 5 A triangular plot ABC, shown in the diagram below, has angle  $A = 80^\circ$ , angle  $C = 32.5^\circ$ , and side  $BC = 325$  m.



- a Find the length of AB.
- b Find the size of angle B.
- c Find the length of AB.
- d Find the length of fencing, in m, necessary to fence the triangular plot.

**6** A box, designed to be used as a juice container, has dimensions 4 cm, 5 cm, and 7 cm.

**a** Find the volume of the cone.

The juice container is expected to hold  $120 \text{ cm}^3$  of juice, but a sample container is found to hold only  $110 \text{ cm}^3$ .

**b** Determine the percentage error

**7** A petroleum tank is in the form of a cylinder with radius 5 meters. The volume of the tank is  $700 \text{ m}^3$ . Find:

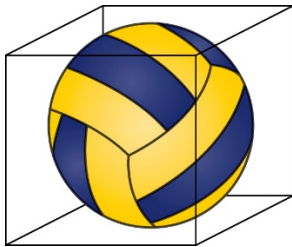
**a** the height,  $h$ , of the cylinder.

**b** the total surface area of the tank.

To reduce air pollution, petroleum tanks must be painted with white paint.

**c** Find the amount of paint necessary to cover the surface of the entire tank, if 1 L of paint covers  $11 \text{ m}^2$ . Use that  $1 \text{ L} = 0.001 \text{ m}^3$ .

**8**

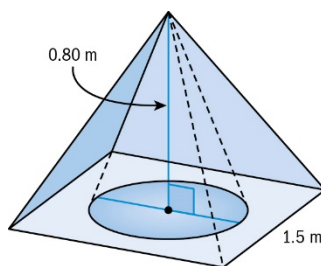


The Ultimate Volleyball factory produces volleyball balls with radius 21 cm. Each ball is tightly packed in a box so that it touches each side of the box. To protect the ball, the box is filled with foam.

**a** Find the volume of the box.

**b** Find the amount of foam needed to fill the box.

**9**



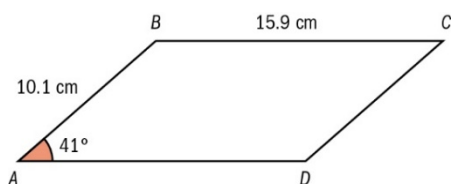
A regular rectangular pyramid with a base side 1.5 m is made of a transparent acrylic material with volume  $1.6 \text{ m}^3$ . It is to be used by a museum to exhibit a piece. A cone, with a radius of 0.80 m and height and apex the same as the pyramid, is carved out to make space for the exhibition piece.

**a** Show that the maximum height of the museum piece that can be encased by the pyramid is 2.1 m, correct to 1 dp;

**b** Determine the volume of the acrylic material that has not been removed from the pyramid.

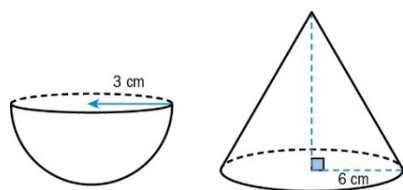
## Exam-style questions

**10** The diagram shows a parallelogram  $ABCD$ .



- a** Find the length of  $AC$ . (4)  
**b** Find the angle that the line  $AC$  makes with the line  $AD$ . (3)  
**c** Find the area of the parallelogram. (2)

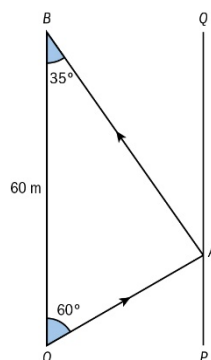
**11**



A hemisphere has radius  $3 \text{ cm}$ , and a cone has radius  $6 \text{ cm}$ .

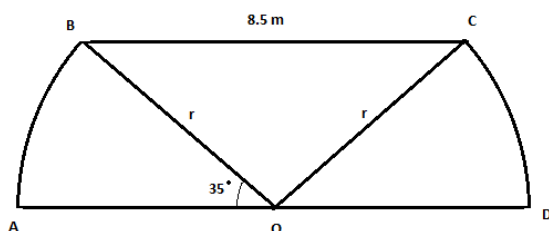
Given that the volume of the hemisphere is twice the volume of the cone, show that the curved surface area of the cone is equal to  $\frac{9\pi\sqrt{65}}{2} \text{ cm}^2$ . (9)

**12**



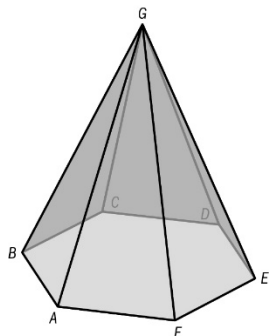
$OB$  and  $PQ$  are two sides of a long straight road. Sarah crosses the road from  $O$  to  $A$  to visit a friend, then crosses back from  $A$  to  $B$ . She finishes on the same side of the road as she started on, but is  $60 \text{ m}$  further along. Find the width of the road. (7)

**13** A paving slab consists of three composite parts: two identical sectorial areas and one isosceles triangle, as shown in the diagram.



Find the total area of the paving slab. (7)

- 14** The following diagram shows a hexagonal pyramid, where the base is regular and vertex  $G$  is directly above the centre of the base. Length  $AB = 6$  cm, and the perpendicular height of the pyramid is 10 cm.



- a** State the number of
- i** faces
  - ii** vertices
  - iii** edges. (3)
- b** Find the volume of the pyramid. (5)
- c** Find the total surface area of the pyramid. (7)
- d** Determine the angle between face  $AFG$  and the base of the pyramid. (4)