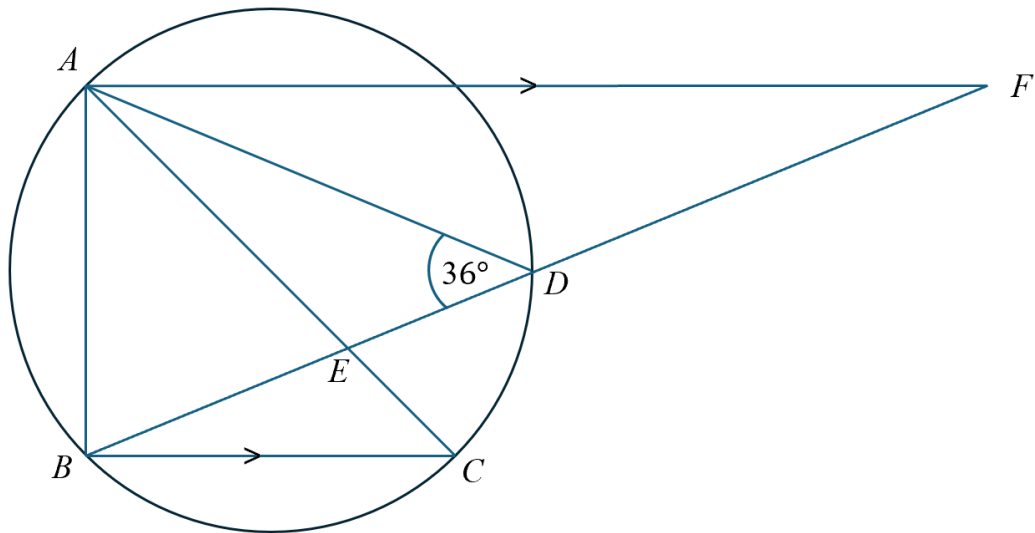# Geometry, mensuration practice questions

**1**   Points A, B, C and D lie on a circle.
AC is a diameter of the circle.
AEC and $BEDF$ are straight lines.
$AF \parallel BC$.
$AD = AC$.
Angle $ADB = 36°$

   (a)   Show that triangle AED and triangle BEC are similar   [3]

   (b)   Find
      (i)   angle ACB [Ans: 36°]   [1]

      (ii)   angle BAD [Ans: 72°]   [2]

      (iii)   angle CAD [Ans: 18°]   [2]

      (iv)   angle DAF [Ans: 18°]   [1]

   (c)   Hence, explain why $AD = DF$. [Ans: angle DFA = angle DAF = 18°]   [2]

2   The diagram below shows a regular hexagon with sides 10 cm.

10
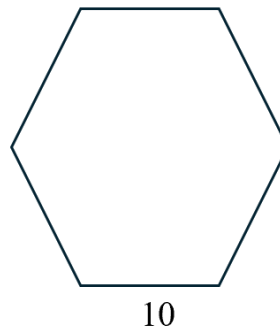
(a)   **(i)**   Find the interior angle of the regular hexagon. [Ans: 120°]   [2]

(ii)   Hence, find the area of the regular hexagon. [Ans: 260 cm²]   [3]

(b)   In the diagram, a hexagonal pyramid with *ON* as the height and sides of 10 cm.
M is the midpoint of *AB*.
AN = 13 cm.
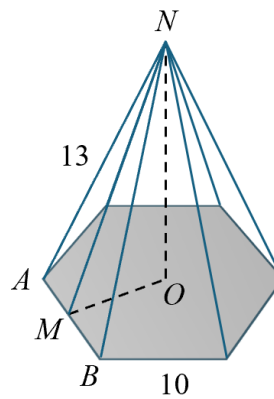
**(i)**   Calculate the volume of the pyramid. [Ans: 720 cm³]   [4]

(ii)   Calculate the **total** surface area of the pyramid. [Ans: 440 cm²]   [3]

3   *A* (0,4) and *B* lie on the y-axis.
       D lies on the x-axis.
       A is the midpoint of *OB*.
       OB : *OD* = 2 : 3.
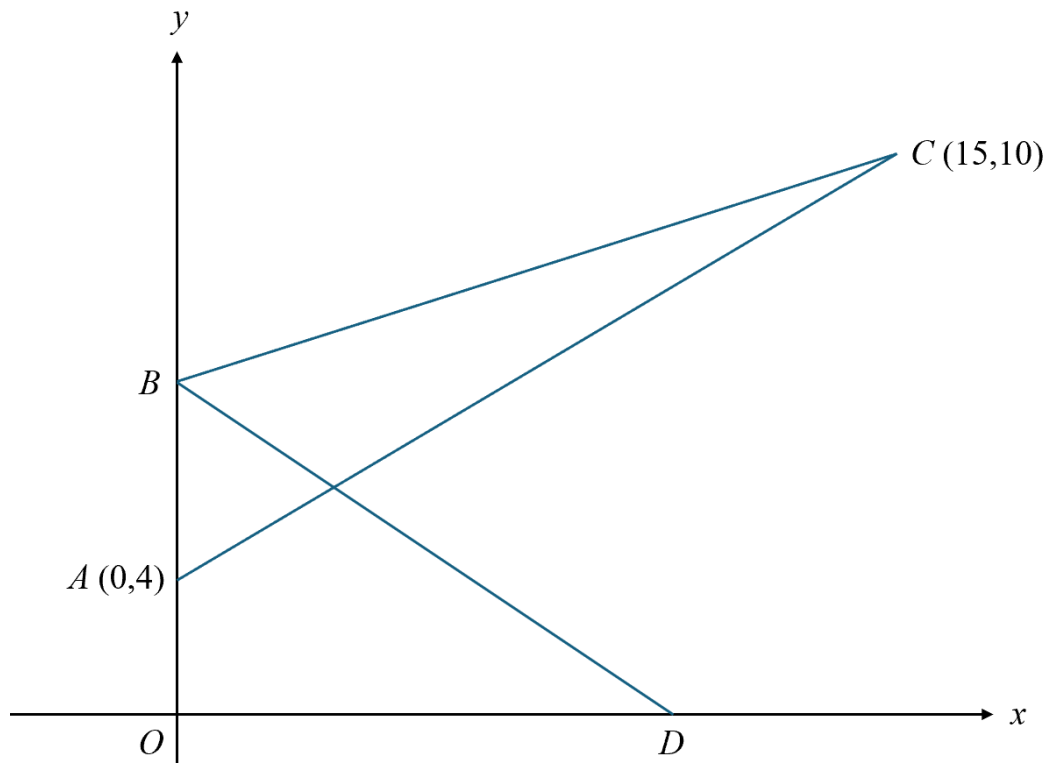
**(a)**   Find the equation of *AC*. [Ans: $y = 2/5x + 4$ or $5y = 2x + 20$]   [2]

(b)   Find the length *BC*. [Ans: 15.1 units]   [2]

(c)   Calculate the area of triangle *ABC*. [Ans: 30 units^2]   [2]

(d)   Find tan angle *ODB*. [Ans: 33.7°]   [2]

(e)   Calculate the area of triangle *BOD*. [Ans: 48 units^2]   [2]

4   A nonagon (9-sided polygon) has six $(x + 2)°$ and three $(2x)°$ interior angles.

Find the largest interior angle. [Ans: 208°]   [4]

5   A circle with centre O has a radius of 8 cm overlaps with rectangle $PQRS$.
The length of PQRS is 15 cm and its perimeter is 40 cm.
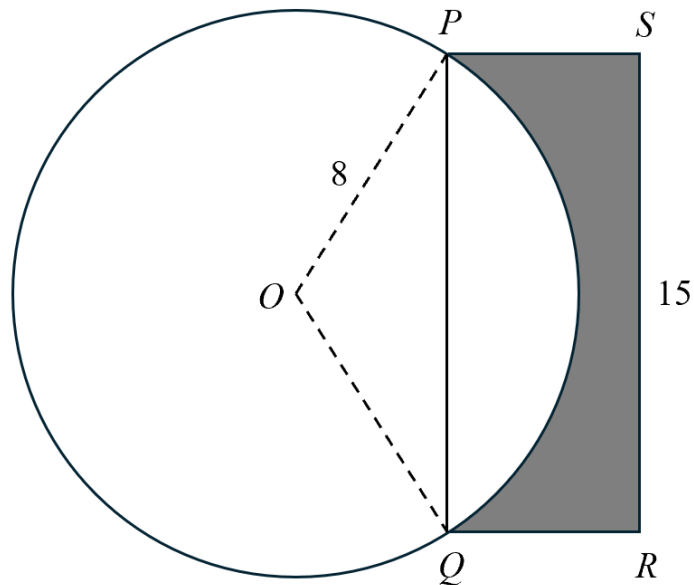
(a)   Calculate the shaded area. [Ans: 18.1 cm²]   [5]

(b)   Calculate the perimeter of the shaded region. [Ans: 44.4 cm]   [4]

6   A sports company manager wanted to make tennis ball containers. Each tennis ball
has a radii of 3.35 cm. He wanted to fit exactly 4 tennis balls into two different
boxes. **Box A** is a closed cuboid while **Box B** is a closed cylinder. Both boxes have
the same height.
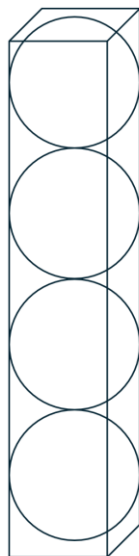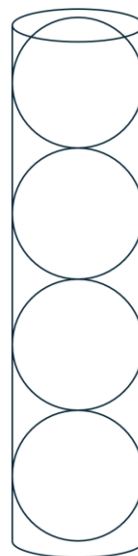
Box A   **Box B**

The cost per cm² of plastic to make the box is $0.60. Which box should the
manager choose if he only puts aside a budget of $400. Show **all** your workings.   [7]
[Ans: **Box A** costs $484.81, **Box B** costs $380.77. He should choose **Box B**.]

7   *AB* and *CD* are sides of the two buildings.
The angle of elevation of *C* from *B* is 42°.
The angle of depression of *C* from *A* is 38°.
The distance between the two buildings is 56 m.
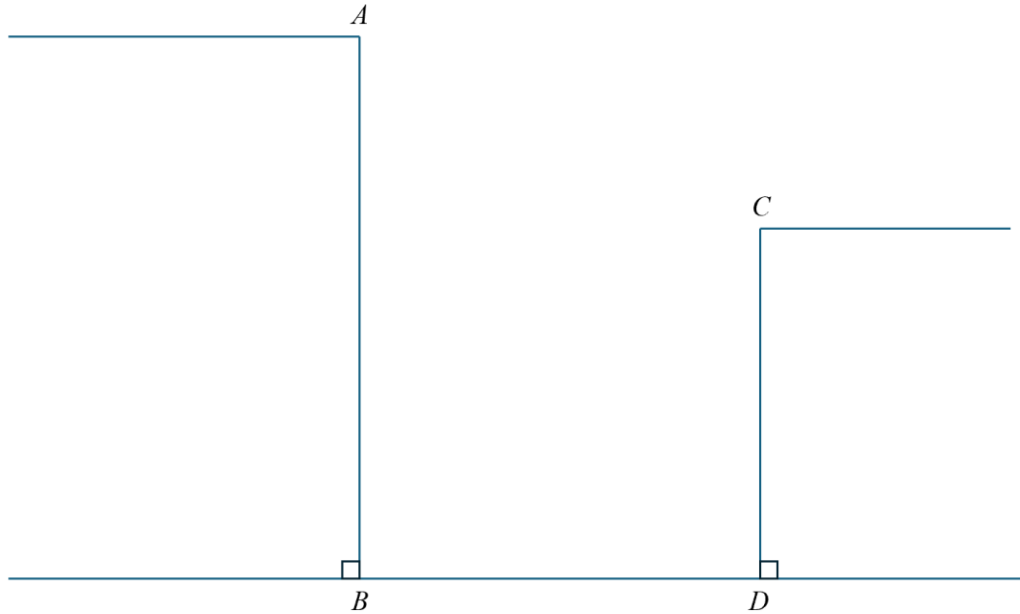
Find the height of the taller building. [Ans: 94.2 m]   [5]

8   **Diagram I** show a kitchen sink. The sink is a trapezoidal prism with height 15 cm.
The prism (sink) is removed from the cuboid (table).
Diagram II show the plane view of the sink.
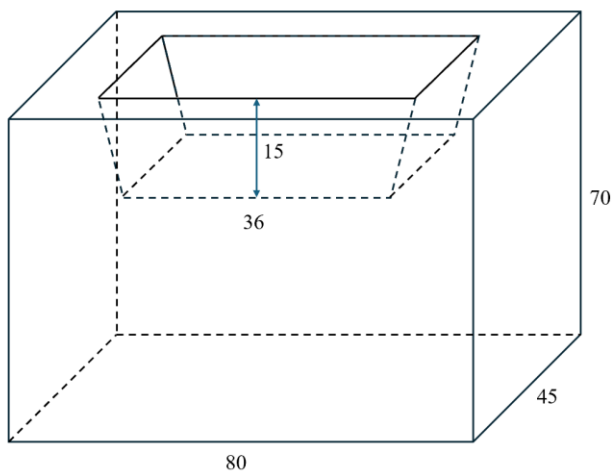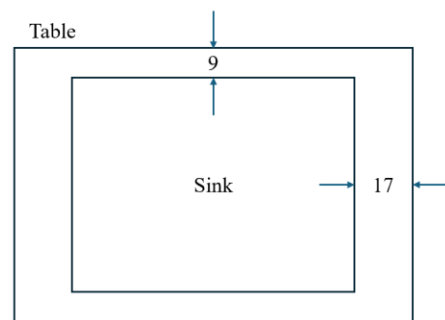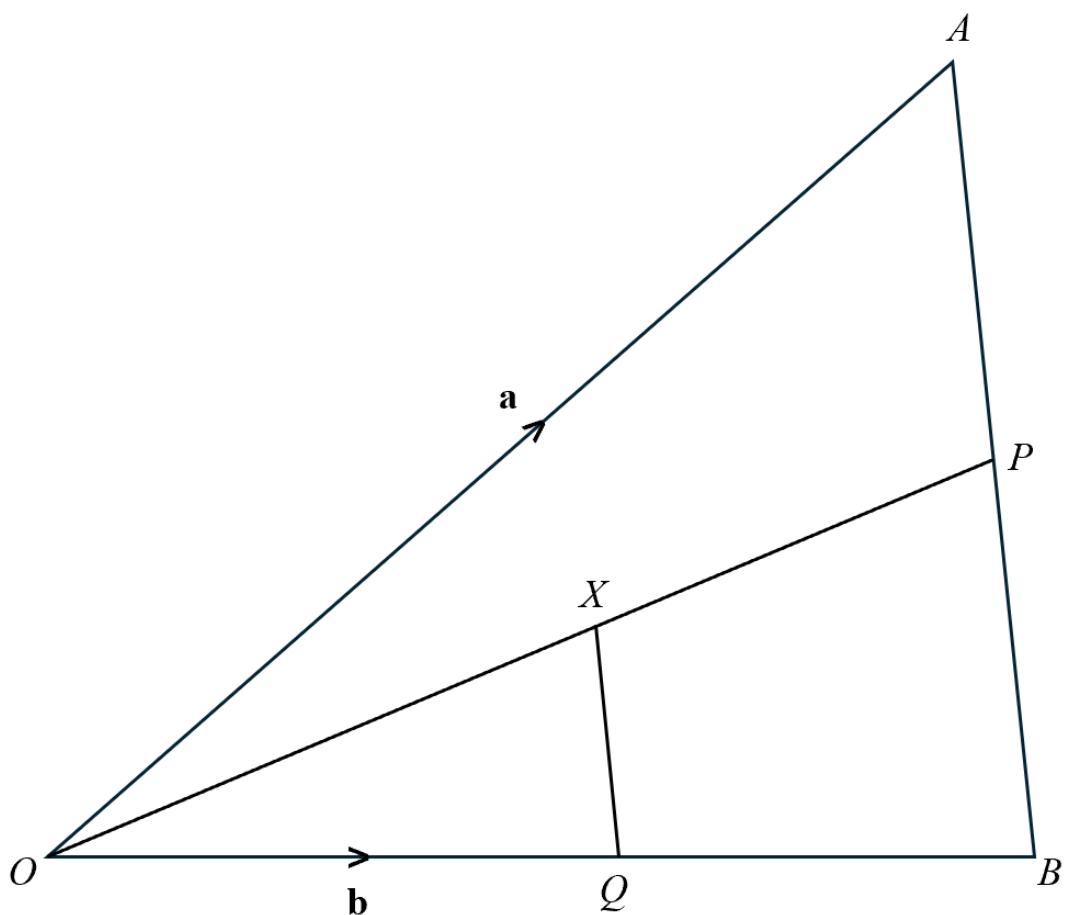All dimensions are in centimetres.

Diagram I

Diagram II

Calculate the volume of the remaining solid. [Ans: 235295 cm^3]   [4]
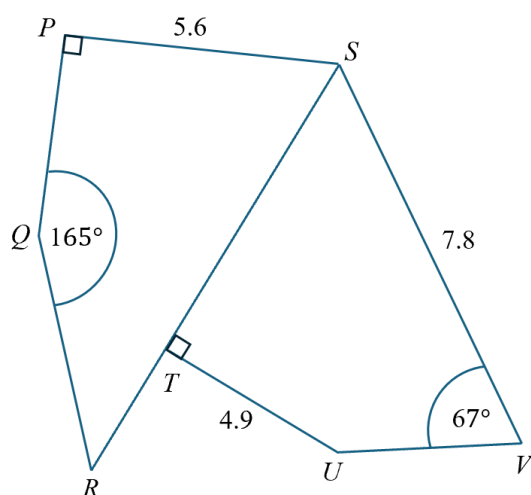
9

OAB is a triangle.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.
$OQ : OB = 3 : 5$.
P is the midpoint of *A* and *B*.

(a) Express your answers in terms of **a** and **b**. Find
    (i) $\overrightarrow{AB}$ [Ans: **b** - **a**]   [1]

    (ii) $\overrightarrow{OP}$ [Ans: ½ **a** + ½ **b**]   [2]

(b) Explain why *ABQX* is a trapezium. [Ans: $\overrightarrow{AB}$ = 3/10 $\overrightarrow{XQ}$]   [3]

(c) Find
    (i)   area of triangle *OPB* : area of triangle *OAB*. [Ans: 1 : 2]   [1]

    (ii)   area of *PBQX* : area of triangle *OAB*. [Ans: 2 : 5]   [2]

10 **(a)**

PQRS and TUVS are congruent quadrilaterals.
Angle PQR = 165° and angle UVS = 67°.
Angle QPS = angle UTS = 90°.
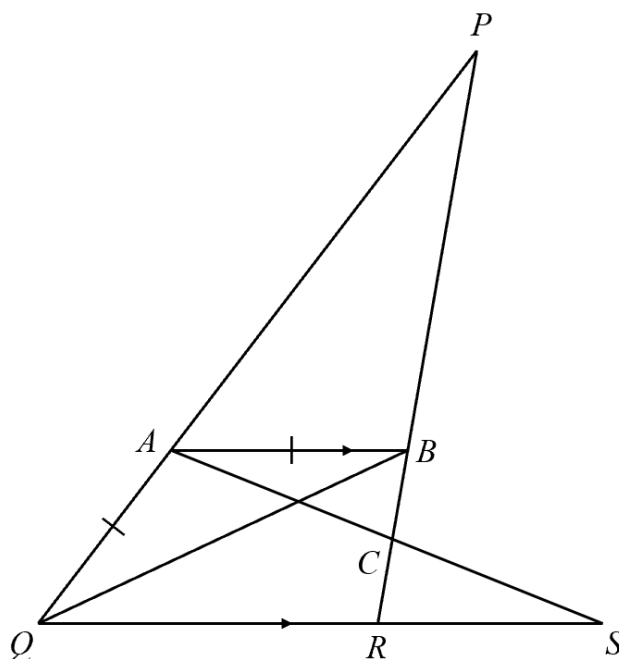PS = 5.6 cm, TU = 4.9 cm and VS = 7.8 cm.

Find
(i) angle TUV [Ans: 165°] [1]

(ii) angle PSV [Ans: 76°] [2]

(iii) TR [Ans: 2.2 cm] [2]

(b) In the diagram, AB = AQ, PA = QS and AB is parallel to QR.
QR and AC are produced to meet at S.

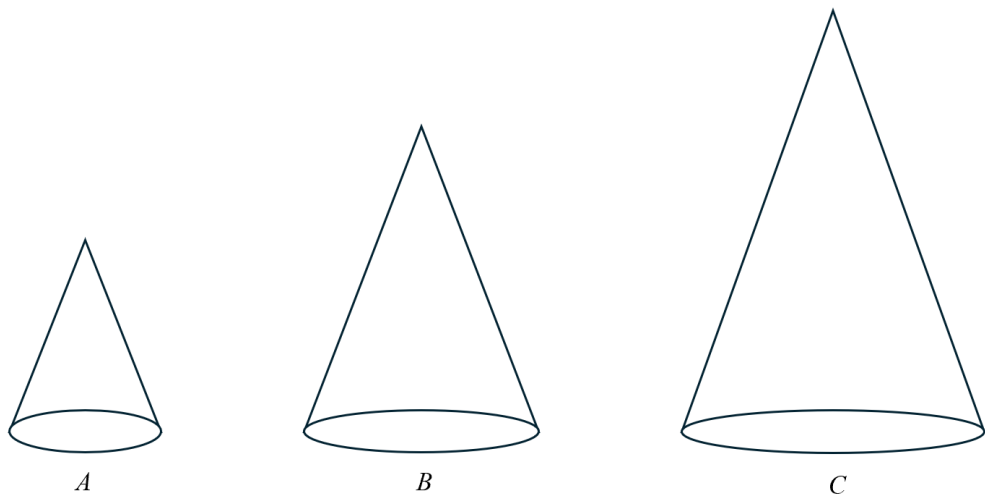**(i)** Name the triangle that is congruent to triangle *PAB*. [1]
[Ans: Triangle *SAQ*]

(ii) Show that triangle *PAC* is similar to triangle *SRC*. [Ans: AA Test] [2]

Given that *AP* = 9 cm, *AC* = 3 cm and *RS* = 5 cm,
find the length of
(iii) *CR* [Ans: 1.67 cm] [2]

(iv) *AB* [Ans: 3 cm] [4]

(c)

A, *B* and *C* are similar cones.
The ratio volume of cone *A* : volume of cone *B* : volume of cone *C* = 1 : 3 : 8.
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(i) Find the ratio height of cone *A* : height of cone *C*. [Ans: 1 : 2] [1]

(ii) Find the surface area of cone *B* as a percentage of the surface area
of cone *C*. [Ans: 52.0 %] [2]