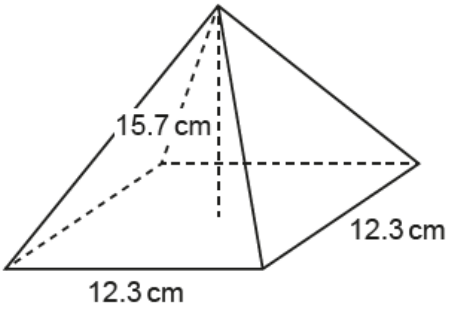
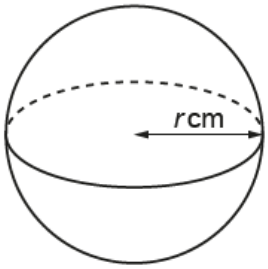
Mensuration – 2022 GCSE Mathematics Higher

1. June/2022/Paper_J560/04/No.7

The diagram shows a square-based pyramid and a sphere.





The pyramid has base length 12.3 cm and perpendicular height 15.7 cm.
The sphere has radius r cm.

The pyramid and the sphere have the same volume.

Work out the radius of the sphere.
You must show your working.

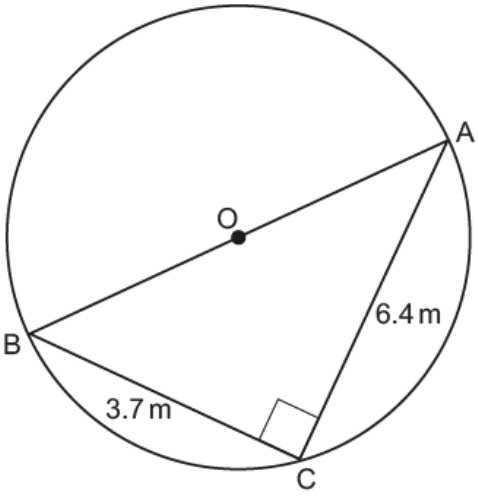
[The volume of a pyramid is $\frac{1}{3} \times$ area of base $\times$ perpendicular height.

The volume V of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

..... cm **[5]**

2. June/2022/Paper_J560/04/No.9

Points A, B and C lie on the circumference of a circle, centre O.



Not to scale

Angle ACB = 90°, AC = 6.4 m and BC = 3.7 m.

Work out the circumference of the circle.
You must show your working.

..... m **[5]**

3. June/2022/Paper_J560/05/No.2

The scale diagram below shows the position of two castles, J and K.

Scale: 1 cm represents 2 km

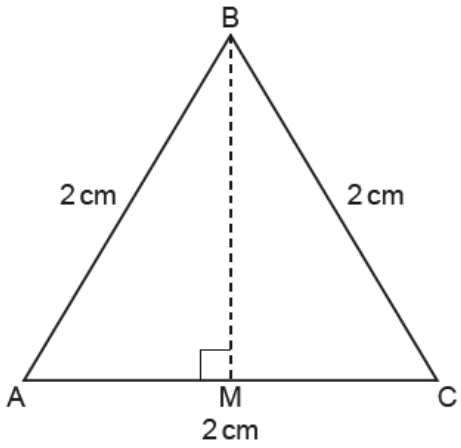
The bearing of a tower from castle J is 072°.
The bearing of the tower from castle K is 116°.

Use construction to find the distance from castle J to the tower.
Give your answer to the nearest 0.1 km.

..... km **[4]**

4. June/2022/Paper_J560/05/No.15

ABC is an equilateral triangle of side length 2 cm.
M is the midpoint of AC.



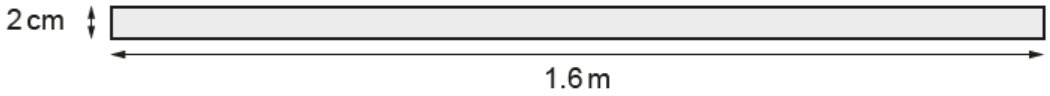
Not to scale

Using this diagram, show that $\tan 30° = \frac{1}{\sqrt{3}}$. **[4]**

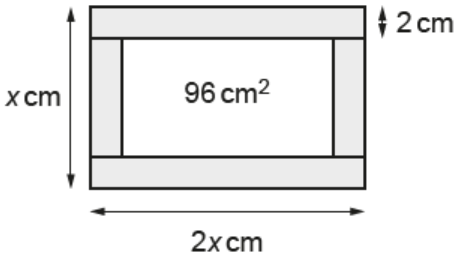
5. June/2022/Paper_J560/05/No.17

Charlie is making some wooden frames.
Charlie has a strip of wood 1.6 m long and 2 cm wide.

Not to scale



Each frame will be made from four pieces of wood cut from the strip to form a rectangle, as shown below.



Not to scale

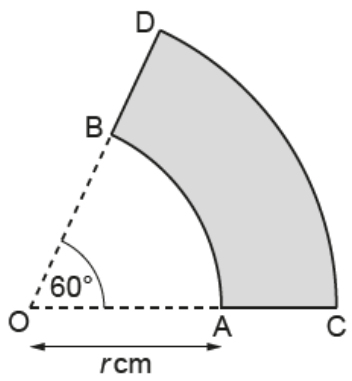
The width of each frame is x cm.
The length of each frame is $2x$ cm.
The area enclosed by each frame must be 96 cm^2.

Work out the maximum number of frames Charlie can make from the 1.6 m length of wood.
You must show your working.

..... **[6]**

6. June/2022/Paper_J560/05/No.18

The diagram shows a shaded shape made by removing sector OAB from sector OCD.
Both sectors have an angle of 60°.
The radius, OA, of the smaller sector is $r$cm.
The ratio of radius OA to radius OC is 2 : 3.



Not to scale

Work out, in terms of π and r, the **total** length of arc AB and arc CD.
Give your answer in its simplest form.
You must show your working.

..... cm **[5]**

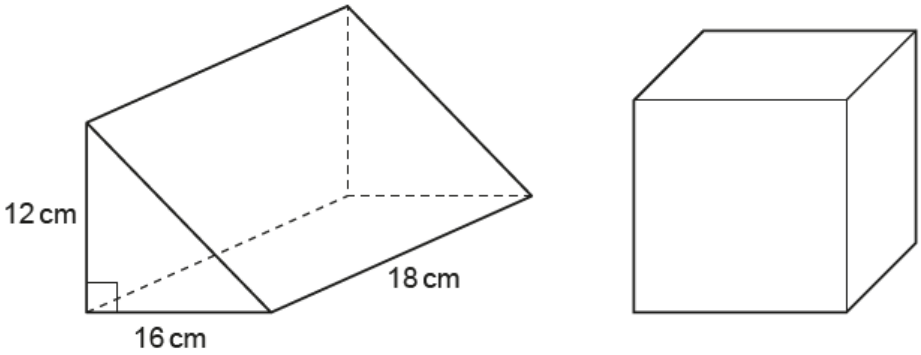
7. June/2022/Paper_J560/06/No.2

The circumference of a circle is 23 cm.

Show that the area of the circle is 42.1 cm^2, correct to **3** significant figures. **[4]**

8. June/2022/Paper_J560/06/No.10

The diagram shows a triangular prism and a cube.
The ends of the prism are right-angled triangles with base 16 cm and height 12 cm.
The prism is 18 cm long.



The volume of the prism is equal to the volume of the cube.

Find the **surface area of the cube**.
You must show your working.

..... cm^2 **[6]**