

Higher tier unit 7a check in test

Calculator

Q1. Here is a right-angled triangle.

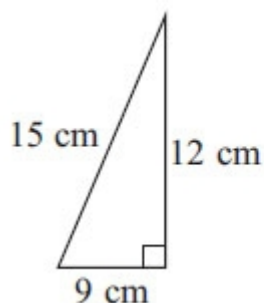


Diagram **NOT**
accurately drawn

The shape below is made from 4 of these triangles.

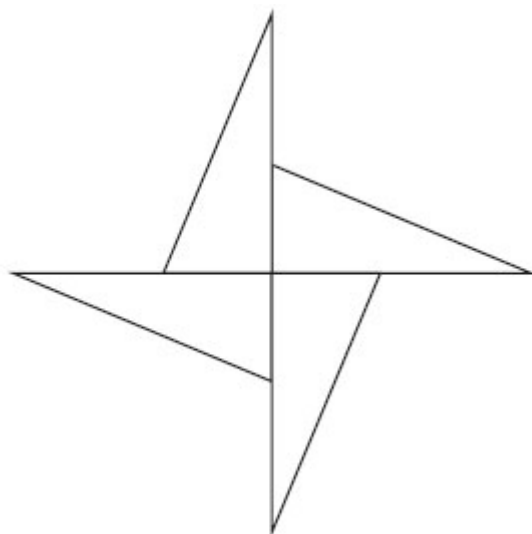


Diagram **NOT**
accurately drawn

Work out the perimeter of the shape.

Q2. The diagram shows a flower bed in the shape of a circle.

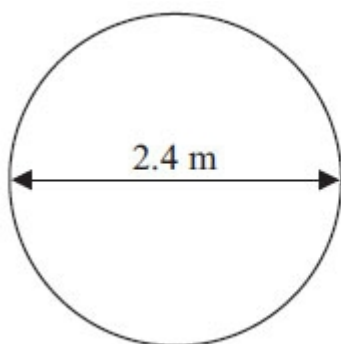


Diagram **NOT**
accurately drawn

The flower bed has a diameter of 2.4 m.

Sue is going to put a plastic strip around the edge of the flower bed.

The plastic strip is sold in 2 metre rolls.

Use $\pi = 3.142$ to work out how many rolls of plastic strip Sue needs to buy.

How much plastic strip will she have left over, correct to the nearest centimetre?

- Q3. The area of a circle is 25 m^2 .
Find the diameter of the circle.
Give your answer correct to 1 decimal place.

- Q4. The diagram shows a circle drawn inside a square.

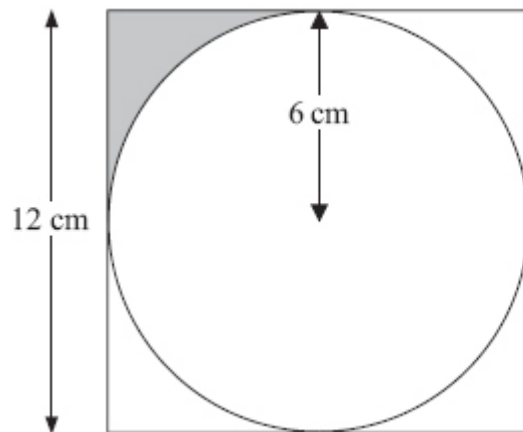


Diagram **NOT**
accurately drawn

The circle has a radius of 6 cm.
The square has a side of length 12 cm.
Work out the shaded area.
Give your answer in terms of π .

- Q5. The diagram shows the floor plan of Mary's conservatory.

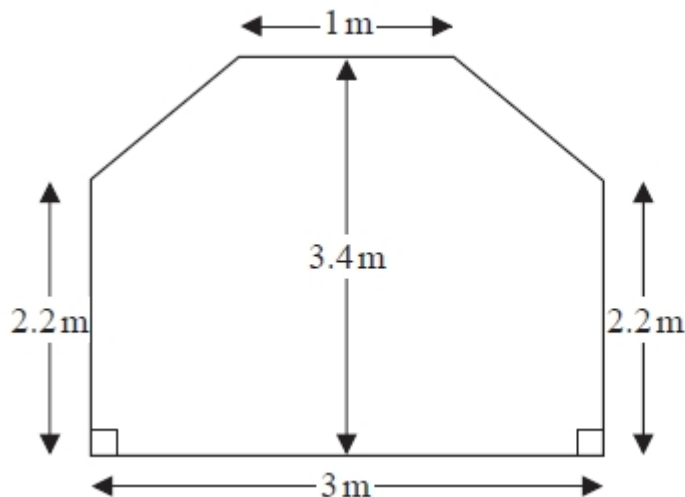


Diagram **NOT**
accurately drawn

Mary is going to cover the floor with tiles.
The tiles are sold in packs.
One pack of tiles will cover 2 m^2 .
A pack of tiles normally costs £19.80.
Find the cost of tiling Mary's conservatory floor.

Q6. The diagram shows the plan of a playground.

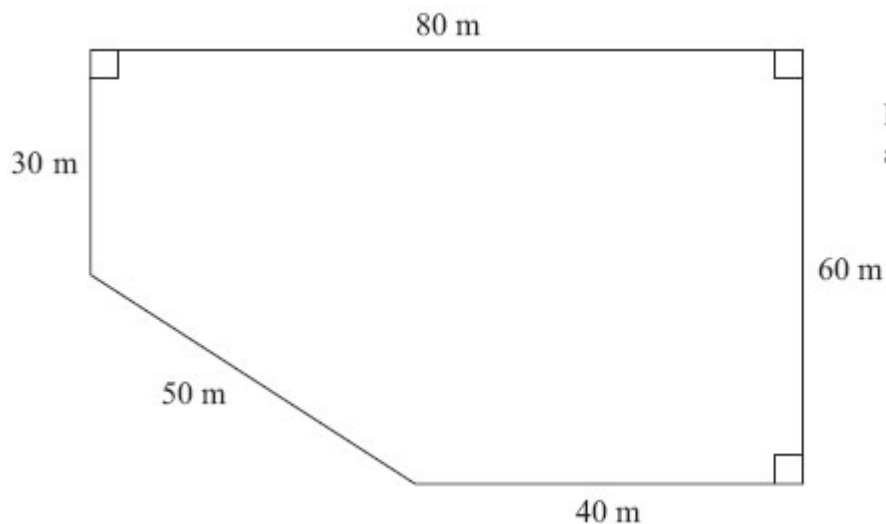


Diagram **NOT**
accurately drawn

Bill is going to cover the playground with tarmac.
It costs £2.56 to cover each square metre with tarmac.

Work out the total cost of the tarmac Bill needs.

Q7. OAB is a sector of a circle, centre O .
The radius of the circle is 15 cm.
The angle of the sector is 30° .

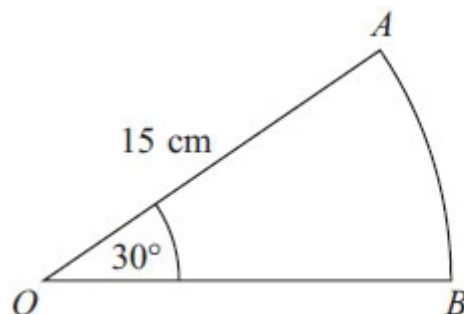
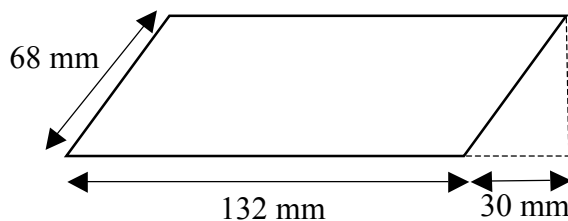


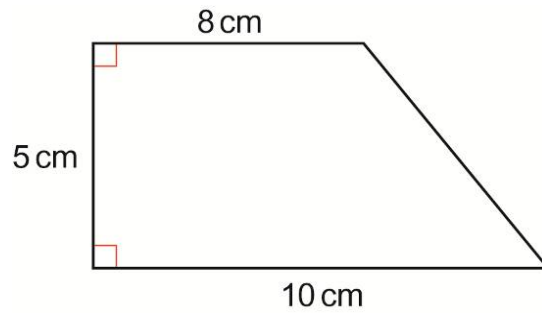
Diagram **NOT**
accurately drawn

Calculate the area of sector OAB .
Give your answer correct to 3 significant figures.

Q8. Find the area of the parallelogram.
Give your answer correct to 3 significant figures.



Q9. The diagram shows a trapezium.



Work out the perimeter of the trapezium.
Give your answer correct to 1 decimal place.

Q10. The diagram shows a pentagon.

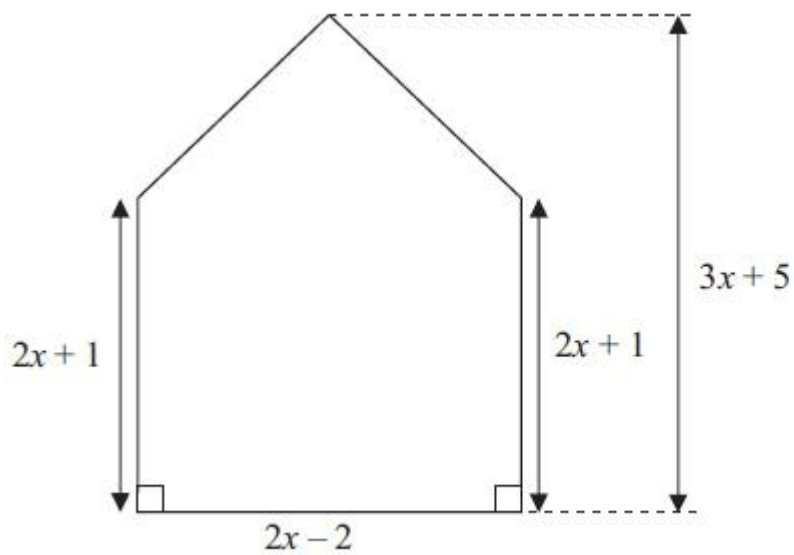


Diagram **NOT**
accurately drawn

All measurements are in centimetres.

Find an expression, in terms of x , for the area of this pentagon

Topics listed in objectives

- Recall and use the formulae for the area of a triangle, rectangle, trapezium and parallelogram using a variety of metric measures;
- Calculate the area of compound shapes made from triangles, rectangles, trapezia and parallelograms using a variety of metric measures;
- Find the perimeter of a rectangle, trapezium and parallelogram using a variety of metric measures;
- Calculate the perimeter of compound shapes made from triangles and rectangles;
- Estimate area and perimeter by rounding measurements to 1 significant figure to check reasonableness of answers;
- Recall the definition of a circle and name and draw parts of a circle;
- Recall and use formulae for the circumference of a circle and the area enclosed by a circle (using circumference = $2\pi r = \pi d$ and area of a circle = πr^2) using a variety of metric measures;
- Use $\pi \approx 3.142$ or use the π button on a calculator;
- Calculate perimeters and areas of composite shapes made from circles and parts of circles (including semicircles, quarter-circles, combinations of these and also incorporating other polygons);
- Calculate arc lengths, angles and areas of sectors of circles;
- Find radius or diameter, given area or circumference of circles in a variety of metric measures;
- Give answers to an appropriate degree of accuracy or in terms of π ;
- Form equations involving more complex shapes and solve these equations.

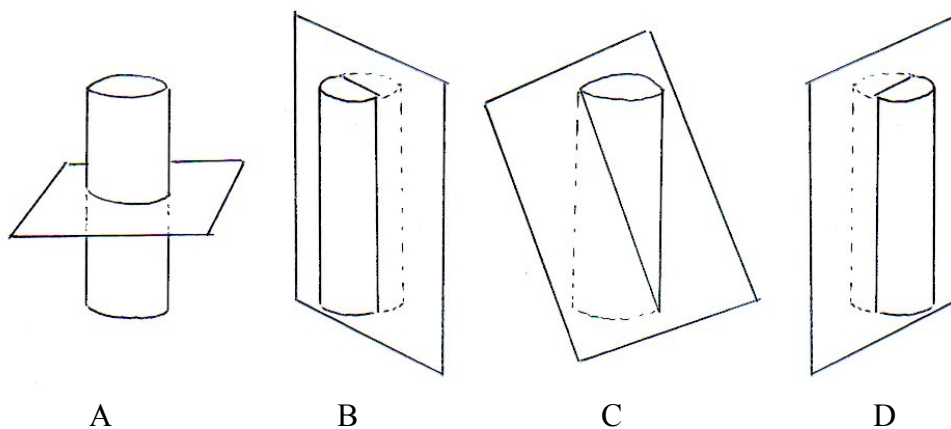
Answers

- Q1. 72 cm
Q2. 4 rolls, 46 cm left
Q3. 5.6 m
Q4. $36 - 9\pi$
Q5. £99
Q6. £10 752
Q7. 58.9 cm^2
Q8. 8060 mm^2
Q9. 28.4 cm
Q10. $5x^2 + x - 6$

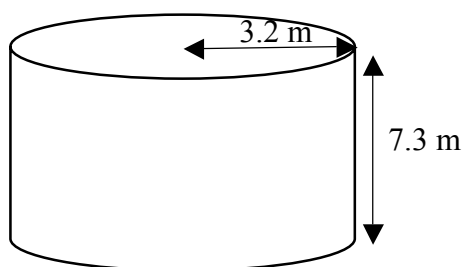
Higher tier unit 7b check in test

Calculator

Q1. Which of these diagrams does **not** show a plane of symmetry of this cylinder?



Q2. The diagram shows a cylinder.



By rounding to 1 significant figure, estimate the total surface area of the cylinder.

Q3. The diagram shows a triangular prism.

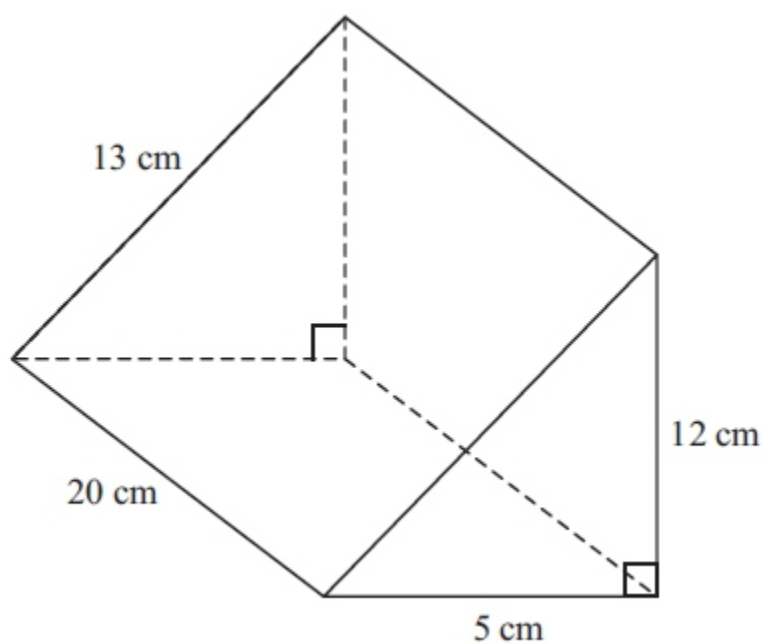
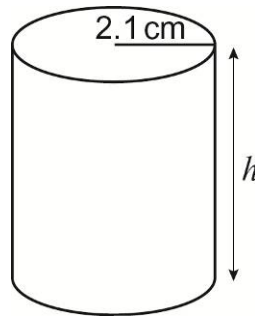


Diagram **NOT** accurately drawn

Work out the total surface area of the prism.

- Q4. The volume of the cylinder below is 166 cm^3 .
Calculate the height of the cylinder.
Use $\pi = 3.142$.



- Q5. The diagram shows a solid made from a hemisphere and a cone.

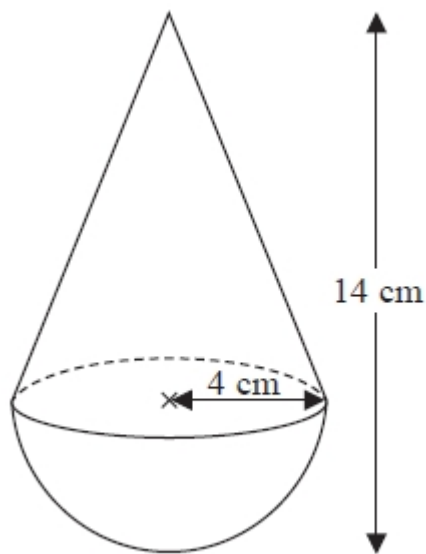


Diagram **NOT** accurately drawn

$\text{Volume of a sphere} = \frac{4}{3} r^3$ $\text{Volume of a cone} = \frac{1}{3} r^2 h$

The radius of the hemisphere is 4 cm.
The radius of the base of the cone is 4 cm.

Calculate the volume of the solid.
Give your answer correct to 3 significant figures.

Q6. The diagram shows a swimming pool in the shape of a prism.

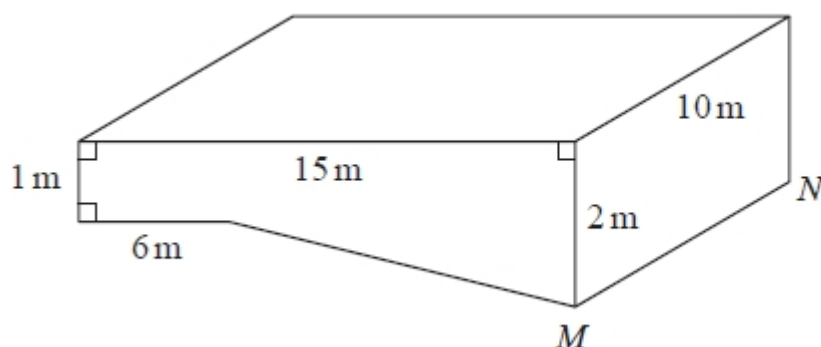


Diagram **NOT**
accurately drawn

The swimming pool is empty.

The swimming pool is filled with water at a constant rate of 50 litres per minute.

Work out how long it will take for the swimming pool to be completely full of water.

Give your answer in hours.

($1 \text{ m}^3 = 1000 \text{ litres}$)

Q7. A frustrum is made by removing a small cone from a similar large cone.

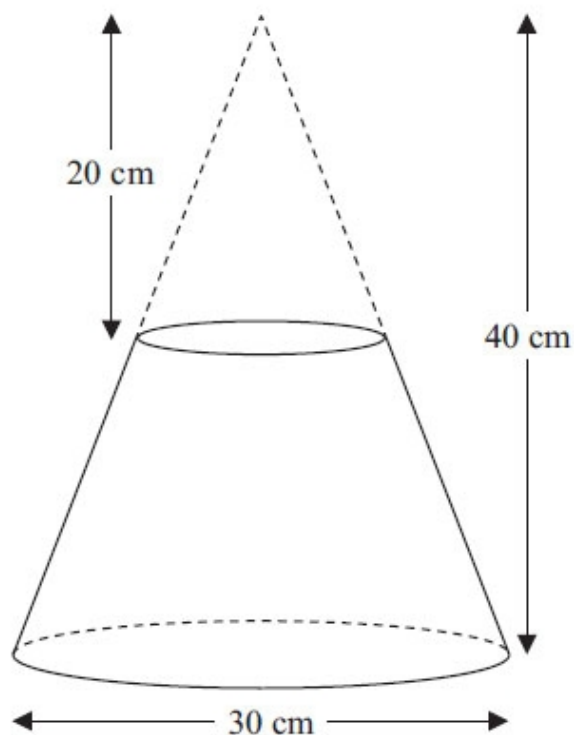


Diagram **NOT**
accurately drawn

$$\text{Volume of a cone} = \frac{1}{3} r^2 h$$

The height of the small cone is 20 cm.

The height of the large cone is 40 cm.

The diameter of the base of the large cone is 30 cm.

Work out the volume of the frustrum.

Give your answer correct to 3 significant figures.

Q8. The diagram shows a pyramid.

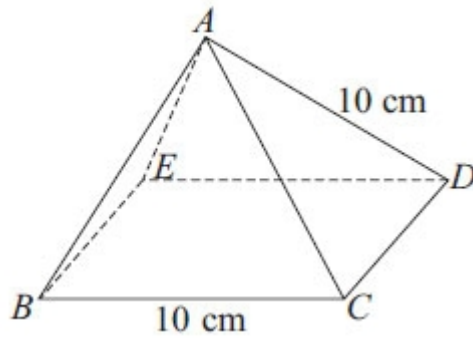


Diagram **NOT**
accurately drawn

$BCDE$ is a square with sides of length 10 cm.

The other faces of the pyramid are equilateral triangles with sides of length 10 cm.

Calculate the volume of the pyramid.

Give your answer correct to 3 significant figures.

Q9. The diagram shows a solid metal cylinder.

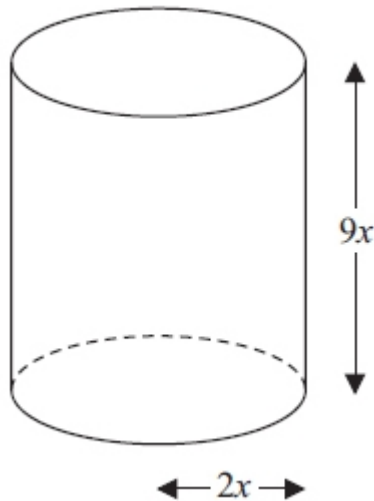


Diagram **NOT** accurately drawn

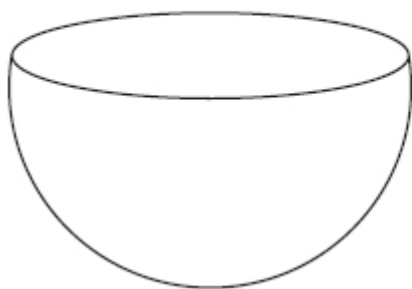
Volume of a sphere = $\frac{4}{3} r^3$
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The cylinder has base radius $2x$ and height $9x$.

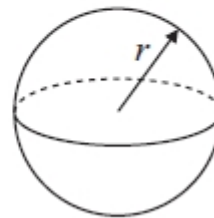
The cylinder is melted down and made into a sphere of radius r .

Find an expression for r in terms of x .

Q10. The diagram shows a solid hemisphere.



$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$
$$\text{Surface area of sphere} = 4\pi r^2$$



The volume of the hemisphere is $\frac{250}{3}$

Work out the exact total surface area of the solid hemisphere.
Give your answer as a multiple of π .

Topics listed in objectives

- Find the surface area of prisms using the formulae for triangles and rectangles, and other (simple) shapes with and without a diagram;
- Draw sketches of 3D solids and identify planes of symmetry of 3D solids, and sketch planes of symmetry;
- Recall and use the formula for the volume of a cuboid or prism made from composite 3D solids using a variety of metric measures;
- Convert between metric measures of volume and capacity, e.g. $1 \text{ ml} = 1 \text{ cm}^3$;
- Use volume to solve problems;
- Estimating surface area, perimeter and volume by rounding measurements to 1 significant figure to check reasonableness of answers;
- Use $\pi \approx 3.142$ or use the π button on a calculator;
- Find the volume and surface area of a cylinder;
- Recall and use the formula for volume of pyramid;
- Find the surface area of a pyramid;
- Use the formulae for volume and surface area of spheres and cones;
- Solve problems involving more complex shapes and solids, including segments of circles and frustums of cones;
- Find the surface area and volumes of compound solids constructed from cubes, cuboids, cones, pyramids, spheres, hemispheres, cylinders;
- Give answers to an appropriate degree of accuracy or in terms of π ;
- Form equations involving more complex shapes and solve these equations.

Answers

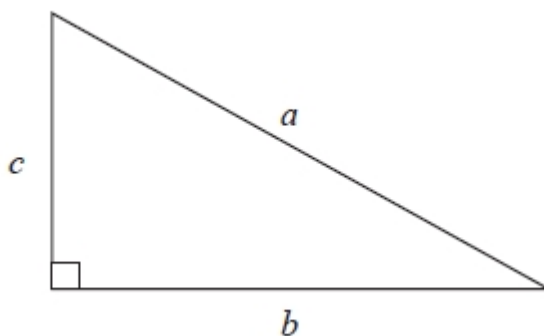
- Q1. C
Q2. 198 m^2
Q3. 660 cm^2
Q4. 12 cm
Q5. 302 cm^3
Q6. 65 hours
Q7. 8250 cm^3
Q8. 236 cm^3
Q9. $r = 3x$ (or $r^3 = 27x^3$)
Q10. 75π

Higher tier unit 7c check in test

Calculator

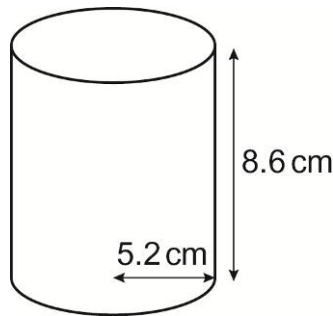
- Q1. A cake has a mass of 255 grams to the nearest gram.
What is the lowest possible mass of the cake?
- Q2. Chelsea's height is 168 cm to the nearest cm.
Write an inequality showing the range into which Chelsea's actual height falls.
- Q3. Dionne has 60 golf balls.
Each of these golf balls weighs 42 grams to the nearest gram.
Work out the greatest possible total weight of all 60 golf balls.
Give your answer in kilograms.
- Q4. The value of p is 4.3
The value of q is 0.4
Both p and q are given correct to the nearest 0.1.
$$r = p + \frac{1}{q}$$

Work out the upper bound for r .
- Q5. $I = \frac{V}{R}$
 $V = 250$ correct to the nearest 5
 $R = 3900$ correct to the nearest 100
Work out the lower bound for the value of I .
Give your answer correct to 3 decimal places.
- Q6. a is 8.3 cm correct to the nearest mm
 b is 6.1 cm correct to the nearest mm
Calculate the upper bound for c .



- Q7. Steve travelled from Ashton to Barnfield.
 He travelled 235 miles, correct to the nearest 5 miles.
 The journey took him 200 minutes, correct to the nearest 5 minutes.
 Calculate the lower bound for the average speed of the journey.
 Give your answer in **miles per hour**, correct to 3 significant figures.

- Q8. The radius and height of this cylinder are given correct to 1 decimal place.



Calculate the lower bound for its volume.

- Q9. A solid sphere has
 a mass of 1180 g measured to the nearest gram
 and a radius of 6.2 cm measured to the nearest millimetre.

Given that $\text{density} = \frac{\text{mass}}{\text{volume}}$

find the upper bound for the density of the sphere.
 Give your answer to 3 significant figures.

$\text{Volume of a sphere} = \frac{4}{3} r^3$

- Q10. Sasha drops a ball from a height of d metres onto the ground.

The time, t seconds, that the ball takes to reach the ground is given by $t = \sqrt{\frac{2d}{g}}$

where $g \text{ m/s}^2$ is the acceleration due to gravity.

$d = 35.6$ correct to 3 significant figures.

$g = 9.8$ correct to 2 significant figures.

Calculate the lower bound of t .

Topics listed in objectives

- Calculate the upper and lower bounds of numbers given to varying degrees of accuracy;
- Calculate the upper and lower bounds of an expression involving the four operations;
- Find the upper and lower bounds in real-life situations using measurements given to appropriate degrees of accuracy;
- Find the upper and lower bounds of calculations involving perimeters, areas and volumes of 2D and 3D shapes;
- Calculate the upper and lower bounds of calculations, particularly when working with measurements;
- Use inequality notation to specify an error interval due to truncation or rounding.

Answers

- Q1. 254.5 g
Q2. $167.5 \text{ cm} \leq h < 168.5 \text{ cm}$
Q3. 2.55 kg
Q4. 7.21
Q5. 0.064
Q6. 5.755 mm
Q7. 68.9 mph
Q8. 712.4 cm^3
Q9. 1.21 g/cm^3
Q10. 2.687 s