

Area, Perimeter and Volume with Algebra

For AQA Level 2 Certificate in Further Mathematics (8365)

Name _____

Total marks: **23**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method. You may use a calculator.

Volume of sphere = $\frac{4}{3}\pi r^3$ Volume of cone = $\frac{1}{3}\pi r^2 h$ Curved surface area of cone = $\pi r l$

- 1** A square has sides of length x cm.
A circle has the same perimeter as the square.

(a) Work out the radius of the circle in terms of x and π .

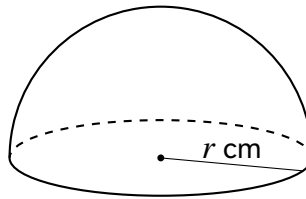
[1 mark]

Answer _____ cm

(b) Show that area of the circle : area of the square = $4: \pi$

[2 marks]

- 2 A solid hemisphere has radius r cm.
Surface area of a sphere = $4\pi r^2$



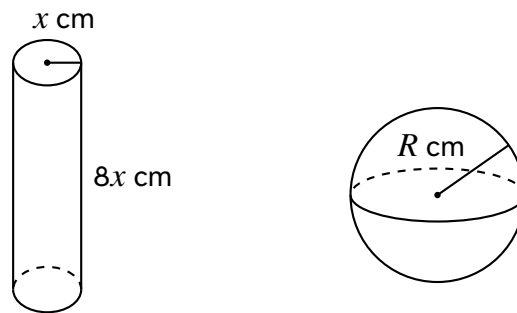
Not drawn accurately

Its volume, in cm^3 , and its total surface area, in cm^2 , have the same value.
Work out the value of r .

[3 marks]

Answer $r =$ _____

- 3** A cylinder has radius x cm and height $8x$ cm.
A sphere has radius R cm.
The cylinder and the sphere have the same volume.



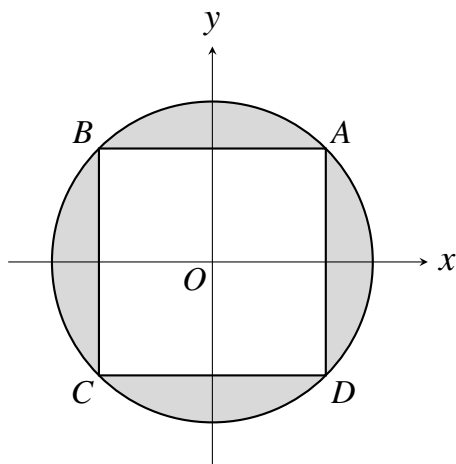
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Work out R in terms of x .
Give your answer to 3 significant figures.

[3 marks]

Answer $R =$ _____

- 4 The points $A(5, 5)$, $B(-5, 5)$, $C(-5, -5)$ and $D(5, -5)$ lie on a circle with centre O , the origin.
 $ABCD$ is a square.



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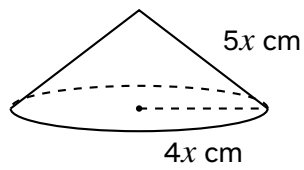
Work out the area of the shaded region.

Give your answer in the form $a\pi - b$, where a and b are integers.

[3 marks]

Answer _____

- 5 A solid cone has base radius $4x$ cm and slant height $5x$ cm.
The total surface area of the cone is 81π cm².



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- (a) Work out the value of x .

[2 marks]

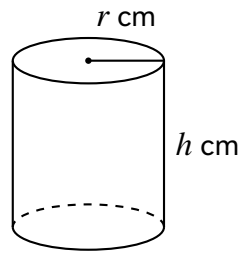
Answer $x =$ _____

- (b) Work out the volume of the cone.
Give your answer in terms of π .

[2 marks]

Answer _____ cm³

- 6 A closed cylinder has radius r cm and height h cm.
The total surface area of the cylinder is 600π cm².
The volume of the cylinder is V cm³.

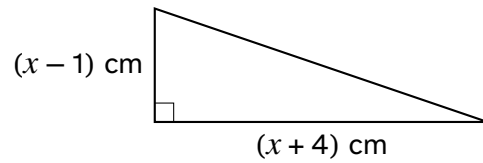


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Show that $V = 300\pi r - \pi r^3$

[3 marks]

- 7 The diagram shows a right-angled triangle.



Not drawn accurately

The area of the triangle is less than 7 cm^2 .
Work out the range of possible values of x .
You must show your working.

[4 marks]

Answer _____