GCSE Grade 8/9

Maths Booklet 5

Paper 3H
Calculator

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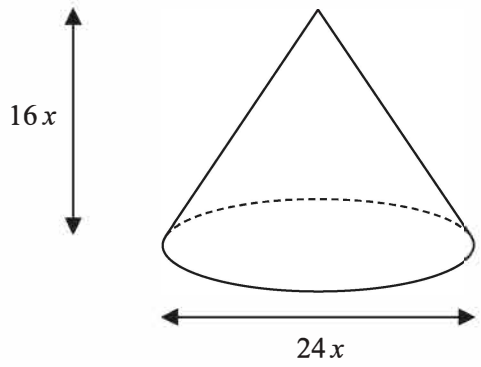
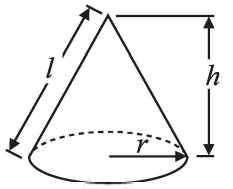
1 The diagram shows a solid cone.



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

Curved surface area of cone $= \pi r l$



The diameter of the base of the cone is $24x$ cm.
The height of the cone is $16x$ cm.

The curved surface area of the cone is 2160π cm^2.
The volume of the cone is $V\pi$ cm^3, where V is an integer.

Find the value of V.

.....

(Total for Question 1 is 5 marks)

2 Thelma spins a biased coin twice.
The probability that it will come down heads both times is 0.09

Calculate the probability that it will come down tails both times.

.....

(Total for Question 2 is 3 marks)

3 (a) Write 0.000 423 in standard form.

.....

(1)

(b) Write 4.5×10^4 as an ordinary number.

.....

(1)

(Total for Question 3 is 2 marks)

4 Mark has made a clay model.
He will now make a clay statue that is mathematically similar to the clay model.

The model has a base area of $6\,cm^2$
The statue will have a base area of $253.5\,cm^2$

Mark used 2 kg of clay to make the model.

Clay is sold in 10 kg bags.
Mark has to buy all the clay he needs to make the statue.

How many bags of clay will Mark need to buy?

.....

(Total for Question 4 is 3 marks)

5 (a) Show that the equation $3x^2 - x^3 + 3 = 0$ can be rearranged to give

$$x = 3 + \frac{3}{x^2}$$

(2)

(b) Using

$$x_{n+1} = 3 + \frac{3}{x_n^2} \quad \text{with } x_0 = 3.2,$$

find the values of x_1, x_2 and x_3

(3)

(c) Explain what the values of x_1, x_2 and x_3 represent.

.....

.....

(1)

(Total for Question 5 is 6 marks)

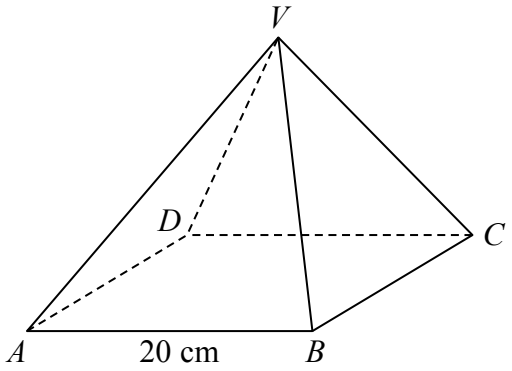
6 Here are the first five terms of an arithmetic sequence.

7 13 19 25 31

Prove that the difference between the squares of any two terms of the sequence is always a multiple of 24

(Total for Question 6 is 6 marks)

7 *VABCD* is a solid pyramid.



ABCD is a square of side 20 cm.

The angle between any sloping edge and the plane *ABCD* is 55°

Calculate the surface area of the pyramid.
Give your answer correct to 2 significant figures.

.....cm^2

(Total for Question 7 is 5 marks)

8 Louis and Robert are investigating the growth in the population of a type of bacteria.
They have two flasks A and B.

At the start of day 1, there are 1000 bacteria in flask A.
The population of bacteria grows exponentially at the rate of 50% per day.

(a) Show that the population of bacteria in flask A at the start of each day forms a geometric progression.

(2)

The population of bacteria in flask A at the start of the 10th day is k times the population of bacteria in flask A at the start of the 6th day.

(b) Find the value of k.

(2)

At the start of day 1 there are 1000 bacteria in flask B.
The population of bacteria in flask B grows exponentially at the rate of 30% per day.

(c) Sketch a graph to compare the size of the population of bacteria in flask A and in flask B.

(1)

(Total for Question 8 is 5 marks)