Mock Grade 8/9

Maths Booklet 5

Paper 3H
Calculator

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1 The diagram shows a cone.

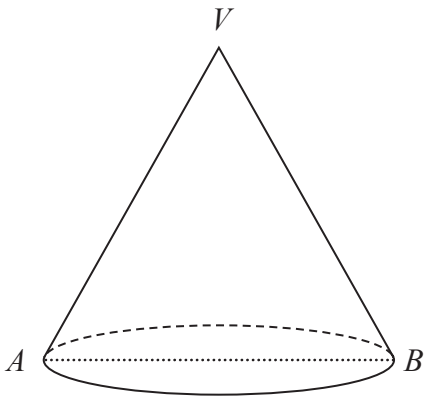

Diagram **NOT** accurately drawn

AB is a diameter of the cone.
V is the vertex of the cone.

Given that

the area of the base of the cone : the total surface area of the cone = 3 : 8

work out the size of angle *AVB*.
Give your answer correct to 1 decimal place.

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(Total for Question 1 is 6 marks)

2 Boris has a bag that only contains red sweets and green sweets.

Boris takes at random 2 sweets from the bag.

The probability that Boris takes exactly 1 red sweet from the bag is $\frac{12}{35}$

Originally there were 3 red sweets in the bag.

Work out how many green sweets there were originally in the bag.
Show your working clearly.

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(Total for Question 2 is 5 marks)

3 The diagram shows two similar metal statues.

Diagram **NOT** accurately drawn

A

B

The volume of statue **B** is 20% less than the volume of statue **A**

The surface area of statue **B** is k% less than the surface area of statue **A**

Work out the value of k
Give your answer correct to 3 significant figures.

k = ...

(Total for Question 3 is 4 marks)

4 (a) Show that the equation $x^3 + 5x - 4 = 0$ has a solution between $x = 0$ and $x = 1$

(2)

(b) Show that the equation $x^3 + 5x - 4 = 0$ can be arranged to give $x = \dfrac{4}{x^2 + 5}$

(2)

(c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \dfrac{4}{x_n^{\,2} + 5}$ twice, to find an estimate for the solution of $x^3 + 5x - 4 = 0$

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(3)

(Total for Question 4 is 4 marks)

5 Two numbers are such that the sum of their reciprocals is equal to 1. Each of these numbers is then reduced by 1 to give two new numbers.

Prove that these two new numbers are reciprocals of each other.

(Total for Question 5 is 6 marks)

6 The diagram shows a solid pyramid *ABCDE* with a horizontal base.

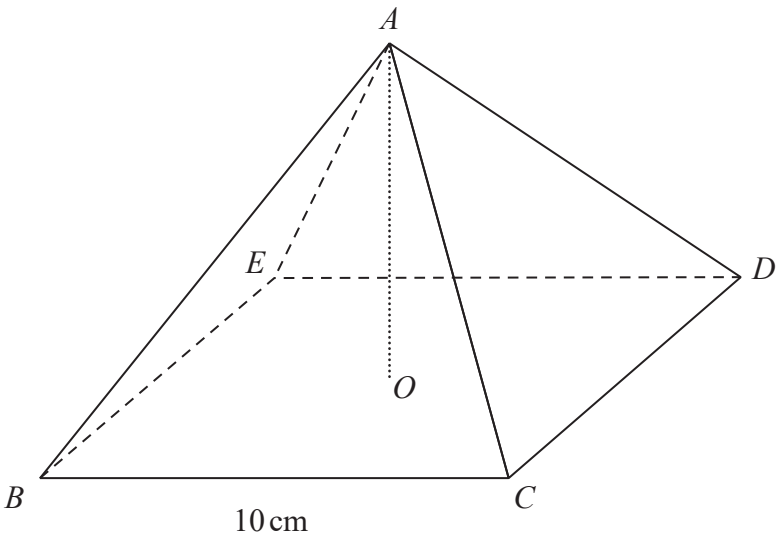

Diagram **NOT** accurately drawn

The base, *BCDE*, of the pyramid is a square of side 10 cm.

The vertex *A* of the pyramid is vertically above the centre *O* of the base so that $AB = AC = AD = AE$

The **total** surface area of the pyramid is 360 cm^2

Work out the size of the angle between *AC* and the base *BCDE*.
Give your answer correct to 3 significant figures.

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(Total for Question 6 is 6 marks)

7 In a geometric series the sum of the second and fourth term is 156.

In the same geometric series the sum of the third and the fifth term is 234.

Find the first term and the common ratio of the series.

(Total for Question 7 is 5 marks)