GCSE Grade 7

Maths Booklet 1

Paper 1H
Non-Calculator

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1 White shapes and black shapes are used in a game.
Some of the shapes are circles.
All the other shapes are squares.

The ratio of the number of white shapes to the number of black shapes is 3 : 7

The ratio of the number of white circles to the number of white squares is 4 : 5

The ratio of the number of black circles to the number of black squares is 2 : 5

Work out what fraction of all the shapes are circles.

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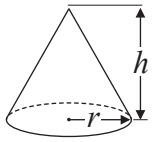
(Total for Question 1 is 4 marks)

2 A cone has a volume of 98 cm^3.
The radius of the cone is 5.13 cm.

(a) Work out an estimate for the height of the cone.

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



.....cm

(3)

John uses a calculator to work out the height of the cone to 2 decimal places.

(b) Will your estimate be more than John's answer or less than John's answer?
Give reasons for your answer.

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(1)

(Total for Question 2 is 4 marks)

3 n is an integer greater than 1

Prove algebraically that $n^2 - 2 - (n - 2)^2$ is always an even number.

(Total for Question 3 is 4 marks)

4 Prove that the square of an odd number is always 1 more than a multiple of 4

(Total for Question 4 is 4 marks)

5 $\sqrt{5}(\sqrt{8} + \sqrt{18})$ can be written in the form $a\sqrt{10}$ where a is an integer.

Find the value of a.

$a =$ .....

(Total for Question 5 is 3 marks)

6 y is inversely proportional to d^2
When $d = 10$, $y = 4$

d is directly proportional to x^2
When $x = 2$, $d = 24$

Find a formula for y in terms of x.
Give your answer in its simplest form.

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(Total for Question 6 is 5 marks)

7 (a) Factorise $a^2 - b^2$

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(1)

(b) Hence, or otherwise, simplify fully $(x^2 + 4)^2 - (x^2 - 2)^2$

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(3)

(Total for Question 7 is 4 marks)

8 There are only red counters, blue counters and purple counters in a bag.
The ratio of the number of red counters to the number of blue counters is 3 : 17

Sam takes at random a counter from the bag.
The probability that the counter is purple is 0.2

Work out the probability that Sam takes a red counter.

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(Total for Question 8 is 3 marks)

9 Simplify fully $\dfrac{3x^2 - 8x - 3}{2x^2 - 6x}$

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(Total for Question 9 is 3 marks)

10 Given that n can be any integer such that $n > 1$, prove that $n^2 - n$ is never an odd number.

(Total for Question 10 is 2 marks)

11 Find the exact value of $\tan 30° \times \sin 60°$
Give your answer in its simplest form.

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(Total for Question 11 is 2 marks)