



OUNDLE

School

2021 Academic Scholarship

Mathematics

PAPER 1

Time allowed: 1 hour and 30 minutes

CALCULATORS ARE NOT ALLOWED

Instructions to candidates

- You are not expected to have time to do all the questions.
- You may answer the questions in any order.
- Choose those questions which you think you can answer best.
- Remember to show your working and clearly show the method you are using.
- Give answers to 3 significant figures where necessary
- The number of marks for each question is shown in square brackets.

Question 1 Work out the following:

a) 36% of 53

b) $17 \times 84 + 83 \times 84$

c) $46 \times 18 + 27 \times 36$

d) $3\frac{1}{4} \times 1\frac{5}{9}$

[8]

Question 2 Simplify the following expressions fully:

a) $5xy - 2x + 4y - x + 2yx$

b) $5x - 2(x + 4) - (x - 2)$

c) $204x^4 \div 34x$

d) $5x - 2x^2 + 4x(x - 2)$

[8]

Question 3 Solve the following equations:

a) $7x - 3 = 3x + 5(2x + 1)$

b) $4x + 7 = \frac{1}{3}x$

c) $7x^2 - 343 = 0$

d) $\frac{2x+3}{1-2x} = 4$

[8]

Question 4

a) I think of a number and add 6. I multiply the result by 8 and get a final answer of 16.
What was my number?

b) I think of a number, multiply it by 5 and then add 3. Squaring the result gives 64.
What *two* numbers could I have started with?

[4]

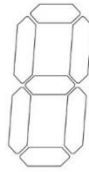
Question 5

Alice and Bertrand bake some cakes in the ratio 5:3. Alice sells 2 cakes for every cake that Bertrand sells. After Alice has sold 196 cakes, Alice and Bertrand have the same number of cakes remaining. How many cakes were baked to start with?

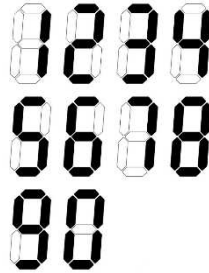
[4]

Question 6

Old fashioned calculators displayed numbers using the template:



Each digit could be represented by filling some, or all, of the seven bars, as shown below:



The number 4 uses four bars, and the number 5 uses five bars, the number 6 uses six bars; the number of bars is equal to the value of the number.

How many two-digit numbers use the same number of bars as the value of the number?

You should explain your answer fully.

[4]

Question 7

Charlotte picks 5 positive integers.

Charlotte's numbers have a:

Mean of 4

Mode of 2

Range of 7

How many different medians could Charlotte's set of numbers have?

You should show detailed working.

[4]

Question 8

What is the units digit of the integer which is equal to $(2^{34} + 5^{67})^8$?

You should show detailed working.

[4]

Question 9

Daniel ran a 1500m race in 9 minutes 30 seconds. He ran the first 1080m of the course at a constant speed of 3 m/s. He ran the remaining part of the course at a constant speed v m/s. What is the value of v .

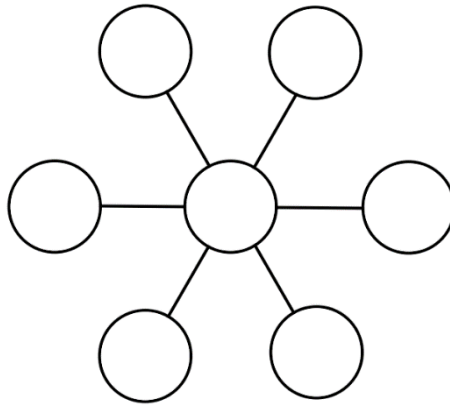
[4]

Question 10

The digits 1 to 7 are added to the diagram below, with one digit in each cell. Along the lines of 3 cells shown in the diagram, the numbers in the three cells must add to a common total.

What are the possible values for the common total?

You should show detailed working.

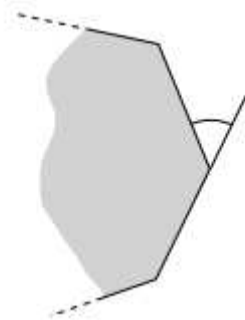


[4]

Question 11

The exterior angles of a triangle are in the ratio 3:4:5. What is the smallest interior angle?

[An exterior angle of a polygon is the angle between one side and the next side extended, as shown in this sketch.]



[4]

Question 12

The diagram shows an equilateral triangle inside a regular hexagon. The hexagon has a perimeter of 84 cm . The vertices of the triangle are the midpoints of the sides of the hexagon. What is the length of the perimeter of the triangle?



[4]