OUNDLE

School

2018Academic Scholarship

Mathematics

Paper I

Time Allowed: **1 hour and 30 minutes**

Calculators are **NOT** allowed

Instructions to candidates:

- Answers on the lined paper provided.
- 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 needed.
- Π may be taken to be 3.14.
- The number of marks for each question is shown in square brackets.

Question 1 Work out the following.

a) 43% of 75

b) $21 \times 58 + 79 \times 58$

c) $44 \times 17 + 28 \times 34$

d) $4\frac{1}{3} \times 7\frac{3}{5}$

[8]

Question 2 Simplify the following expressions fully.

a) $2xy - 3x^2 + 5x \times y + x \times 4x$

b) $3x - 5(2 - x) - (2x - 4)$

c) $121x^4 \div 22x^2$

d) $(x-2)^2 - 3x + 2x(5 - 3x)$

e) $\dfrac{4x-6}{6x-9}$

[10]

Question 3 Solve the following equations

a) $5 - 3(2 - x) - x = 3$

b) $\dfrac{2x}{3} - 5 = \dfrac{1}{2}x$

c) $4x^2 - 144 = 0$

d) $\dfrac{4x-3}{2-3x} = 6$

[8]

Question 4

a) I think of a number and subtract 5. I multiply the result by 9 and get a final answer of -99.
What was my number?

b) I think of a number, multiply it by 7 and then subtract 3. Twice the result is 4.5.
What was my number?

[4]

Question 5

How many positive integers less than 400 can be created using only the digits 1,2 or 3, with repetition of digits allowed? Justify your answer.

[3]

Question 6

It takes a clock six seconds to strike six. How long will it take to strike eleven?
Explain your answer carefully.

[3]

Question 7

When a second-hand bookstore holds a sale with a 10 percent reduction in prices, it makes an 8 percent profit on each book sold.
What was the profit on each book before the sale?

[4]

Question 8

A horse travels half his route, with no load, at 12 miles per hour. The rest of the way a load slows him to 4 miles per hour. What is his average speed?

[4]

Question 9

The petrol tank in Catherine's car is $\frac{1}{8}$ full. When 30 litres of petrol are added, the tank becomes $\frac{3}{4}$ full.
If the petrol costs Catherine £1.38 per litre, how much will it cost her to fill the remaining quarter of the tank?

[3]

Question 10

Fifty students were surveyed about their participation in hockey and tennis. The results of the survey were:

33 students played hockey
24 students played tennis
8 students played neither hockey nor tennis

How many of the students surveyed played both hockey and tennis?

[3]

Question 11

The average of a list of three consecutive odd integers is 7. When a fourth positive integer, *m*, different from the first three, is included in the list, the average of the list is an integer. What is the sum of the three smallest possible values of *m*?
Note: an integer is a positive or negative whole number

[3]

Question 12

The non-negative difference between two numbers *a* and *b* is $a-b$ or $b-a$, whichever is greater than or equal to 0. For example, the non-negative difference between 24 and 64 is 40.

In the sequence 88, 24, 64, 40, 24, ..., each number after the second is obtained by finding the non-negative difference between the previous 2 numbers.

Find the sum of the first 100 numbers in this sequence.

[5]