OUNDLE

School

2019 Academic Scholarship
Preliminary Examination

Mathematics

Time Allowed: 90 minutes
Total Marks: 75

Instructions

- **Calculators may NOT be used.**
- Write your answers on **lined paper** and **show as much working as possible**. **Answers without clear logical working will gain little credit.**
- Do not spend too long on any single question. If you are having difficulty with a particular question, move on and return to it at the end if you have time. Do not be concerned if you cannot answer all of the questions.
- **Please note that the diagrams in Question 12 and 13 have not been drawn accurately or to scale**.
- **At the end of the examination**, hand in both the question paper and your answers with your name clearly indicated on all sheets.

1. Work out :

(a) $38 + 29$

(b) $67 - (-24)$

(c) $\frac{2}{7} \div 3$

(d) 25×0.04

(e) $2\frac{1}{4} - 1\frac{1}{3}$

(f) $12 \div 4 \times 3 + (4 \div 8) \times 8$

(g) 40% of 40% of $4\,000$

(h) $2^3 + 3^2$

(i) $\frac{2.4}{0.08}$

(j) $\sqrt{160\,000}$

(k) 10^0

(l) 2^{2^2} (19 marks)

2. If $a = -4$ and $b = \frac{1}{2}$ and $c = 3$, find the values of :

(a) $2b + ac$

(b) $2c^2 - a^2$

(c) $\frac{4c - 3a}{b}$ (6 marks)

3. Remove brackets and simplify :

(a) $3(4x + 1)$

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

(c) $(x + 5)(2x - 3)$ (5 marks)

4. Rewrite each of the following with brackets to make the statement true.
(You may use more than one set of brackets if needed) .

(a) $12 - 8 \div 4 + 4 = 5$

(b) $24 \div 2 \times 3 + 3 \times 5 - 2 = 13$ (3 marks)

5. Factorise fully :

(a) $21xy - 14y$

(b) $4y^3 - 6y^2 + 8y$ (4 marks)

6. Solve each equation for x :

(**<u>USE A CLEAR ALGEBRAIC METHOD – NOT TRIAL AND ERROR – SHOWING YOUR WORKING IN FULL</u>**)

(a) $4x - 8 = -6$

(b) $3(2x - 5) = x - 10$

(c) $5 + \frac{x}{3} = 2x$

(d) $\frac{4}{1-x} = \frac{1}{2}$ (10 marks)

7. You are told that $588 \times 138 = 81\,144$
<u>Without any further calculations</u>, write down the values of :

(a) 58.8×1.38

(b) $81\,144\,000 \div 0.138$

(c) 294×276

(Correct answers obtained by long multiplication or division will not gain full marks).

(3 marks)

FOR THE REMAINING QUESTIONS, YOU CAN ANSWER THEM IN ANY ORDER THAT YOU CHOOSE. YOU MUST SHOW FULL WORKING TO MAKE IT CLEAR HOW YOU OBTAINED YOUR ANSWER. (ANSWERS WITHOUT WORKING WILL BE AWARDED VERY FEW MARKS).

8. In this question, the symbol # is defined as follows :

$$x \# y = 3x + y - 2$$

So, for example : $1 \# 6 = 3 + 6 - 2 = 7$

(a) Work out the value of $(2 \# 3) \# 4$

(b) Work out the value of $2 \# (3 \# 4)$

(c) Find the value of x if $(x + 2) \# 5 = 18$

(6 marks)

9.

On *The Apprentice*, Ravi bought 400 T-shirts for resale.
Sharon bought 450 T-shirts but paid 15% more in total than Ravi did.
Which of them got the better value for money ?
(You must show by clear calculation/working how you decided).

(3 marks)

10.

Alan, Bernie and Craig (you can call them *A*, *B* and *C* if you like !) play poker at Alan's house every Tuesday night. Last Tuesday, at the start of the evening, the amount of money each player had was in the ratio

Alan	:	Bernie	:	Craig
5	:	4	:	3

At the end of the evening, the ratio was

Alan	:	Bernie	:	Craig
5	:	3	:	1

Alan worked out that he had made a 'profit' of £10.
Calculate the total amount of money in the poker game.

(4 marks)

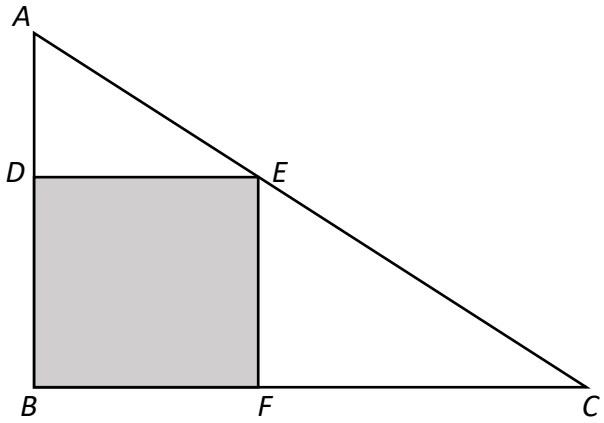
11.

Every day, Amy goes up an escalator on her journey to work. If she stands still, it takes her 20 seconds to travel from the bottom to the top. One day the escalator was broken, so she had to walk up it. This took her 30 seconds.

How many seconds would it take her to travel up the escalator if she walked up at the same speed as before while it was still working ?

(4 marks)

12.

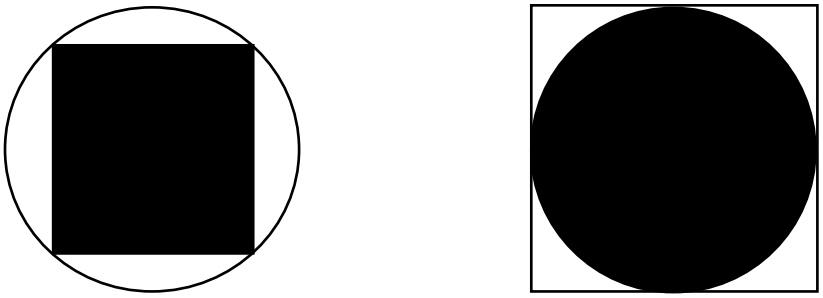


<u>Please note</u> : Diagram NOT drawn accurately or to scale.

If the sides of triangle *ABC* are 3 cm, 4 cm and 5 cm, calculate the area of the shaded square *BDEF*.

(4 marks)

13.



<u>Please note</u> : Diagrams NOT drawn accurately or to scale.

Which is a better fit : a square peg in a round hole or a round peg in a square hole ?

In other words, which peg fills a greater proportion of its 'hole' ?

Your full working / calculations must be shown clearly.

(**<u>Please note</u> : You are not given any dimensions in this question. It can be solved without them**)

(4 marks)

END OF PAPER