

S850/1
**SUBSIDIARY
MATHEMATICS**
Paper 1
August 2019
2HOURS 40 MINUTES



MASAKA DIOCESAN EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

JOINT MOCK EXAMINATION 2019

SUBSIDIARY MATHEMATICS

PAPER 1

2 HOURS 40 MINUTES

INSTRUCTIONS TO CANDIDATES:

- Answer all the eight questions in section A and only four questions in section B.
- Any additional question (s) will not be marked.
- Each question in section A carries 5 marks while each question in section B carried 15 marks.
- All working must be shown clearly.
- Begin each answer on a fresh sheet of paper.

SECTION A

1. Evaluate $\frac{\log_6 216 + \log_2 64}{\log_3 243 + \log_{10} 0.1}$ (5 marks)
2. Express $\frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ in the form $a + b\sqrt{c}$. Hence find the value of a , b and c . (5 marks)
3. Given that A and B are mutually exclusive events such that; $P(A) = 0.5$, $P(A \cup B) = 0.9$, Find;
(i) $P(A \cup B)$ (ii) $P(A \cap B)$ (5 marks)
4. Calculate the four – point moving average of the data for 32, 54, 56, 61, 64, 70, 72, 78. (5 marks)
5. A car travelling at 50 m/s accelerates uniformly to 80 m/s in 10 seconds. Find the acceleration and distance it travelled in 10 seconds. (5 marks)
6. The matrix $A = \begin{pmatrix} 2 & 1 \\ -3 & 0 \end{pmatrix}$ and I is a 2×2 identity matrix. Determine the matrix B such that; $A^2 + \frac{1}{2}B = I$ (5 marks)
7. The probability that it will be a fine day is 0.6. Find the expected number of fine days in a week and also the standard deviation. (5 marks)
8. The fifth term of an A.P is 23 and the twelfth term is 37. Find the first term and the common difference of the series. (5 marks)

SECTION B (60 MARKS)

9. (a) A and B are acute angles such that $\sin A = \frac{12}{13}$ and $\sin B = \frac{4}{5}$. Without the use of tables or a calculator, find the value of $\sin(A - B)$. (5 marks)
- (b) Given that $X - 1$ is a factor of $a^2x^4 + bx^3 - 3$ and the remainder is 31 when divided by $X - 2$. Find the value of a and b . (5 marks)
- (c) Given that α and β are roots of the equation $2x^2 - 10x + 12 = 0$. Find the equation whose roots are $\frac{1}{\alpha^2}$ and $\frac{1}{\beta^2}$ (5 marks)

10. (a) A random variable has a p.d.f given by;

X	0	1	2	3	4
P (X=X)	0.1	0.2	0.4	0.2	0.1

- (i) Find E (X) and Var (X)
(ii) Given that $y = 3x + 6$, find E (y) and Var (y). (9 marks)

- (b) A continuous random variable X has a p.d.f given by;

$$f(x) = \begin{cases} Kx; & 0 \leq x \leq 2 \\ K(2 + x); & 2 \leq x \leq 4 \\ 0, & \text{elsewhere} \end{cases}$$

Determine;

- (i) Value of the constant K.
(ii) $P(1 \leq x \leq 3)$ (6 marks)

11. Given that curve $y = x^2 + 2x - 8$.

- (a) Find the intercepts.
(b) Find the turning point and distinguish it.
(c) Sketch the curve and hence find the area enclosed by the curve $y = x^2 + 2x - 8$, lines $x = \{-3, 2\}$ and the x – axis. (15 marks)

12. A school entered 88 students for an examination. The results of the examination are shown in the following table.

Mark (X)	0 - < 10	10 - < 20	20 - < 30	30 - < 40
Frequency	3	6	9	10

40 - < 50	50 - < 60	60 - < 70	70 - < 80	80 - < 90
12	18	14	11	5

- (a) Calculate the;
(i) Mean mark
(ii) Variance
(iii) Standard deviation
(b) Draw an O-give and use it to estimate the Median and Interquartile range.
(c) The lowest mark required to obtain a grade A in the examination was 75, estimate from your graph the number of students who were awarded grade A for the examination. (15 marks)

13. (a) The weight X of goats on a certain farm is normally distributed with mean 20kg and standard deviation 15kg. Find;
- $P(X > 31.25)$
 - Percentage of goats with weight between 8.75kg and 31.25kg.
- (b) If there are 3000 goats on the farm, find the number of goats with weight more than 8.75kg. (15 marks)
14. The following table shows the examination marks in French and German of the students.

French	21	29	39	44	55	64	68	79	86	94
German	33	37	43	39	51	51	53	46	59	58

- Plot the data on a scatter diagram.
 - Draw the line of best fit, hence estimate the German mark corresponding to a French mark of 50. (8 marks)
- Calculate spearman's rank correlation coefficient of the data and comment on your result at 1% level of significance. (7 marks)

END