

S475/1

SUBSIDIARY MATHEMATICS

Paper 1

$2\frac{2}{3}$ hours

PRE-MOCK EXAMINATIONS-2025

Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

Paper 1

2 hours 40 minutes

INSTRUCTIONS TO CANDIDATES:

*Attempt all **eight** questions in Section A and any **four** from Section B.*

*Section B comprises **two** Parts; Part I and Part II. You are required to select at least **one** question from each Part.*

Each question in Section A carries five marks while each question in Section B carries fifteen marks.

Begin each answer on a fresh page.

Graph papers are provided.

*Any extra question(s) **will not** be assessed.*

All working must be shown clearly.

Silent, non-programmable Scientific Calculators and Mathematical tables with a list of formulae may be used.

SECTION A: (40 marks)

Answer **all** the questions in this section.

- The third term of an A.P is 12, and the common difference is 5. Find the;
(i) first term of the progression, (02 marks)
(ii) sum of the first 10 terms. (03 marks)
- If the letters of the word **GREENS** are arranged at random, what is the probability that two E's are separated. (05 marks)
- The probabilities for three soldiers *A*, *B* and *C* to hit a target are $\frac{3}{11}$, $\frac{5}{7}$ and $\frac{2}{9}$ respectively. If each soldier hits only once; find the probability that the target is hit by at least a soldier. (05 marks)
- The table below shows the prices (in Uganda shillings) and weights of selected building materials from a certain building shop for the months of May and August 2020.

Item	Prices in (Ug. Shs)		Weights
	May	August	
Cement	28,500	31,000	20
Iron sheets	48,000	55,000	8
Nails	3,500	4,000	5

Using May as the base month, calculate the weighted average price index. (05 marks)

- Given the matrix $\mathbf{P} = \begin{pmatrix} -6 & 0 \\ 3 & 2 \\ -4 & 5 \end{pmatrix}$ and $\mathbf{Q} = \begin{pmatrix} 2 & 0 \\ 3 & -2 \\ 4 & 1 \end{pmatrix}$, find;
(i) Matrix \mathbf{R} such that $\mathbf{P} + 2\mathbf{R} = \mathbf{Q}$ (03 marks)
(ii) $\mathbf{R} + \mathbf{Q}$ (02 marks)
- Without using tables or a calculator, simplify:
 $\frac{1}{2} \log_{10} 1600 - 2 \log \left(\frac{x}{5}\right) + \log x^2$. (05 marks)
- Calculate the standard deviation for the weights 60, 58, 72, 47 and 82 kg. (05 marks)
- Given that $P(A) = 4x$, $P(B) = \frac{1}{3}$, $P(A \cap B) = x$ and $P(A \cup B) = 8x$,
Find;
(a) the value of x (03 marks)
(b) $P(A^1 \cap B)$ (02 marks)

SECTION B: (60 marks)

Attempt *at least one* question from each Part

Part 1: PURE MATHEMATICS

9. (a) Solve; $3 - 3\cos \theta = 2\sin^2 \theta$ for $0^\circ \leq \theta \leq 360^\circ$. (08 marks)
- (b) Given that $\cot A = \frac{4}{3}$, where A is reflex, find without using tables or calculators the value of $\sin A - \cos A$ (07 marks)
10. The distance s m of a particle moving in a straight line measured from a fixed point O on the line is given by $s = 2t^3 - 15t^2 + 24t + 20$ where t is the time in seconds after start.
- (a) Determine the times when the particle is at instantaneous rest.
- (b) Determine the acceleration when $t = 2$ (15 marks)
11. (a) Determine the nature of the turning points of the curve $y = 2x - x^2$. Hence sketch the curve. (10 marks)
- (b) Find the area enclosed between the curve and the x – axis from $x = 0.5$ to $x = 2$. (05 marks)
12. Given the vectors $\underline{p} = \underline{i} - 2\underline{j}$, $\underline{q} = 3\underline{i} - \underline{j}$ and $\underline{r} = \underline{i} + 2\underline{j}$, find the
- (a) Length of the vector $3\underline{p} - 5\underline{q} + 2\underline{r}$.
- (b) Angle between the vectors \underline{p} and \underline{q}

Part 2: STATISTICS

13. The table below shows the weights and fitness factor for a number of women.

Weight(kg)	45	48	50	54	56	60	64	72	99	112
Fitness Factor	41	48	45	40	35	40	34	30	17	15

- (a) (i) Plot a scatter diagram for the data. Comment on your graph.
- (ii) draw a line of best fit and use it to estimate the fitness factor for a woman whose weight is 80kg (07 marks)
- (b) Calculate the Spearman's rank correlation coefficient for the data and comment on your answer. (08 marks)

14. The table below shows the 3 – point moving total scores for the amount of gas used by a certain house hold over a period of time.

Year	Jan	June	Dec
2015	525	543	531
2016	549	621	663
2017	670	674	685
2018	x		

- (a) Calculate the 3 – point moving averages for the data. (07 marks)
- (b) Represent the moving averages on the graph and comment on the trend. (06 marks)
- (c) Use your graph to determine the units of gas used in Jan 2018. (02 marks)
15. People in a certain organization with 1000 workers were asked to measure their pulse rates when they woke up in the morning. The results were normally distributed with the mean of 70 beats and the standard deviation of 3 beats. Find the;
- (a) $P(x < 67)$
- (b) $P(x \geq 69)$
- (c) Number of people with pulse rates between 64 and 73. (15 marks)
16. A continuous random variable X , has a probability density function (pdf) given by:

$$f(x) = \begin{cases} k(4x - x^2) & ; 0 \leq x \leq 3, \\ 0 & ; \text{elsewhere.} \end{cases}$$

Where k is a constant.

Determine the:

- (a) value of k . (04 marks)
- (b) $P(X > 1)$. (04 marks)
- (c) expectation, $E(X)$. (03 marks)
- (d) variance, $Var(X)$. (04 marks)

END