S475/1
SUBSID. MATHEMATICS
PAPER 1
July/August
$2^2/_3$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

SUBSIDIARY MATHEMATICS

PAPER 1

2hours 40minutes

INSTRUCTIONS TO CANDIDATES:

- *Answer* **all** *the* **eight** *questions in section A and any* **four** *questions from section* **B**.
- *Any additional question(s) answered will* **not** *be marked.*
- **All** *working* **must** *be shown clearly.*
- *Each question in section* **A** *carries* **5** *marks while each question in section* **B** *carries* **15** *marks.*
- *Begin each answer on a fresh page.*
- *Graph papers are provided.*
- *Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used.*
- *Where necessary take* $g = 9.8ms^{-2}$.

Turn Over

SECTION A (40 marks)

Answer **all** questions in this section.

1. Given that $\alpha - \beta = 1$ and $\log_{10}\alpha + \log_{10}\beta = 1$.
   Find the values of α and β. (05 marks)

2. For any two independent events M and N, $P(M \cup N) = {}^{6}/_{7}$ and $P(N^{1}) = {}^{5}/_{7}$
   (i) P(M)
   (ii) $P(M^{1} \cap N^{1})$
   (05 marks)

3. The third term of a G.P is 10 and the sixth term is 80, find the common ratio and sum of the first six terms. (05 marks)

4. A random variable x has a probability distribution $P(x=1) = P(x=2) = 0.3$, $P(x=3) = a$, $P(x=4) = b$ and $E(x) = 2.5$, find the value of a and b. (05 marks)

5. Solve for θ if $(\cos\theta + \sin\theta)^2 = (1 + 2\cos\theta)$, for $0^{o} \angle \theta \angle 360^{o}$. (05 marks)

6. Kakira factory packs sugar in bags which are 25kg each. 80 bags are investigated by UNBS and the mass y kg of each is obtained such that $\Sigma(y - 25) = 27.2$ and $\Sigma(y - 25)^2 = 85.1$.
   Find the mean and standard deviation of the masses. (05marks)

7. The curve is defined by $y = mx^2 + p$, where m and p are constants. Given that the gradient of the curve at the point (1, -4) is 7, find the value of m and p. (05 marks)

8. A man of mass 52 kg uses a lift to move up and down a storied building. Find the reaction of the floor of the lift when it is;
   (i) descending.
   (ii) Ascending,
   the building with a uniform acceleration of 5 ms^{-2}. (05 marks)

SECTION B (60 marks)

Answer any **four** questions from this section.

9. The table below shows weights by 10 learners taken using two different weighing scales.

Learner	1	2	3	4	5	6	7	8	9	10
Scale 1 (x)	22	27	23	30	20	31	40	35	20	28
Scale 2 (y)	21	29	24	28	20	33	40	36	20	28

a) (i) Plot a scatter diagram for the given data and draw the line of best fit.
(ii) Estimate the weight of a learner with a weight of 36 on scale 2.

b) Calculate a Spearman's rank correlation coefficient of the weight and hence comment on your results. (15 marks)

10. The roots of the equation $2x^2 + 5x - 8 = 0$ are α and β.

Determine the;

(a) Value of

(i) $(\alpha - \beta)^2$.

(ii) $\frac{1}{\alpha^2\beta} + \frac{1}{\alpha\beta^2}$. (11 marks)

(b) Quadratic equation with integral coefficient whose roots are;

$\frac{1}{\alpha^2\beta} + \frac{1}{\alpha\beta^2}$ and $(\alpha - \beta)^2$ (04 marks)

11. The table below shows prices in (Ug. Shs) of some items in 1998, 2008 and 2022 together with their corresponding weights.

Item	Price (in Ug shs)			Weight
	1998	2008	2022	
Beans (1kg)	2000	2500	3500	5
Sugar (1kg)	2500	2800	3500	2
Cooking oil (1litre)	3000	4500	10,000	4
Soap (1bar)	3000	3500	8000	3

Taking 1998 as the base year, calculate the;

(a) Simple aggregate price index for 2008, hence give a comment on your result. (05 marks)

(b) Weighted aggregate price index for 2022. Comment on your result. (10 marks)

Turn Over

12. The rate of decline of students doing sub mathematics in a given school is proportional to the number, N, offering computer studies at given time, t. Initially they were 50 students, after 3 years the number had reduced to 20 students.

(a) Form a different equation for the rate of decline of the number of students. (03 marks)

(b) Solve the differential equation formed above. (08 marks)

(c) Find the time taken for the number to reduce to 5 students. (04 marks)

13. A factory produces metal strips whose lengths are normally distributed with a mean length of 12m and standard deviation 2m. Find the probability that the length of a randomly selected strip is;

(a) longer than 17m. (5 marks)

(b) less than 10m. (5 marks)

(c) between 9 and 13m. (5 marks)

14. A cyclist starts from rest and travels uniformly for 6 seconds until he attains a velocity of $15ms^{-1}$.He maintains this velocity for more 5 seconds and eventually comes to rest after a further 10 seconds.

(a) Sketch a velocity-time graph for the motion of the cyclist. (4 marks)

(b) Calculate the total distance covered by the cyclist (6 marks)

(c) Determine his uniform acceleration and retardation (5 marks)

END