

S475/1
SUBSID. MATHEMATICS
PAPER 1
August 2016
2²/₃ 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 paper is provided.
- Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used.
- Where necessary take $g = 9.8\text{ms}^{-2}$.

SECTION A (40 MARKS)

Answer all questions in this section.

1. A box contains 4 green and 3 yellow oranges. Two oranges are picked at random one at a time without replacement. Find the probability that the oranges are
- (i) all yellow, (2 marks)
- (ii) of different colours. (3 marks)

2. Solve the simultaneous equations

(i) $2^{(x+y)} = 32$

(ii) $4^{\frac{x}{y}} = 8$. (5 marks)

3. The price relatives and weights of some selected items in 2015 were as follows.

| ITEMS | PRICE RELATIVE | WEIGHT |
|-------|----------------|--------|
| Sugar | 120 | 2 |
| Milk | x | 5 |
| Bread | 105 | 3 |

Given that the weighted price index was 103, find the value of x . (5 marks)

4. Solve the equation $2\tan^2\theta + \sec\theta = 1$ for $0^\circ \leq \theta \leq 360^\circ$. (5 marks)

5. Find the expression for Q given that $\frac{dQ}{dp} = 5 - 4p$. Given that $Q = 10$ when $p = 0$. (5 marks)

6. The heights (in cm) of a sample of candidates in a certain school were recorded as follows: 120, 132, 118, 141, 128, 134, 127, 138, 128, 145 and 130. Calculate the inter quartile range. (5 marks)

7. Given that $A = \begin{pmatrix} 3 & 1 \\ 0 & 4 \end{pmatrix}$, $B = \begin{pmatrix} x & 0 \\ 3 & y \end{pmatrix}$ and $M = \begin{pmatrix} 9 & 1 \\ 12 & 4 \end{pmatrix}$. Find the value of x and y if $M = AB$. (5 marks)

8. A car of mass 9 tonnes accelerating uniformly at 2 ms^{-2} from a velocity of 8 ms^{-1} covers 20m in t seconds. If the resistance to motion is 8,000N, find the
- (i) value of t , (2 marks)
- (ii) driving force. (3 marks)

SECTION B (60 MARKS)

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

9. The marks scored by a group of students in a sub Maths test were recorded as follows.

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 50 | 65 | 42 | 52 | 54 | 83 | 77 | 62 |
| 43 | 54 | 57 | 63 | 68 | 53 | 69 | 53 |
| 62 | 49 | 65 | 75 | 63 | 82 | 56 | 69 |
| 78 | 57 | 60 | 80 | 51 | 76 | 72 | 54 |
| 84 | 72 | 74 | 69 | 55 | 66 | 70 | 68 |

- (a) Construct a grouped frequency table with equal class width taking 40 – 46 as the first class and use it to determine the median and modal classes. (11 marks)
- (b) Calculate the
- (i) mean, (2 marks)
- (ii) standard deviation. (2 marks)
10. Given that $\mathbf{a} = 2\mathbf{i} + 3\mathbf{j}$ and $\mathbf{b} = \mathbf{i} - 3\mathbf{j}$
- (a) Find the angle between \mathbf{a} and \mathbf{b} . (8 marks)
- (b) If $\mathbf{c} = \mathbf{a} + 2\mathbf{b}$, find the magnitude and direction of \mathbf{c} . (7 marks)
11. The quantities of fuel (in liters) used by a school water pump on daily basis were recorded as follows.

| WEEK | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY |
|------|--------|---------|-----------|----------|--------|
| 1 | 35 | 30 | 25 | 35 | 20 |
| 2 | 27 | 32 | 24 | 30 | 29 |
| 3 | 34 | 28 | 32 | 25 | 23 |
| 4 | 26 | 31 | 27 | 33 | 36 |

- (a) Calculate the 5 day moving averages for the data. (6 marks)
- (b) On the same axes, plot the graphs of the original data and the 5 day moving averages. (7 marks)
- (c) Use the graph in (b) above to estimate the quantities of fuel used on Monday of week 5. (2 marks)

Turn Over

12. A multiple choice question has four alternatives with one correct answer. A student attempted 5 such questions by pure guessing.
- Find the probability that a student who attempted all the questions gets all the answers correct, (4 marks)
 - A student who gets at least 3 answers correct is considered to have passed. Find the probability that a student passes. (6 marks)
 - Find the mean and standard deviation of the correctly answered questions. (5 marks)
13. A lift of mass 0.6 tonnes is raised or lowered by means of a cable attached to its top. Given that the lift carries passengers whose total masses is 400kg and it accelerates uniformly from rest to 2ms^{-1} over a distance of 5m.
- Calculate the
 - magnitude of acceleration, (3 marks)
 - time taken to reach a speed of 2ms^{-1} . (2 marks)
 - Calculate the tension in the cable if the lift moves vertically
 - downwards, (6 marks)
 - upwards. (4 marks)
14. Given that $y = 50 + 36x - 15x^2 + 2x^3$, find the
- coordinates of the stationary points, (12 marks)
 - gradient of y at the origin. (3 marks)

END