
P425/2

APPLIED MATHEMATICS

Paper 2

Nov./Dec. 2025

2 $\frac{1}{2}$ hours

MENGO SENIOR SCHOOL
Uganda Advanced Certificate of Education

APPLIED MATHEMATICS

Paper 2

2 hours and 30 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of two Sections; A and B.

Both sections are compulsory

Answer any six items

Any additional questions answered will not be marked.

Begin each answer on a fresh page.

All necessary working must be shown clearly.

Graph paper is provided.

Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

In numerical work, take acceleration due to gravity, g , to be 9.8 ms^{-2} .

SECTION A

*Answer all the items in this section.
(Statistics and Probability)*

1. (a) Allan, Brenda and Christine aim at a target. Their probabilities of hitting the target are $\frac{3}{4}$, $\frac{1}{5}$ and $\frac{2}{3}$ respectively. Determine the probability that
- only one of them hits the target;
 - at least one of them hits the target;
 - all of them hit the target.
- (b) Moses was tasked to determine the number of red balls in a bag containing 4 green and some red balls of identical size. Information has it that, when two balls are drawn at random, one after the other without replacement, the probability of drawing two green balls is $\frac{2}{15}$. Help Moses to determine:
- the number of red balls which were in the bag at the start;
 - the probability that the two balls drawn are of different colours.
- (c) In a certain town, there is a 25% chance of someone owning a car. Given that the probability that a person who owns a car is a University graduate is 0.2, determine the probability that a person selected at random from this town owns a car and is a University graduate.
2. In a study of how effective a certain insecticide is, 50 houseflies were collected and the table below shows the lifetime in minutes of 50 houseflies subjected to the insecticide.

2.4	0.7	3.9	2.8	1.3	1.6	2.9	2.6	3.7	2.1
3.2	3.5	1.8	3.1	0.3	4.6	0.9	3.4	2.3	2.5
0.4	2.1	2.3	1.5	4.3	1.8	2.4	1.3	2.6	1.8
2.7	0.4	2.8	3.5	1.4	1.7	3.9	1.1	5.9	2.0
5.3	6.0	0.2	2.0	1.9	1.2	2.5	2.1	1.2	1.7

Help the scientist to

- draw a frequency distribution table with classes of equal intervals of 1 minute starting with a class whose lower limit is 0.1 minutes;
- use the table in (a) to determine the
 - mean lifetime;
 - standard deviation of the lifetime;
 - number of houseflies whose lifetime is at most 3.8 minutes.

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3. A supermarket in Kampala records the number X of the meat pies sold per day over several weeks. Their probability distribution is given by

Number of pies (x)	10	20	30	40	50
$P(X = x)$	k	$2.5k$	$3.5k$	$1.5k$	$1.5k$

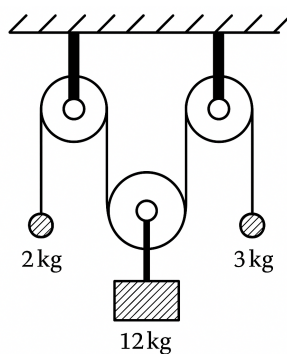
Each meat pie which is sold at sh 6000 costs sh 1500 to make it. If Y is the possible profit each day, help the manager to:

- (a) Determine the
- value of k ;
 - expected number of pies sold per day;
 - variance of the distribution;
 - cumulative distribution $F(x)$ and sketch it.
- (b) Construct the probability distribution of the daily profit made. Hence determine the average daily profit made.

section B (Mechanics)

Attempt only three items from this section.

4. A heavy rectangular frame $ABCD$ of mass 120 kg is such that $AB = 8$ cm, $BC = 6$ cm. The forces of magnitudes 7 N, 1 N, 13 N, 5 N, 20 N and 30 N act along the lines AB , BC , CD , DA , AC and BD respectively, in the directions given by the order of the letters. Take AB and AD as the x -axis and y -axis respectively. Sarah wishes to know whether the frame will move and the direction in which it will move. Help Sarah to:
- write each of the forces in vector form;
 - determine the magnitude and direction of the resultant force;
 - determine the magnitude of the rate at which the frame will accelerate under the action of these forces.
5. (a) Show that for uniform motion, $s = ut + \frac{1}{2}at^2$ and define each of the terms in the equation.
- (b) A cyclist starts from rest and accelerates uniformly to a speed of V m s⁻¹ in 9 s. He maintains this speed for another 50 s and then decelerates uniformly to rest. If his deceleration is numerically three times his previous acceleration,
- sketch a velocity–time graph of the motion of the cyclist;
 - calculate the time during which the cyclist was decelerating;
 - determine the value of V , given that the total distance travelled is 840 m;
 - calculate the acceleration of the cyclist.
6. Three particles of masses 2 kg, 12 kg (movable pulley) and 3 kg are connected by means of a light inextensible string passing over smooth light pulleys as indicated below.



Assuming the strings are vertical, determine the

- accelerations of the 2 kg, 12 kg and 3 kg masses;
- tension in the string.

END