

Candidates name: ..... combination .....

Signature: .....

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Paper 2

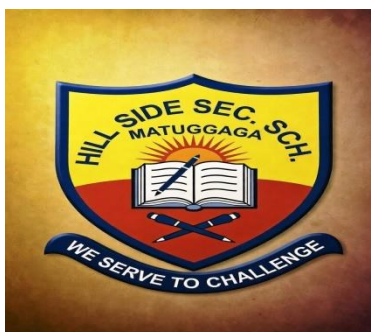
April 2026

2 ¼ HRS

SENIOR SIX

**examiner use**

ITEM	SCORE
ONE	
TWO	
THREE	
FOUR	



**Uganda Advanced certificate of education**

**APPLIED MATHEMATICS**

**Paper 2**

**END OF TERM ONE ASSESSMENT**

**2 hours 15 MINUTES**

**INSTRUCTION TO CANDIDATES:**

This paper consists of TWO sections A and B. It has FOUR examination items.

Section A and B have two items each. Answer at least one item from each section

Answer THREE items in all.

Any additional item(s) answered will not be scored

All answers must be written in the answer booklets provided

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

## SECTION A

Attempt atleast one from this section

Item one

Rf fitness club conducted research to establish whether there is a negative or positive relationship between the hours spent exercising per week and an individual's body weight. The researcher's data from a sample participant as shown below

Participant	A	B	C	D	E	F	G	H
Hours spent exercising	1	3	5	8	10	12	14	17
Body weight ( kg)	85	80	75	70	68	65	53	50

Unfounately, data of two additional participants I and J was not recorded due to the equipment malfunction. Participant I spent 420 minutes exercising but had no body weight recorded; and participant j recorded a body weight of 60kg but had no indicated. The fitness club will increase on the hours the clients spend exercising if the results of the research are significant at 1% level

Task

Help the researchers to;

- (a) (i) Obtain the missing data of participants I and j
- (ii) ascertain the relationship hours spent exercising per week and an individual's body weight
- (b) With clear reasons, should the fitness club increase or reduce the hours its clients spend exercising

## ITEM TWO

The physics class of the year 2025 embarked on a project to model the distribution of the life – time  $x$  in the hours of a certain type of dry cells used in the physics laboratory . two different set ups were used in order to achieve the above objective in two different intervals.

Additionally, the team was to graphically present their results, establish the average lifetime and variance of the life- time of the dry cell

If the average life –time of the cells used is less than 2 hours, the physics department will stock another type of dry dry cells; otherwise, it will continue using the current type

The project report showed that the distribution for the life-time of the dry cells can be modeled by a continuous random variable  $x$  with a constant,  $k$  and probability density function given by;

$$f(x) = \begin{cases} kx & ; 0 \leq X \leq 2 \\ k(4 - X) & ; 2 \leq X \leq 4 \\ 0 & ; \text{Otherwise} \end{cases}$$

## Task

As the mathematics student, help the project team to;

- (a) Establish the value of the constant  $k$
- (b) Hence, illustrate the distribution on a sketch diagram
- (c) Determine;
  - (i) Likelihood that any dry cell selected randomly has a life- time between  $0 \leq X \leq 3$  given that  $X \geq 1$
  - (ii) Mean life –time and variance of the life –time of the dry cells used in the project
  - (iii) Should the physics department stock another type of dry cell? justify your response

## SECTION B

Attempt atleast one from this section

Item three

As a certain construction company was purchasing a pulley and cable to use on its construction sites, its engineers tested their strength using the reactions experienced by pulley when masses of 80 kg and 120 kg are connected using this cable to pass along this smooth fixed pulley. they used these two experiments to test that

For the first experiment, 80kg mass was placed on a rough horizontal plane whose coefficient of friction is 0.5 and this light inelastic cable was connected to it and then passed over smooth pulley fixed at the edge of the plane. 120 kg Mass was then attached to the other end of the cable to vertically hang freely before the system is released from rest.

For the second experiment, the same rough plane whose coefficient of friction is 0.5 was inclined at  $60^\circ$  to the horizontal such that an 80kg mass remains in contact with this plane with the same inelastic cable connected to it to pass over the smooth pulley fixed at the edge of this incline for the cable to holds a 120kg mass on its other end to vertically hang freely before the system is released from rest

The company plans to buy the cable and the pulley if the reaction on the pulley in each of the experiments is greater than 900N

TASK

As a student of mechanics, determine if this construction company will purchase these products

**Item four**

In an experiment to demonstrate the effect of forces on the body, a teacher applied the following forces on the solid metallic blocks; 5N AND 13N forces acting vertically upwards ,11N Force acting vertically downwards, 3N Force and 5N force acting horizontally to the left and 14N acting horizontally to the right.

The teacher tasked the students to determine a single resultant from the effect of these six forces acting on the block.

In the further demonstration, he played a video that involved a monster truck at the center of five small cars, each connected to it using a strong cable. the cars pulled apart with the forces of 30N, 60N, 100N, 70N, and 20N in the directions of  $270^{\circ}$ ,  $040^{\circ}$ ,  $120^{\circ}$ ,  $330^{\circ}$ , and  $225^{\circ}$  respectively. The teacher also asked the students to use the system of forces above to determine a single force with which the monster truck will resultantly move and the direction it will take

**Task**

- (a) Help the students to determine the single resultant from the effect of six forces acting on the block
- (b) Determine the single force with which the monster truck will resultantly move and the direction it will take