P425/2
PRINCIPAL
MATHEMATICS
Paper 2
2026
3 hours

UGANDA TEACHERS' EXAMINATIONS SCHEME

Uganda Advanced Certificate of Education

JOINT MOCK EXAMINATIONS

PRINCIPAL MATHEMATICS

Paper 2

3 hours

INSTRUCTIONS TO CANDIDATES:

This examination paper consists of two sections; **A** *and* **B.** *It has* **five** *examination items.*

Section **A** *consists of* **one compulsory** *item.*

Section **B** *has two parts;* **I** *and* **II** *each with two optional items. Respond to only* **two** *items from section* **B.** *choosing* **one** *item from* **each** *of the parts.* **I** *and* **II.**

Respond to **three** *items in all.*

Any additional item(s) responded to will **not** *be scored.*

Begin each item on a fresh page.

All *necessary working* **must** *be shown clearly.*

Graph paper is provided.

Where necessary, use $g = 9.8ms^{-2}$.

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

 Turn Over

SECTION A

*The item in this section is **compulsory.***

Item 1

A certain distribution company uses trucks to carry its luggage from Kampala to Busia. The company introduced a module to monitor the charges in relation to weights, speed and distance covered and fuel consumption by the vehicle.

The cost of fuel (y in shillings) for distances (x in kilometers) is as shown in the table below.

Distance, x(km)	10	20	30	40
Cost, y(shs)	2800	3600	4400	5200

The manager will hire another driver if the cost of covering 45km exceeds shs. 6000 but if the driver spent shs. 4000, on fuel then the minimum distance to be covered should be at most 30km or else he/she will lose the job.

The route taken by the truck is described by the function $f(x) = x^3-5x+1$, and at every check point, $f(x) = 0$. Unfortunately, the company did not insert this module into their system, yet the only tool left is **graph** and the driver is confused where exactly the vehicle will stop for police checkpoint, and failure to stop at the right spot, the vehicle will be impounded. The driver is required to be careful only in the first 4 kilometers of the journey since it contains the deadliest checkpoints. His friend is a police man who works at one of the checkpoints between 2km and 3km from the company premises and told the driver to consult their technicians at the main station to iterate the graphical value until appropriate numerical distance is obtained, if not the company should be ready to suffer the loss.

Task.

As a student of mathematics;

(a) Guide the manager on the values he will use in order to hire or maintain the driver.

(b) Help the company on how they can dodge the loss.

SECTION B

Answer only **two** *items from this section, choosing one item from* **each** *of the parts* **I** *and* **II**

PART I

Item 2

One of the prominent Schools in Uganda has organized a visitation day, but for the previous years, parents always complain of traffic jam along the way to the school, since many parents will be moving on that day. The school is planning to meet the parents of candidates but it requires the modal, average and median time such that majority of the parents can attend the meeting.

The table below shows the time taken by parents to travel to school during visitation day

Time (minutes)	<5	<10	<15	<20	<25	<30	<35	<40	<45
Number of parents	28	45	78	143	280	340	375	395	400

Turn Over

The meeting will be delayed if the interquartile range is less than 10 minutes.

The school is willing to give T-shirts to parents who will arrive in less than 18 minutes, on condition that majority arrive in less than 23 minutes.

On this very day, some parents used personal car (C) while others used buses (B) and taxis (T), with the proportions 40%, 50% and 10% respectively. For those who used personal car, 9% arrived late, and those who used buses, 6% came late and 20% of those who boarded taxi arrived at school late.

Task

As a student of mathematics,

(a) Help the school in planning such that they can have a wonderful visitation day.

(b) Determine the proportion that the vehicle used is a bus given that it arrives late.

Item 3

The director of studies (DOS) in a certain school is complaining why students are performing well in chemistry than in mathematics. He was trying to compare marks of students in both subjects and the table below shows the marks obtained by 10 students.

Mathematics (x)	10	15	20	15	30	35	40	45	50	60
Chemistry (y)	15	20	35	40	35	50	55	40	55	60

More teachers will be recruited if there is negative correlation between the performance in the above subjects. And extra lessons shall be created if the correlation is insignificant at 5%.

The DOS is wondering what could be the marks obtained in chemistry if a student scores 25 in mathematics.

During printing of report cards, the secretary occasionally makes mistakes. In a batch of 20 cards, 5 are found to have mistake. A sample of 3 batches were at random and examined, the DOS wishes to know the expected number of mistakes and standard deviation made by the secretary.

Task

As a student of mathematics;

Help the Director of Studies clarify on the disparities of marks in the two subjects and the mistakes in order to make an informed decision.

PART II

Item 4

Peter is a very concerned parent, one day, he bought two toy cars, one of mass 1kg and the other of mass 4kg. To his surprise, he found his 5-year-old boy trying to combine the two toys but the strings keep breaking and sometimes the heavier toy would fall on his feet. This always makes the little boy to cry a lot while playing. Peter decided to get for him a rough plane and tried to arrange the set up as follows;

Turn Over

For safety of the child, he placed the 1kg mass toy on a 4m long rough plane which has a coefficient of friction 0.25, a smooth fixed pulley was placed at the edge of the plane, light inextensible string was connected to the 1kg mass and allowed to pass over the pulley and a 4kg mass which hangs freely at 2.5m above the horizontal ground. Since he wanted the boy to enjoy the movement of the toys, he tilted the plane such that the angle of inclination θ with the horizontal is $\sin^{-1}\left(\frac{3}{5}\right)$. And the system is to be released from rest. In order for peter's son not to cry again, the following conditions must be met,

Condition 1:

Acceleration of the system must be less than $7ms^{-2}$

Condition 2:

The tension in the string must not exceed 15N

Condition 3:

The maximum kinetic energy with which the 4kg mass hits the ground must be less than 70J.

Task

As a mathematics student,

Determine whether the setup peter made will stop his son from crying and justify your responses.

Item 5

Pirates always smuggle people's goods in Oceans and seas. Due to that, shipmen and fishermen always try to avoid the paths which they like.

One business man always imports his products from India to Mombasa via Indian Ocean. He uses a global positioning system (GPS) to track the path, speed and position of the ships carrying his goods. One day, when he was checking the progress of his goods, he observed that, at **11:30am** a pirate ship is at a place with position vectors $(-6\vec{i} + 12\vec{j})\ km$ and is moving with velocity vector $(16\vec{i} - 4\vec{j})$ km/h. At 12:00 noon the ship carrying his goods is at a place with position vectors $(12\vec{i} - 15\vec{j})\ km$ and is moving with velocity vector $(8\vec{i} + 16\vec{j})\ km/h$. Both ships' velocities are constant and the business man is worried that the pirate might destroy his goods if they meet. However, he sent a rescue team which must reach their ship before 1pm.

When the rescue team saw the pirates ship, one of the soldiers in the recue ship fired a bullet with velocity of $320ms^{-1}$ at an angle of 30^0 to the horizontal. But the bullet must pass over a vertical cliff in order to hit the right target and the bullet must be shot when the ships are less than 10000m from each other.

Task

As a student of mathematics;

Determine whether the business man's goods will reach Mombasa safely or not. Justify your response.

END