ST MARY'S SENIOR SECONDARY SCHOOL

EXAMINATION BOARD

Uganda Upper Certificate of Education

S.5 APPLIED MATHETHEMATICS EOT II 2025

3 hours 00 minutes

INSTRUCTIONS TO CANDIDATES:

This paper has two sections, SECTION A and SECTION B.

SECTION A is compulsory AND choose ONLY TWO ITEMS from SECTION B.

SECTION (A) compulsory

ITEM 1

An opinion poll was carried out by a group of researchers. These polls were about two candidates A and B in 10 different polling stations

Candidates	Number of votes attained per polling station									
A	67	52	17	90	82	51	83	15	43	111
B	40	45	60	18	34	60	23	73	58	14

The researchers wanted to use this information to present the opinion of the whole district. On a certain polling station, candidate B obtained 53 votes but the team had no time to count those of candidate A.

The information was to be considered valid if the magnitude of spearman's rank correlation coefficient is atmost 0.69.

TASK:

a. As mathematics student, help the team of researchers to determine whether the results were valid or not.
b. Estimate the number of votes candidate A got from a polling station where candidate B got 53 votes.

ITEM 2

A certain district was hit by a certain disease which affected the people in that district as follows:

Age(years)	< 5	<15	<25	<30	<40	<50
Number of patients	01	03	10	05	02	01

The report was to be made from the health facility in order to advise on how to combat the disease.

TASK:

a. Help the team to determine the average age that is likely to be infected by the disease.
b. During the vaccination, the health team started with the oldest patients and by the end of the day, they realized that only a quarter of the patients was vaccinated that day. Help the team to estimate the youngest age that was vaccinated that day.

ITEM 3.

A man is studying the motion of two objects connected by a string. He places a 5kg block on a smooth inclined plane that makes an angle 30^0

with the horizontal. The block is connected to a 3kg mass hanging freely by a light inextensible string that passe over a smooth pulley. When the system is released from rest, the block started moving up the inclined plane and the hanging mass starts moving downwards. The mass hits the ground after 4 seconds.

TASK:

a. Draw a diagram showing all the forces acting on the masses.
b. Find the acceleration of the motion and the tension in the string.
c. Find the speed with which the hanging mass hits the ground.
d. Determine the magnitude and the direction of the reaction force exerted on the string by the pulley.

SECTION B (attempt only two questions from this section)

ITEM 4

During Christmas season, Mr. James decided to visit his village for the festivals. He chose to use his Subaru car where he started his journey by travelling at a speed of 90km/hr. Since he never wanted to be late for the festival, he maintained this speed where he accidentally passed a stationary police car. When the policeman realized that the Subaru car was over speeding, he decided to chase it after 3 seconds it passed him by accelerating his car at $4m/s^2$. On catching him, the policeman tasked Mr. James to pay an over speeding fee of UGX 50,000 and also compensate for his fuel wasted during the run. The officer told him that his police car consumes 2 litres of fuel for every 50 metres covered and that 1 litre of fuel costs UGX 3000.

TASK:

Advise Mr. James on how to determine the total amount of money he has to pay to the police officer.

ITEM 5

Two people were playing a game using two boxes A and B, where A had 5 green balls and 7 red balls, while B had 3 green and 2 red. A first ball was to be picked from A and taken to B before a second ball is picked from B.

TASK:

If success was to be that;

a. **A second ball was green.**
b. **A second ball was red given that the first ball was red.**
   In both cases above, guide an individual on how to win the game.

ITEM 6

In an experiment to study the equilibrium and vertical motion of bodies, Okello fixed a stone of mass 30kg at the lower end of a light inextensible string whose other end he fixed on a ceiling leaving the stone hanging freely in the vertical plane, he then pulled the stone in the direction that is normal to the string which kept the stone equilibrium with the string inclined at 30^0 to the vertical.

He later threw the stone vertically upwards with a velocity of 16m/s from a point, H metres above the ground level. The stone later hit the ground after 4 seconds.

TASK:

a. **Help Okello determine the force he applied that kept the system in equilibrium and the tension in the string.**
b. **Find the value of H and the speed with which the stone hits the ground.**

END

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