BUKEDEA COMPREHENSIVE SCHOOL

MATHEMATICS CLUB B.M.C

(Southern campus)

PRESENTS

S5 Holiday Activities: Transition to S6 2026

INSTRUCTIONS: Respond to all activities and submit for scoring to the office of The Club General Secretary HON KANSANA JACKLINE by Second week of term one 2026

APPLIED MATHEMATICS

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ITEM 1

At a poultry farm that deals in meat production for a chicken, the monthly weight records from the sale of the month of April 2025 chicken. The farmer manager has to order for a change to new feed supplier if the average weight of the month is below 720 grams.

The data is as shown below:

Weight(grams)	700	710	720	730	740	760	770	790	810
Number of chickens sold	4	19	53	77	23	75	53	30	18

TASK: Using your statistical knowledge will the, manager change to a new feed supplier? What the standard deviation of the weights of chicken from the data above.

ITEM 2

Texas shopping malls around the country are experiencing a massive turnout of customers, leading to a critical shortage of enough attendants in the various malls. To address this challenge, the mall's management has planned an innovative solution which includes an allowance paid to the available attendants basing on the number of customers served, the table below shows the distribution of allowance paid to 500 mall attendants in various outlets across the country.

Allowance (Dollars)	0 – 10	10 – 20	20 – 40	40 – 45	45 – 60	60 – 100
Frequency density	0.8	1.0	1.5	4.4	2.8	0.4

TASKS

a) Assist the mall's management in identifying the Standard deviation, the mode and the mean allowance paid to the attendants

b) Create two graphical representations on paper and help mall's management accurately visualize and understand the:

i) Number of attendants who were paid an allowance of at least 50 dollars.

ii) The decile deviation.

iii) Inter quartile range

ITEM 3

In a certain calendar printing factory, the length of each calendar made has been organized into a cumulative frequency distribution as shown below.

Length(cm)	<20	<30	<35	<40	<50	<60
Cumulative frequency	04	20	32	42	48	50

From the market research team, it has been duly determined that the commonest calendar length sold is the one whose length is at least a half the lengths and the production team will produce more of those.

The factory will also produce more calendars of the mean length in the next production plan if the measure of dispersion from this mean length is less than 5.0

TASKS

a) Help the production team to determine the length of a calendar whose length is at least a half of the lengths.

b) Determine the mean length and mathematically suggest whether the factory should produce more calendar of this length or not in the next production plan.

ITEM 4

A certain County was hit by a certain disease which affected the people in that county 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.

TASKS

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 5

A local health clinic is conducting a study on the prevalence of obesity and malnutrition in a community. As part of their assessment, they measured the masses (in kilograms) of 40 individuals randomly selected from the community. The data collected is as follows:

46 52 62 55 61 48 57 46 70 60 54 49 52 47
48 52 60 55 50 53 64 54 54 53 57 58 51
64 56 61 52 58 41 59 57 44 51 58 68 65

The clinic is particularly concerned about identifying mass ranges that might indicate a higher risk of health issues within the community.

TASKS: Help the clinic to:

a) Construct a frequency distribution table with equal class intervals, beginning with the 41-45 kg class and determine mass range that indicates higher risk of health issues.
b) Calculate the standard deviation of the above given information
c) Using an appropriate diagram, determine

i) the number of individuals above 50kg mass.

ii) the middle 40^{th} percentile.

ITEM 6

An opinion poll was carried out by a group of researchers in Bukwo district. These polls were about two candidates, P and Q for member of parliament position in 10 different polling stations

Candidates	Number of votes attained per polling station									
P	67	52	17	90	82	51	83	15	43	111
Q	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 Q obtained 53 votes but the team had no time to count those of candidate P.

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

TASKS

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 P got from a polling station where candidate Q got 53 votes.

ITEM 7

Two consecutive examination sets were done by 10 students and their scores in the two exams were as in the table below.

Students	A	B	C	D	E	F	G	H	I	J
Week 1 Test	60	30	88	71	16	22	47	55	15	60
Week 2 Test	55	40	77	59	25	20	50	50	30	49

The report about the above results was needed where the relationship between the tests was to be established. The results were to be considered valid if the magnitude of Spearman's rank correlation coefficient is greater than 0.90.

Yeramu who missed both tests due to sickness was given week 1 test but not week 2 test, and he was able to score 80%.

TASKS

a) Determine the relationship between the results hence establish whether the examination results were valid or not.

b) Obtain the equation of line of the best fit and use it to estimate the marks Yeramu would have got if he sat for week 2 test

ITEM 8

The department of science at a certain school want to analyses the performance of 10 students in two subjects, mathematics and physics; to identify any potential relationships between theirs cores, the following table shows the marks obtained by these 10 students

student	1	2	3	4	5	6	7	8	9	10
Mathematics	40	90	54	32	80	65	55	48	55	30
Physics	68	40	47	64	55	41	62	76	74	80

TASK

a) Draw a scatter diagram to represent the data above, based on the trend comment on the relationship observed between the student's marks.

b) Draw the line of best fit and use it to estimate the mark a student who scored 60 in mathematics would likely get in physics.

c) Calculate the rank correlation between mathematics and physics, what does this coefficient suggest about the relationship between performance in these subjects?

d) Using your results in (c) above comment at 1% and 5% level of significance.

ITEM 9

Over a period of time, Egessa finds that on a long-distance flight, she flies economy class on 82% of the flights and the rest of the flights, she flies first class. When she flies economy class, the probability that she gets a good night sleep is x. when she flies first class, the probability that she gets a goodnight sleep is 0.9. The probability that Egessa gets a good night sleep on a random flight is 0.285.

Egessa also has two boxes A and B, box A contains 1 red ball, 3 green balls and 1 blue ball. Box B contains 2 red balls, 1 green ball and 2 blue balls. A balanced die

is thrown and if the throw is a six, box A is chosen otherwise box B is chosen. Egessa picked a ball at random from the chosen box.

TASK:

a) Help Egessa to find the value of x.
b) Given on a particular flight, Nancy does not get a good night sleep, find the probability that he is flying economy class.
c) Given that the ball Nancy picked was green, find the probability that the ball came from box A.

ITEM 10

Two people Eli and Sharon 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.

TASKS: 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, help them to obtain the probability of success

ITEM 11

A study was conducted to examine two independent preventive actions A and B
Event A is "a person is vaccinated against new virus"
Event B is "a person wears a mask regularly"
The probability that a person is both vaccinated and wears a mask is twice the probability that a person is only vaccinated.

The probability that a person is either vaccinated or wears a mask is $\frac{71}{75}$

TASKS

a) Explain to someone who does not understand probability symbols the meaning of
   i) $p(A^I \cap B^I)$
   ii) $p(A \cap B^I)$
b) Prove that A^I and B^I are also independent
c) By determining the individual probabilities, A and B state with the reason which action is most likely taken by the people of the area.
d) What percentage of people take only of the preventive actions?

ITEM 12

Okello wants to construct a regular pentagonal film hall ABCDE of sides 4m. he wishes to put the walls under tensional forces to ensure its stability and durability. To do achieve this, four forces of magnitude: 2N, 3N, 5N and 7N have to be applied alongside AB, BC, CD and EB respectively, With AB being the horizontal. He also wants to know the number of bricks he will have to buy in order to have its foundation completed. Okello was told that for a similar foundation on area of $5m^2$ requires 800 bricks to be completed.

TASKS

a) Write each force as vector.
b) Determine the equivalent force Okello would have applied that would do the same work as the four applied forces hence find its direction.
c) Help him to determine the number of bricks required to have his foundation complete.

ITEM 13

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 300 with the horizontal. The block is connected to a 3kg mass hanging freely by a light inextensible string that passes 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.

TASKS

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.

ITEM 14

During 2024 Christmas season, Mr. Carlson 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/h. 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 $4ms^{-2}$. On catching him,

the policeman tasked Mr. Carlson 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.

TASKS

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

ITEM 15

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 300 to the vertical.

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

TASKS

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.

ITEM 16

A logistic manager at a local depot in fort portal needs to move a 200kg box of electronics across a rough concrete floor to a new storage location, the coefficient of static friction between the box and the floor is 0.5. to minimize the effort and prevent damage, a worker will use a light rope attached to the box to pull it, the manager needs to know the minimum tension required in the rope to just get the box moving under two different conditions. The worker pulls the box at angle of 30 above the horizontal The worker pulls the box at an angle of 30 below the horizontal

TASK: Determine the tension in the string in both cases and advise the manager on the most efficient method to use when pulling the box.

For inquiries or suggestions, please contact:

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