A MUST HAVE A'LEVEL MATHEMATICS ITEM BANK

NEW EDITION
2026

$$\int_a^b \frac{1}{(1+x)} = [\ln(1+x)]_a^b$$

$$\sin 2X = 2 \sin X \cos X$$

600 ITEMS INSIDE

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ITEM 1

A group of environmental scientists is developing a model to predict the concentration of a pollutant in a lake over time. The behavior of the pollutant concentration is represented by the function $f(x) = x^2 - 6x + 5$, where x represents time in days after a chemical treatment is applied. The critical condition occurs when the pollutant concentration reaches zero, meaning the treatment has fully neutralized the pollutant. To begin their analysis, the scientists suspect that the root of the function lies between x = 1 and x = 4. They need to confirm whether this interval contains a root and then locate the exact times when the pollutant is fully neutralized by graphing the function

TASK:

Help the scientists:

a) Verify that a root of the equation $f(x) = x^2 - 6x + 5$ lies between x = 1 and x = 4

b) Sketch or graph the function to accurately locate the roots.

(20 Marks)

ITEM 2

A construction company is setting up a simple lifting system to move building materials. The system involves a rope with one end firmly attached to a beam. The rope passes under a movable pulley (used to support a platform of tools), then over a fixed pulley, and is connected to a 5 kg cement bag at its free end. The movable pulley itself has a mass of 2 kg and can move vertically. When the system is released from rest, the company wants to determine how the platform will move.

TASK:

Help the site engineer determine:

a) The tension in the rope during motion.

b) The acceleration of the movable pulley (platform) when the system is released

(20 marks)

ITEM 3

A nursery school teacher wants to understand whether there is a relationship between her pupils' reading and writing abilities. She believes that pupils who perform well in reading may also perform well in writing, but she wants to use data to confirm this before designing a combined reading-writing support program. She records the following scores for seven pupils:

Pupil	A	B	C	D	E	F	G
Reading Score	63	81	73	23	33	41	53
Writing Score	77	69	84	61	58	62	69

Task:

Help the teacher to:

a) Calculate the spearman's rank correlation

b) Understand the relationship between reading and writing

(20 marks)

ITEM 4

A veterinary officer recorded the weights of animals brought to a community clinic over one month. The animals were grouped by weight, and the number in each group was recorded as shown below:

Mass (kg)	21–25	26–30	31–35	36–40	41–50	51–65	66–75
Frequency	10	20	15	10	30	45	5

Task:

Help the veterinary officer to:

(a) Estimate the mass with the highest number of animals graphically.

(b) Determine the mean and 70^{th} Percentile for the above data

(20 marks

ITEM 5

The Geography Department at Elite high School is studying climate change trends in Uganda. As part of their research, they collected temperature data from a rural weather station over a few specific days in July. However, due to limited equipment, some data points were missed.

The recorded average daily temperatures were as follows:

Day (July)	5	10	15	
Temperature (°c)	23.3	25.0	26.5	

The students are required to estimate missing data points and make predictions using linear interpolation and extrapolation, assuming temperature changes steadily over time.

TASKS:

a) Estimate the average temperature on July 8 using linear interpolation between July 5 and July 10.

b) Estimate the average temperature on July 12 using linear interpolation between July 10 and July 15.

c) Predict the average temperature on July 18 using linear extrapolation based on the trend between July 10 and July 15.

(10 marks)

ITEM 6

A civil engineer is designing a water channel with a curved cross-section. The shape of the base of the channel, between x = 0 m and x = 6 m, follows the curve $y = \sqrt{(x^3 + 1)}$, where y is the depth of the channel in meters at position x. To estimate the area of the cross-section, the engineer decides to use the Trapezium Rule with 6 sub intervals. This estimation will help determine how much concrete is needed to line the base of the channel.

TASKS:

a) Use the Trapezium Rule with 6 intervals to estimate the area under the curve $y = \sqrt{(x^3 + 1)}$

from $x = 0$ to $x = 6$.

b) Suggest one way the engineer could improve the accuracy of the estimate.

(10 marks)

ITEM 7

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ITEM 8

A company is developing a new software algorithm to model the behavior of a chemical process. The algorithm uses a function defined by the equation $f(x) = x^2 - 4x + 1$, where x represents the time in hours after the process starts. The team wants to determine the exact

time x when the function output reaches zero, meaning the process reaches a specific target condition. To simplify their search, the engineers suspect the solution lies between x = 0.5 and x = 3.5, They need to confirm this by checking whether the function changes sign within this interval.

TASK:

Help the engineering team

a) verify that the root of the equation $f(x) = x^2 - 4x + 1$ lies between x = 0.5 and x = 3.5

b) To locate the roots of the function on a graph

ITEM 9

A civil engineer is designing a water channel with a curved cross-section. The shape of the base of the channel, between x = 0 m and x = 6 m, follows the curve $y = \sqrt{(x^3 + 1)}$, where y is the depth of the channel in meters at position x. To estimate the area of the cross-section, the engineer decides to use the Trapezium Rule with 6 sub intervals. This estimation will help determine how much concrete is needed to line the base of the channel.

TASKS:

a) Use the Trapezium Rule with 6 intervals to estimate the area under the curve $y = \sqrt{(x^3 + 1)}$ from x = 0 to x = 6.

b) Suggest one way the engineer could improve the accuracy of the estimate.

ITEM 10

A teacher wants to find out if there is a relationship between how students perform in Math and English. She collects test results from 10 children in her class, as shown below:

Child	A	B	C	D	E	F	G	H	I	J
Math Marks	1	8	15	18	23	28	33	39	45	45

English Marks	3	14	8	20	19	17	36	26	14	29

Task:

(a) Using a scatter diagram, help the teacher to understand the relationship between Math and English marks.

(b) Estimate the Math mark of a student who scored 30 marks in English.

(c) Calculate the rank correlation coefficient to measure the relationship between the two subjects and comment on your results

ITEM 11

The Ministry of Health is analyzing data on malaria cases across different districts in Uganda to allocate resources effectively and plan intervention strategies.

Below is the data on monthly malaria cases reported in 12 Health Centers (HC) in northern Uganda.

Health Centre	Monthly Cases
HC1	145
HC2	187
HC3	203
HC4	168
HC5	227
HC6	192
HC7	254
HC8	176
HC9	219
HC10	238
HC11	182
HC12	209

Tasks

a) Organize the data into frequency distribution and represent it on a histogram.

b) Determine;

`The mean number of cases

Median number of cases The coefficient

of variation

c) If resources are allocated proportionally to the number of cases, and the total of UGX 60 million is available, how much will be allocated to each category

ITEM 12

The National Agricultural Research Organization (NARO) is evaluating the performance of a new drought – resistant maize vary across different regions in Uganda. Below is the yield data collected by Agricultural statisticians from 40 farms across the country in tons per hectare.

Yield (tons/ha)	Number of Farms
2.0 – 2.5	3
2.5 – 3.0	7
3.0 – 3.5	12
3.5 – 4.0	10
4.0 – 4.5	5
4.5 – 5.0	3

Tasks

a) Illustrate the data on an Ogive and use it to determine the median yield, the interquartile range and the 90^{th} percentile.

b) The standard maize variety has a mean yield of 3.2 tons/ha with a standard deviation of 0.6 tons/ha. Compare the performance of the new variety with the standard variety using appropriate statistical measures.

c) If farms with yields in the top 20% are selected for seed multiplication, what should be the minimum yield threshold?

ITEM 13

The Human Resource Manager of a cleaning company is in the process of searching for a new staff.

Age (years)	20-	25-	40-	45-	50-	55-

Number of applicants	14	12	7	8	9	0

The Human Resource Manager has failed to interprete the information to be able to make a report to the administrative team of the company.

TASK:

a) Help the Manager to display the data graphically for easy interpretation.

b) From your graph, help the manager identify the modal age of the applicants.

c) By calculation or otherwise, identify the median age of the applicants.

ITEM 14

At a certain school, Eighty S.5 students sat for their End of Term III Mathematics Examinations. However, their performance in the previous End of Term II Mathematics Examinations was no satisfactory. The Headteacher warned that if their results did not show improvement in comparison to Term II, he would call for a Parents-teachers' meeting to discuss the way forward before being promoted to S.6. additionally, the Headteacher, promised to reward students whose pass mark was 75% and above. The performance statistics for End of Term II were as follows.

Average score	60.5
Minimum score	62.5

Below are the students' scores for the End of term II

68, 64, 64, 75, 50, 53, 70, 67, 66, 63, 66, 72, 60, 59, 66, 62, 71, 55, 66, 61, 53, 58, 55, 57, 52, 55, 51, 66, 74, 76, 74, 64, 56, 75, 74, 59, 65, 76, 69, 58, 57, 70, 69, 62, 58, 58, 60, 64, 51, 67, 63, 75, 63, 75, 51, 73, 54, 62, 62, 58, 76, 62, 72, 67, 69, 72, 66, 64, 65, 51, 70, 61, 52, 68, 50, 61, 57, 61, 70, 52.

TASK:

a) Analyze the End of Term III results using equal class widths of starting with a class of 50 to 54. Based on your analysis, provide a recommendation to the headteacher on whether a Parents-teachers' meeting is necessary.

b) Based on graphical analysis, how many students qualify for the Headteachers reward? (06 STUDENTS)

ITEM 15

1. A-Z Photographers Limited specialize in printing and framing High - Quality photographs. The company produced 50 photo frames with a range of Heights (in inches). From the production Manager's records, the number of photo frames produced in a certain month were as follows.

Height (inches)	10-20	20-30	30-35	35-40	40-50	50-60
Number of photo frames	4	20	32	42	48	50

TASK:

a) Help the production manager to represent the above data on a suitable graph and estimate the popular height of the photo frames, correct to the nearest inch. (34 inches)

b) Based on calculations, help the production manager to determine the standard deviation of the heights of the photo frames produced in the month. (9.2919 inches)

ITEM 16

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

The teacher asked the students to determine a single force resulting from the effect of these six forces acting on the block.

In his further demonstration, he played a video that involved a monster truck at the centre of five (5) small cars, each connected to it using a strong cable. The cars pulled apart with forces of 30N, 60N, 100N, 70N and 20N in the directions of 270°, 040°, 120°, 330°, and 225° respectively. The teacher also asked the students to use the system of the above forces to determine a single force with which a monster truck will resultantly move and he direction it'll take.

TASK:

As a student of Mechanics, help students to accomplish the tasks in each of the cases above.

(1ST CASE: 9.2195N, 49.40° & 2ND CASE: 26.6091N, 47.32°)

ITEM 17

Amelia's heavy luggage which is at a point, O, is under the action of four forces 1N, 6N,$2\sqrt{3}$N and 3N acting in the directions given by the bearings 030° 270° 060° and 090° respectively. She wants the luggage to be moved in the bearing 120° at a constant rate provided by the net force of magnitude $2\sqrt{3}N$ but the other four forces couldn't achieve her aim.

TASK:

By writing each of the forces in a vector form, help Amelia achieve her aim by determining the magnitude and direction of the fifth force that can be applied on the luggage.

ITEM 18

In order to improve on the performance of Mathematics, the head of department laid down strategies, which included a test that was administered and the marks were distributed as shown in the table below.

Marks	<20	<26	<35	<45	<55	<60	<68	<80	<95
Cumulative number of learners	0	6	24	66	110	130	154	174	180

Other strategies included:

- A reward from administration to be given to the learner who scores not less than 85 marks -

Remedial lessons to be organized for those who score below average.

Those to get distinctions were limited to only 16 learners.

The performance is inconsistent if the measure of dispersion of all the marks away from the average mark is more than 10 marks.

TASK:

a) Hel the Head of department to determine;

i) The number of leaners who are to be rewarded ii) The number

of learners who are to attend remedial lessons iii) The minimum

mark of a distinction

b) Were the learners consistent in their performance?

ITEM 19

MTN Uganda has been tracking its mobile money subscribers over the past 5 years. The number of active users has been growing exponentially. The company started with 850,000 active users in 2020 and has experienced a constant annual growth rate. You are a data analyst at MTN Uganda tasked with analyzing this growth to help the company plan for future infrastructure needs. In 2023, the number of active users was recorded as 1,309,500.

Tasks:

a) Utilizing the knowledge of logarithms, determine the annual growth rate of MTN mobile money subscribers. Express your answer as a percentage to 1 decimal place.
b) Predict the number of active subscribers MTN Uganda will have in 2025.
c) How many years would it take for the number of subscribers to reach 5 million users?
d) how can exponential growth models can be used by telecommunications companies for planning resource allocation.

ITEM 20

Kiira Motors Corporation, Uganda's vehicle manufacturer, is designing components for their new electric vehicle model. The engineers need to calculate exact dimensions for specific components to ensure proper fitment.

You are an engineering intern at Kiira Motors working on the battery bracket design. The chief engineer has given you measurements for a triangular mounting bracket that involves surds. The diagonal support brace of the bracket needs to be exactly $\sqrt{50}$ cm long. Two sides of the triangular bracket are $(5 + 3\sqrt{2})$ cm and $(7 - 2\sqrt{2})$ cm long.

Tasks:

a) Express the length the bracket diagonal support in the simplified form $a\sqrt{b}$ where a and b are integers and b is not divisible by a perfect square.

b) Establish the exact length of material needed for both sides combined.

c) If the perimeter of the entire triangular bracket must be exactly 25 cm, calculate the length of the third side.

ITEM 21

A farmer in Mbarara has 800 square meters of land for growing beans and maize. Based on local market prices, she makes a profit of UGX 5,000 per square meter of beans and UGX 3,000 per square meter of maize. Due to crop rotation requirements, she must plant at least 200 square meters of beans and at least 300 square meters of maize. The farmer has approached you he needs help of how he can maximize her profits while meeting all the constraints.

Tasks:

a) Help the farmer to represent all the constraints as inequalities including the total profit

b) Determine the maximum possible profit and the corresponding areas of land to be allocated for each crop.

c) If the profit per square meter for maize increases to UGX 4,000, how would this change your recommendation? Show your workings.

ITEM 22

The National Water and Sewerage Corporation (NWSC) is designing a water distribution system for three neighboring communities in Kampala. Each community has different water requirements and infrastructure constraints. A consultant engineer working on this project wants to determine the optimal flow rates for each community.

The water distribution system is modeled by the following equations

$X + 2Y + Z = 2400$ (Total available water supply in liters per minute)

$2X + Y + 3Z = 3900$ (Pressure balancing equation)

$3X + 4Y + 2Z = 5100$ (Flow optimization equation)

Where X, Y and Z represent the flow rate in liters per minute in communities A, B and C respectively

The polynomial equation $P(X) = X^3 - 7X^2 + 14X - 8$ models the operational efficiency of the pumping systems

Tasks

a) Help the engineer to determine the optimal flow for each community

b) If the community A's water requirements increase by 200 liters per minute. What adjustments should be made to other communities' supply to maintain the system balance?

c) Determine all the possible value X where the efficiency of the pumping system is zero

ITEM 23

A small-scale manufacturer in Jinja produces handcrafted furniture. Their workshop makes tables and chairs from locally sourced wood. Each table requires 5 hours of labor and 8 square meters of wood, while each chair requires 3 hours of labor and 2 square meters of wood. The workshop has 60 hours of labor and 72 square meters of wood available per week.

Tasks

a) Obtain all the constraints as inequalities that can help the production manager to determine the optimal production strategy.

b) The profit is UGX 70,000 per table and UGX 25,000 per chair. Model the total weekly profit as a function of the number of table and the number of chairs

c) Illustrate the feasible region defined by the constraints and use if to find the optimal strategy that maximizes the profit.

ITEM 24

The Entebbe Municipal Council is planning to develop a new neighborhood with roads, residential areas, and a community center. The planning department uses a coordinate system where each unit represents 100 meters. An urban planner, needs to design the road network and determine optimal locations for key facilities. Road A is planned to connect points $A(2, 3)$ and $B(8,15)$ and another road B will connect points $C(4, 5)$ and $D(12,9)$.

Tasks

a) Help the urban planner to determine
   i) The length of the road A in kilometers.
   ii) The gradient of the road A and the equation that models the path of the road.

b) Establish whether the two roads A and B intersect, and if so, at what point and the angle between the two roads to the nearest degree.

c) If a community center needs to be located at a point that is equidistant from points A, B, and C. Find the coordinates of this point

ITEM 25

The Uganda National Roads Authority (UNRA) is studying traffic patterns on the Kampala-Jinja highway. They've developed a mathematical model to predict traffic density at different times of the day.

The traffic density function (vehicles per kilometer) at time t hours after 6:00 AM is given by;

$$D(t) = \frac{20t^2 + 30t + 15}{(t+1)(t+3)}$$

Tasks

As a traffic engineer, you need to analyze this model to optimize traffic flow and plan future road expansions.

a) Representing the function as a sum of partial fractions.

b) By partial fraction decomposition determine the time of day when traffic density is at its minimum

ITEM 26

A renewable energy company is installing solar panels on buildings in Tororo district. To maximize energy collection, they need to determine optimal installation angles based on the building's orientation and the sun's position throughout the year. The company engineer needs to know the ideal mounting angles for a solar project at a school. He finds out that the amount

of solar energy collected by the panels is modeled by the function: $E(\theta) = 800\sin\theta - 200\sin 2\theta + 100$ where E is the energy collected in watt-hours per square meter and θ is the angle of the panels from the horizontal in radians and the shadow

length L of a vertical pole of height h at time t hours after noon is given by: $L = h\tan\left(\frac{\pi}{12}t + \frac{\pi}{4}\right)$

Tasks

a) If the school building has a roof with a pitch of 35° facing south. If the optimal angle for solar panels is 15° relative to the roof surface, determine the absolute angle of the panels from the horizontal.

b) Establish the value of θ that maximizes energy collection.

c) At what time will the shadow be equal to the height of the pole?

ITEM 27

In a certain pharmaceutical company a certain product is produced by using a process function which depends on the thickness ,t, of the tablet produced in mm given $f(t) = 3t^2 + 4t + 1$. At a certain instant when $f(t) = 0$, tablets of thickness V and U were produced. However the company started facing a problem of varying the thickness tablets produced due to mechanical problems in the production machine. However the company has no money to import a better machine but after analysis, it has been observed that tablets produced differ from the previous ones by 2mm.

Your father is an process engineer in this company and he is stuck on what to do and has approached you.

Task

As a student of s5 mathematics use mathematical concepts to come up with anew process function that can be used by your father to continue tablet production using the available machine.

ITEM 28

In a certain chemical processing company product X is formed by combining reactants A, B and C according to the reaction equation below. $aA + bB$ +Cc - X, Where a, b, and c are different ratios that vary with time. The company produces product X in shifts morning , evening and nights shifts .The table below shows how different shifts and how they combined reactants A, B and C to produce x on Friday.

Shift	Ratios used			Quantity of X produced in grams
	A	B	C	
Morning	3	-2	-1	5
Evening	1	3	-1	4
Night	2	-1	4	13

Your Aunt is working with the company and would like to know the quantities of each reactants used previous friday and has approached you for assistance.

Task

As a student of mathematics use your mathematical knowledge to help your Aunt to know the amount of A, B and C used on that Friday.

ITEM 29

Kiira Motors Corporation, Uganda's Vehicle Manufacturer is designing components for their new electric vehicle model. The engineers need to calculate the exact dimensions for specific components to ensure proper fitting.

You're an Engineering intern at Kiira Motors working on the bracket design. The chief engineer has given you the measurements for a triangular mounting bracket that involve surds. The diagonal support brace of the bracket needs to be exactly $\sqrt{50}$ cm. Two sides of the triangular bracket are: $(5 + 3\sqrt{2})$ cm and $(7 - 2\sqrt{2})$ cm.

TASKS:

a) Express the length of the bracket diagonal support in the simplified form $\sqrt{b}^{a}$ where a and b are integers and b is not divisible by a perfect square.

b) Establish the exact length of the material for both sides combined.

c) If the perimeter of the entire triangular bracket must be exactly 25cm, calculate the length of the third side.

ITEM 30

MTN Uganda has been tracking its Mobile Money subscribers over the past five (5) years. The number of active users has been growing exponentially. The company started with 850,000 active users in 2020 and has experienced a constant annual growth rate.

You're a data analyst at MTN Uganda tasked with analyzing this growth to help the company plan for future infrastructure needs. In 2023, the number of active users was recorded as 1,309,500.

TASK:

a) Determine the annual growth rate of MTN Mobile Money subscribers. Write your answer as a percentage correct to only two decimal places.

b) Predict the number of active users MTN Uganda will have in 2025.

c) How many years would it take for the number of subscribers to reach 5 million? Correct your answer to the nearest year.

d) How can the exponential growth model be used by telecommunication companies for planning resource allocation?

ITEM 31

A biologist is studying the relationship between the population of two bacterial species X and Y, in a controlled environment. The population of this bacteria, denoted as x and y follows the logarithmic relationships

1. The growth rate equation for species X

$$\log_4(6 - X) = \log_2 X$$

2. The interaction equation between species X and Y: $\log_{10} X - \log_{10} Y =$

$\log_{10} 25$and $\log_{10} X + \log_{10} Y = 1$

The biologist wants to determine the population values x and y that satisfy these equations

TASK:

Help the biologist to get the value of x and y by forming simultaneous equations

ITEM 32

As a senior five student, your Mathematics teacher chose you that you'll present the concept of completing squares to S.3 students on His behalf since He won't be around next week, that day.
TASK:

a) In Essay format, write down the steps followed when completing squares, exactly the way you're to explain to S.3 students.

b) Generate one equation and solve it for the students to understand what you'll have talked about in a) above.

ITEM 33:

Bajjo Events is selling tickets for "PALLASO LIVE IN CONCERT". The price, P per ticket (in thousand shillings) and the number of tickets, x sold by Bajjo Events is modelled by the equation;

$$\boldsymbol{P = -0.1x^2 + 100x + 50}$$

Bajjo wants to accumulate a lot of money that would sustain him before staging another concert. However, He doesn't know at what price He should sell his tickets to accomplish his plan.

TASK:

Help Bajjo to determine at what price He should sell His tickets. And how much will He generate?

ITEM 34

Jason is a casual laborer at Community Cattle Ranch in Lyantonde. A week before the community dips cattle into Plunge dip tank, he has to be closely observing the levels of acaricides in the plunge dip tanks.

The depth of the water in the plunge dip tank is modelled by the equation;

$\boldsymbol{H = 13 + \sqrt{3}\cos\left(\frac{\pi t}{6}\right) - \sin\left(\frac{\pi t}{6}\right)}$ for $0 \leq t \leq 24$ where t is the time in hours measured since Midday

TASK

Help Jason to determine the:

a) the time of day to switch off the tap and the depth level of acaricide at that time
b) Times when the depth of the water in the tank is 12 metres.

ITEM 35

Racheal is a Nuclear reactor operator in Koeberg Nuclear plant. She always monitors the pressure levels in the reactor vessel and containment building of a plant, to ease her work, she modelled an equation that relates the pressure,P with time t given as;

$$P = 20 + 5cos(\frac{4\pi t}{25}) - 12sin(\frac{4\pi t}{25}) \; for \; 0 \leq t < 12$$ where t is the time taken in hours measured from Mid night.

The reactor vessel is always turned on at midnight such that it generates sufficient pressure that would be used for the rest of the day in the containment building. However, she has to always power off the reactor vessel just before it bursts due to much pressure generated.

TASK:

a) Help Racheal to find the time when she's supposed to be switching off the Reactor Vessel daily. And at what pressure will it always be?

b) At what time(s) of the day will the pressure be 15 Units of pressure?

ITEM 36

Mosh passes through Kampala as he goes to Kalagala for work every day.

At time, t hours past 7:00AM, the distance, $x\ km$ of Mosh from Kampala to Kalagala is expressed as: $x = 4sint - 6\cos^2(\frac{t}{2}) + 1$.

It's well known that; one (1) degree is; $\frac{\pi}{180}$radians.

TASK:

Help Mosh determine the time when He's;

a. In Kampala
b. Two (02) km after Kampala
c. 4km behind Kampala distance

ITEM 37

Upon his arrival at work in Quatar, Bbosa plans to save for 60 months in order to raise enough funds to purchase a small house back in Uganda worth UGX 56M.

He wishes to start by saving $300 in Jan, 2026 and each two successive weeks thereafter, to save extra;

Plan A: $15

Plan B: $25, compared to the previous two weeks.

Given that his annual work salary will be $25,000, and he's to work in Quatar for only 60 months starting from 1st Jan, 2025, and his expected expenditure is as follows:

Item	Status	Cost
Food	Monthly	$70
Water	Monthly	$40
Mobile token	Monthly	$35
Rent	Monthly	$130
Return Air ticket	one time	$900

Task:

Help Bbosa to determine;

a. How much he'll have saved by the end of August, 2027 using;

i. Plan A

ii. Plan B

b) How much will be his expenditure throughout his stay in Quatar.

c) The best saving plan to go for. And why?

Assume: 1$=UGX. 3500

ITEM 38

Wedding halls in Mbarara town are designed in such a way that the ground floor accommodates 90 seats, first floor accommodates 115 seats, second floor accommodates 140 seats and so on. A groom invited 4050 people to his wedding. The chairperson of the party has three potential halls to hire as follows;

- ✓ A 9 - storey hall.
- ✓ A 10 - storey hall.
- ✓ A 13 - storey hall.

As per the wedding chairperson's plan, two people are to occupy one seat during the function.

Task:

Help the chairperson to determine;

a) The storey hall to go for if the hall chosen has to be fully occupied.
b) Number of seats in the;
    i. Fifth floor
    ii. Seventh floor
    iii. Ninth floor
c) How many more seats will be required if every two invited attendees come with their one uninvited friend.

ITEM 39

On 1st birthday, Trebo was given UGX. 50,000 as a present by his godmother Maria. For every birthday ever since, Cleo gave Trebo UGX. 16,000 more than how much he gave him on his previous birthday.

TASK:

Help Trebo and his Mom to determine;

a. how much his son will receive from his godmother on his;
    i. 9th
    ii. 12th
    iii. 23rd iv. 17th birthday
b. what his birthday will be if Trebo receives UGX.7.448M from godmother.

ITEM 40

A new Gym opened, and during its first trading month, 26 people joined its membership.

A business forecast for the Gym membership is drafted for the next twelve months.

TASK:

Help the group chairperson to predict the number of people that will;

a) join in the twelfth month,
b) have joined during the first twelve months, if extra 15 members join Gym's membership every month.

The business plan foresees that in order for the business to succeed in long term, it needs a total membership of 1500 during its first twelve months.

c) What extra number of members should join monthly to have the target accomplished?

ITEM 41:

At Fort Lugard Museum, one of its buildings has a sloping shape with the roof tiles arranged neatly in horizontal rows.

There are 28 roof tiles in the top row and each row below the top row has an extra 4 tiles than the row above it. The bottom row has 184 tiles.

TASK:

Help the Architectural tourist to know the number of tiles on the;

a) 13th row from the top
b) 16th row from the bottom
c) 9th row from the top
d) 21st row from the bottom
e) On the roof of the building.

ITEM 42

Mr. Jk shared his Maths online resource to His three unique WhatsApp contacts at 1PM. After an hour, each of the three WhatsApp contacts shared the same resource to other three unique contacts. Then at 3PM, each of the contacts shared it with three other unique contacts, and so on.

TASK:

Help Mr. Jk to determine how many contacts received the resource by;

a) 06PM
b) 11PM
c) 08PM
d) 03PM

ITEM 43

Isiah's parents want to invest in a University fund for Him. On his 1st birthday, they would like to invest UGX. 200,000 and the Fund program promises them a 9% growth on it every year. Parents will invest the same amount every year through his 25th birthday.

TASK:

Help Isiah's parents to predict how much they'll in the program on Isiah's; a) 19th,

b) 12th,
c) 23rd,
d) 08th,
e) 25th birthday

ITEM 44

Shivan is a fresh graduate from university. In a search for job, she ran into two job adverts whose jobs had the following information;

Job A

- Starting monthly salary: UGX. 850,000

- Effective working year: 1st Jan, 2025

- Salary increase annually: 6%

Job B

- Starting Annual salary: UGX. 9,000,000

- Effective working year: 1st Jan, 2025

- salary increase annually: 7%

Her plan is to be with atleast UGX. 57,000,000 in her bank account by the end of 2030 since she will be saving all the money from the job she'll take.

TASK

Help Shivan to

a) predict the amount of money she's like to have earned by the end of; i. 2027,
ii. 2032, in each of the above jobs if taken.
b) choose the job she should apply for. And why?

ITEM 45

Joseph drops a ball from a point 100 metres above the ground. The ball rebounds to 80% of each of the heights its falling from.

Task

As a Mathematician, help Joseph to predict;

a) how high his ball will rebound in the;

i) 5th rebound
ii) 7th rebound
iii) 17th rebound
iv) 31st rebound

b) The total distance travelled by the ball in

i. 20
ii. 4
iii. 5,
iv. 06, rebounds vertically

ITEM 46

In a chemistry experiment, a teacher prepares a solution whose concentration is modelled as $\frac{6x+4}{(x^2-4)(x+2)}$ where x is the number of test tubes used. To determine how each component affects the concentration, the fraction must be broken down as separate fractions.

Task

Simplify the task for the chemistry teacher

ITEM 47

An alternating current (A.C) circuit has an impedance $Z = \frac{(2+3i)^2(1-i)^3}{1-5i}$ and a current $= \frac{2i}{3+4i}$. Engineers are required to obtain the voltage V across the circuit using Ohm's law, $V = IZ$, and the magnitude of this voltage. The current size supplied has to be increased if the voltage size is less than 10.

Task

Finish the task, and find out whether the current supplied should be increased.

ITEM 48

A community council is organizing a function at the ssaza playground. The playground has dimensions $(12 + 5i)$ metres by $9 - \sqrt{19}i$ metres. They are planning to use tents which they are hire from a private organization. Each tent occupies an area of $13m^2$, and the company charges

shs 15,000 per tent per day. However, the council is not sure about how many tents are to be used and the total expenditure on the tents.

Task

Help the community council to determine the

(a) Total area of the playground to be used (b) Number of tents needed for the function (c) Total expenditure on the tents to be used.

ITEM 49

Your brother is planning to construct a children's playground from his triangular piece of land. The two sides of the land are 100 metres and 150 metres long, and the angle they include is 60°. He is to use a wire mesh to design the playground but he does not know the actual length of the wire mesh needed.

Task

Help your brother know the actual length of the wire mesh needed, by clearly applying your trigonometrical knowledge.

ITEM 50

You have participated in an annual math contest in which all schools within your district have to take part by sending a single representative per school. In the group stages, each participant randomly chooses three questions to answer from the box, selecting a question after the other. Qualified candidates move to the semi-finals, and at this stage, all competitors answer two similar questions. The best two qualify for the final round which declares the winner of the contest.

Task

(a) Suppose you qualified for the semi-finals, through picking and answering the questions below

Given $\cos 2A - \cos 2B = -p$ and $\sin 2A - \sin 2B = q$.

i) Prove that $\sec(A + B) = \frac{1}{q}\sqrt{p^2 + q^2}$

ii) Prove that in any triangle $\frac{b^2-c^2}{a^2} = \frac{\sin(B-C)}{\sin(B+C)}$

iii) Show that $\tan(\frac{\pi}{4} + \theta) - \tan\left(\frac{\pi}{4} - \theta\right) = 2\tan 2\theta$. Write your responses.

b) You were given the two questions below at the semi finals

"The equation $3x^2 - 7x - 1 = 0$ has roots α and β. Find the values of $(\alpha - \beta)^2$ and $(\alpha^{-4} + \beta^{-4})$. Hence form a quadratic equation whose roots are $(\alpha - \beta)^2$ and $\alpha^{-4} + \beta^{-4}$.

Suppose you still qualified for the finals, write your responses.

c) You emerged the winner of the competitions after correctly responding to the question below. Write your responses.

Prove the identity $\cos^2 x + \sin^2 x = 1 - \frac{3}{4}\sin^2 2x$

ITEM 51

In a school hall, chairs are arranged in rows. The first row has 10 chairs, the second row has 12, the third has 14 and so on. The class teacher needs to know the number of chairs in the 50th row, and the total number of chairs in the 50 rows but it may be tedious to physically count them and has assigned this duty to you.

Task

Using mathematical evidence, help the class teacher out of the challenge.

ITEM 52

Alice, a farmer in Mbale district is planning to plant sorghum in parallel lines. The first proposed line is to pass through the earth coordinates (10, 50) and (30, 10), while the second line is to pass through the earth coordinates (15, 60) and (25, 40). However, she is not sure whether these lines are actually parallel to each other. To ensure access to sunlight a reasonable distance between these lines is needed. The minimum distance needed between them is 100cm, but Alice does not know if the given coordinates do not meet this requirement. Task

Help Alice find

a) The equations of the first and second lines. Convince Alice that these lines are surely parallel to each other.
b) Whether Alice should increase the distance between these lines.

ITEM 63

A textile manufacturing company has just bought a new technological system that produces curtains. The system was set to produce only the number of curtains (repeated) in the first and second run in a single command to ensure uniform production. The system operator commanded the machine to produce blue and black curtains and the system displayed an operation in form of an equation $\frac{x^2-x+1}{x-1} = k$ where x represents the number of blue curtains and k represents the number of black curtains. The system operator wants to know the number of blue and black curtains that would be produced following the command.

Task

Help the system operator know how many blue and black curtains that are most likely to be produced by the command.

ITEM 64

Miriam accidentally left the tap not properly closed at 8:00am. She has found out that water has been leaking since then. It is known that if the tap starts leaking, loses 1 litre, 1.5 litres and 2 litres of water in the first, second and third minutes respectively and so on. She wants to know the total volume of water lost by 11:00am when she realizes this. However, she does not have the mathematical knowledge to finish this task quickly.

Task

Help Miriam to know the total volume of water lost by the tap.

ITEM 65

The area of Kigezi is infested with tsetse flies and the government is planning to send drones to take aerial photographs in the area, since it is not safe to use vehicles. The drones take clear photographs if the argument of the flight path remains within 0° and 160° inclusive.
Two drones are sent and take different flight paths represented by the expressions:

Drone 1; $\boldsymbol{Z_1 = 4 + 4i}$.

Drone 2; $\boldsymbol{Z_2 = -3 + 3\sqrt{3}i}$

The control panel wants to know the modulus and argument of each path for the drones, and to ensure whether drones will take clear photographs.

Task

Help the panel members complete the task.

ITEM 66

In a school hall, chairs are arranged in rows. The first row has 10 chairs, the second row has 12, the third has 14 and so on. The class teacher needs to know the number of chairs in the 50^{th} row, and the total number of chairs in the 50 rows but it may be tedious to physically count them and has assigned this duty to you.

Task

Using mathematical evidence, help the class teacher out of the challenge.

ITEM 67

There has been a terrorism threat in DRC in the recent months. To curb this problem, the United states government has deployed two teams of soldiers; the Infantry and the Air force. The Infantry has been divided into two groups. One group is situated at an earth coordinate given simultaneously as; $\boldsymbol{log}\ \log_2 x + 2\log_4 y = 4$, $\log_{10}(x + y) = 1$. The second group is situated at coordinates given by $\log_{25} 4x^2 = \log_5(3 - x^2)$ $\boldsymbol{and}$ $\log_4(6 - y) = \log_2 y$.

At exactly 8:00PM, the Airforce noticed the terrorists are at a distance $-7\left[\frac{(\sqrt{5}-2)^2-(\sqrt{5}+2)^2}{8\sqrt{5}}\right]$kilometers away from the main town, Goma. The Airforce is planning to attack them if they confirm terrorists are more than 5km away from the main town but have not yet confirmed.

Task

a) Calculate the coordinates for the location of each of the groups.

b) How far are the two groups apart?

c) Based on calculations, show whether or not it is safe for the Airforce to attack the terrorists given the stated conditions.

ITEM 68

Moses has a rectangular cardboard of dimensions $(4x - 4)$cm by $(3x - 3)$cm. This cardboard has an area of 1200cm2. He wants to design a circular photo frame out of it. This frame is aimed to pass through the points $A(0,10)$, $B(30, -20)$ and $C(30,40)$ labelled on the cardboard. He has been advised to reduce the radius of the photo frame if its radius is greater than 30cm. However, he has no mathematical knowledge to enable him make the decision.

Task

Help Moses to find the

(a) Dimensions of the rectangular cardboard.

(b) Equation of the circular photo frame. Advise Moses on whether he should reduce the radius of the photo frame or not.

ITEM 69

Kwagala sells photographs at art fairs with small, medium and large sizes. She sells 3 more small photos than twice the difference between large from medium photos. It is also noted that when she sells 2 times small photos and 3 times medium photos, their sum is equal to 11 minus the

number of large photos. She knows that small photos cost $10, medium $30 and large $40. She wants to determine how many of each size to sell to cover her booth rental cost of $150.

Additionally, she monitors her stock by the equation $y = \frac{(x+1)}{(x^2+3)}$, then considers the discriminant of a suitable quadratic equation to determine the range of possible values of y which would give real stock value of x.

Task

Help Kwagala determine;

a) How many of each size he should sell to cover her booth rental cost.
b) The range of possible values of y which would give real stock value of x.

ITEM 70

Mutebi a boda-boda rider in Kampala wants to buy land that is expected to be worth shs2 million at the end of the year 2025. He has decided to start saving shs2,000 on day 1, increasing the amount by shs 500 every day. However, he is not sure whether he will be ready to buy this land by the end of 160 days. He wants to tighten his spending on food by this time, he will not be able to fulfil his goal.

Task

Help Mutebi find

a) Whether his savings will be ready by the stated time.
b) Number of days needed to raise shs 12 million.

ITEM 71

A treasure map uses a coordinate grid to help adventures locate hidden treasures in Kassanda district. The grid is labelled with coordinates (x, y) where each point represents a specific location. Two equations are used for safety of the treasures but the travelers have no knowledge of how to identify the coordinates. These equations are $5^{x+2} + 7^{y+1} = 3468$ and $\mathbf{7^y = 5^x - 76}$.

Task

Help them to identify the location.

ITEM 72

Your class teacher loses her phone after being stolen by thugs while coming to school. He decides to go to police so that the phone can be tracked using GPS coordinates. The phone's location at

different times is recorded and the police are trying to find its movement pattern. The tracking device uses a logical operation given simultaneously as $2^X + 3^y = 5$ and $2^{x+3} - 3^{y+2} = 23$. When they got so close to the phone, they could not tell the coordinates to locate the phone with ease. The coordinates are in meters and one point gives the position of those with the tracking device, the other point gives the position of those with the phone.

Task

(a) Help them find the coordinates.

(b) How far is the phone from the police tracking it?

ITEM 73

A robot arm moves such that the positions of its ends are described by $\boldsymbol{x = 7 + \sqrt{3}\cos\theta}$ and $\boldsymbol{y = 5 + 7\sin\theta}$ where θ is the rotational angle. The robot operator needs to determine the largest reflex angle of rotation of the robot arm if it is known that $\boldsymbol{x + y = 13}$

Task

(a) Show that $\boldsymbol{49x^2 + 3y^2 = 686x + 30y - 2329}$.

(b) Help the robot operator get the required rotational angle.

ITEM 74

A pharmaceutical company produces tablets for treating a contagious disease. The company tracks expenses using the function $\boldsymbol{E = \frac{\sin 8x\cos x - \sin 6x\cos 3x}{\cos 2x\cos x - \sin 3x\sin 4x}}$. It also tracks profits using the function $\boldsymbol{P = \tan 2x}$. They are adopting a better production technology when the expenses(E) are equal to the company profits(P).

Task

Basing on mathematical evidence, find out whether the company should adopt the new production technology.

ITEM 75

The number of items (y) produced by a company are modelled by the equations $\boldsymbol{y = 8\sin 2x - 5\cos 2x}$ where x represents number of production inputs needed for the company to maximize production.

Task

Help the company manager find out the smallest number of inputs(x) needed for the company to maximize production.

ITEM 76

A technology company is designing a satellite communication tower. The strength of the signal S received at a distance d from the tow is given by $S = \frac{p}{d^2}$, where P is the signal power emitted by the tower. Due to environmental regulations, the company is required t o reduce power usage over time. They decided to reduce the signal power P exponentially over time such that $P = 100e^{-0.2t}$

To the tower a dish of curvature x meters has to be designed and installed and the cost of designing the dish is $\boldsymbol{C = x^2 - 12x + 32}$. To optimize the cost, engineers seek the values of x for which the cos t equals 21 dollars.

Task

a) Calculate the signal strength S at a fixed distanced 5 meters after 3 years.
b) Determine the time, t correct to 2 decimal places when the signal strength will be 1 unit at the same fixed distance in (a).
c) Solve for the possible values of x to determine the curvature of dishes designed. Which dish should be selected and why.

ITEM 77

Few months ago, your sister gave birth to a baby boy. As a result, the family Vs expenditure kept on increasing for the first three days.

Day 1: The family spent shs 11000 to buy a kg of sugar, 4 jerry cans of water and 2 packets of soap.

Day 2: The family spent shs l3500 to buy a kg of sugar, 6 jerry cans of water and 3 packets of soap.

Day 3: The family spent shs l2000 to buy a kg of sugar, 6 jerry cans of water and 2 packets of soap.

Currently their son is months old and his age satisfies the equation $\boldsymbol{\log_y 5 + 4 \log_5 y = 4}$, The husband is twice as old as the wife and the sum of their ages is 72.

Task

Determine the:

a) Unit price for each of the items that were bought.
b) Age of the son.
c) Age of the wife and the husband.

ITEM 78

Charles one of the poultry farmers in Mpondwe has been rearing local birds over years. He has a gate of which if a person wants to enter his poultry farm should first integrate $\frac{1}{(2x^2+3x+2)}$ by first using the knowledge of partial fractions before he/she is allowed to enter his farm.

At one of his poultry houses, there is a ladder leaning against a vertical wall. The ladder is 10 meters long and makes an angle with the horizontal ground, angle 16 with the vertical wall The foot of the ladder is 6 meters from the base of the wall. He needs to the height of the wall, the angle the makes with the horizontal. He is also not sure whether. $\sin^2\beta + \cos^2\beta = 1$ holds on this kind of set up.

Task

a) As a S5 student of Mid Valley solve the problem so as you ca n be allowed to the enter Charles' poultry farm.
b) Help Charles to determine the angle the ladder makes with the horizontal.
c) Verify whether the relation $\sin^2\beta + \cos^2\beta = 1$ holds or not.

ITEM 79

Your friend practices agriculture on piece of land with area of $3375m^2$ The land is of dimensions $\mathbf{3 \times 5^{x+1}}$ by $\mathbf{9 \times 5^{2x-1}}$. He al so has a wire of length 1 00m that he intends to cut into two p arts. He is to use each of the parts to fence two square water reservoirs at different points in his garden respectively. The total area of two water reservoirs is $325m^2$. He needs to know the actual dimensions of the land and length of the wires he will use to fence each of the water reservoirs.

Task

Help your friend to determine;

a) Actual dimensions of his land he uses for agriculture.
b) Length of the wires he will use to fence each of his water reservoirs.

ITEM 80

Akello is preparing for the new school term and plans to visit a bookshop to buy:

3 books, 6 pens and 1 mathematical set

She has saved up 10,000 shillings for this shopping trip.

Before going, she consulted three of her friends who had recently bought school materials from the same bookshop. They shared their purchase details as follows:

- Joan bought 1 book, 1 pen, and 1 set and paid 5,500 shillings.
- Mary bought 3 books, 2 pens, and 2 sets and paid 13,000 shillings.
- Tom bought 5 books, 4 pens, and 2 sets and paid 18,000 shillings.

Akello wants to go to the same bookshop but isn't sure if her 10,000 shillings will be enough.

Task:

Conclude whether her budget of is enough for the 3 books, 6 pens, and 1 set

ITEM 81

In a research project conducted by the National Agricultural Research Institute, scientists are studying whether there's a relationship between soil fertility scores and crop yield on various farm plots.

Soil fertility is measured on a scale of 0 to 100, and crop yield is measured in kilograms per hectare. A total of 12 sample plots were tested. The team believes that higher soil fertility should result in higher yields, but wants statistical proof. They will take a conclusion if the correlation of the results is moderate or above.

Unfortunately, 2 of the plots had incomplete data due to equipment malfunction:
Plot 4 is missing a crop yield reading, and Plot 9 is missing a soil fertility score.

Plot no.	1	2	3	4	5	6	7	8	9	10	11	12
Soil fertility	75	60	85	90	55	70	68	88		62	80	66
Crop yield	78	58	92		54	74	72	90	70	60	85	69

TASK.

Help the scientist

(a) find the missing values for sample from plot 4 and 9

(b) Can the institute reasonably conclude that higher soil fertility leads to higher yield?

ITEM 83

In the village of Harmony Hill, community leaders are preparing for a major cultural festival by forming a youth choir. A total of 5 boys and 7 girls have expressed interest in joining. However, due to space and budget constraints, the choir can only include 6 members.

To promote fair gender representation, the organizers are considering two possible selection options:
(a)A choir made up of exactly 3 boys and 3 girls, or (b) choir with at least 4 girls (c) a choir with at most 2 boys.The problem is they are unsure how many different ways each option can be formed. To make the selection process easier and more organized, they have decided to go with the option that has the fewest possible combinations, in order to avoid confusion and potential conflict.

Task:
Help the organizers by:

- Calculating the number of possible ways, the choir can be formed under each option.
- Determining which option should be selected based on the least number of combinations.

ITEM 84.

At the start of the school term, a Physical Education (P.E) teacher decided to record the weights of 50 students in Senior Three as part of the school health monitoring program. If the average weight turns out to be below 40 kg, the school administration plans to add eggs to the students' breakfast menu to help improve their nutrition. The teacher also wants to know the most common weight among the students. Additionally, if the common weight is above 51kgs, the teacher needs to find out how many students are above this common weight so that they can be put on morning jogging aimed at maintaining healthy body mass.
The weights (in kilograms) were grouped as follows:

Age	30 − 39	40 − 49	50 − 59	60 − 69	70 − 79
No. of patients	8	12	15	10	5

Task:
help the teacher:

(a) find out if they need to introduce eggs on breakfast menu.

(b) if they need to put some students on morning jogging, if yes how many?

ITEM 85.

A local community in a rural area has a large water storage tank that supplies water to households through two distribution pipes. The rate at which water flows out of the tank through these pipes depends on how full the tank is. After conducting measurements, the engineers model the rate of water flow, R(x), with respect to time using a rational function:

$$R(x) = \frac{5x + 3}{(x + 3)(x - 3)^2}$$

Where R(x) is the rate of water flow (in litres per minute) and x is the number of hours after the start of the day.

The engineers must first decompose it into partial fractions before they determine the volume of the tank.

TASK

By expressing the function as partial fractions, help the engineers to:

Simplify the integration process by expressing it into partial fraction.

ITEM 86

Mr. Mukasa and family organized a field tour to western Uganda, they hired a caravan for the long journey, they towed a caravan of mass 1000kg on the car of mass 800kg by means of coupling (light rigid tow bar).

On a straight level road, the car exerted a driving force of 1270N and if the resistances to the forward motion of the car and caravan was 400N and 600N respectively.

At some point Mr. Mukasa encountered a hill while travelling at 40km/hr inclined at $\sin^{-1}(\frac{1}{1000})$ and plans to overcome it in 2minutes when the driving force and resistances remain constant.

Task

Help Mr. Mukasa to determine his acceleration on the level road and distance covered on the inclined road(hill).

ITEM 87

ABC pharmacy has just opened a branch in Mitooma Town.

It wants to transport syrups in cubical containers packed in a large box.
The designing team has a rectangular material of dimensions; $\boldsymbol{80cm \times 50cm}$. Equal sides of; $\boldsymbol{x\ cm}$ are to be removed from each corner and the edges turned up to make a box of volume, $\boldsymbol{V\ cm^3}$.

They need your help since they want to transport as many syrups in a so formed box as possible.

TASK:

a) Show that; $\boldsymbol{V = 4x^3 - 260x^2 + 4000x}$

b) What should be the value of; $\boldsymbol{x}$ if their plan is to be fulfilled?

c) What will be the capacity of the box so formed? It's known that they want to transport 2,250 syrup cubical containers.

d) Of what dimensions should each cubical container be?

ITEM 88

Mukwano company has planned to design premium Hemispherical plates of radius, $\boldsymbol{r}$ and volume, $\boldsymbol{V}$.
A worker in production team has made a $\boldsymbol{6\%}$ error in the volume of each plate manufactured for a full week.
Each day, the company produces 160 plates, and for each plate errored, it costs a company UGX. 16,000 of the error made in the surface area of the same plate, to modify it.
The team has approached you for help.

TASK:
Help the designing team to;

e) Know the percentage error made in the surface area of each plate.

f) Know how much the company must incur to modify the errored plates.

ITEM 89

During class discussion, Muteesi has been tasked to approximate the value of; $\boldsymbol{sin30.\ 2^0}$ using small changes. She has been given a hint that; $\boldsymbol{\sin 30^\circ = \frac{1}{2}}$ by the teacher. She,

however, needs your help to finish the task.

TASK:

Help Muteesi to;

a) Generate a small change in the output of; $sin30.\ 2°$

b) determine the value of; $sin30.\ 2°$. Hence, show that; $\sin 30.2 = \frac{\sqrt{3}}{1800}(\pi + 300\sqrt{3})$

ITEM 90

The profit made, $\boldsymbol{y}$ (in ten thousands of UGX) with $\boldsymbol{x}$ (in hundreds of kg) sales by a local retail shop in a day in Mukono town is given by; $\boldsymbol{y = mx - x^2 - 8}$ where $\boldsymbol{m}$ is a constant.

On a random day, it makes a maximum profit of; UGX. 170,000.

TASK:

i) Find the value of; $\boldsymbol{m}$

j) What are total sales of the shop if it's to realize maximum profits?

k) How many kilograms are sold for a shop to break even?

Write your answers to the nearest kg.

ITEM 91

A fixed point, O lies on a straight road along which a car races.

A racing car moves on the road such that at a time, t hours, $\boldsymbol{t \geq 0}$, after passing through O, the velocity of the car, $\boldsymbol{V\ kmhr^{-1}}$ is modelled as;

$$\boldsymbol{v(t) = \frac{1}{20}(t^3 - 8t^2 + 15t}$$

The driver starts racing at 08:00AM TASK:

Help the car driver to;

a) Determine the times of the day when He's at instantaneous rest

b) Find the magnitude of acceleration when $\boldsymbol{t = 1hr}$

c) 0btain the maximum speed he can race in the interval; $\boldsymbol{0 \leq t \leq 3}$. And at what time of the day is it always?

ITEM 92

ABC pharmacy has just opened a branch in Mitooma Town.

It wants to transport syrups in cubical containers packed in a large box. The designing team has a rectangular material of dimensions; $\boldsymbol{80cm \times 50cm}$. Equal sides of; $\boldsymbol{x\ cm}$ are to be removed from each corner and the edges turned up to make a box of volume, $\boldsymbol{V\ cm^3}$. They need your help since they want to transport as many syrups in a soformed box as possible.

TASK:

a) Show that; $\boldsymbol{V = 4x^3 - 260x^2 + 4000x}$

b) What should be the value of; $\boldsymbol{x}$ if their plan is to be fulfilled?

c) What will be the capacity of the box so formed?

It's known that they want to transport 2,250 syrup cubical containers.

d) Of what dimensions should each cubical container be?

ITEM 93

Mukwano company has planned to design premium Hemispherical plates of radius, $\boldsymbol{r}$ and volume, $\boldsymbol{V}$. A worker in production team has made a $\boldsymbol{6\%}$ error in the volume of each plate manufactured for a full week. Each day, the company produces 160 plates, and for each plate errored, it costs a company UGX. 16,000 of the error made in the surface area of the same plate, to modify it. The team has approached you for help.

TASK:

Help the designing team to;

e) Know the percentage error made in the surface area of each plate.

f) Know how much the company must incur to modify the errored plates.

ITEM 94

During class discussion, Muteesi has been tasked to approximate the value of; $\boldsymbol{sin30.\ 2^0}$ using small changes. She has been given a hint that; $\boldsymbol{sin30^0 = \frac{1}{2}}$ by the teacher. She, however, needs your help to finish the task.

TASK:

Help Muteesi to;

g) Generate a small change in the output of; $\boldsymbol{sin30.\ 2^0}$

h) determine the value of; $\boldsymbol{sin30.\ 2^0}$. Hence, show that;

$$sin30.\,2^0 \cong \frac{\sqrt{3}}{1800}\left(\pi + 300\sqrt{3}\right)$$

ITEM 95

The profit made, y (in ten thousands of UGX) with x (in hundreds of kg) sales by a local retail shop in a day in Mukono town is given by; $y = mx - x^2 - 8$ where m is a constant. On a random day, it makes a maximum profit of; UGX. 170,000.

TASK:

i) Find the value of m
ii) What are total sales of the shop if it's to realize maximum profits?
iii) How many kilograms are sold for a shop to break even? Write your answers to the nearest kg.

ITEM 96

A fixed point, O lies on a straight road along which a car races.
A racing car moves on the road such that at a time, t hours, $t \geq 0$, after passing through O, the velocity of the car, $V\ kmhr^{-1}$ is modelled as;

$$V(t) = \frac{1}{20}(t^3 - 8t^2 + 15t)$$

The driver starts racing at 08:00AM TASK:

Help the car driver to;

i) Determine the times of the day when He's at instantaneous rest
j) Find the magnitude of acceleration when $t = 1hr$
k) Obtain the maximum speed he can race in the interval; $0 \leq t \leq 3$. And at what time of the day is it always?

ITEM 97

The National Water and Sewerage Corporation (NWSC) is designing a water distribution system for three neighboring communities in Mitooma district. Each community has different water requirements and infrastructure constraints. A consultant engineer working on this project wants to determine the optimal flow rates for each community.

The water distribution system is modelled by the following equations;

$\boldsymbol{x + 2y + z = 2400}$ (Total available water supply in litres per minute)

$\boldsymbol{2x + y + 3z = 3900}$ (Pressure balancing Equation)

$\boldsymbol{3x + 4y + 2z = 5100}$ (Flow optimization Equation)

Where x, y and z represent the flow rates in litres per minute in communities A, B and C. The polynomial equation; $\boldsymbol{P(x) = x^3 - 7x^2 + 14x - 8}$ models the operational efficiency of the pumping systems to be used.

TASKS:

a) Help the Engineer to determine the optimal flow for each community.

b) If the community A's water requirements increase by 200 litres per minute, what adjustments should be made to other communities to maintain the system balance?

c) Determine all the possible values of "$\boldsymbol{x}$" where the efficiency of the pumping system is zero

ITEM 98

The Entebbe Municipal Council is planning to develop a new neighborhood with roads, residential areas and community center. The planning department uses a coordinate system where each unit represents 100 metres. An urban planner needs to design road network and determine the optimal locations for key facilities. Road A is planned to connect points P(2,3) and R(8,5) and another road B will connect points S(4,5) and N(12,9) TASKS:

a) Help the planner to determine;

i. The length of the road A in kilometers

ii. How steep road A is and the linear equation that models the path of the road.

b) Establish whether the two roads A and B intersect, and if so, at what point, and the angle between the two roads? (Correct your angle to 1 decimal place)

c) If a community center needs to be located at a point that is equidistant from points A, B and C, find the co-ordinates of this point.

ITEM 99

The Uganda National Roads Authority (UNRA) is studying traffic patterns on the KampalaJinja highway. They've developed a mathematical model to predict traffic density at different times of the day.

The traffic density function (Number of vehicles per kilometer) at time t hours after 6:00AM is given by:

$$D(t) = \frac{20t^2 + 30t + 15}{(t^2 + 1)(t + 3)}$$

TASKS:

As a traffic Engineer, you need to analyze this model to optimize traffic flow and plan for future road extensions.

a) Represent the function as a sum of partial fractions.

b) By partial fraction decomposition, determine the time of the day when the traffic intensity is at its minimum.

ITEM 100

A renewable Energy Company is installing solar panels on buildings in Budduda district. To maximize energy collection, they need to determine optimal installation angles based on the building's orientation and the sun's position through the year. The company engineer needs to know the ideal mounting angles for solar project at school.

He finds out that the amount of solar energy collected by the panels is modelled by the function;

$E(\theta) = 800sin\theta - 200sin2\theta + 100$ where E is the energy collected in Watts-hours per square metre and θ is the angle of the panels from the horizontal in radians and the shadow length L of a vertical pole of height, h at time, t hours afternoon is given by; $L = h\tan(\frac{\pi}{12t} + \frac{\pi}{4}$

TASKS:

a) If the school building has a roof with a pitch of 35° facing south, and the optimal angle for solar panel is 15° relative to the roof surface, determine the absolute angle of the panels from the horizontal.

b) Establish the maximum Energy that can be collected, and at what value of θ?

c) At what time will the shadow be equal to the height of the pole?

ITEM 101

A bus heading to Masaka passes through Mpigi town. At time, t hours, past noon, the distance of the bus from Mpigi to Masaka is modelled by the equation; $\boldsymbol{x = 7sint - 4\cos^2 t + 2}$. It's known that 1 degree $=\frac{\pi}{180}$ rad.

TASK: Help:

a) The manager knows when the bus was in Mpigi. (Give your answer to 2 dps)

b) Identify the time when the bus will be behind Mpigi by a distance of 5Km.

Ans (a) 0.25 hours, b) 0.8481 hours before noon)

ITEM 102

The chairperson of ward B who is suffering from blood pressure is given a sleeping pill. This has caused an initial level of 4mg of a drug per litre of his blood. After hours, the number of mg per litre in the blood is N, where $\boldsymbol{N = 4(0.76)^t}$.

TASK:

a) Help the doctor to estimate the number of mg per litre after four (4) hours. (Correct your answer to one (1) d.p)

b) The doctor also wants to know how long it'll take the amount of the drug per litre of blood to reduce to half its initial value?

c) If the mg per litre of blood increases to thrice the initial amount, the patient has to be put on drip, advise the doctor, after how long can this happen?

Ans (a) 1.3 mg per litre, b) After 2.5257 hours, c) After 4.0033 hours)

ITEM 103

John has applied for a job in a construction company and He has been selected among those to sit for interviews. Among the areas to be considered, is how good one's knowledge of trigonometry is. John has tried the task below and failed.

Given that; $\boldsymbol{tan\theta + sin\theta = x \text{ and } tan\theta - sin\theta = y}$, then; $\boldsymbol{(x^2 - y^2)^2 = 16xy}$.

TASK:

As a student who has done trigonometry, help John prepare for interview.

ITEM 104

Mr. Jookun is a farmer and his son has joined A' level this year offering Mathematics, Economics and Geography. The Mathematics teacher gave homework and whoever doesn't present the work with correct solution will be given a punishment next day,

and the farmer's son is not good at all health-wise. Mr. Jookun is so much worried and has contacted you to help his son solve the task below.

a) If $\log_5 x = n$ and $\log_{15} x = m$ then, prove that: $\frac{n+m}{n-m} = \log_3 75$

b) Without using calculators, find the value of: $\frac{\log 0.8 - \log 32 + \log 8}{\log 0.7 + \log 7 - \log 49}$ give that

$\log 2 = 0.30310$

ITEM 105

The Director of EXODUS COLLEGE SCHOOL wants to procure school uniform for New students at the beginning of the Year but students' heights are still the issue. He has directed his Uniform Master to carry out an investigation to get the right picture about the student's height. 20 students whose average height is 160cm with standard deviation of 4cm and 30 girls whose average height is 155 cm with standard deviation of 3.5 cm were selected.

TASK:

As a student with knowledge of statistics, help the uniform master come up with the combined mean and standard deviation for the whole group of 50 students so that the master can advise the Director on students' heights before ordering for Uniforms of new students.

Ans (Combined mean=157 cm and Combined SD=4.4441cm)

ITEM 106

The numbers of male and female candidates admitted at a certain university in a certain year to offer different courses A,B,C,D,E,F,G,H,I and J were as follows:

Course	A	B	C	D	E	F	G	H	I	J
Male	66	54	60	70	62	46	74	58	80	58

Female	50	38	54	68	60	32	62	46	70	49

Given the dean of students of this university has been asked to present the data showing the relationship of the male students (x) and female(y) and comment on the nature relationship of his report to the ministry of gender under Girl child education empowerment.

a) Use a scatter diagram to help the dean of students show the relationship.
b) Given that a new course that has been set up with a survey conduct among the current students where only 40 males showed interest, estimate using line of best fit to find the possible number of girls to nearest whole number who would be interested

c) Determine the:
   i) Spearman's rank correlation co-efficient
   ii) Comment on the correlation obtained above

ITEM 107

In certain school beginning of term exams results for end of term were recorded as shown in the table below by the class teacher showing the average of each student in all subjects and they were to be depended on to determine whether the modal average mark is less than 50 they should have external facilitators to boost performance

Average marks	Number of students
Below 10	6
10 and under 25	11
25 and under 35	17
35 and under 45	28
45 and under 50	20
50 and under 65	15

65 and under 80	3

Task;

a) Determine whether the school should have external help to boast learners' performance using an histogram
b) Estimate the Average mark
c) Standard Deviation

ITEM 108

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	4	20	32	42	48	50

From market research team, it has been duly determined that the commonest calendar length sold is the one with a median length. And the production team will produce more of these.

Task:

Using a cumulative frequency curve help the production team determine the:

a) median length they have to produce for the next output units.
b) 80^{th} Percentile length
c) Interquatile range

ITEM 109

A teacher at Exodus College School wants to investigate if there's a relationship between the average number of hours students spend studying per week and their score on a recent math test. Data for 7 students is collected:

Study Hours/Week (x)	Test Score (y)
5	65

8	75
2	50
10	85
4	60
12	90
6	72

Tasks:

a) Help the teacher to represent this data on a scatter diagram.
b) Visually, draw a line of best fit through the points on your scatter diagram.
c) Estimate the number of weeks for a student who scored 55
d) Calculate the rank correlation coefficient

ITEM 110

A treasure map uses a coordinate grid to help adventures locate hidden treasures in Mubende District. The grid is labelled with coordinates (x,y), where each point represents a specific location. Two equations are used for safety of the treasures but the travellers have no knowledge of how to identify the coordinates. The equations are;

$5^{x+2} + 7^{y+1} = 3468$ and $7^{y} = 5^{x} - 76$

Task

Help them identify the location

ITEM 111

A health food company is creating a new herbal drink that requires an exact measurement of a rare extract. The amount of extract needed for one bottle is - $7\left(\frac{(\sqrt{5}-2)^2-(\sqrt{5}+2)^2}{8\sqrt{5}}\right)$***milliliters***. To ensure precision in production, the machine can only handle rational numbers. The company wants to produce 50 bottles.

Task

Help the company to find the total amount of extract needed.

ITEM 112

A cinema sells snacks in Combo deals;

Combo A includes 1 tin of popcorn, 1 drink and 1 chocolate bar all at a total cost of UGX.26,250.

Combo B includes 2 tins of popcorn, 1 drink and 2 chocolate bars all at a

total cost of UGX.43,750.

ZCombo C includes 1tin of popcorn and 2 drinks all at a total cost of UGX.28,000. Your friend wants to buy 3 tins of popcorn, 2 drinks and 1 chocolate bar for both of you but not sure of how much to pay for all of them.

Task

Use your knowledge of mathematics to save your friend from being cheated.

ITEM 113

During your first term holiday in senior five you decide to visit your uncle in the village having taken long not seeing him. He wishes to plant trees around his plot of land whose length is 2 metres longer than its width. The total area of the plot is 35 square metres according to the land tittle .He plans to use a spacing of 1m from each tree that but doesn't know how much money he will spend on buying the trees .

Hint; Each tree costs UGx 2,500

Task

Help your uncle to determine the total amount of money needed to be spent on buying trees.

ITEM 114

Your class teacher looses her phone after being stolen by thugs while coming to school. She decides to go police so that the phone can be tracked using GPS coordinates. The phone's location at different times is recorded and the police are

trying to find its movement pattern. The tracking device uses a logical operation given simultaneously as;

$\log_2 x + 2\log_4 y = 4$ and xy = 16 when they got so close to the phone but couldn't tell the coordinates to locate the phone with ease. The coordinates are in metres and one point gives the position of those with the tracking device, the other point gives the position of the phone.

Task

(a) Help them find the coordinates.

(b) What is the distance between the two points?

ITEM 115

Mr Otim plans to put pavers in the diagonal path of his rectangular flower garden that measures $(5+\sqrt{5})$ m by $\sqrt{3}$ m. He consults an engineer who tells him that the whole path requires 1,000 pavers which makes Otim doubtful thinking that the engineer wants to cheat him. Mr Otim contacts you to come and help him clear his doubt by at least finding the number of pavers per metre.

Task

Help Mr. Otim to clear his doubt even though he asks you to only use a calculator at the last step of the solution since he targets to avoid errors as much as possible and wants the number of pavers rounded to the nearest whole number

ITEM 116

Toyota Motors Uganda limited have started a plant to manufacture electric vehicle models. The Engineers need to calculate exact dimensions for specific components to ensure proper fitment. The chief Engineer has given you measurements for a triangular mounting bracket for battery bracket design which involves surds. The diagonal support brace of the bracket

needs to be exactly$(7\sqrt{50} + 3\sqrt{98} - 5\sqrt{72})$ long.

Two sides of the triangular bracket are $\boldsymbol{a}$ = $(\mathbf{6} + \mathbf{3}\sqrt{\mathbf{5}})\boldsymbol{cn}$ and b = $(9 - 2\sqrt{5})cm$ long while the third side is $d$cm long.

The Engineer was told that you are a good mathematician with deep understanding of surds, logarithms and indices. He wishes to solve for the unknown variable, x in different mathematical equation models developed as shown below to produce more fitments.

Model one: $\sqrt{\boldsymbol{x+5}} + \sqrt{\boldsymbol{x+21}} = \sqrt{\boldsymbol{6x+40}}$

Model two: $\mathbf{2^{2(x+1)} - 5(2^x) + 1 = 0}$

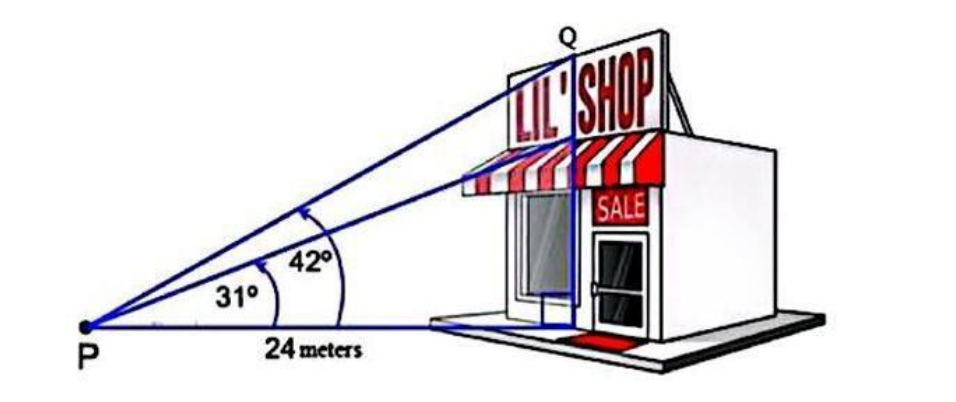
Model three: $\mathbf{\log_3 x + 6\log_x 3 = 5}$ Task:

Help the Engineer:

a) Express the diagonal support length in the form $\alpha\sqrt{2}$Hence, state the value α
b) Find the length of the third side of the triangular bracket, d if the perimeter of the entire triangular bracket is 25 cm and Hence find the value of $\frac{\boldsymbol{a}}{\boldsymbol{b}} + \frac{\boldsymbol{a}}{\boldsymbol{c}}$ in simplified form.
c) Solve for x in each of the three models to make more fits for the best electronic vehicles.

ITEM 117

Simon bought a new shop and wants to order a new sign post for the roof of the building and wanted to know its height. From point P, he finds the angle of elevation of the roof, from ground level, to be 31° and the angle of elevation of the top of the sign post to be 42°. Point P is 24 meters from the building. The design would look as that shown in the diagram below.



Simon was told by the neighbors that the best angle, θ of elevation from P of the top of the sign post could best be determined by solving the equation: 14 tan 2θ + 2 = 16$sec\theta$. Hint: 0° ≤ θ ≤ 360° Task:

Use the understanding you have acquired in trigonometry to help Simon:

a) Know the height of the sign post to be made.
b) Solve for the possible values of θ and suggest if they can provide the best elevation for the desired height of at least 16meters of the sign post.

ITEM 118

A health practitioner wants to study about the growth of certain bacteria and find out how their numbers vary with time. A colony of bacteria is grown in a dish starting from 3:00AM in the laboratory and it is found that their population doubles each hour that passes. He managed to get the machine that counts their numbers at 9:00AM, when he realized that at that time, the population was one million.

TASK:

Help the health practitioner to determine the;

c) Population of the bacterial at:

i) Start of the Growth

ii) 12:00 noon

iii) 11:30 AM

iv) 7:00 PM

iv) 8:15 AM

d) Time at which the population was:

i) 32,000,000

ii) About 353553

ITEM 119

On his return from Japan, Moses came with a special and a beautiful design of a rectangular foundation of a building know as "Golden design" using a special ratio known as "Golden ratio"

The "Golden ratio" = perimeter divided by twice the length and is to cover it with smaller golden rectangular tiles each of width; $\frac{\sqrt{12}}{4}$ metres.

He wishes to design his rectangular foundation of width 24m using this design

He never got the ratio, but he was given a sample golden rectangle of dimensions; $\frac{1+\sqrt{5}}{2}$ metres by 1.0 metres to calculate the ratio.

TASK:

As an Architect, help Moses to determine the;

a. Golden ratio in its simplest form
b. Exact length of:
    i. The foundation,
    ii. Each tile, in its simplest form
c. Number of tiles to be used to cover the foundation

ITEM 120

A wheel chair ramp is to be constructed on a strayed building. Mr. Gashu, the owner of the building wishes that the outer view of one side of the ramp is a right-angled triangle of base; x metres, height, y metres and area $84m^2$ and of angle of inclination θ for safety.

TASK:

Help Mr. Gashu to;

a) Prove that; if $x = 18(\sec\theta + \tan\theta \ and \ y = \frac{28}{3}(\sec\theta - \tan\theta$, then the area required for the side view of the ramp will be achieved.

b) Determine the base and height of the triangular side view; if $x + y = 31$.

c) Determine the length and angle of inclination of the ramp

ITEM 121

Imagine being a worker in a company determining workers payments by multiplying $2 on the cube of the total number of hours worked per worker. One day, each of the workers Alex, Becky and Charles were paid $32, $256 and $108 respectively. The finance manager then called you to

simply make him know the exact number of hours corresponding to the total payments which was given to the three workers that day.

Task:

With evidence, respond to the general manager's questions.

ITEM 122

A deadly virus attacked a certain country. The initial number of male and female people infected is 14 and 35 respectively. However, this initial number of sick people is thought to be increasing at a rate 30% and 69% per week. As the minister of health was addressing a live presentation on the YouTube social media handle, one individual asked through the comment section "What will be the probability of finding a woman contracted by the virus over thousand patients?" Task.

Kindly response to the question in the comment section.

ITEM 123

"Abbo lost her phone after being stolen by thugs on Her Way Home. She decided to go to police so that Her phone can be tracked using GPS co-ordinates. The phone's location at different times is recorded and the police was trying to find its movement pattern. The tracking device uses the logical operating system that uses simultaneous equations given by;"

$3^{2x-3y} = 243$ and $\log_y x = 2$

When they got close to the phone, they could not tell the co-ordinates to easily locate the phone. The co-ordinates are in metres and one point gives the position of those with the tracking device while the other point gives the location of the phone.

TASK

Help the police to;

a) Determine the co-ordinates of where they were and the stolen phone
b) Know how far they were from the stolen phone.

ITEM 124

Joan is a daughter to University Mathematics Lecturer, Dr. Ben. Joan was sent from school to pick school fees. On reaching Home, her mom informed that Her dad went for a business trip to Dubai. They thus had to WhatsApp call Her dad and see how to resolve the school fees issue. Due to the fact that Her dad is a good Mathematician, He told Joan that before He travelled, he put Her remaining school fees balance on the House's Grid satisfied by the following Equations;

$\mathbf{8}^{(x+y)} = \frac{\mathbf{512}}{\mathbf{4}^{(x+1)}}$ and $\mathbf{27}^{(x-1)} = \mathbf{3}^{3y} \times \mathbf{243}$

TASK:

Help Joan to locate Her school fees.

ITEM 125

Joram is a zoo Keeper at Entebbe Zoo. On a random day, He woke up and found that one of the lions in the zoo had died. However, he tried to closely look at the lion, and it seemed to have died that day. He had to contact officials from the Uganda National Wildlife Conservation Authority (UNWCA). After two months, the manager of UNWCA came with his team to the zoo and they weighed the dead lion before relocating it for Post-Mortem and its mass was 108kg.

At the Headquarters of UNWCA, the Wildlife Medical doctor had gone for a vacation in Dubai so they had to wait for him for further 3 months. When the Wildlife Medical doctor returned at the Headquarters, He had to obtain the mass of the dead elephant as part of the Post-mortem and the dead lion weighed 52 kg. However, Joram wanted to know the mass of the lion before it died from the medical team at the Headquarters but all they could send him was the above information.

TASK:

a) Help the zoo Keeper to determine the mass of the lion before it died for proper record keeping.
b) What would be the mass of the dead lion if the Medical Examiner would have stayed on vacation for further;
c) After how many weeks was the dead lion weighing 42.7kg?

ITEM 126

In Northern region of Uganda, a population Analyst; David Mwenda, has been closely analyzing the patterns of village's population growth since 2019. At the start of his analysis, the region's population was 2,000,000 people. After 3 years, it had increased to 6,750,000 people. The government had promised the people of Mashe village to construct for them three Health Centre IV's once the population reaches 34,171,875 people. However, to easily analyze the population growth statistics, Mwenda intend to develop a model that simply represents the population growth but he couldn't.

TASK:

a) Help David Mwenda to come up with the population growth Model-Equation.
b) Determine the population of Mashe Village after;
   (i) 4 years
   (ii) 5 years
c) Determine the year in which the region is likely to get three Health Centre IV's as promised by the Government.

ITEM 127

Upon their return from the church service on Sabbath day, Jonah, Britah, and Rhodah passed by the shopping mall to purchase the school requirements i.e; books, pens and reams of paper since the next day was the reporting day at their school.

Jonah purchased three books, three pens and three reams of paper and paid UGX.54600, Britah purchased four books, six pens and a ream of paper and paid UGX. 40,200 AND Rhoda purchased five books, five pens and one more ream of paper than those purchased by Jonah and paid UGX. 84,000.

On their way home, they passed by the classmate's home, showed her what they had purchased from the mall and she picked the interest of also purchasing scholastic materials. she intends to purchase seven books and 4 reams of papers only and she is to use a bodaboda to and fro and she she is to be charged UGX 4,000 from home to mall

TASK

Help Martha to know how much she's supposed to be having in her pockets for her plan to go through.

a) Form mathematical statements representing the given information.

b) Basing on the mathematical calculations, help the village Chairperson to know the exact total number of tickets of Each type on a particular day.

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(KASUMBA ASHIRAF)

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