

MENGO SENIOR SCHOOL

S.1 MATHEMATICS TOPICAL QUESTIONS 2025

NUMBER BASES

1. Peter and Rita were asked to find the base of k in $11111_{\text{two}} + 24_k = 50_{\text{nine}}$ and Peter said the answer is base three while Rita said the answer is base five, of the two who is right? And why?
2. Mugisha received 1870 sweets in packs of nine and her father asked her to share those sweets amongst 40 children.
 - a) how many sweets did each get?
 - b) how many packs of can be obtained from each one's share?

WORKING WITH INTEGERS

1. Three buses leave a station at the same 8:20 AM. Bus A returns every 8 minutes, Bus B returns every 12 minutes, and Bus C returns every 15 minutes. Isaac noted that Bus A makes UGX 150,000 per trip, Bus B makes UGX 185,000 per trip and Bus C makes UGX 170,000 per trip

Tasks:

- a. After how many minutes will all three buses be back at the station together for the second time?
 - b. How many trips would each bus have made by this time?
 - c. Determine the total amount of money made by the three buses by this time.
2. Mr. Opio a father of 3 boys and 4 girls. he has two plots of land 7948square miles and 6723square miles which should be equally shared without leaving any portion amongst girls only and boys only, you are requested as a mathematician to use the divisibility test idea to find out which land is for boys? and which one for girls? And why?
 3. Mr. Kelly planted Beans, Maize, Rice and G. nuts in a certain season. On harvest he has 1700kg, 2400kg, 2700kg and 1300kg respectively. Mr. John has less ideals on packaging of items so he has been directed to you as a packaging manager, you are required to

organize the packaging of these commodities so that they are transferred to a warehouse in the city.

Task:

- a). Determine the maximum capacity of the packaging bag you will recommend so that equal amounts of each are packed.
 - b). How many bags of each commodity will be obtained?
 - c). Suppose @bag costs 1500/= for every commodity, find the total amount of money obtained.
4. A Senior One classroom has been without tiles for the last two years, causing students to struggle with dust in the class. The school engineer is now tasked with tiling the classroom floor, which measures **540 cm by 420 cm**, using square tiles of length x cm. The challenge is to find the length of largest size of square tiles that can fit the classroom floor without needing to cut any tiles. Additionally, the engineer needs help determining the number of tiles required and the total cost for purchasing the tiles. It is known that each tile of size x cm costs shillings five thousand two hundred fifty.

Task: Help the school engineer by calculating the largest size (x cm) of the square tiles that can be used, the number of tiles needed to cover the entire floor, and the total cost to purchase the tiles

FRACTIONS, PERCENTAGES AND DECIMALS

1. John eats $\frac{3}{10}$ of the sweets in a packet and Joy eats $\frac{4}{7}$ of the remaining sweets. Determine the:
 - a) fraction of the sweets that has been eaten.
 - b) fraction of the sweets that has been left.
 - c) With evidence, who ate the biggest number of sweets.
2. Allan gave 0.3666.... of his sweets to Jesca. He gave **two-fifth** of the remaining sweets to John and he was left with nineteen sweets.
 - a. Express the number of sweets given to Jesca as a fraction
 - b. How many sweets did Allan have altogether?

- c. Express the number of sweets received by John as a percentage.
- d. Express the number of sweets that remained as a decimal number.
3. Ben and Adam spend their Saturdays cleaning cars. They agree that Adam will have 60% of the money they earn and that Ben will have the rest.
- (a) What fraction of the money will Ben have?
- (b) How much will each have if they earn UGX200,000?
- (c) How much will each have if they earn UGX 350,000? Express Ben's share as a decimal of the earned money.
4. There are 200 children in a school hall, eating lunch. Of these children, 64 have chosen chicken, $\frac{27}{50}$ have chosen Beef, 0.6 Of the remainder have chosen fish and the rest have chosen beans.
- (a) What fraction of the children have chosen chicken and beans?
- (b) What percentage of children have chosen chicken and fish?
- (c) Express the number of children who have chosen chicken, fish and beans as a percentage of the whole. Are they more than those who have chosen beef?
5. Max scored 6 marks more than what he did in the previous exam in which he scored 30. Maria scored 69 marks but she scored 60 in the previous exam. Who showed less improvement?

RECTANGULAR CARTESIAN COORDINATES IN 2-D

1. John wants to fence his home however when he consulted a structural planner, he gave him the following coordinates as corners for his compound: (-3,1), (-3, -2), (3, -2) and (2,1). John has to know the perimeter of his home by plotting the given points.

Tasks:

- i. Plot the given points and identify the figure formed.
- ii. Help John to determine the perimeter of his home.

- A quadrilateral has vertices A(-10, 0), B(-10, 25), C(15, 25) and D(25,-10). Plot the points of the quadrilateral and identify it. Use a scale of 2cm to represent 10 units on both axes
- Represent the following data on a scatter graph

Age (years)	1	3	5	7	8	10	14
Value of the car (Euros)	150	125	106	85	73	64	60

- What is the relationship between the value of the car and its age?
- Use a scatter graph to determine the relationship between the sales of ice cream and the temperature of the day.

Temperature ($^{\circ}\text{C}$)	12	14	17	18	20	24	25	26
Ice-cream sales (\$)	100	135	200	350	440	480	520	580

- Represent the following data on a cartesian plan

Revision time (Hours)	0.5	1	2	3	5	6	8.5	2.5	7
Test score (%)	20	38	33	65	68	77	90	45	80

What is the relationship between the revision time and test scores?

CONSTRUCTION

- John wants his sitting room to have three corners with angles in the ratio 2:3:7 and one side measuring 7m. Help John to come up with an accurately clear diagram of the floor of his sitting room and hence give a special name to the shape of the sitting room.
- A stubborn bull is tethered on a rope in the center a triangular field of grass which is surrounded by maize, cassava and beans. Given that the field measures **11m** by **9.5m** by **8.5m**. He doesn't want the goat to eat any of the maize outside the garden. He wants to know the length of the rope of the triangular so that the goat does not eat the maize outside the garden.

Task: Determine the length of the rope that should be used to tether the goat.

3. Alvin, part of the Mengo 130-year celebrations committee, needs to maximize space in the Kazibwe arena by arranging chairs in a quadrilateral shape with **100m and 80m sides** and a **60-degree angle between adjacent sides**. The shape has **two equal opposite sides and two equal adjacent angles**.

Task:

- a. Help Alvin create an accurate diagram representing this layout.
- b. Help Alvin to determine the length of a diagonal red-carpet walkway that he needs for convenient guest movement during the ceremony.

PATTERNS AND SEQUENCES

1. Write down the first 6 multiples of 8 and the formula for the n^{th} term of the sequence .
2. What is the n^{th} term of the sequence 1, 4, 9, 16 . . . ?
3. The school canteen manager has noticed a consistent pattern in student attendance at the beginning of every term. Specifically, the number of students increases by 10 each day, starting with 200 students on the first day of June. The school manager wants to develop a mathematical formula to calculate the number of students on any given day, use it to calculate the total number of students by the end of June, and determine which day (n^{th} day) the student population will reach 900. This information will help the manager stock up on supplies accordingly.

TASK: Help the school manager develop a mathematical formula, calculate student by end of June and determine the specific day (n^{th} day) when the student population will reach 900

4. John summarized **the number of guests that were invited on each day** for the school's 130 years, celebrations in the table below.

Day	1	2	3	4
Number of guests invited	1	3	5	7

TASKS:

- a). Write down the number of guests that will be invited for the next four days following the above pattern in the table.
- b). With a reason, identify the type of sequence formed by number of guests invited per day.
- c). Determine the general formula for the number of guests that will be invited on any given day and use it to draw a number machine that puts out the above sequence.
- d). How many guests will be invited on the 13th and 15th day.

BEARINGS

1. A plane flew from Entebbe international airport to Jomo Kenyatta international airport, which lies 800 km away and East of Entebbe international Airport. It then continued to Dar-es-Salaam Airport, South East of Jomo Kenyatta International Airport, 1000 km away.
 - a. Draw a sketch to show the route of the plane.
 - b. Using a scale of 1 cm to represent 100 km, find the:
 - i. Bearing of Dar-es-Salaam from Entebbe.
 - ii. Shortest distance between Dar-es-Salaam and Entebbe.
2. A farmer is scheduled to attend a Farmers' workshop at the City Conference Hall and has been provided with a sketch map showing the directions from his home. According to the map, he will first travel 120 km due east to reach the Petro Station. From there, he will travel 110 km on a bearing of 210° to reach the nearest church, which is close to the Hall. Finally, he will continue travelling 160 km due west to arrive at the City Conference Hall. However, the map also indicates a shortcut from his home directly to the City Hall, and the farmer is interested in taking this route to save time and transportation costs.

Task: Help the farmer estimate the distance of the shortest route and the location of the City Conference Hall from his home.
3. A tourist group in Uganda is visiting three sites, A, B, and C, by helicopter. They began their journey at point S, traveling 300 km on a bearing of 315° to reach site A. Afterward, they changed course to a bearing of 250° , flying 350 km to site B. From site B, they flew directly south for 400 km to site C. Unfortunately, one of the tourists fell ill at site C, and they now need to return to the starting point, S, as quickly as possible for medical attention.

The group seeks help to find a shorter, direct route from site C back to the starting point S, optimizing their flight path for a faster return.

TASK: Help the tourist determine the bearing and distance on the direct route they should take to reach the starting point from site C in the shortest time possible.

4. A fisherman on island A in L.Victoria sailed on a motorboat from 6:00 p.m. to 7:15 pm at a speed of 40 km per hour to island B due South of A. Unable to catch fish, he left island B at 8:00 pm and sailed to island C on a bearing of 120° at a speed of 50 km per hour and arrived at 9:30 pm. After catching fish, he left island C at 11:00 pm and sailed 50 km North-Eastwards to island D, where he sells the fish.
 - A. Find the distance and bearing the fisherman should take from island D to go back to island A.
 - B. If he sailed back at midnight using the shortest route to island A at a speed of 40 km per hour, find the time at which he arrived.

GENERAL AND ANGLE PROPERTIES OF GEOMETRICAL FIGURES

1. The interior angle sum of a regular polygon is 18000 . How many sides has the polygon? Name the polygon.
2. Find the size of each exterior angle of a regular octagon.
3. If the vertices of a regular hexagon are joined to the centre of the hexagon, what is the size of each of the six angles at the centre? Use your answer to construct a regular hexagon ABCDEF of side 3cm. Start with a circle of radius 3cm. Measure the length of the diagonal AC

DATA COLLECTION AND REPRESENTATION

REFLECTION

1. Find the image of triangle PQR with A (-5, 3), B (-3, 1) and C (-5,-2) after a reflection along the line $x = 2$
2. Find the image of the gure with points (-2,1),(-2,6),(-6,6),(-6,4),(-4,4),(-4,1) after a reflection along the line $y = x$
3. Find the image of triangle ABC with A (2, 3), B (3, 5) and C (4, 4) after a reflection along the line $y = x$

4. Draw the triangle with corners at the points with coordinates P(1, 3), Q(1, 8) and R(6, 8).
 Reflect this triangle in the following lines:
 (a) $x = 0$ (b) $y = 0$ (c) $y = x$ (d) $y = x + 12$.
5. Draw the triangle that has corners at the points with coordinates Q(1, 1), R(4, 7) and S(2, 5). Reflect the triangle in the lines:
 (i). $x = 8$ (ii) $x = 1$ (iii) $y = 2$ (iv) $y = 4$

EQUATIONS OF LINES

- Plot the points with coordinates: (0, 0), (1, 3), (3, 9) and (5, 15).
 (b) Draw a straight line through these points
 (c) Write down the coordinates of two other points on this line.
 (d) Write down the equation of the line drawn
- Plot the points with coordinates: (2, 6), (3, 5), (4, 4) and (7, 1). Draw a straight line through them.
 (b). On the same set of axes, plot the points with coordinates (0, 1), (1, 2), (3, 4) and (5, 6) and draw a straight line through them.
 (c) What is the relationship between the two lines
- Plot the points with coordinates: (1, 1), (2, 2), (4, 4) and (5, 5) and draw a straight line through them.
 (b) Write down the coordinates of two other points on the line.
 (c) Describe the relationship between the x- and y-coordinates.
- Draw the graph of $y = 2x + 3$ for: $-4 \leq x \leq 4$. Use the graph to determine the value of y when x is 6.
- Determine the coordinates of the point where the lines $y = x + 3$ and $y = 7x$ cross.

ALGEBRA 1

- Remove the brackets and simplify the following expressions:
 (a) $2(3x + 2)$ (b) $-4(3 + x)$ (c) $-5(a - b)$
- Simplify the expression:
 i. $3(4x - 2) + 8(2x + 3)$ ii. $4(2x + 6) - 2(3x + 3)$
- A number is added to 10, and then 6 is subtracted to get 40. What is the number?

4. The teacher asked Joy how old she is. Joy replied that if you double her age, add 14 and then divide by 3, you will get 12. How old is she?
5. Alexandra is given her pocket money. She puts half in the bank and then spends UGX 30000 in one shop and UGX50,000 in another shop. She goes home with UGX 2400. How much pocket money was she given?
6. A bus leaves Uganda to Kenya with its maximum number of passengers from the bus station. At the first stop, half of the passengers get off. At the next stop 8 people get on and at the next stop 18 people get off. There are now 24 people on the bus. How many passengers were on the bus when it left the bus station?
7. The sum of the ages of 5 children born at intervals of 3 years each is 50 years. Find the age of the youngest child.

BUSINESS ARITHMETIC

1. A company selling newspapers spends UGX 15,00 to produce a copy of the newspaper and sells it at UGX 2,000. On a given day, the company produced 2000 copies and managed to sell 1000 copies only. (a) Did the company make a profit or loss on that day? (b) Calculate the percentage profit or loss for the day.
2. A salesman gets a fixed salary of \$2000 per month and a commission of 2% on sale. If total sale for the month of April was \$30000, find his total salary for that month?
- 3.
4. A trader bought **120** bags of beans at **UGX 50,000 per bag**. He sold **1/2** of the bags at a **25%** profit, **1/4** of the bags at a **15% loss** and the remaining bags were sold at **UGX 55,000 per bag**. After selling all the bags, the trader paid **5%** of the total sales as commission to his sales agent. However, the trader found it difficult to determine his net profit or loss after all the transactions.

Task: Help the trader to determine:

- a). The total amount of money he received after selling all the bags of beans.
- b). The commission he paid to his sales agent.
- c). The net percentage profit or loss from the entire transaction.

5. John's laptop was initially valued at UGX 960,000. the price dropped by 15% in the first month and then by 9% in the second month. He wanted to swap his laptop for a new one valued at twice the current price of his old laptop. John has sixty-five thousand shillings as top up to acquire the new laptop upon selling the old one. Help John to determine the price of the new laptop and whether he will be in position to buy this new laptop after selling his old laptop and topping up with the money on his account.

TIME AND TIMETABLES

1. Mr. Namwiga the chair LC5 councilor of Mayuge Municipality is planning to open up a primary school in his locality, with two sections, that is, the lower primary (P1-P4) and upper primary (P5-P7). Mr. Namwiga needs to draw a time table for both sections. The sections should both start their morning lessons at the same time before break-time, start and end their break-time at the same time. The after-break lessons should start at the same time as well as the lunch time for both sections. The time to start the lessons for both sections is 8:00am. The duration of the lesson for lower section is 30 minutes while upper section lessons each lasts 40 minutes. The pupils are to attend school from Monday to Friday. He also intends to have a Sunday church program since he has not got a school chaplain yet. Due to high transport costs, Mr. Namwiga suggests that the pupils of lower section will go to church every after 3 weeks while those of upper section will go to church every after 4 weeks.

Task.

- a) Help Mr. Namwiga to come-up with a timetable for the two sections up to lunch time.
- b) How many lessons does each section have up to lunch time?
- c) Express the total number of lessons for lower primary as a fraction of the number of lessons for the whole school in a week. (Consider up to lunch time)
- d) For proper planning, help Mr. Namwiga know when the two sections will be going to church on Sunday together.