

SETLIGHT QUALITY SECONDARY SCHOOL

MATHEMATICS DEPARTMENT

14th JUNE 2026 SEMINAR ITEMS

FORMAT OF THE PAPER (456/1)

Section A: comprises of two compulsory items

Section B: comprises of Part I and Part II each having two questions and a learner answers one question from part each part

ITEM	AREA OF CONSTRUCT/THEME	TOPICS
SECTION A COMPULSORY		
ITEM ONE	NUMBERS Learner appreciates and uses computational skills to solve problems in real-life situations.	Number bases ✓ Working with integers ✓ Fractions, percentages and decimals ✓ Numerical concepts 1 and 2 ✓ Ratios and proportions
ITEM TWO	PATTERNS AND ALGEBRA Learner appreciates and uses analysis to solve problems in real-life situations	✓ Sequences and patterns ✓ Equations of lines and curves ✓ Algebra 1 and 2 ✓ Mapping and relations ✓ Inequalities and regions ✓ Equation of a straight line ✓ Rectangular Cartesian plane ✓ Simultaneous equations ✓ Linear programming ✓ Loci
SECTION B		

PART ONE (CHOOSE ONE ITEM)

ITEMS 3 AND 4

DATA AND PROBABILITY

Learner appreciates and uses logical reasoning to solve problems in real-life situations

- ✓ Data collection and presentation
- ✓ Graphs
- ✓ Set theory
- ✓ Data collection and display
- ✓ Matrices ✓ Probability

PART II (CHOOSE ONE ITEM)

ITEM 5 AND 6

GEOMETRY AND MEASURES

Learner appreciates and uses spatial reasoning to solve real-life situations

- Geometric construction skills
- ✓ Bearings
- ✓ General and angle properties of geometric Figures
- ✓ Reflection
- ✓ Business arithmetic
- ✓ Time and time tables
- ✓ Similarities and enlargement
- ✓ Circles
- ✓ Rotation
- ✓ Length and area properties of two-dimensional geometrical figures
- ✓ Nets, areas, and volumes of solids
- ✓ Trigonometry 1 and 2
- ✓ Vectors
- ✓ Business mathematics
- ✓ Matrix transformation
- ✓ Circle properties
- ✓ Lines and planes in three dimensions

THEME ONE: NUMBERS

ITEM 1

ROKO Construction Company has been contracted to construct a bridge in a swamp connecting Kamuli district to Kayunga district. According to the map of the area covered by this swamp, it shows a scale of 1:250,000 and an area of 7.36 cm^2 covered by the swamp. Basing on the work plan designed by the project engineer, it shows that either a bull dozer vehicle will be used in case the actual area of the swamp is less than 40 km^2 or an excavator vehicle shall be used in case the actual area of the swamp is greater than 40 km^2 . If the construction company is to use a bull dozer, then 25 operators shall be needed each being paid UGX 65,000 per day and if it's to use an excavator, then 14 operators shall be needed each being paid UGX 125,000 per day. The company has been given fifty million shillings to do the work in only two weeks. After paying the operators' expenses, the balance shall be used as follows; 40% as a share to this construction company for its operations,

18% shall be allocated for maintenance and repairs of the vehicles used and the remaining amount shall be given to the executive director of the company.

TASK:

As a mathematics student, help the project engineer to;

- a) (i) Calculate the actual area of the swamp in km^2 .
(ii) Which type of vehicle can you propose and recommend to the engineer to be used for such a project?
- b) Compute for the amount of money that shall be paid to the operators for the period of time that they will spend constructing this bridge?
- c) Of the payments made to the construction company's operations and the executive director, whom do you think shall receive the biggest share and by how much?

ITEM 2

A camping site attracts visitors among which include children, men and women. On a certain day, the manager of the site recorded the attendance as ratios. Men : Women = 5:4 and Women : Children = 3 :7. In total 224 children visited the camping site that day. However, the manager was not sure of the number of men and women who visited the site that day. In 2024, the cost of a ticket to the campsite for children was at half price that for adults and that a ticket for adults cost UGX30,000. In order to attract more customers, the manager instructed the attendants to set the ticket charges for 2025 such that their cost is less by 20%. However, the attendants were not sure of the exact costs to set for 2025.

Task:

- (a) Help the manager to find the total number of men and women who visited the camping site that day.
- (b) Determine the amount of money collected by the camping site on that day.
- (c) Determine the cost for the tickets for children and in 2025.

ITEM 3

David and Mark have been diligently saving a portion of their business earnings in a joint savings account. After accumulating a total of 7,080,000 Ugandan shillings, they now wish to divide the savings based on an agreed-upon ratio of 7:3 with David receiving 7 parts and Mark receiving 3 parts. However, David has instructed Mark to give him 0.4 of his share, while the remaining amount will stay in the joint account for future use. 252 apples 210 oranges 294 pears. Additionally, David and Mark are planning to launch a new fruit packaging and selling business. Their initial stock consists of: They intend to pack these fruits into boxes without wasting any fruit. Their business is growing at a compound growth rate of 12% per year, and they currently generate an average monthly profit of 1,800,000 Ugandan shillings. They want to estimate how much profit they will make in 3 years if the growth rate remains constant. Task:

- (a) How much of the savings will Mark give to David?
- (b) (i) How many boxes can David and Mark create from the fruits they have?
(ii) What will be the ratio of fruits in each box?
- (c) What will be the expected monthly profit of their business in 3 years, assuming the growth rate remains constant?

PATTERNS AND ALGEBRA

ITEM 4

Your school has a rectangular garden with a length that is 5 meters more than three times its width. The area of the garden is 120 square meters. The school wants to determine the actual dimensions of the garden to allocate a section for a new greenhouse. They have approached you as a student of mathematics and asked you for help. The garden is used to grow corn and soybeans. In the first planting season, the school used 2 bags of corn and 8 bags of soybeans to cover 80 square meters. In the second season, they used 5 bags of corn and 4 bags of soybeans to cover 70 square meters. This year, in the first season, they plan to use 6 bags of corn and 3 bags of soya beans, but they are unsure how much space this will occupy.

TASK:

- (a) Determine the actual length of the garden.

- (b) Calculate how much space (in square meters) each bag of corn and soya beans cover
- (c) Estimate the total space that will be used for planting this season.

ITEM 5

Your sister is a member of NASECO FARMERS. After being trained on how to add quality to their products and increase output she was given one machine to help her in planting and she recorded her expected daily operations in one week. She wanted to plant two types of seeds; maize and g-nut seeds. She wanted to plant at least 3 sacks of maize seed, not more than 8 sacks of g-nut seed and less than 12 maize and g-nut seed sacks altogether. The number of g-nut seed sacks she wanted to plant was more than three quarters of the number of maize seed sacks to be planted.

Task:

- (a) (i) Write down mathematical inequalities to represent the above conditions.
- (b) (ii) Show clearly the feasible region on a Cartesian plane.
- (c) Help your sister to find the minimum number of maize and g-nut seed sacks she should plant in one week. State the number of each sack to be planted to get the minimum number of sacks altogether.

ITEM 6

Maya and Peter, bookstore owners, received an order to package 200 books for a customer. Previously, Maya packaged 48 books using 2 meters of packing tape and 168 books using 7 meters of packing tape. The customer requests that some books be packed in cardboard boxes (x) and some in paper wraps (y), with the following conditions:

The number of books in cardboard boxes should be more than those in paper wraps. The number of cardboard boxes should not exceed 100. The number of books in paper wraps should be at least 60. The total number of packing materials (boxes and wraps) should not exceed 200.

Task:

- (a) Establish a mathematical relationship between the number of books packaged and the amount of packing tape used.
- (b) Determine the amount of packing tape required to package 200 books.
- (c) Write down the mathematical inequalities for the number of cardboard boxes and paper wraps.
- (d) Find the maximum number of cardboard boxes and paper wraps they can use.

DATA AND PROBABILITY

ITEM 7

Three students, Liam, Emma, and Noah are organizing a fundraiser for their school club. They need to purchase supplies for the event. Liam wants 5 markers, 6 posters, 3 stickers, and 1 banner. Emma needs 4 markers, 7 posters, and 2 stickers, while Noah requires 4 markers, 1 banner, and 4 posters. The costs of a marker, poster, a sticker and a banner are as follows; shs.1000, shs.6500, shs.500 and shs.3500 respectively. Their teacher asks them to organize the items and costs in a structured format of rows and columns for clarity. To decide who will handle the shopping, they agree to a game where the winner is the one to go for shopping since all of them have interest in going for shopping. In the game, they have put 4 blue marbles and 7 yellow marbles. Each student picks two marbles at random one after the other without replacement. The winner is the first to draw the two marbles of different colors. Noah volunteers to go first for the game but is unsure of his chances of winning:

TASK:

- (a) (i) Present the items and costs in a clear row and column format.
(ii) Use the format above to determine the total cost of the items to be used in the club.
- (b) Determine the probability that Noah wins the game and gets to go for shopping.

ITEM 8

A farmer's cooperative society gave out fertilizers to a sample of maize farmers in the first season. The number of bags of maize harvested in the first season is given below.

20 40 60 55 36 69 59 78 47 66

59 70 53 24 63 50 46 38 68 57

30 65 58 61 57 86 77 54 29 88

62 44 89 45 87 65 47 49 52 69

41 80 37 56 74 27 76 58 79 39

The society wants;

- (i) The data to be presented in a frequency distribution table with classes of interval 10 for easy interpretation.
- (ii) To determine the number of bags of maize above which half of the farmers harvested so as to establish the real effect of the fertilizers.
- (iii) To determine the number of farmers whose harvest is 44.5 bags of maize and below for re-training before the second season but they lack information.

Task:

Help the society to;

- (a) Represent the data in a frequency table.
- (b) Determine the number of bags of maize above which half of the farmers harvested.
- (c) Determine the number of farmers for re-training.

ITEM 9

The head teacher promised to gift all those who won different games with money. Those who won only one of the games were to receive Ugx 10,000 each. And those who won two games strictly, were to receive Ugx 20,000 each and those who won in all the three games were to receive Ugx 30,000 each. Out of the 100 learners who participated in the competitions, 15 won in football, 20 won in netball, 30 won in volley ball. 6 won in volleyball and football, 7 won in netball and volley ball while 8 won in football and net ball. Some learners won in all the three games while others won none of the games. Those who won at least one game were 48 in total. Now the head teacher needs to know how many out of 100 will not receive gift money and the exact amount to organize for prizing those who fall in the categories he mentioned to gift money.

Task

- (a) How many out of the 100 will not receive money from the head teacher?
- (b) How much should the head teacher organize for prizing those who fall in the categories he mentioned?

GEOMETRY AND MEASURES

ITEM 10

A container is in shape of a frustum with an open end of diameter 45cm and a bottom diameter of 35cm. the bucket which is 44cm deep is used to fill an empty cylindrical tank of diameter 2.1m and height 1.5m

Three hundred and sixty litres of a homogeneous paint is made by mixing three paints A, B and C. The ratio by amount of paint A to point B is 3:2 and that of B to C is 1:2. Paint A costs shs 1800 per litre paint B costs shs 2400 per litre and paint C shs 1,275 per litre.

Task:

- (a) (i) Determine the capacity of the container in litres correct to 3dp.
- (ii) The capacity of the tank in litres correct to 2 dp.
- (iii) The number of buckets that must be drawn to fill the tank.

- (b) (i) The amount of each paint in the mixture
(ii) The amount of money needed to make 360 litre of the mixture
(iii) The percentage profit made by selling the mixture at shs 2,210 per litre.

ITEM 11

Akiso bought a car in January 2017 from his friend at shs. 12,500,000. If the car depreciates at a rate of 10% per annum. He left Germany for Uganda through Switzerland. While in Switzerland he bought a watch worth 54 Deutsche Marks (Germany currency). Akiso is a secondary school teacher and as a requirement by the government pays PAYE every month according to the tax structure below.

Income (shs) per month	Tax rate(%)
1-50,000	5
50,001 - 100,000	9
100,001 - 180,000	15
180,001 - 300,000	18
300,001 - 400,000	23
400,001 - 500,000	30
Above 500,000	35

He earns Shs. 760,000 and his allowances include

- Marriage allowance - shs. 50,000 per month
- Water and electricity - shs. 60,000 per month
- Housing allowance - shs 150,000 per month
- Medical allowance - shs. 300,000 per annum
- Transport allowance - shs. 3,000 per day
- Paying for insurance and relief - shs. 180,000 per annum

Family allowance for only three children.

For children in the age bracket 0 to 10 years, shs 212,000 per child,

Between 10-15 years shs. 9000 per child 15 years and above shs 5000.

Given that he has five children, two of whom are aged between 0 and 10, the other two aged between 10 and 15 while the other 18 years.

Support material

Take a month has 30 days

1 Swiss Franc = 1.28 Deutsche Marks

1 Swiss Franc = 1,350 Ugandan Shillings

Task:

- (a) Calculate the value of Akiso's car by January 2020.
- (b) Find the value of the watch in;
 - (i) Swiss Francs
 - (ii) Ugandan Shillings.
- (c) Determine his Net income
- (d) Determine the percentage of his gross income that goes to tax.

ITEM 12

The organizing committee of this year's UCE thanksgiving ceremony is planning to give gifts including a cake to the chief guest. A cylindrical cake is to be wrapped in a round transparent cake box, which is gold white clear. The base area of the cake is 445.06cm^2 . The service provider has bought a cylindrical cake box, which measures 26 cm by 32cm in diameter and height respectively. However, the committee is not certain of the capacity of the cake box and whether the cake of height 29.5 cm will fit into the cake box. She is to transport the cakes from the bakery to the venue She drives northwards from the bakery a distance of 9 km to the nearest trading center. From the trading center, she continues on a bearing $N30^\circ E$ to the venue, a distance of 12 km from the trading center. The average speed throughout her journey is 15km/hr . She leaves the bakery at $9:03\text{ am}$ but the committee thinks that she might be late since the function is to start at $10:20\text{ am}$

Task:

- a) Help the committee to determine the capacity of the cake box
- b) Determine whether the cake will fit exactly in the cake box. justify your answer
- c) Find out the time when the service provider will arrive at the venue. Will she deliver the cake on time? give reasons

d) The service provider later discovered that there is a direct route from the venue to the bakery and so decided to return via that route. Find the distance of the direct route from the venue to the bakery

ITEM 13

Your friend wants to design a food pyramid as her project under (DO IT YOURSELF CLUB) to guide healthy eating and its impact on dietary choices to the community. According to her design, the pyramid will have a rectangular base measuring 8ft by 6ft with a slanting height of 13 ft and its vertex directly above the centre of the base. The cost of painting the plane surfaces is UGX 4500 per square meter. But she was not sure the angle at which each slanting pole can be made with the base of the rectangular and the volume to which the pyramid can hold the items for demonstration the total cost of painting the food pyramid. (Hint: 1 ft = 30.48cm)

Task:

Help your friend to determine:

- a) The volume to which the pyramid can hold demonstration items.
- b) The angle between a slanting side and the base of the food pyramid.
- c) The total cost of painting the food pyramid.

ITEM 14

Daniel works with African Queen Uganda Limited a company that distributes goods. On a certain day, he left the company warehouse to the first trading center which is 80km away on a bearing of 150° . After delivering, he then moved Eastwards at an average speed of 60km/h for 40 minutes to the second trading center. From this center, he took a bearing of $N50^\circ E$ and moved a distance of 60 km to the third trading center. The cargo car he used had 20 liters of fuel at the beginning of the journey and its consumption rate is such that for every 15km it uses 1 litre of fuel. At the third center, one of his clients showed him a direct route that would take him back to the company's ware house but he was undecided on whether to add fuel or not since he didn't know the distance of the direct route.

Task

Help Daniel to;

- (a) Determine the distance of the direct route from the third trading center to the company's warehouse
- (b) Decide whether to add more fuel in the car or not. Give a reason for your answer.

ITEM 15

The Executive Director of a school, seeks to modify the logo of his schools so as to align with its values and appeal to current younger demographic generation. The current logo, a triangle with coordinates $P(2,3)$, $Q(4,1)$ and $R(1,2)$ on a white rectangular background, is required to be modified. So, the Executive Director got in touch with one of the prominent and well experienced graphic designer who suggested to him the following design modification options to enhance the logo. Keep the original triangle in place, but turn it 90 degrees counterclockwise around the origin. Then, mirror the resulting triangle across the horizontal axis. Next, scale up the new triangle by a scale factor of 3 about the center $(-5, -2)$, thereby creating a logo with four triangles. Thereafter, only the enlarged triangle shall be painted with a maroon-to-green ratio of 3:5, using a maroon paint that costs UGX 20,000 per square unit and green paint that costs UGX 15,000 per square unit. The school as institution has set aside a budget limit of UGX 205,000 per logo for painting work.

Task

- a) (i) Assist the graphic designer in creating a precise layout of the logo, showcasing the exact placement of the four triangles on the same material.
(ii) Specify the exact vertices of the new triangles.
- b) Using data-driven insights, recommend to the Executive director whether the allocated logo expenses shall fit within the schools' budget or not.

ITEM 16

In preparation for the National Elections that will take place early next year 2026, the chairman electoral commission has planned to dispatch the first set of the election materials to three of the major cities in Uganda. A heavily guarded truck fully parked with election materials is going to use 15 liters of fuel and its fuel consumption rate is 1 liter of fuel for every 15 kilometers. The truck left the main stores in Kampala city to Arua City which is 60 km away in a direction of N700E. It then moved Southwards at an average speed of 100kmhr⁻¹ for 30 minutes to Mbale City. From there it took a bearing of 2000 and moved a distance of 40km to the third city called Jinja. At Jinja city, the driver of the truck was shown a direct route that would connect him to the main stores but he was not sure whether the remaining fuel in the car was enough for that journey since he didn't know how long that route would take him.

TASK:

Help the manager to determine;

- a) The distance of the direct route from Jinja City to the main store.

b) Whether the remaining fuel in the truck will be enough for the journey using the direct route.

ITEM 17

Mr. Thomas plans to build a small house next to his main house where he can always rest from in his free time. The house is to have sides in form of a cuboid with dimensions 12m by 8m by 4m and a pyramidal roof with slant side edge of length 13m. The house is to have three windows of dimensions 0.9m by 0.6m and one door of dimensions 2.1m by 0.8m. he plans to paint the outer walls of the house using 1 litre tin paint and each tin costs Ugx 15,000. A tin can paint 5m^2

SUPPORT



TASK

- a) (i) Help Mr. Thomas to calculate the surface area of the wall to be painted.
(ii) How many tins of paint will be required to paint the house.
- b) How much money will he spend on paint for the whole house.
- c) Help Mr Thomas to estimate the height of his whole house to the top vertex of the roof and hence determine the volume of his house.

END

THANKS FOR ATTENDING

WISH YOU SUCCESS IN YOUR FOURTH COMING EXAMS.