MAKHAI SEED SECONDARY SCHOOL

MATHEMATICS SCENARIO TYPE QUESTIONS

"Practice Makes Mathematics Easier"

ITEM 1

Jovia is planning a graduation party and wants to give her guests some snacks on arrival for the party .she buys 72 cup cakes, 144apples, and288 chocolate bars .Each plate must have exactly the same number of chocolate bars, apples, and cup cakes. There must not be any left overs.

a. What is the greatest number of guests Jovia must invite for the graduation party?

(Integers, factors, HCF and numbers)

ITEM 2

Makhai secondary school has two sections, that's Lower UNEB (S.1-S.4) and Upper UNEB (S.5-S.6) .The Director of studies needs to draw a time table for the online lessons for both sections. The sections should start and end 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 and end at the same time .The lunch time for both sections should start and end at the same time .The after lunch lessons should start end at the same time .Maths must have three lessons in a week in each class.

The time to start lessons for the two sections is 8:30am and lessons end at 4:30pm .The duration of the lesson for Lower UNEB section is 1 hour and that of Upper UNEB section is 2 hours .Assume the following subjects to be offered

Maths	English	History	Art	Geography	CRE	ICT
Biology	Chemistry	Physics	Entrepreneurship	Lumasaba	Kiswahili	AGRI

a. Help the Director of studies by drawing the timetable for the week (Monday- Friday) for the two sections

b. How many lessons does each section have up to lunch time?

c. What is the total number of hours in a week for the lower section?

(Fractions, percentages, naturalnumbers, factors, multiples, LCM)

ITEM 3

Joshua and his uncle Geoffrey have an age difference of 25years and the product of their ages is 150years. One day during a mathematics lesson, Joshua borrows a calculator from his friend and on the screen he finds a number 420 which made him wonder which two numbers he could have

entered to get as the product of the figure. Later on during the festive season, Joshua and his young sister Deborah were visited by the auntie and were each given UGX42000 and UGX53500 respectively .Joshua bought 4 t-shirts and 3 shorts while Deborah bought 5 shirts and 4 shorts.

a. How old do you think is Joshua and his uncle Geoffrey

b. Help Joshua figure out all the possible values that his friend could have typed in the calculator to get the number on the screen

c. Help the two siblings explain to their father how much he would spend if he wanted to buy three shorts and five shirts for their brother Isaac

ITEM 4.

The Ministry of Public Service advertised for suitably qualified personnel to fill the vacancies of Chief Administrative Officer(CAO) existing in newly created districts in Uganda. Of the 93 who were shortlisted for the interviews, 53had experience in a related field (E) ,52 had a master's degree (M), 57 had no criminal record (C), 25 belong to both E and C, 27 to both M and C while 31 to both E and M.

a) Represent this information in a venn diagram, clearly showing thr the number of applicants in each region .

b) Find the number of who had;

i) all the three qualifications

ii) exactly two of the qualifications

iii) only one of the qualifications

c) Giving reasons, who among these applicants would you recommend for the job of CAO?

ITEM 5.

A flower garden inform of a square has an area of x^2-6x +9.Work out the length of the square.

If the flower garden has an area of 100 square meters, workout the value of x.

ITEM 6.

A rectangular house has length of (4x-1) m and width 2xm and has an area of $10m^2$ .what is maximum value of the length and width of the rectangular house, hence find its perimeter

ITEM 7

Peter is a painter and he usually buys paint packed in similar tins. he bought 8 liter tin of paint and was able to paint one face of a square room measuring 2m by 2m ,Peter has now got a contract to paint one wall of a public hall measuring 12m by 12m.

Help peter know the capacity of one tin he should buy which will be enough for this new contract.

ITEM 8

Apollo is constructing a perimeter wall around his house. He bought 500 bricks for the work but he has realized that the bricks will not be enough for the work. He therefore needs to buy more bricks if the construction work has to be complete.

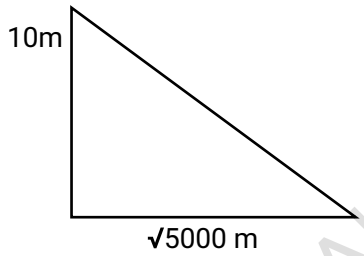
The wall under construction is 36m long and 2.2m tall .the bricks being used are each 25cm long and 12cm tall.

As the engineer for the construction site, advice Apollo on an estimate for the number of additional bricks he should buy so as to have the construction complete.

ITEM 9

Opio has four plots of land in his village and intends to give the out to his four children but unfortunately ,the plots do not relate in size .Opio's friend has accepted to give out an equivalent consolidated land to enable opio distribute it to his children .

A surveyor's record indicates that there are 3 rectangular plots measuring √ 3200 m^2, √1800 m^2 and √9800 m^2 .the third plot has the structural map below;



Opio wants to reserve ½ of the land for himself and distribute the remaining portion equally among his children.

As a mathematician, help Opio prepare sharing plan for his piece of land.

ITEM 10

Lwasa a prominent business man in Kiwenda town wants to start hardware in the town that is valued at UGX 12.5 millions. He has saved 45% of the required amount with his local SACCO and wants to top up the balance. However he has been approached by two money lenders Juma and Saidi who lend there money according to the following conditions.

JUMA	SAIDI
He lends at a simple interest rate of 8% per annum payable in 24 equal month installments.	He lends at a compound interest rate of 8% per annum payable in 24 equal month installments.

Lwasa wants to decide on which of the two money lenders to opt for.

a. Help Lwasa find how much money he intends to borrow

b. Which of the two money lenders would you recommend Lwasa to opt for?

c. Having selected for Lwasa the right money lender, how much does he pay per installment?

d. What would be the saving Lwasa would make if he had all the money at the start than going for the loan from the money lender?

ITEM 11

Four members of Nalodo market order for produce from namisindwa village and the produce are as given below;

Khaweka bought one bag of posho, 5bags millet, 2bags of sorghum, and 2bags of rice

Betty bought 5bags of posho, 3bags of millet and 4 bags of rice

Cate bought 4bags of posho and 8bags of rice

David bought 3bags of rice, 4bags of sorghum, 3bags of millet and 2bags of posho

The cost per bag of the items bought was; RICE at UGX200, 000, SORGHUM at UGX60, 000, MILLET at UGX75, 000, and POSHO at UGX 100,000.

a. Assist the market members summarize the above information in matrix form

b. help the members to know how much each shall spend on their purchase ,and hence find the total cost for the four venders

c. If the sales for the four venders were ugx14.3millions and agreed to share the money among Khaweka, Betty, Cate and David in the ratio of 2:4:6:1 respectively. Help the members to determine how much each takes and represent the information in a pie-chart.

ITEM 12

In a survey to determine the average weight of a new born baby, the medical class of St.Julian collected weights of 40 babies from Kabubu Health Centre (IV). The weights in kgs are given below;

2.0	2.1	2.0	2.2	6.4	2.6	3.0	3.5
3.1	3.2	2.3	2.7	2.8	3.4	4.0	3.2
3.7	4.5	5.0	5.4	4.9	6.0	6.4	6.3
5.4	4.7	4.6	4.9	6.2	6.2	6.7	2.5
2.6	2.9	4.4	5.3	3.6	4.8	6.3	5.0

a) Form a frequency distribution table with interval of 0.5kg starting with the lowest weight of 2kg

b) What is the mean weight?

c) Help the class obtain the median weight

d) Represent the information on a statistical graph to obtain the modal weight .

ITEM 13

A certain member of your family re- wrote each digit of his 4 digit ATM card pin from number system ten (base ten) to another number system less than four.

He did this in fear of theft. Now he is sick in the hospital and can neither talk nor write but the money on his account is needed to finance the hospital bills. Here is how he wrote the pin; 12 20 22 10 .Assuming that you have been able to encript the ATM pin for the family and funds are available to take care of him.

The hospital has a nurse who takes care of the sick after every two hours and a medical doctor who checks on him after every four hours. Both the medical pèrsonnels last checked him together at 9:30am. He was treated well and discharged and advised as follows;

Spend three-eighths of the day resting, one sixths of the day eating , two thirds of the remainder having a healthy diet and the rest time of the day visiting the hospital for further checkups .

a) Which number system did he use to re-write the pin and why?

b) Use the identified number system to help your family regenerate the original pin.

c) At what time will both the nurse and the medical doctor check on him at the same time?

d) How many hours of the day in a week does he spend on visiting the hospital?

ITEM 14

Mr.Juma is buying a container to start a hardware in Namwaro village to sell bags of cement. Each bag of cement occupies an area of 0.8 cubic meters. The container is ABCDEFGH with AB=12m , BC=9m , ADEF is a square and O is the point of intersection of AC and BD.

a) Find the lengths;

i) BE

i) OH

b) Determine the angle formed between;

i) line BE and the base

i) Plane BDH and the base

c) Calculate the capacity of the cuboid in litres and how bags of cement can be accommodated.

ITEM 15

There is a quarantine of all cattle and goats in some parts of western Uganda especially Mbarara district. The honourable member of parliament wants to throw for his constituents a celebration party for the success of Parish Development Model (PDM) and he has invited alot of guests . However due to the quarantine , he can't buy animal from Mbarara and he has been advised to go to Kayunga where cheap cattle and good yoghurt can be found . He moves from Mbarara to Masaka which is 160Km north of Mbarara. From Masaka he moves west wards 150Km to Kampala . From Kampala he heads to Mukono which is in the direction of S75^{o}W which is 90Km from Kampala. From Mukono je heads to Kayunga which is 148Km and south of Mukono .When he reached Kayunga, he bought 400 cows at UGX850000 @ . The farmer gives a 5% discount on each cow plus an additional 10% discount for any number of cows in excess of 250.

In order to pack the yoghurt , he bought two identical types of buckets. A smaller bucket with a base radius of 30cm and a larger bucket with a base radius of 50cm . He intends to use the buckets to keep the yoghurt for his guests. The capacity of the smaller bucket is 45litres and he is to buy 4 smaller buckets and 2 larger buckets.

a) Direct the honourable on the shortest route(distance) he should use from Mbarara to Kayunga.

b) Find the total cost he incurred in purchasing the cows

c) What is the maximum amount of yoghurt bought by the honourable.

ITEM 16

Three schools from Gayaza region wanted to participate in the national schools football gala to be held in Lyantonde district play ground . Unfortunately none of the schools has the school bus so they want to hire a bus for the of the activity. A bus charges ugx25000 per km moved . The 3 schools through the Sports Master agree to share the cost of the bus equally amongst themselves. On that day they hire your school's bus and sets off at 4:30am . The bus travels at a speed of 90km/hr reaching Mpigi at 6:45am. The driver maintained his speed for 2 and 1/4 hours up to Masaka. From Masaka the driver travels at the same speed until he reaches Lyantonde at 9:30am. The games start at 10:00am and each team plays six matches. School A won 3 matches, drew 2 and lost 1 match. School B won 4 matches and lost 2. School C won 2 and drew 4. The organizers award 3 points for a win , 1 point for a draw and no point for the loss. They declared these schools being the first in order according to their points. They were to receive a price of UGX 16500000 in ratio of their points.

a) Find how much each school paid for the bus

b) Decide the cash prize for each school.

ITEM 17

Mr. Amuza the head of mathematics department organised for a study trip to Namanve where assembling of Toyota vehicle and manufacturing of coca cola products are done . In his report to the members of the Mathematics department, he showed the cost of hiring a bus is constant for any bus and varies as the

distance covered . He later realed that if a bus covers 100Km the charges are UGX 450000 and UGX 400000 for a distance of 60Km.

The distance between the school and Namanve is 480Km and they expected to leave school at 8:00am at an average speed of 100km/hr and according to the schools study trip rules and procedure ;after the trip ,the students would rest for forty five minutes and then proceed back to school.

a) As a treasure for the mathematics department, help Mr. Amuza know the total expenses for the journey.

b) By representing the journey on a suitable gragh , explain the motion of the bus to the school administrators.

ITEM 18

Moses is 1.5m tall and is standing on top of a building 34m tall. In a straight line, he can see a car and a bicycle at angles of depression of 50^{o} and 65^{o} respectively. As Moses was going home , he found a magician presenting to the village members an entertainment. The magician had a bag containing x red balls and (x-8) white balls . The probability of drawing a red ball from the bag is 2/3 .

a) How far is the bicycle from the car.

b) Help Moses know how many balls were in the bag.

ITEM 19

House of Prayer Ministries international for a long time has been soliciting money to construct a church which can congregate all the church members. Pr. Bujingo the Senior pastor has a vision of constructing a Pentagonal church which can fit exactly in the plot of land available. He wants to know the cost of constructing the church. He also has to buy a Sino truck to transport all the building materials and requirements.

The contractors inform him that the area of each triangle that can be formed from the Pentagonal church Will cost him UGX 128000000. He then proceeded to Toyota motors to buy the Sino truck. A brand new sino truck costs shs.480000000 on cash . It can be also bought by paying a deposit of a quarter of the cash price and either pay ugx 7.5millions weekly for 50 weeks or ugx 24.5millions monthly for 15months. The pastor doesn't have the required money to obtain the Sino truck on cash.

a) Help the pastor determine the total cost of the church

b) Which payment plan would you recommend the pastor to opt for and why?.

c) How much extra money will the pastor pay for the sino truck and explain why?

ITEM 20

A friend of yours wanted to participate in the National Ludo Championship competitions. During his practice, he roled a die several times and kept on taking note of each occurrence. He needs to find out whether he will compete favourably but he is unable to do so . He gives you the diagram below showing the scores so

that you can guide him.

5 3 5 1 2 1 1 3 1 1 4 6 3 1 4 5 5 2 4 4

5 2 5 3 2 2 5 6 5 6 1 4 4 1 1 3 4 2 2 4

3 6 2 2 5 1 2 2 4 6 6 3 4 1 1 3 6 5 6 3

4 6 3 5 3 6 1 6 2 3 2 1 4 3 5 3 1 3 6 1

6 4 4 4 2 5 3 6 6 1 3 6 5 6 4 3 3 3 3 3

a) Use the information above to determine the score with the highest chance of occurrence on top.

b) Find the probability that an odd number occurred on top when the die was rolled.

c) Will your friend compete favourably in the competitions ? Give reason.

ITEM 21

Mr. Kyagulanyi owns a swimming pool in Muyenga and in his swimming pool , 4 people can swim butterfly stroke and 11 can swim free stroke . The people who can swim butterfly stroke can also swim free stroke. There are 15 people in the pool. Each person pays an entrance fee of ugx 10000 .

a) Display the information on a venn diagram

b) Find the number of people who can swim;

i) free stroke only

ii) neither stroke

c) Advise Mr. Kyagulanyi on how to increase on the number of customers in order to increase profits.

ITEM 22

Henry is a farmer in Bududa district who practises both growing of crops and animal rearing on a large scale. Due to high demand of products from animals, he puts much emphasis on animal rearing dealing in cows and goats. He has atleast 200 heads of goats and cows and atmost 240 goats and cows. The number of goats is twice the number of cows on the farm . Henry wishes to maximise profits by selling each goat at ugx 500000 and each cow at ugx 1.5millions but he doesn't know the number of goats and cows to sell to fulfill his wish.

a) write mathematical statements to show the relationship between the cows and goats on the farm

b) Show the feasible region of the relation on the Cartesian plane

c) Help Henry determine the maximum amount of money he will possibly make from the sale of cows and goats.

ITEM 23

On a square compound of dimension 8m , Mpagi has a rectangular flower garden measuring 4m by 3m. He wants to increase the size of the flower garden using a scale factor of 3 along the width and a scale factor of 1.5 along the length.

Since your the compound designer in that village, advise Mpagi on how increase the size of the flower garden.

ITEM 24

Daniel stands between two houses A and B which are at a distance of 50m apart . Hr views the top of the two houses at angles of elevation of 45^{o} and52^{o}. What's bothering Daniel are the heights of the two houses.

As a mathematician, help Daniel know the heights of the two houses A and B.

ITEM 25

Five friends Apio , Asiimwe, Babirye, Namono and Namuli have their names as Babra, Cathy , Kevin, Mercy, and Prisca. When they went together for swimming game, they kept using their surnames and first names interchangeably. The Sports trainer got confused so that he couldn't correctly establish both names of a person.

One day, the Sports trainer got information on a sheet of paper written as;

- Apio went swimming with Prisca, Babra, and Cathy.
- Namono travelled to Nairobi with Prisca and Cathy
- Asiimwe, Babirye, Prisca and Mercy went for a meeting in Dubai
- Mercy, Apio and Namuli visited Asiimwe
- Babirye and Cathy went shopping

Advise the Sports trainer on how he can match the two names of each individual correctly.

ITEM 26

Welikhe has a bag in which he carries his books during school. Everyday he carries a die and some coins with him to school for gaming during break time and lunchtime. In his bag , is also 4 green mangoes and 8 yellow mangoes to be used as breakfast and lunch. During break time, his friend Wandwasi tosses a coin and a die together at once . After the games, two mangoes are successively picked without replacement from Welikhe's bag.

a) If the scores of a tail and a head of the coin are 3 and 4 respectively, and the sum of the top score of a coin and a die is recorded accordingly, what is the probability that the sum is ;

a. A prime number

b. A square number

c. An odd number

b) Find the probability that the two mangoes picked are;

a. Green

b. Yellow

c. Of different colour

ITEM 27

In the school staffroom , there are two similar cylindrical cans that have different heights, from which teachers draw drinking water. The smaller can is 6cm high and the larger can is 9cm high and the surface area of the larger can is 840cm^2.

Help the teachers know the surface area of the smaller can.

ITEM 28

A secondary school teacher as a requirement by government pays PAYE every month according to the tax structure below;

Income (shs) per month	Tax rate(%)
01-50000	5
50001-100000	9.5
100001-180000	15
180001-300000	18
300001-400000	23
400001-500000	30
Above 500000	35

The teacher earns shs.760000 per month and his allowances include;

- Marriage allowance -shs50000 per month
- Water and electricity - shs60000 per month
- Housing allowance - shs300000 per annum
- Transport allowance- shs3000 per day
- Insurance and relief - shs180000 per annum
- Family allowance for only three children; children in age bracket of 0 to 10years- shs12000 per child, between 10-15 years- shs9000 per child and 15 years and above-shs5000.

Given that the teacher has five children, two of who are aged between 0 to 10 , the other two aged between 10 and 15 while the other is 18 years

a) Determine the teacher's net-income

b) what is the percentage of his gross income that goes to tax?

ITEM 29

Mesach bought a car in January 2017 from his friend Moses at shs 12500000 and the car depreciates at a rate of 10% per annum. In January 2020, Mesach wanted to go to Germany thus wanted to sell off his car but he didn't know the value of the car at that time.

Mesach left Germany for Uganda through Switzerland. While in Switzerland, he bought a watch worth 54 Deutsche Marks(Germany currency), but he didn't know the value of the watch in ugandan shillings. He was given the exchange currency below;

1 swiss Franc= 1.28 Deutsche Marks

1 swiss Franc =1350 Ugandan shillings

a) What was the value of the car at the time Mesach wanted to sell it off?

b) Find the value of the watch in ugandan shillings

ITEM 30

A carpenter is known for crafting traditional wooden doors with elaborate geometric patterns . He wishes to make a door with a circular design at its centre. He ensures the circular design fits perfectly with in the rectangular frame of the door with 2.5m high and 1.5m wide. The circular design must touch the two parallel sides of the door frame.

He also buys vanish packed in tins of 1 litre and each at cost of shs.9000. It's known that one litre of vanish can paint 1 square metre.

a) Help tge carpenter determine how much of the frame will be covered by the circular design.

b) will one tin of vanish be enough for the circular design? Give reasons.

c) With reasons, help the carpenter determine how much will be spent to buy vanish that will paint the entire frame of the door.

ITEM 31

On Mukasa's farm, Peter bought 10 goats and 10 cows at a total of ugx 13000000. Paul bought 5cows and 20 goats at ugx.11,000,000. How much does each animal cost.

b) Jackson and Enock went to the school canteen, Jackson paid ugx.1500 for one chapatti and one cake . Enock spent ugx.3500 on one cake and three chapattis . How much does each cake and each chapatti cost?

ITEM 32

During a mathematics lesson, Mr.Mukhwana taught some learners how to rotate and enlarge different shapes given the centre and angle of rotation, scale factor and centre of enlargement. You are to help the absentees catchup with the next lesson.Given the triangle with vertices A(1,3),B(3,3) and C(3,1) to be enlarged with scale factor -4 about (2,2) and then rotate it through positive quarter turn about (0,-4) to a similar shape.

a) Use a graph paper to determine the vertices of the image of the triangle and hence confirm whether the shape of triangle remains the same after enlargement and rotation .

b) Help the absentees to find out the areas of the object and its images, hence comment on the areas.

ITEM 33

5 men working at the same rate can prepare a site for construction in 18 days. If 8 men work at the same rate, how long Will they take to prepare the same construction site?

b) A school compassion association announced a need to donate to support the friends who had challenges in clearing their school dues. Munialo the secretary contributed twice as much as Dickson the mobilizer and Precious the Chairperson contributed twice as much as Munialo . The total contribution from the three members was ugx.105,000. Determine the amount each member contributed.

ITEM 34

Given point A(2,4) and B(-3,5) , Find the coordinates of point C that divides the line segment AB externally in the ratio 3:-2.

b) Points A(1,3),B(4,5),C(-2,-4) are coordinates on the Cartesian plane. Obtain the coordinates of point D such that CD=6AB

ITEM 35

Given that f(x)=2x and g(x)=x-3. Find;

a) $fg(x^2)$

b) $gf(4)^{-1}$