Senior one and two end of cycle sample questions

Number bases

Question 1

Karyn owns a bakery in Kampala. She uses a base eight system to display the prices of different prices of bread in dollars. In her display, each digit from 0 to 7 represents a specific price value as shown in the table below

Digit	Price value in dollars
0	2.5
1	3.0
2	3.5
3	4.0
4	4.5
5	5.0
6	5.5
7	6.0

She sells each loaf of bread at 256 base eight. Oscar is a business man who buys 100 loaves of bread daily from the bakery and sells each loaf at UGX 70000. He is given a discount of 5% on every loaf of bread.

Task

a) Determine the price of 1 loaf of bread in dollars
b) Given that $1\text{USD} = \text{UGX}3800$, Help Oscar to determine his percentage profit.

Question 2

Your mathematics teacher has promised to award his best three students Maria, Monica and Mariam with 126 counter books. Each counter book costs UGX12000 in the market. Maria will receive 42 counter books in base 6. Monica will receive 36 counter books in base 8. Mariam will receive the share of her counter books in base 10. To provide accountability to the school head teacher, the mathematics teacher intends to present the data on appropriate chart to the head teacher.

Task

a) Determine how much money was spent in buying Mariam's Counter books
b) Help the teacher to present the data to the school head teacher.

Question 3

Wilson and Ronald are students of the same school. They are working on a mathematics assignment that involves number bases. Wilson is working in base 6 while Ronald is working in base 8. Wilsons number is 24 written on a white cardboard while Ronald's number is 32 written on a blue cardboard. They are all aiming at find the least number that can divide all the two numbers. Wilson′s class has 5 streams with 15 students each while Ronald's class has 2 streams with 24 students each. The school wishes to determine the minimum number of students each stream should have so that they contain the same number of students.

Task

a) Help Wilson and Ronald to determine the least number that can divide all the two numbers
b) Help the school to determine the number of students each stream should have?

Question 4

Your school has received a new set of mathematics books for the lower secondary school curriculum from the ministry of education and sports. The school is arranging the books into boxes to hand them over to the school librarian. The school decides to arrange the books in rows on different number bases. The first box is arranged in base 2, the second box in base 3 and the third in base 5. Each box has equal number of books in each row. The first box contains rows of books. The second box contains 9 rows of books and the third box contains 8 rows of books. The librarian is creating selves and each self will contain equal number of books. Each book costs UGX25000

Task

a) Determine the total number of books that the school received from the ministry of education and sports.
b) How many books will the librarian arrange in each shelf?
c) Determine the amount of money spent in buying each box of books

Question 5

Scovia locks her phone with a password "MATH" after using it. Each letter in the password represents a number in base five. M represents 13, A represents 1, T represents 20 and 8 represents 8. Ruth wants to use the phone but needs to combine the numbers in base 10 to unlock the phone. Scovia bought the phone at UGX780000. She plans to sell the phone to Ruth at UGX1080000. Scovia plans to use part of the money to buy a crate of soda that has 24 bottles for her birthday and save the rest. Each bottle of soda costsUGX12000.

Task

a) What number should Ruth use to unlock the phone?
b) Determine Scovia's percentage profit
c) Express the amount of money that will be used to buy the crate of soda as a percentage of the amount of money that will be save.

Question 6

A telecommunication company in Uganda offers a special promotion to all customers having their brand smartphone. The promotion allows customers to convert their loyalty points to a specific amount of money in US dollars and finally to Ugandan shillings (UGX) basing on a unique number base system. In this system, the digit 3 in the loyalty points is equivalent to the digit 5 in the decimal system. Joshua accumulates 243 loyalty points every week. Each loyalty point can be converted to UGX 11400. The company sells each phone at a profit of 5%. They sell each phone at UGX585000.

Task

a) Determine the amount of money Joshua received for his loyalty points in US dollars for last week. Hence determine the total amount of money he will receive within 6 weeks.
b) Determine the cost price of each phone.

Question 7

James and Joan are students in the same school. James is holding a white card with numbers 24 and 45 written in base 6 on it. Joan is holding a blue card with the same numbers written in base 8 on it. They all want to find the least number that can divide the two numbers on their respective cards. James claims that he will be the first to obtain the correct answer since he is 5 years older than Joan.

Task

a) Determine the correct answer James will find
b) How old is Joan if the sum of the ages of the two students is 39.

Working with integers

Question 1

Your school plans to raise USD1100 that will be used in the construction of a new school library. The school organized a school carnival to raise money that will enable it achieve

the target. The table below shows the income generated and the expenses for in US dollars for the school carnival. The expenses are indicated in brackets

Games	Sports	Donations	Flyers (expenses)	Decorations (expenses)
650	530	52	28	75

The head teacher of the school plans to present the above data to the school management committee in one of the meetings this Saturday.

Task

a) Did the school reach its goal?
b) Using two different charts, help the head teacher to represent the data to the school management committee
c) Given that $1USD = 3800UGX$, determine the total amount of money the school remained with after expenses in UGX.

Question 2

A football team gains 3 points on the first tournament, loses 6 points on the second tournament, loses 3 points on the third tournament and gains 4 points on the fourth tournament. Each point gained is awarded UGX54500 and each point lost is deducted UGX12500. The team has 40 players who are either left footed or right footed. 28 players are right footed while 17 players are left footed. A player who is both left and right footed is awarded UGX 258000 by the football association.

Task

a) Determine the total amount of money the football team obtained from the four tournaments
b) How much money did the football management spend in awarding the players who are both right and left footed? (write your answer in words)

Question 3

You are playing a game on your computer using a spinner. You start with the spinner at blue and score 48, and spin the spinner four times to orange, spin the spinner three times again to green and finally spin the spinner 6 times to red. Each spin gives a score of 4.

Task

a) Write your total score in words
b) Using two different charts, display the scores at blue, orange, green and red

Question 4

James bought three bags at UGX 45000 each after being given a discount of 5% on the original price of each of the bags from a shop in Kampala. He bought oranges at UGX500 each and put in the bags. Each bag contained 8 oranges. James then decided to share them with his four friend Joshua, Jakin, Jack and Jadon by dividing them equally in to four groups. He bought 10 more oranges later on and added them to the total number of oranges he had. James realized that he had to multiply the sum of the oranges by 2 to determine the final count. Joshua being the oldest of the other four friends by 2 years claims that he should be given more oranges. The sum of the ages of the five people when pressed on a calculator was found to be 77.

Task

a) Determine the total amount of money of the final count.
b) What is total original cost of the three bags
c) Determine the ages of the five people.

Question 5

Your sports teacher is organizing a sports event this Saturday. He wants to buy sports equipment sets that include basketballs and footballs for their activities. He has three different sets to choose from: Set A includes 8 basketballs and 12 footballs, Set B includes 6 basketballs and 18 footballs and Set C includes 10 basketballs and 15 footballs. Each ball in set A costs UGX80000, each ball in set B costs UGX 8000 more than that in Set A and each ball in Set C costs UGX12000 more than that in Set B. The sports teacher wants to figure out the total number of each type of ball he needs to buy to ensure that each activity group has the required number of balls without shortage or wastage.

Task

a) Determine the total amount of money he must spend in buying to balls to achieve his target.
b) The sports teacher has UGX 7800000 for buying the balls, he wants to use 10% of the balance to purchase mineral water. Determine how much he has to spend on mineral water.

Question 6

Your high school friend spent UGX15000 in buying apples. He wants to distribute the apples equally among his other friends. If he gives each friend x apples , he will have 3 apples remaining. Each apple costs UGX1000. Emily, Michael and Sophia are among your best friends as well. Emily has 18 apples in her bag. Michael has 24 bags in his bag

while Sophia has 30 apples in her bag too. They want to find the highest equal number of apples that should be put in each bag and the least equal number of apples each bag can contain.

Task

a) Determine the number of apples (x) each friend will receive from your friend.
b) Help Emily, Michael and Sophia to address the challenge.

Question 7

Your brother went to school to do mathematics practice on the chalkboard. During his practice, he pressed a number on a calculator, added the square of 5 to the number. He later realized that when he divides the result by 4, he gets 5 times the number. After the practice, your brother left school and walked 5 kilometers to a trading centre to buy water, he then walked in the north east to his friend's home and rested there for some hours before walking 6 kilometers in the western direction to a supermarket to buy some scholastic materials for mathematics practice in the coming days. Your home is 5 kilometers due south of the supermarket.

Task

a) Help your brother to find out the number.
b) How far is your home from the school using the direct route?

FRACTIONS, PERCENTAGES AND DECIMAL

Question 1

Your uncle works as a sales agent in a cement manufacturing company. He is paid a basic monthly salary of UGX1800000. He is paid UGX400000 for every 25 bags of cement he sells. Your uncle sells 400 bags of cement in a month. He decides to save 20% of total salary every month and share the 10% of it among his four children in the ratio of 2:3:4:1 according to their ages. The eldest child receives the highest amount of money. His daily expenses are UGX 20000. The rest of the money is invested in to the family business.

Task

a) How much money is invested in to the family business every month?
b) Work out how much money the youngest child gets

Question 2

Annet bought fruits consisting of mangoes, guavas, oranges and passion fruits in the ratio of 2:4:4:2 from a fruit store. He ate $\frac{1}{4}$ of the fruits and gave away 40% of the remaining oranges to his friends. She sold the rest of the fruits to his neighbor at UGX1500 each. Each fruit in the fruit store costs a UGX800. She bought 14 passion fruits from the fruit store.

Task

a) Determine her percentage profit.
b) Display the information using an appropriate chart.

Question 3

A secondary school consists of 24 lower secondary school prefects. The prefects plan to hold a meeting this Saturday in one of the school hall. The school hall can accommodate many people as it has single seats arranged in 8 rows and 12 columns. The school has bought 48 bottles of mineral water, 120 bottles of soda and 84 cups of juice. 17 prefects drink soda, 12.5% of the prefects do not drink soda or juice and 9 prefects drink juice. Each bottle of the drinks costs UGX4000

Task

a) Using appropriate chart, display the categories of drinks bought
b) Work out how much money was used to buy bottles of drinks for people who drink both soda and juice if they will drink two bottles each.

Question 4

Oscar wants to design a triangular garden in her backyard. The base of the triangular garden is 12 metres long and the height is 8 metres. He plans to divide the garden in to three equal sections to plant different flowers. Oscar decides to allocate $\frac{1}{3}$ of the garden to roses, $\frac{1}{4}$ to tulips and the remaining section to sunflowers. Oscar realizes that the roses need 40% of their section to grow properly, the tulips need 25% and the sunflowers require 35%. Oscar decides to install a decorative border around the perimeter so that it just touches the edges of the garden and the border costs UGX50000 per metre.

Task

a) What is the total cost of installing the decorative border?
b) What is the area in square meters allocated to each type of flower?

c) Find out how many square metres of each flower bed should be allocated for optimal growth.

Question 5

The village hunters standing by the roadside need to navigate through the game park to find three different wild animals, cob, rhino and porcupine resting at three different places. The village hunters need to move northeast to find the cob and turn southward to find the rhino before turning southwest to find where the porcupine is resting. The distance from the road to the cob is 25% of the total distance and the distance to the rhino is 40% of the total distance. The remaining distance to the porcupine accounts for the remaining 35%. The distance to the cob from the village hunters is 500 metes

Task

a) Work out the total distance the village hunters need to cover.
b) What angle should the hunters turn through if they are to move from the road to the porcupine?

Question 6

Mr. Amara is a village farmer. He owns a triangular garden with sides measuring $(x + 2)$ metres, $x + 5)$ metres and $(x + 8)$ meters. Mr. Amara wants to build a circular fence around the garden in such a way that it just touches the corners of the garden without entering it to keep out animals. The fencing material costs UGX7800 per meter. He wants to fence $\frac{3}{4}$ of the perimeter of the garden and leave the remainder unfenced for an entrance. The perimeter of the garden is 45 metres. The garden will be used to grow trees and each tree will occupy $2m^2$ of space of the garden

Task

a) Determine the cost of fencing the garden
b) Work out the total number of trees that can be planted in the garden

Question 7

Your sister, Mercy works in one of the non-governmental organizations in Uganda. She is paid a monthly salary of UGX8800000. Your sister decides to invest a portion of her total savings in a fixed deposit account that offers a simple interest rate of 5% per month. She invests $\frac{1}{3}$ of her total savings which amounts to UGX1400000. Mercy saves 30% of her monthly salary and uses the remainder to pay school fees.

Task

a) Determine the amount of money she withdraws from the fixed deposit account after 4 years.
b) Work out her total savings in 2 years.

Coordinate plane

Question 1

You and your friend have tickets to watch a football match in Kampala in which only 12500 spectators are expected to attend. You sit inside the VIP section and your friend sits at $(-5,-3)$. The football pitch is located at positions $(-4,-3),(4,3),(-4,3)\ and\ (4,3)$. Each unit is equal to 20 metres. The football match has been organized by the football association to raise funds required to fence the football pitch where by each spectator will pay UGX1000. UGX 20000 will be used to fence every 2 meters of the perimeter of the pitch and 40% of the balance will be distributed equally by the football association to the 46 football players that will participate the football match and the remainder will be saved in a bank account that offers a 8% simple interest rate per month.

Task

a) Using a suitable graph, display the position of your friend and determine the area of the football pitch.
b) Workout the amount of money the football association will withdraw from the bank after 3 years

Question 2

Your school is located at $(2,-1)$, which is 2 blocks east and 1 block south of the centre of town. To get from your house to the school, you walk 5 blocks west and 2 blocks north. The school is near the houses of four of your friends Alex, Bernard, Cathy and Dalton. Alex's house is 600 meters north of the school, Bernard's house is 300 metres on 60° east of north of the school. Cath's house is half kilometer on south of east of the school while Dalton's house is south west of the school. Dalton's house is 400 metres from the school.

Task

a) Is your school or your school closer to the centre of town? use a suitable graph
b) Show accurately the position of the houses of the four friends and determine how far Dalton's house is from Alex's house

Question 3

Three people Amon, Anthony and Mark are village friends. They decided to go hunting for wild animals in a village forest. They left their bottle of water at point A(2,4) and their spears at point B(-1,1) and started tracing the wild animals from point C(5,3). While exploring the area the next day, they discovered a mysterious circular rock enclosing the area formed by three points just touching the tips of the three points

Task

a) Using a graph and suitable geometric instruments, show the design of the area covered by circular rock
b) Work out the area of the circular rock

Question 4

Jerome is a village farmer in Iganga district. He has rectangular farm land whose corners are at points $A(2,3), B(2,7), C(8,7), and\ (8,3)$. He bought the farm land from his neighbor 2 years ago at a total cost of UGX8400000. Jerome plans to sell the farm land to his friend Destiny. He wants to sell each square meter of the farm land at UGX120000 and save the profits obtained in a fixed deposit account that offers a 2% simple interest rate per month for 2 years. Each unit of the length or width of the farm land represents 5 metres of the actual size.

Task

a) Using a suitable graph, present the design of the farm land
b) How much money will Jerome withdraw from the bank after 2 years?

Question 5

Your school has designed a rectangular meal card whose corners are at points P(2,7), Q(6,7) R(6,-2) and S(2,-2) to help in school fees collection. The meal card is unique with a triangular design whose tips are at points (1,2),(3,4) and (5,6) inside it. A student in senior one has drawn a circular design that just touches the three edges of the triangular design.

Task

a) Present the design of the card on a suitable graph
b) Work out the area of the card covered by the circular design

Question 6

A new football coach of an English premier club is designing a new style of play for his team on a coordinate plane that represents a football pitch. The goalposts are located at points $A(2,4)$ and $B(2,-4)$. The football coach wants the team to practice running a play to facilitate counter attack against the opponent where the centre back starts the ball at point $Q(-3,1)$ and throws the ball in a straight line to the wide midfielder at point $(4,-2)$.The football club has a total of 40 players. 28 of the players can defend, 14 can attack while 2 of the players can neither attack nor defend. A player who can both defend and attack receives a weekly bonus

Task

a) The football coach would like to present his new style to the board of directors of the club, help him to address this challenge.
b) Write an equation that represents the path of the ball
c) How many players receive the weekly bonus?

Question 7

Your school has planted trees in a rectangular pattern to beautify the school compound. The design of the planted trees shows tree A at point (3,5), Tree B at point $(-2,4)$, Tree C at point $(1,-1)$ and Tree D at point $(-3,-2)$. The school wants to create a walking path that connects all the trees in the most efficient way possible and a straight road that passes diagonally from a tree at one corner to the tree in the other corner.

Task

a) Using a suitable graph show the design of the planted trees
b) Find the total distance of the walking path that connects all the four trees
c) Determine the length of the diagonal path and write its equation.