



MTC THEME ONE SAMPLE ITEMS

Numbers (Summary of Topics)

1. Number Bases

- ❖ Place value in different bases
- ❖ Converting from one base to another

2. Integers

- ❖ Positive and negative numbers
- ❖ Operations with integers (addition, subtraction, multiplication, division)

3. Fractions, Decimals & Percentages

- ❖ Types of fractions (proper, improper, mixed)
- ❖ Conversions between fractions, decimals, percentages
- ❖ Operations with fractions and decimals
- ❖ Applications in daily life

4. Rectangular Cartesian Coordinates (2D)

- ❖ Plotting and locating points on the plane
- ❖ Interpreting coordinate pairs

5. Ratios & Proportions (extension / appears later but fits well here)

- ❖ Simplifying ratios
- ❖ Equivalent ratios
- ❖ Direct & inverse proportion
- ❖ Word problems and real-life applications

6. Numerical Concepts I

- ❖ Laws of indices (exponents)
- ❖ Introduction to logarithms
- ❖ Solving simple exponential and logarithmic problems

7. Numerical Concepts II

- ❖ Indices and logarithms (advanced applications)
- ❖ Introduction to surds
- ❖ Simplifying and operating with surds
- ❖ Rationalizing denominators

ITEM 1

Two friends formed a partnership and agreed to deal in animal feeds. Amos contributed seven hundred and fifty thousand shillings while Brian contributed UGX.900,000. They agreed to save $\frac{1}{5}$ of their gross profit in their joint account and further use 20% of the remainder to buy materials for new products and thereafter, share the net profit in the ratio of their initial contribution.

At the end of their first year of operation, they made gross profits amounting to UGX 3,160,000 and Brian deposited Amos's share on his account but Amos was not sure if it was actual amount he was supposed to get so he sought for your help to avoid biasness. Amos sent you to withdraw some money from his phone but had forgotten the pin however remembered that he had saved it as 179 in decimal base which he converts to base five to get the actual pin.

TASK

- (a) Show Amos how to determine the actual amount that was to be deposited in his bank account.
- (b) How did you manage to get the actual pin in order to make the withdrawal from Amos's phone?

ITEM 2

Musa bought 25 text books and 35 exercise books at Ugx. 135,000 from Kampala modern styles bookshop. From the same bookshop Menya bought 21 text books and 38 exercise books and spent Ugx. 13,000 less than Musa's expenditure.

In Mukono bookshop the cost of a text book is 5% less and that of an exercise book is 5% more than in Kampala modern styles bookshop. Menya still bought the same number of text books and exercise books and even Musa from Mukono bookshop.

TASK

- (a) As a senior four student, help Musa and Menya to find out the price of an exercise book and a text book in Kampala modern styles book shop.
- (b) Which bookshop would you advise Musa and Menya to buy from and why?

ITEM 3

Miria has a stall in Masaka main market. She found out that her customers prefer buying in small quantities to large amounts and decides to repackage her tomatoes into heaps of six. One day, she bought ten heaps of tomatoes which had nine tomatoes each from the dealer at a cost of UGX 2500 per heap and was given a discount of 6%. She decides to sell her heaps of six tomatoes at UGX 2000 each and hence wants to know how much profit she will earn from all her heaps.

She further intends to visit the farmers trade show always organized every year at Saza grounds in Masaka city in 2025. Her friend Nyombi visited the trade show last year in 2024 with three children and spent UGX 22000 as entrance fee while her uncle James and his wife visited the show in 2023 with their two children and spent UGX 24000 as entrance fee. Miria intends to go to the show with her husband and their six children and hence needs to know how much she will pay for entrance fee. The entrance fee charges are adjusted after every four years and were last adjusted in 2023

TASK

Help Miria to know how much

- (a) Profit she will earn from her heaps after re-packaging per day.
- (b) Money she will spend in total to pay for the entrance at the show.

ITEM 4

A vendor dealing in spices mixes different spices for her customers' needs. The vendor borrowed shs100,000 from a SACCO that requires her to return the money with an increase of 5%. She used the money to buy 120kg of spice C and due to its high demand, she was able to sell $\frac{1}{6}$ of it to make enough money to pay back what she owed the SACCO. However, she found it difficult to bank the money since she cannot ably fill the amount in words on the deposit slip, she mixes 200g of A with 150g of B and 250g of C for a perfect mixture of tea spice.

She has got a client who wants the tea spice with 1800g of A but is not sure of the amount of B to mix in order to get the perfect mixture.

She wants to reduce the price of the remaining kilograms by shs100 since it has a short shelf-life but needs help to determine the amount of money she would get before she makes the decision.

TASK

- (a) Help the vendor to write the money on the deposit slip.
- (b) Show the vendor how to determine the quantity of B and c needed to make the perfect mixture for her client.
- (c) Determine the amount of money she will make if she reduces the price by shs100.

ITEM 5

My siblings and I, want to surprise our father on his birthday, my siblings are planning to buy our father a gift on that day. The initial plan was that each one buys their own gift but later they realized that if they do it as the children of the family would be cheaper. So, they mobilized themselves and each contributed as follows;

Betty contributed one hundred thirty-three thousand two hundred fifty shillings.

Suzan contributed $\frac{3}{2}$ of the amount Betty contributed.

Simon contributed 20% more than that of Betty.

Prossy contributed a fraction which is $\frac{1}{5}$ less than that of what Suzan contributed.

Maria contributed the balance required to make Shs 800,000 which was the cost of the gift.

On the birthday, the money was given to Maria to buy the gift in town. From Home, Maria used a boda-boda moving at 10kmh^{-1} , they moved for 30 minutes due west and then 15 minutes due south to reach town.

TASK

- (a) Identify the amount each contributed towards the birthday gift and who of the siblings contributed more money.
- (b) In which other way could they contribute the money more fairly and equally and by how much would each contribute.
- (c) Help Simon to locate the direct route from home where Maria has gone to buy the gift after taking long to come back.

ITEM 6

Dr. Akera a resident of Abim town council, has three of his children studying at Gulu: Monica, who is 10 years old; Fortunate who is 15 years old, and Bernard, who is 25 years old. He instructed Bernard to withdraw from his account the sum of five million shillings and share among themselves in the ratio of their ages. Bernard who is a student of Law at Gulu University spent 70% of his share on tuition fees, a fifth of the remainder on meals and the rest on accommodation, upon reaching Stanbic bank Gulu, Bernard realized that his father had not given him the ATM pin, wanted to call but their younger sister, Monica stopped him and gave him to piece of paper containing the number (1979) then Monica added that "Dad said we should convert this to base nine to get the actual pin.

TASK

- (a) Help these Children to get the actual pin.
- (b) Determine the monthly rental rate of Bernard, given that there are four months in a semester.
- (c) How much fees did Monica and Fortunate receive respectively?

ITEM 7

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.

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ITEM 8

Birabwa is a market vendor who sells vegetables in Jinja Central market. She buys her produce from farmers in nearby farming villages. This week she bought 8 packs of tomatoes containing 10 tomatoes from a farmer's garden. She sold 25% of the total number of packs before her longtime friend Afua came to visit her and decided to take her out for a drink at a hotel.

At the hotel, the friend ordered for 2 cups of hot coffee worth Shs 5,100 and 2 plates of food each at Shs 20,000. While enjoying their evening meal, Afua informs Birabwa that she goes to the hotel gym after every four days. Birabwa is impressed and she also resolves to come to the same gym every after a week to do exercise.

After the meal and the chat, her friend gave Birabwa Shs 20,000 for transport back to the market. Unfortunately, she found that one sixth of the remaining packs of tomatoes had been damaged and she could not sell them. She decided to re-pack the undamaged tomatoes in new packs of five tomatoes.

TASK

- (a) What percentage of the total number of tomatoes is damaged?
- (b) How many packs of fives and five fives did she get after packing again?
- (c) After how many days will she meet her friend again at the hotel gym?
- (d) How much money (in words) did her friend spend on the outing?

ITEM 9

Madam Namagembe bought three large cooking pots with capacities of 36 litres, 48 litres, and 60 litres respectively for her newly opened community kitchen. A land planner drew the site layout showing an area of 6.25 cm^2 on a map drawn to a scale of 1:200,000.

She later hired a new coordinator, who was told to convert the code 213five to base ten in order to access the storage records. Upon inspection, the new coordinator also realized that only 3 out of every 5 of the 300 utensils had been labelled.

TASKS

- (a) What is the largest possible volume, in litres, of a single jug that can be used to completely empty each pot without any remainder?
- (b) Calculate the actual area of the land in square kilometres.
- (c) Help the coordinator convert the code "213five" to base ten.
- (d) How many utensils still need to be labelled?

ITEM 10

Mukasa has bought 48 broilers, 60 layers and 72 local chicken to start a poultry farm. He was advised not to mix up these birds yet he wants to put an equal number of birds in different cages. Mukasa does not know the highest number of birds he can put in each cage.

He has been given a formula of mixing feeds for birds as $a + b\sqrt{c}$ which must be deduced from $\frac{3\sqrt{2}+\sqrt{3}}{\sqrt{3}-\sqrt{2}}$

When Mukasa went abroad, he sent four million one hundred twenty-five thousand Uganda shillings to his wife. He instructed her to use only 0.4848.. expenses and invest the balance in their poultry project for family

TASK

Help;

- (a) Mukasa to know the highest equal number of birds he can put in each cage without mixing them.
- (b) Mukasa to understand the formula for mixing feeds using figures.
- (c) Mukasa's wife to determine the amount of money to invest in the poultry project.

Wishing you great success in your exams

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