



**COMPETENCE BASED MATHEMATICS BY
ALADIN**

NAME OF STUDENT:

SCHOOL:

CLASS: **YEAR:**

FUTURE CAREER:

SKILLS:

Practice to surpass

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PREFACE

In the rapidly evolving landscape of the 21st century, education must adapt to meet the demands of a dynamic and interconnected world. As educators, we have the responsibility to equip our students with the skills and competencies necessary to thrive in this environment. It is with this vision that I, Agaba Ashraf, a dedicated teacher at Kololo Senior Secondary School, present this Scenario-Based Practice Book.

Aligned meticulously with the National Curriculum Development Centre (NCDC) syllabus under the Competence Based Curriculum, this book is designed to bridge the gap between theoretical knowledge and real-world application. Through carefully crafted scenarios, students are encouraged to engage actively with the material, fostering critical thinking, problem-solving, and decision-making skills. These are the cornerstones of a competent 21st-century learner.

The core aim of this practice book is to help students develop not only academic excellence but also societal skills that will enable them to navigate and contribute positively to their communities. Each scenario is crafted to challenge students, urging them to think beyond the classroom and consider the broader implications of their actions and decisions.

In developing this book, I have drawn upon my experiences as an educator and my commitment to fostering a learner-centric environment. The scenarios presented within these pages are more than just exercises; they are opportunities for students to engage with the content deeply, apply their knowledge creatively, and cultivate a mindset geared towards continuous learning and improvement.

As you embark on this journey, I encourage you to approach each scenario with curiosity and an open mind. Embrace the challenges, reflect on your experiences, and strive to surpass your own expectations. Together, let us pave the way for the next generation of students who are not only knowledgeable but also capable of making meaningful contributions to society.

Thank you for choosing this practice book as a tool for your educational journey. May it inspire and empower you to achieve your fullest potential.

Sincerely,

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NUMBER BASES, INTEGERS AND PERCENTEGES

ITEM 1

On April 4, 2020 the Covid-19 task force started the distribution of food in Kawempe Division (Kampala District). Each member in the household was given a package containing 6 kgs of maize flour and 3 kgs of beans. There are 10 households in the community with 3, 5, 7, 4, 6, 5, 8, 12, 13, 4 members respectively. The prices of beans and maize flour was approximated to be UGX. 4,000 and UGX. 2,500 per kilogram respectively.

Task:

- Determine the number of packages the task force distributed in Kawempe division.
- Determine the total weight of the maize flour that was distributed in the division.
- In case there are some remaining packages, briefly discuss what the task force should do with them.
- What is the total amount of money spent by the government on maize flour and beans in the 10 households.

ITEM 2

A wildlife conservation organization received a grant of UGX 50,000,000 to support various conservation projects. The organization decided to allocate the grant to three main projects: forest restoration, wildlife protection, and environmental education. The allocations were decided based on the importance and urgency of each project: Forest Restoration: 40% of the grant Wildlife Protection: 35% of the grant Environmental Education: 25% of the grant The forest restoration project plans to plant trees costing UGX 5,000 each. The forest project plan laid is planting around 2,650 trees but the amount is not enough, the CEO suggests that the remaining amount of money should be added to forest restoration.

Tasks:

- Determine the amount of money allocated for each project.
- Find the total amount of money allocated to forest restoration
- Based on mathematical calculation, state the possible cost of planting one tree.

ITEM 3

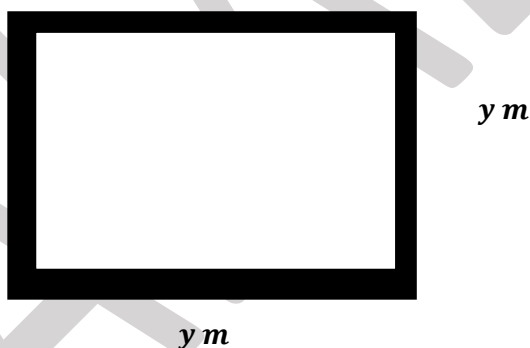


Tasks:

- a) State three short reasons as to why Janat and Rahma want to know the number of scoops?
- b) (i) Write down a combined linear equation we can use to describe the relation connecting the cost and amount of scoops.
(ii) Find the cost of each scoop of ice cream.
- c) (i) Represent the above equation (relation) on a graph paper.
(ii) use the graph to find Janat's expenditure.

ITEM 20

Musa would like to buy a certain piece of land. Unfortunately, he does not have a measuring tool to find the actual size of this land. He wants to put a square hedge of flowers around the plot. The width of this hedge is to be 2 m and the area it's to cover is 112 m^2 . Suppose he bought this piece of land at 2,000 dollars. Flowering each square metre of the hedge costs shs. 5,000. (1 dollar is 3,600 shillings)

Support:**Tasks:**

- i) Find the dimensions of the rectangular piece of land.
- ii) What is the area of the piece of land.
- iii) How much will it cost Musa to buy the land and flower the stated area.

ITEM 21

Some island is a coastal village located on the edge of a large bay, which has been facing a critical issue with insufficient access to fresh water for a long time. The government, in partnership with an international aid organization, plans to establish a freshwater reservoir that can supply water to the entire village. According to a geological survey conducted by the engineers, the village is approximately in the shape of a triangle XYZ, with $\overline{XY} = 14 \text{ km}$ along the coastline. Side $\overline{YZ} = 11 \text{ km}$, and $\overline{XZ} = 9 \text{ km}$. The reservoir is to be established at the point where the angle bisectors of the triangle meet, known as the incenter.

Tasks:

- As part of the engineering team, create an accurate scale drawing of the village.
- Use the scale drawing to find the interior angles.
- Determine the exact location of point I, where the freshwater reservoir should be established.
- Assuming that the reservoir can supply water to the entire village, draw a locus around the reservoir that shows the area of easy access to the reservoir.
- Measure its distance show the region covered by the water supply.

BEARING AND DIRECTION, VECTORS

Note: Under this chapter most of the times you have to generate a suitable scale on your own. Always use a graph paper when you are developing the layouts for accuracy.

ITEM 37

Abbo a friend to Asiimwe, Nicole, Mulungi and Bua whose has a birthday tomorrow and her home is not known clearly. Asiimwe's home is located 40 km East and 20 km North of Bua's home. Nicole stays 100 km North of Bua's home. Mulungi is 20 km East and 11 km North of Bua's home. Abbo organized a birthday party stationed 100 km North East of Bua's home.

Tasks:

On a cartesian plane, draw the location of Abbo's home to help direct the friends to the venue.



BUSINESS MATHEMATICS

ITEM 120

A customer wants to buy cooking oil from an oil factory which offers a trade discount of 2% to its customers. It also offers a 1% cash discount to any customer who pays cash for the oil bought. The factory price for a 20-litre jerrican of cooking oil is shs. 30,000. The customer buys some jerricans and plans to increase on his stock in the coming year. He is planning to borrow shs. 2,400,000 in a bank which offers a loan at a compound interest rate of 2.75% per four months. He buys a number of jerricans using this amount and sells each jerrican at his shop at shs. 40,000 each.

Tasks:

- Find the amount of money a customer saves by paying cash for 100 jerricans of the oil.
- How many jerricans is he to buy using the borrowed money if he pays cash.
- What profit is he able to generate during the new year.
- Find the amount of money that he is supposed to return to the bank at the end of the year.

ITEM 121

A hawker sells T- shirts at UGX. 8,000 each. He sold 50 T- shirts in the first week. In the second week he sold 20% more than in the first week. In the third week he sold 10% more than in the second week, he receives a commission of 8% on the price of the first 20 T-shirts sold, and 12% for any T- shirts sold in excess of 20. In the fourth week, the hawker received a commission of UGX. 65,600.

Tasks:





If he wants to buy 60 m of fencing material to cover three sides but there are two types of materials that cost UGX. 6,000,000 each with type A given at 10% discount and type B given at a 20% discount. Kapere's objective is to construct a simple compartment with an area of 450 m^2 that can be enough for his telescope, his sit and even small movements.

Tasks:

- Basing on mathematical calculations, advise the Kapere on how to choose the length and width of this compartment.
- Find how much he is about to spend on each type of fencing material.
- Using critical analysis, help him choose the fencing type material to use for his desired place.

ITEM 146

SMIGO has a rectangular enclosure for his poultry farm which measures 15 m long by 10 m wide. Due to the increase in demand for chicken he thought of doubling the size of the enclosure by adding exactly the same distance on either side. He wishes to put up a new fence and wants every pole to be 2 metres from the other while surrounding his farm. He wants to order the poles and the fencing net online which cost UGX. 6,500 per meter and UGX. 3,500 per pole but does not know in what measurements he should buy. Only one pole along the width should be 1 m apart from the corner.

Tasks:

As his friend;

- Help this farmer to come up with the dimensions of his enclosure in order to satisfy the demand of the customers.
- Come up with business sheet that shows the expenditure that his about to undergo.

ITEM 147

Tasks:

- (i) Express the amount of wheat used as a function of the number of times.
- (ii) Calculate the amount of wheat required to produce 100 chapatis.
- (iii) Determine how many chapatis can be produced if 10 kilograms of wheat are available.
- (iv) What weight of flour can be used in 5 hours hence how many chapatis are produced.

CIRCLES AND LOCI

ITEM 173

A local farmer in Budumba village wants to install a sprinkler system in their field to ensure even irrigation. The sprinkler is in such a way that it distributes water evenly across all sides from the fixed distributing point. The square field is of side 42 metres. Seeking expertise, they have engaged you as an expert, known for their innovative agricultural solutions to design this irrigation setup. The cost charges are 3,000/= per square meter of irrigation area. (take $\pi = \frac{22}{7}$)

Tasks:

- a) Help the farmer to design the irrigation layout, with the best position of the sprinkler such that a bigger part of the field is irrigated.
- b) Determine the total area covered by the irrigation system.
- c) Calculate the area of the part that is not irrigated.
- e) Calculate the project cost for the farmer in Budumba.

ITEM 174

A local theater group in Setta wants to host outdoor performances in a beautiful park. They wish to accommodate a certain number of viewers with a circular seating arrangement with the first seats a distance of 7 m from the center. The seats are arranged in concentric circles with no space left between seats on either

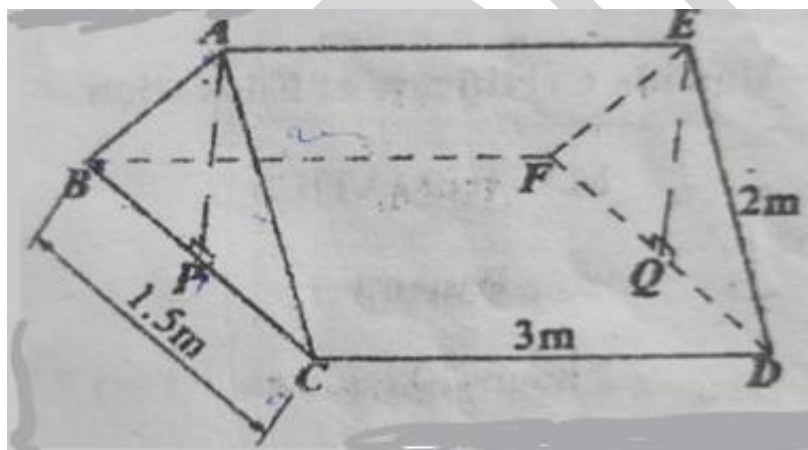


THREE DIMENSIONAL FIGURES

ITEM 198

In a company that makes tents, there are two departments that work together. Department X that works on the tent frames and Y that works on surfaces to cover the tent using leather material. Department X has been tasked by the boss to make a new tent because the cuboidal tents that were always made are not generating genuine profits. The proposed tent is in form of the shape $ABCDEF$ below with sides $\overline{BC} = 1.5\text{ m}$, $\overline{CD} = 3\text{ m}$ and the slanting edges are 2 m long.

Support:



The leather material is to cover all sides of the tent except the base and each square meter worked on costs UGX. 65,000.

Tasks:

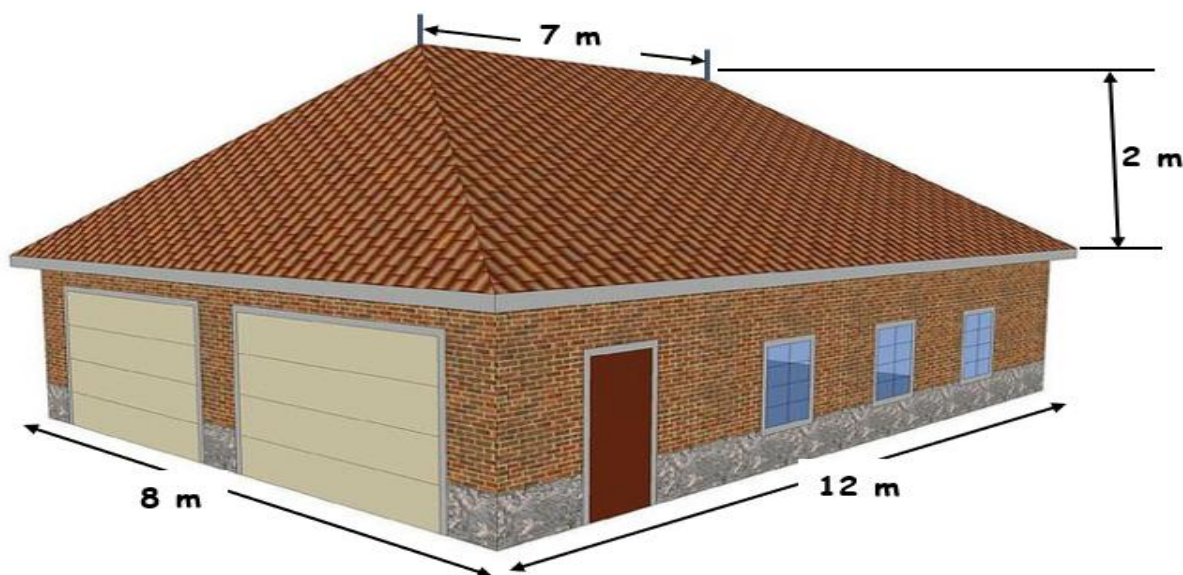
- Being a coordinator and an analyst of the two departments, determine the height department X is to use from the base to the upper edge.
- At what angle should the metallic pipe CA be inclined from CB .
- Help department Y know the angle between the surfaces $ABFE$ and $ACDE$.
- Determine the surface area to be covered by the leather material.



- (a) Determine the of inclination of the floor of the swimming pool to the horizontal to enable the construction to be a success.
- (b) What amount of water is needed to fill this pool.
- (c) How long (to the nearest hour) will the pool take to get filled.

ITEM 210

In a certain village school, lessons are always taking place under trees. The local residents through the school administration decided combine resources and construct some small building to have some classes. With reference to the one of the neighbouring schools, the four walls of the building are constructed but the Engineers are looking for the proper way the roofs could slope. The neighbouring class building is as shown below with the respective measurements taken.



The building is of length 12 metres and width 8 metres, the ridge of the roof is 7 metres in length and must be symmetrically placed above the classroom house and 2 metres above the top level of the walls. The school is expecting money for iron



make 24 trips.

18. THREE DIMENSIONAL FIGURES

| | |
|---|--|
| ITEM 198 (a) 1.32 m (b) 41.4^0 (c) 22.02^0 (d) 12.375 m^2 (e) UGX. 804,375 | ITEM 199 (a) Type A: Shs. 2,838,000 Type B: Shs. 3,444,000 (b) He should choose Type A since it has a lower price and will minimize the costs. Or He should choose Type B since it is expensive and seems to be of better quality. |
| ITEM 200 (a) 25,600 bricks (b) UGX. 12,800,000 (c) cuboid and triangular prism (e) 1050 m^3 | ITEM 201 (a) 125 m (b) 53.13^0 (c) UGX. 4,250,000 |
| ITEM 202 (a) cylinder (b) 770 m^2 (c) 1,078,000 litres | ITEM 203 (a) 8400 tiles (b) 22,100 (c) 84 boxes (d) 176,085,600 |
| ITEM 204 (a) 8,000 litres (b) shs. 8,000,000 | ITEM 205 One seat occupies 34.5 cm^3 ; Shs. 250,000 |
| ITEM 206 (a) $23,335.19 \text{ cm}^3$ (b) 886.26 cm^2 | ITEM 207 (a) $12,144 \text{ cm}^3$ (b) Shs. 16,898,000 |
| ITEM 208 $9,266.86 \text{ cm}^3$ | ITEM 209 (a) 6.84^0 (b) 1,250,000 litres (c) 52 hours |
| ITEM 210 (a) Small roofs: 38.66^0 Big roofs: 26.56^0 (b) Area of the Taplin = 111 m^2 | ITEM 211 (a) 2925 ft^3 or 78.975 m^3 (b) UGX. 59,231.25 |
| ITEM 212 (a) 48,000 litres (b) UGX. 115,200,000 | ITEM 213 (a) The budgeted money will be enough since only UGX. 368,500 is used. (b) UGX. 4,000 |
| ITEM 214 (a) 160 boxes (b) 20 iron sheets (c) Shs. 370,000 | ITEM 215 15,489 jerricans |

