

NTENUNGI SECONDARY SCHOOL
MID TERM TWO EXAM, 2025
S2 Mathematics
Duration: 2hrs

Instructions to students:

- ❖ Attempt any **four** items from this paper

Item one (20 scores)

Rafiki is an entrepreneur who deals in purchase and selling of mattresses. He hired an engineer to construct for him a warehouse where he will be storing his mattresses. The floor of the warehouse will have its width shorter than the length by 20cm and the expected area of the floor is 800cm^2 . According to the plan of the warehouse, the height of the ceiling from the floor will be $\frac{1}{4}$ of the floor's length. Rafiki told the engineer that he will use the warehouse to store two types of mattresses A and B, whose numbers will be x and y respectively. In order for the engineer to meet all the contractual conditions, he generated the following mathematical expressions that will guide him to construct the desired warehouse: $x \geq 1$, $y \geq 1$, $x+3y \leq 15$, and $4x+3y \leq 24$. The engineer has consulted you as a learner of mathematics for some assistance in planning to construct the warehouse.

Task

Help the engineer to;

- Determine dimensions of the warehouse
- Determine volume of the warehouse
- Determine the maximum number of mattresses of both types, if type A has volume 20cm^3 and type B has volume 15cm^3
- Use the approach of shading the unwanted regions to find a feasible region that satisfies the contractual conditions of the desired warehouse

Item two (20 scores)

A designer is creating a triangular logo for Ntenungi Environment Management Association (NEMA), an environmental conservation club, at Ntenungi Secondary School. She wants to construct a triangle XYZ where $XY = 7\text{ cm}$, $YZ = 6\text{ cm}$, and angle $XYZ = 60^\circ$. She wants to place a circular badge exactly inside the triangle (an in-circle) and later draw this circle on a graph paper as a locus of points from the center of the cartesian plane.

Task:

As a learner of mathematics, help the designer to;

- Construct triangle XYZ with the given dimensions.
- Construct the in-circle of triangle XYZ.
- Measure and state the radius of the in-circle.
- Calculate the area of the in-circle (consider $\pi = 3.14$)
- (i) copy and paste the in-circle above on a graph paper with a clear cartesian plane and draw it as a locus of points from the center of the cartesian grid.
(ii) List at least **four** points through which the circle passes

Item three (20 scores)

During the second term holiday, Lira Secondary School organized an inter-school debate competition in Kampala. A team of debaters, accompanied by their teacher, boarded a school bus and left Lira at exactly 7:30 a.m. heading to Kampala, a distance of 380 km. The school bus moved without stopping at a steady speed of 60kmh^{-1} . Meanwhile, the team of tourists who had overslept in Kampala was called to officially attend a meeting in Lira at midday. At exactly 8:50 a.m., the tourists set off from Kampala in a Pajero driving towards Lira at a steady speed of 120kmh^{-1} to catch up with the time of the meeting. A taxi conductor in Kisenyi bus-park landed on the program of these two journeys and he wants to analyze them using a graphical approach.

Task

As a learner of mathematics, help the taxi conductor to;

- Determine when the school bus will arrive in Kampala
- Determine when the Pajero will arrive in Lira
- Determine the time and distance from Kampala when the two vehicles will bypass each other.
- Determine how far apart the vehicles will be at 9:30am

Item four (20 scores)

A group of Senior Two students at Kiwumu High School were tasked with designing a miniature park on a Cartesian plane as part of their mathematics and design project. They assumed the origin (0, 0) to be the center of the park. The teacher instructed them to make one of the walkways in their designed park a straight line passing through the points A (2, 3) and B (6, 7). The teacher also told them to build a mirror monument along the line $x + y = 0$ and reflect the walkway and make its image so that it passes through A^1 and B^1 where A^1 is the image of A and B^1 is the image of B. The students consulted you to help them design the desired miniature as instructed by the teacher.

Task

Help the students to;

- Determine slope and equation of line AB, which represents the original walkway
- Determine reflections of points A and B
- Determine slope and equation of the reflected line A^1B^1 , which represents the image of the original walkway.

(Hint: lines AB, A^1B^1 and mirror line $x + y = 0$ must be plotted on your graph.)

Item five (20 scores)

Sarah, a student at Nyamwamba High School, carried out a small business project to raise funds for her school club. Over one week, she recorded the number of bottles of juice she sold each day: 20 on Monday, 35 on Tuesday, 30 on Wednesday, 25 on Thursday, and 40 on Friday. She sold each bottle at 2,000 UGX and bought each at 1,200 UGX. The club patron asked Sarah to analyze and summarize the data of the transactions she performed in that week. She also wants to find out on which day she made the highest sales and represent her sales data as instructed by the patron.

Task

As a learner of mathematics, help Sarah to;

- Determine the total bottles sold, average daily sales, and her total profit for the week.
- Identify the day she made the highest sales
- Determine her commission if the patron gives her 0.25% of the total profit as commission every week
- Present her sales on a bar graph
- Present her sales on a pie-chart

*******END*******