MBARARA REGION SESEMAT 2023
SARB EXAMINATIONS
SENIOR TWO (S.2) MATHEMATICS

TIME: 2 HOURS

INSTRUCTIONS:

- Attempt all the questions in **section A** and choose only **FOUR** from **section B**
- Only non-programmable calculators should be used.
- All working should be done in the answer script.

SECTION A (20 MARKS)

1. Musoke deposits Ushs.5,000,000 in a bank which gives simple interest at a rate of 12% per annum. If Musoke wishes to withdraw the money after 18months, what interest does he get?
   (04marks)

2. In square ABCD, side AB has column vector$\begin{pmatrix} 2 \\ 4 \end{pmatrix}$. Find two possible column vectors for $\overrightarrow{BC}$.
   (04marks)

3. To get the next number in the sequence you double the previous number and subtract two. The fifth number in the sequence is 50. Find the first number in the sequence.
   (04marks)

4. In a regular polygon with n sides, each interior angle is $\left(180^0 - \dfrac{360^0}{n}\right)$ degrees. How many sides does a polygon have if each interior angle is 156^0. **(04marks)**

5. Juddy wants to measure the height of the tree in her school compound but without climbing it. She observes that her shadow ends at the same point as the shadow of the tree. She measures the length of her shadow as 5m and she is standing 1.5m from the foot of the tree. Juddy is 1.8m tall. Help Judy to determine the height of the tree.
   **(04marks)**

SECTION B (60 marks)

6. A certain tourist in USA is planning to visit the following places in Africa next month. The tourist has highlighted the following places on the map of Africa. These include; South Africa, Burundi, Kampala, Dodoma, Accra, Bujumbura, Nairobi, Ghana, Johannesburg, Tanzania, Uganda, Kenya, Cairo, Kigali, Egypt and Rwanda.

   a) Help the tourist to sort the places by use of an arrow diagram.

b) (i) List the places in the Domain set.
   (ii)   List the members of the range
   (iii)   What is the relationship between the domain and the range.
   (iv)   Describe the type of mapping in the arrow diagram in (a) above.

c) Using the relation $x \longrightarrow 3x - 2$, what is the domain if the range is
$\{10, 16, 22, 25\}$ **(15marks)**

7. William was asked to plot the following points A(-4, 1), B(-4, 4), C(-7, 4) and
P(1, -4), Q(4, 4), R(4, -7) on the same pair of axes. He was also requested to join A
to B to C and P to Q to R to form two triangles. After drawing the two triangles
William identified a line of symmetry between the two triangles.

a) (i) Draw the line of symmetry that William identified
   (ii)   Find the equation of the line of symmetry drawn.

b) William placed a plane mirror along the line $y = -1$ facing triangle PQR. Write
down the coordinates of the image of PQR through the mirror and draw the image
triangle.   **(15 Marks)**

8. The motion of the rat is given in the graph below. Graph showing speed of the Rat
against time in seconds.
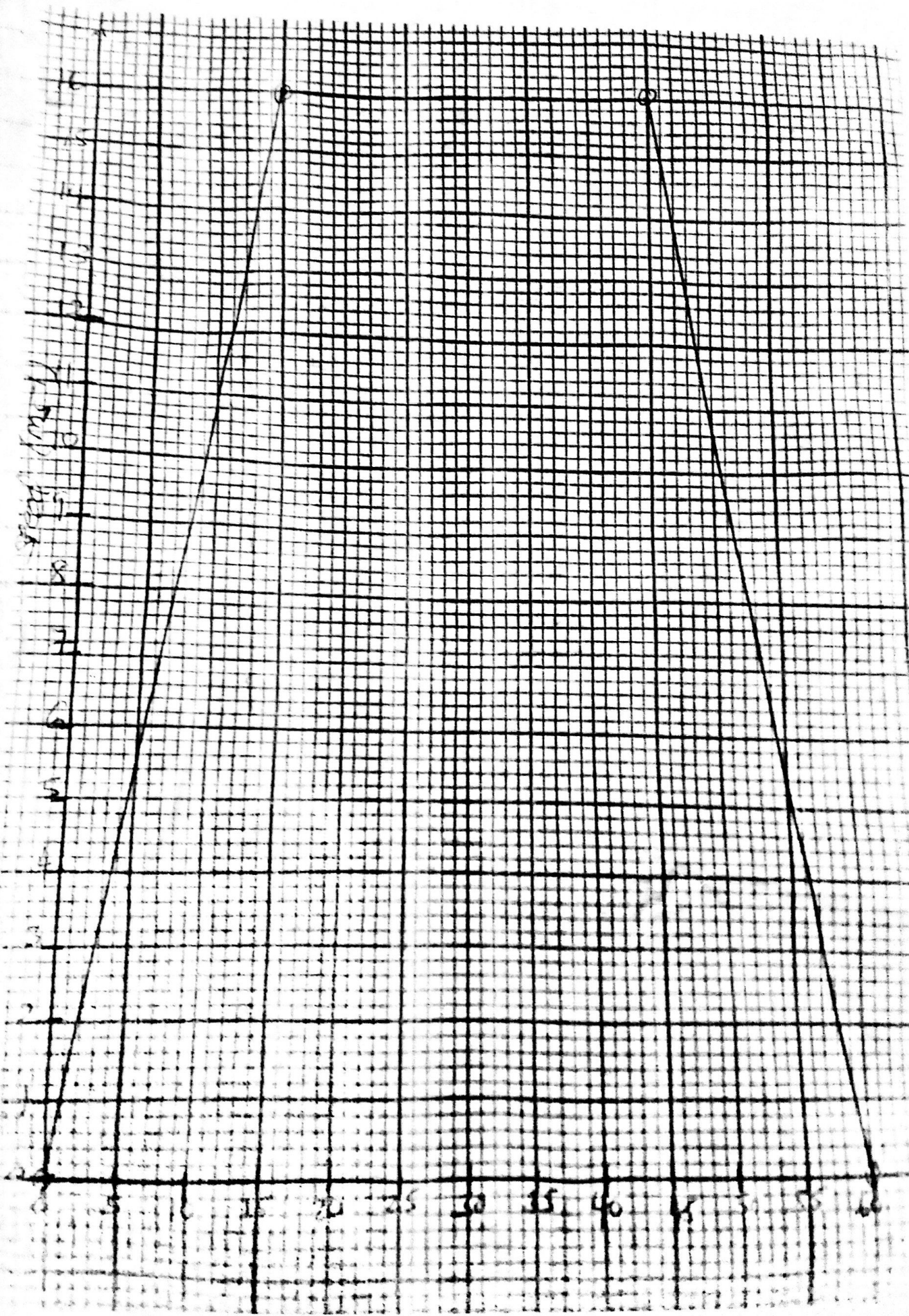
Use the graph above to;
a) State the times when the rat is having a speed of 14ms⁻¹.
b) Determine the distance travelled by the rat.
c) What is the average speed of the rat for the whole journey?   (15marks)

9. Two learners Sarah and Miriam were arguing on how to plot points on the graph. They were to plot the following points in order A(-4, -3), B(-4, 3), C(0,5), D(4,3), E(4, -3) and F(0, -5). Sarah argues that plotting point A one moves 3 steps to the left and 4 steps downwards. While Miriam argues that plotting point A, one moves 4 steps to the left and 3 steps downwards.
   a) Comment on their explanations.
   b) Using the correct argument, plot the points on the graph and label them. Name the shape of the figure ABCDEF.
   c) Calculate the area of the shape.
   d) Find the equation of the line joining points B and E. **(15marks)**

10. A chef is going to make some fruit cakes and sponge cakes. He has plenty of ingredients except for flour and sugar. He has only 2000g of flour and 1200g of sugar. A fruit cake uses 500g of flour and 200g of sugar. A sponge cake uses 200g of flour and 200g of sugar. He wishes to make more than four(4) cakes all together but the number of fruit cakes should at least be two(2). A chef can make x number of fruit cake and y number of sponge cakes.
   a) Write down all possible inequalities which must satisfy the above conditions.
   b) Graph the inequalities stated above on the same pair of axes clearly showing the region that satisfies all the inequalities.
   c) List the possible combinations of fruit cakes and sponge cakes which he can make.
   d) How many fruit cakes and sponge cakes can the chef make to maximize production?   **(15marks)**

11. A peasant decides to use his rectangular piece of land in such a way that he plants in one portion beans and another portion Peas. These portions are separated by a diagonal of the rectangular piece of land equivalent to $(x + 2)m$. The length of the rectangular piece of land is $x\ m$ and width $(x - 2)m$ The peasant is intending to fence his fields separately using the barbed wire, fencing the beans from Peas and also the whole land.
   a) As a business man operating a hardware shop, help this peasant to determine the length of the barbed wire he is to buy to fence off his two fields of beans and peas.
   b) The peasant intends to use two lines of barbed wire to fence off his fields. How much would you charge the peasant if one metre of barbed wire costs Ushs.500?
                                                                                    (15marks)

END.