THE UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

TABORA REGION
FORM FOUR MOCK EXAMINATION

041   **BASIC MATHEMATICS**

(For both School and Private Candidates)

**Time: 3 Hours**   **July 2024**

INSTRUCTIONS

1. This paper consists of sections A and B with a total of fourteen (14) questions.

2. Answer all questions in both sections A and B. Each question in section A carries six (6) marks while each question in section B carries ten (10) marks.

3. All necessary working and answers for each question must be shown clearly.

4. NECTA mathematical tables and non-programmable scientific calculators may be used.

5. Cellular phones and any unauthorized materials are not allowed in the examination room.

6. Write your examination number on every page of your answer booklet(s)

This paper consists of **4** printed pages

SECTION A: (60 MARKS)
Answer all questions in this section.

1. (a) A number J is such that 8 is in hundreds, 7 is in tens, 3 is in ones, 9 is in tenths, 3 is in hundredth, 0 is in thousandths, 8 is in ten thousandths and 1 is in hundred thousandths.

   (i) Write down a number J

   (ii) Express a number J in expanded form

   (iii) Find the total value of the digit 7 in number J.

   (b) Four wooded rods are of lengths 120cm, 150cm, 180cm and 240cm respectively. They are cut off up into small pieces which are all of the same length. What is the greatest possible length for these pieces if no wood is left over?

2. (a) If $3 - 2\log x = \log 250$. Find the value of x.

   (b) Find the value of "x" given that $\left(\frac{1}{3}\right)^{x} . 81 = \left(\frac{1}{9}\right)^{2x}$

   (c) Rationalize the denominator; $\frac{m}{\sqrt{n} + \sqrt{p}}$

3. (a) Let A and B be the two sets such that n(A) = 52, n(B) = 60 and n(AUB) = 96. Find n(A-B)

   (b) Given the events A and B are such that P(A) = $\frac{1}{2}$, P(AUB) = $\frac{3}{5}$ and P(B)= r, find r if the events A and B are

   (i) Mutually exclusive

   (ii) Independent

4. (a) If $\underline{a} = \underline{I} + 2\underline{j}$, $\underline{b} = \underline{i} - 2\underline{j}$ and $\underline{c} = 5\underline{i} + 14\underline{j}$. Find the scolars p and q such that $p\underline{a} + 2q\underline{b} = \underline{c}$

   (b) Find the equation of a straight line with gradient $\frac{2}{3}$ and having the same y-intercept as the straight line $2x - 5y + 20 = 0$. Express your answer in the form of $ax + by + c = 0$

5. (a) Given the following diagram
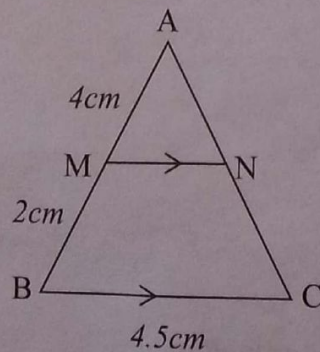
(i) Show that $\triangle ABC \sim \triangle AMN$

(ii) Find the length $\overline{MN}$

(b) Determine the perimeter and area of the regular octagon inscribed in a circle of radius 10cm.

6. (a) Three quantities V, M and N are such that V varies directly as M and inversely as the square of N, where V = 24, M = 12 and N = 3. Find the value of V when M = 18 and N = ½

(b) The volume of a cylinder is given by the formula $V = \pi r^2 h$ where r = radius, h = height, v = volume and π = pie (constant). If the radius is increased by 20% and the height is increased by 15%. What will be the volume of the cylinder in terms of r and h?

7. (a) A shopkeeper makes 15% profit by selling an article for Tsh 575,000/=. Find the ratio of buying price to selling price. Hence find the profit made by the shopkeeper.

(b) Prepare a trading account for the year ended 31st December 2020.

Stock at the end	100,000
Purchases	600,000
Carriage in wards	30,000
Return in wards	10,000
Sales	980,000
Stock at first	200,000

8. The sum of the first two terms of a geometric progression is 10 and the sum of the first four terms of the same geometric progression is 40. Given that all terms of the G.P are positive.

(a) Show that the common ratio is $\sqrt{3}$

(b) Show that the sum of the first n terms is $5\left(3^{n/2} - 1\right)$

9. (a) If $\tan x = \frac{12}{5}$ evaluate $\frac{\sin x + \cos x}{1 - \sin x}$

(b) A rope 15 m long is stretched out from the top of a flag-post 10m high to a point on a level ground.

(i) What angel does it make with the ground?

(ii) How far is this point from the foot of the flag post?

10. (a) Solve by completing the square method $x^2 - x - 6 = 0$

(b) Asnath is three years older than her brother John. Three years to come, the product of their ages will be 130 years. Formulate a quadratic equation representing this information. Hence, by using the quadratic formula, find their present ages.

11. The following is the record of daily temperature (in ^{0}C) for one month in a certain town in East Africa.

    32 35 28 42 35 33 31 41 29 42

    46 31 28 37 35 25 29 32 27 33

    28 45 33 32 41 29 26 33 42 34

    (a) Prepare frequency distribution table of a class interval of size 5 beginning with the number 25 taking into consideration.

    (b) Calculate the mean using assumed mean from the class mark of the modal class.

    (c) Calculate the median temperature.

12. (a) Find the distance measured along the parallel of latitude between two points whose latitude are both $56°$ N and whose longitude are 23^0 E and 17^0 W.

    (b) A pyramid with vertex V and edges VA, VB and VC each 13cm long has a rectangular base ABCD where AB= CD =8cm, and AD = BC= 6cm. Calculate

        (i) The height of pyramid V_O

        (ii) The angel between the base and the edge

13. (a) Determine the possible value of x which the matrix A has no inverse where

    $$A = \begin{pmatrix} x - 2 & 1 \\ 2 & x - 3 \end{pmatrix}$$

    (b) Asha finds that it is possible to buy 12 pencils and 10 rulers for Tsh 210. Alternatively it is possible to buy 20 pencils and 4 rulers for Tsh 160 at the same price per each unit item. What are the unit prices per pencil and ruler? (Use crammers rule method)

    (c) A transformation in a plane is a mapping which shifts an object from one position to another within the same plane. Give four examples of transformations in the xy – plane.

14. (a) Given f(x) = x^2 - 2x - 3. By using completing the square method, find:

        (i) Turning point

        (ii) Domain and range

        (iii) The line of symmetry

        (iv) The maximum and minimum value

    (b) A Sadock businessman has 120,000 shillings to spend on exercise books. At the school shop an exercise book costs 800 shillings and at a stationary store it costs 120 shillings. The school shop has only 60 exercise books left and a Sadock businessman wants to obtain the greatest number of exercise books possible using the money she has. Find the greatest number of exercise books that a Sadock businessman can buy.