THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

041 **BASIC MATHEMATICS**
(For Private Candidates Only)

Time: 3 Hours **Monday, 24th November 2014 a.m.**

Instructions

1. This paper consists of sections A and B.
2. Answer **all** questions in section A and **four (4)** questions from section 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 done must be shown clearly.
4. Mathematical tables may be used.
5. Calculators and cellular phones are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).
7. Use radius of the Earth R = 6370 km and $\pi = 3.14$.

SECTION A (60 Marks)

Answer **all** questions in this section.

1. (a) (i) Find the LCM and GCF of 120 and 252.

(ii) Mariana has two pieces of cloth and she wants to cut both pieces into strips of equal width that are as wide as possible. If one piece is 156 centimeters wide and the other is 180 centimeters wide, how wide should she cut out the strips.

(b) Doto takes $\frac{5}{6}$ of an hour to read 60 pages of a story book. How long does he take to read 1 page? (Give your answer in seconds).

2. (a) Simplify $9\sqrt{20}-7\sqrt{45}$.

(b) Given that $\log 5 = 0.6990$ and $\log 7 = 0.8451$, calculate the value of log 175.

3. (a) Chakupewa is 9 kilograms heavier than Katani. If the sum of their weights is 109 kilograms, determine the weight of Chakupewa.

(b) If $\xi = \{a, b, c, d, e, f\}$ is a universal set and A and B are two sets such that $A = \{a, c, d\}$ and $B = \{b, c, d\}$;

(i) Represent the given information in a Venn diagram,

(ii) Find the number of elements in $A' \cap B$.

4. (a) (i) Draw the graph of a straight line that will pass through the points $P(5, 3)$ and $Q(-1, 1)$.

(ii) Use the graph obtained in part (a) (i) to find the x and y-intercepts.

(b) Point P lies on the x-axis. If the distance from P to $Q(4, 5)$ is equal to the distance from P to $R(2, -3)$, find the coordinates of P.

5. (a) The ratio of the areas of two similar polygons is 144 : 225. If the length of a side of the smaller polygon is 60 cm, find the length of the corresponding side of the other polygon.

(b) Find the length of one side of a regular six-sided polygon inscribed in a circle of radius 5 cm.

6. (a) The variable y is directly proportional to x^2 and inversely proportional to z. If $y = 27$ when $x = 3$ and $z = 1$, find y when $x = 6$ and $z = 9$.

(b) A car travelling steadily covers a distance of 480 km in 25 minutes. What is its rate in m/s.

7. (a) A mixture is made up of powders C and D in the ratio $4:6$. If 110 kg of this mixture is required, how much of powder C should be used?

(b) Find the principal that will earn a profit of shs 7,290,000 at the rate of $2^1/_2\%$ per annum in 8 years.

8. (a) The sum of the first three terms of a G.P is 13. Find the sum of the first five terms if the common ratio of the G.P is $\frac{1}{3}$.

(b) In how many years would one's investment double if 100,000 shillings is invested at 10% interest compounded semi annually?

9. (a) If $\sin(x-20°)=\frac{\sqrt{3}}{2}$, find the values of x for $0° \le x \le 180°$.

(b) A kite flying at a height of 50m is attached to a string which makes an angle of $60°$ with the ground. What is the length of the string? (Leave your answer in surd form).

10. (a) Solve the equation $9x^2+9x-54=0$ by using the factorization method.

(b) Nyakwimba has 3,000 shillings to buy either expensive or cheaper pens. The two types differ in price by 100 shillings. If he buys the expensive type he get one pen less than if he buys the cheaper ones. What is the price of each type of the pens?

SECTION B (40 Marks)

Answer any **four (4)** questions from this section.

11. A school is preparing for a trip of 360 students. The company providing the transport has 12 buses of 45 seats each and 8 buses of 30 seats each and has only 10 drivers available. The rental cost for a large bus is 648,000 shillings and 500,000 shillings for a small bus. How many buses of each type should be used for the minimum cost?

12. The following distribution table shows the scores of 64 students in a Chemistry weekly test.

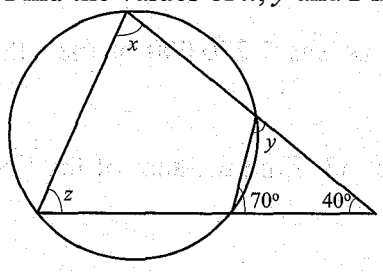
Scores	30 - 39	40 - 49	50 - 59	60 - 69	70 -79	80 - 89	90 - 99
Frequency	5	10	15	17	4	6	7

(a) Calculate the mean and mode.

(b) Draw the ogive and use it to estimate the median.

13. (a) Prove that opposite angles of a cyclic quadrilateral are supplementary.

(b) Find the values of x, y and z in the figure below:



(c) Find the distance in kilometers between Lushoto $(4°47'S, 38°20'E)$ and Mkata $(5°45'S, 38°20'E)$.

14. (a) Give a short description of each of the following terms:
(i) Gross profit (ii) Net profit (iii) Trading account (iv) Profit and loss account

(b) In July 1st 2010 Mr. Mabuba started business with Capital in Cash 10,000,000/=
July 3 Purchased goods for Cash 2,500,000/=
4 Sold goods for Cash 5,000,000/=
7 Purchased goods for Cash 1,800,000/=
11 Bought goods for Cash 2,350,000/=
16 Paid Cash for rent 1,110,000/=
27 Paid Cash for wages 550,000/=
29 Sold goods for Cash 3,100,000/=
NB: Stock in hand at 31 July 2010 was 400,000/=
Prepare Trading, Profit and Loss Account.

15. (a) (i) Find the inverse of matrix $A = \begin{pmatrix} 2 & -3 \\ 1 & 2 \end{pmatrix}$.

(ii) Find the point $P(x, y)$ if $\begin{pmatrix} 2 & -3 \\ 1 & 2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -5 \\ 8 \end{pmatrix}$.

(b) Determine the image of the point obtained in part (a) (ii) under enlargement by the matrix $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$ followed by a reflection in the line $y = x$.

16. (a) A bag contains 6 red balls and 4 blue balls. A ball is drawn at random and then replaced. Another ball is drawn. Use a tree diagram to find the probability that both balls are blue.

(b) Given the function $f(x) = x^2 + 6x + 10$
(i) Find the minimum point of $f(x)$.
(ii) Find the x and y intercepts.
(iii) Determine the axis of symmetry of $f(x)$.
(iv) Draw the graph of $f(x)$ using the results in part (i) – (iii) and use it to indicate the solution of the equation $x^2 + 6x - 7 = 0$.
(v) Find the domain and range of $f(x)$.