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

041

BASIC MATHEMATICS

(For Private Candidates Only)

Time: 3 Hours **Monday, 23rd November 2015 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 **6 marks** while each question in section B carries **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).

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SECTION A (60 Marks)

Answer **all** questions in this section.

1. (a) Given that $\sqrt{2} = 1.4142$, evaluate to 4 significant figures:
   (i) $\sqrt{12800}$,
   (ii) $\sqrt{0.0512}$.

   (b) Evaluate $\dfrac{324 \times 10^{-13}}{15 \times 10^{-4} + 7.5 \times 10^{-3}}$ and write the answer in standard form.

2. (a) Make x the subject of the equation $\left(\frac{1}{2}\right)^x \left(\frac{1}{2}\right)^7 - \left(\frac{1}{5}\right)^x = 0.$

   (b) Find the value of x in the equation: $12\log_x \sqrt{2} + 8\log_3 27 = 25.$

3. (a) In three years to come Jeremia will be as old as Annita was six years ago. If at present the sum of their ages is 23 years, find the age of each.

   (b) Jamungo secondary school has a total of 500 students of which 350 can speak English and 300 can speak French. By using a venn diagram, find how many can speak:
   (i) Both French and English,
   (ii) English but not French,
   (iii) French but not English.

4. (a) Given the position vectors $\overrightarrow{OA} = -2\mathbf{i} + 4\mathbf{j}$, $\overrightarrow{OB} = 2\mathbf{i} + \mathbf{j}$ and $\overrightarrow{OC} = 3\mathbf{i} - \mathbf{j}$:
   (i) Draw on the same pair of axes these vectors and the vector $\overrightarrow{CB}$.
   (ii) Describe the relationship between the vectors $\overrightarrow{OA}$ and $\overrightarrow{CB}$.

   (b) Juma walks 25 m North East from his classroom to the football ground and then he walks 20 m due East to the Library.
   (i) Represent this information diagrammatically,
   (ii) Find the distance between the classroom and the library.

5. (a) (i) Are congruent triangles also similar? Explain.
   (ii) Show whether triangles DCF and EBF in the following figure are congruent and/or similar.

   (b) Find the perimeter and the area of a regular six – sided polygon inscribed in a circle of radius 10 cm.

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6. (a) The variable y varies directly as x and inversely as square of z.
   (i) Write down the equation connecting y, x and z.
   (ii) If x is increased by 5% and z is decreased by 10% write down the new equation connecting y, x and z and hence find the percentage change in y.

   (b) It takes 24 days for 20 people to accomplish a certain task. How long could it take for 30 people to complete the same task?

7. (a) The ratio of boys to girls at Chipelo secondary school is 3:7. If the school has 500 students, find the number of boys at the school.

   (b) Jerry sold his computer for sh. 2,430,000 and as a result lost 20% of the price he paid for it.
   (i) How much did he pay for the computer?
   (ii) What was the loss he incurred?

8. (a) After completing Form Four Safina will work for Tazima Company with a starting annual salary of 1,500,000 shillings. If the company offers an annual increment of 50,000 shillings, how much will she get after nine years?

   (b) Find the sum of all the multiples of 5 between 1 and 201.

9. (a) Use mathematical tables to find sine, cosine and tangent of 10.8°.

   (b) A car travels 180 m along a straight road which is inclined at 10.8° to the horizontal. Calculate the vertical distance through which the car rises.

   (c) (i) State Pythagoras' theorem.

   (ii) Find the sides of a square which has diagonals of length 20 cm correctly to fou decimal places.

10. (a) Solve the simultaneous equations: $3x^2 + 12y^2 = 6$ and $2x + 4y = 4$.

    (b) Two numbers differ by 7. If their product is 60, find the numbers.

SECTION B (40 Marks)

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

11. Ally wishes to buy up to 40 notebooks for his stationery. He can buy either type A fo 3,000 each or type B for sh. 6,000 each. He has a total of sh. 150,000 to spend and he have at least 10 note books of type A and at least 5 notebooks of type B in his stock.

    (a) Write down all the inequalities which represent the given information.

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(b) If he makes a profit of sh. 400 on each notebook of type A and sh. 1,000 on each notebook of type B, how many notebooks of each type he should buy for maximum profit?

12. (a) Mode, median and mean are the measures of central tendency of a distribution. Give a description of each term.

(b) The following frequency distribution table shows the marks of 100 students in an end of term Mathematics examination.

Mark (%)	31 - 40	41 - 50	51- 60	61 - 70	71 - 80	81 - 90	91 - 100
Frequency	11	23	20	17	18	7	4

(i) How many students had less than 71 marks?
(ii) How many students had at least 41 marks?
(iii) Determine the modal and the median classes.
(iv) Determine an estimate of the mean of the marks.
(v) Draw a cumulative frequency curve of the marks.
(vi) Estimate the median examination mark from the graph.

13. (a) A bucket UVST was made from the cone URT such that its top radius is 12 cm, bottom radius is 9 cm and its depth (PQ) is 10 cm.
(i) Find the height QR of the cone VRS, using the fact that triangles PRT and QRS are similar.
(ii) Find the volume of the bucket, giving your answer in four significant figures.

(b) In the diagram below PA and PB are tangents to the circle. If O is the centre of the circle, find the values of x and y.

(c) Find the distance along the circle of latitude between $A(13°25', 43°S)$ and $B(28°15', 43°S)$. (Use the radius of the earth $R = 6400$ km).

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14. (a) What is an account?

(b) State the principle of double entry.

(c) What is a trial balance?

(d) What is the importance of preparing a trial balance?

(e) On 1st August, 2001 Mr Paulo started business with capital in cash 800,000/=

August 3 Bought goods for cash 400,000/=
4 Paid salary for cash 150,000/=
8 Sold goods for cash 200,000/=
12 Paid rent for cash 220,000/=
18 Purchased goods for cash 300,000/=
28 Sold goods for cash 350,000/=
29 Paid insurance for cash 250,000/=

Enter the above transactions in a cash account, balance it and bring down the balance to the next month.

15. (a) If A and B are square matrices of order 2×2, expand the brackets for $(A+B)(A-B)$.

(b) Work out the values of x and y in the following cases:

(i) $\begin{pmatrix} 5 & 7 \\ 6 & 8 \end{pmatrix}\begin{pmatrix} 2 \\ 3 \end{pmatrix}=\begin{pmatrix} x \\ y \end{pmatrix}$

(ii) $\begin{pmatrix} 6 & 4 \\ 8 & 10 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}=\begin{pmatrix} 24 \\ 46 \end{pmatrix}$

(c) Find the equation of the image of the line joining points (1, 7) and (2, 9) after a reflection in the line $y=x$.

16. (a) The function f is defined as follows:

$$f(x)=\begin{cases} -x+2 & \text{if} \quad x<-1 \\ 2 & \text{if} \quad -1<x\leq 1 \\ x & \text{if} \quad x\geq 1 \end{cases}$$

(i) Sketch the graph of $f(x)$,

(ii) Use the graph to determine the domain and range of $f(x)$.

(b) A die and a coin are thrown together. If the die has its six faces marked 0, 1, 1, 1, 6, 6 use a tree diagram to determine the probability that:

(i) a tail and a face marked 1 occurs,

(ii) a head and a face marked 1 or a head and a face marked 6 will occur.

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