THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
FORM TWO NATIONAL ASSESSMENT

042 ADDITIONAL MATHEMATICS

Time: 2:30 Hours **Year: 2021**

Instructions

1. This paper consists of **ten (10)** questions.
2. Answer **all** questions.
3. All writing must be in **blue** or **black** ink **except** drawing which must be in pencil.
4. Cellular phones and any unauthorized materials are **not** allowed in the assessment room.
5. Write your **Assessment Number** at the top right-hand corner of every page.

1. (a) You are given the following numbers; 14932, 438454, 1946, 23842, 11748, 254174, 746164, 1914 determine which numbers are exactly divisible by 4.

   (b) Find the next three numbers from the following given pattern 2, 9, 20, 35…

   (c) You are given the formula $n^{th} = \frac{n(n+1)}{2}$. Find the 14^{th} term.

2. (a) Solve for x if $\left|\frac{x-1}{x+1}\right| = 3$

   (b) Express h as a subject of the formula given that $s = \frac{wd}{h}(h+d)$

   (c) Use graphical method to solve the system of simultaneous equations.

   $$\begin{cases} x - y = 3 \\ y - 2x + 5 = 0 \end{cases}$$

3. (a) (i) Define the term quadrilateral.

   (ii) calculate the number of side of the polygon given that each interior angle of the regular polygon is 150^o.

   (b) You are given the interior angles of a hexagon as 100^0,110^0 , 120^0 and 128^0, Find the size of the other two angles which are equal.

4. (a) Draw the locus of (x,y):$y = -x^2 + 1$, and state the value of y which makes the locus to be defined.

   (b) Find and draw the loci of a moving point whose distance from y – axis is equal to its distance from the x – axis.

5. (a) Find the system of simultaneous equations satisfying the given graph.

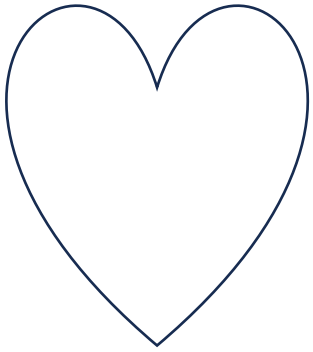
(b) (i) Find the value of k so that (1, k+2), (4, 3) k(4, 3k) and (10,6k) are collinear.

(ii) Find k so that ky + 3x = 2 is parallel to y = ½ x – 4

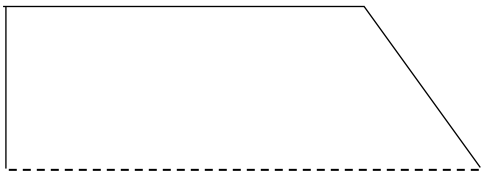
6. (a) Given that A(1,2), B(3,1), C(-3,2) and D(3,-1) are some of the vertices of a six sided polygon. Draw the complete figure on x-y plane so that x-axis is the only line of symmetry.

(b) (i) You are given the letters **O, N, T** and **V.** Determine which one of the given letters has no axis of symmetry.

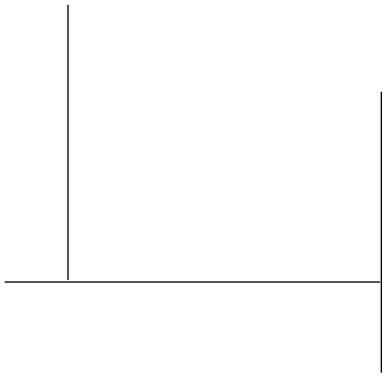
(ii) Draw the line of symmetry on the given figure.



(c) (i) Copy the given shape and complete it so that the dotted line to become line of symmetry.



(ii) Add one line to the given diagram so that the resulting figure will have rotational symmetry but no line of symmetry.



7. (a) (i) Let p be 'He is happy' and q be 'He is rich'. Write the statement 'He is rich but not happy' in symbolic form and construct the corresponding truth table.

(ii) Draw an electrical network for the statement (p ^ q) v r.

(b) (i) use truth table to verify the equivalence of the following logical statement.

$$(p \rightarrow q) \wedge (q \rightarrow p) \equiv p \longleftrightarrow q$$

(ii) Test the validity of the argument: "If I like Mathematics, then I will study. Either I study or I fail. Therefore, if I fail then I do not like Mathematics.

8. (a) Calculate the value of y when $x = 5$, given that y is directly proportional to the square of x and $y = 98$ when $x = 7$

(b) Given that, y varies directly as x and inversely as z. If x varies inversely as y^2, prove that z^2 varies directly as x^3.

9. (a) In analysing the food preference of 80 teaching staff members it was observed that 43 members selected carrots, 30 selected potatoes and 43 selected tomatoes, 29 members selected carrots and tomatoes, 21 selected carrots and potatoes, 25 selected potatoes and tomatoes and 19 selected all three vegetables.
   (i) Show this information in a Venn diagram.
   (ii) How many members selected carrots only or tomatoes only?

   (b) If A, B and C are the sets and n(A) = 20, n(B) = 24 and $n(A \cap B) = 12,\ n(A \cap C) = 13,\ n(B \cap C) =$ *and* $n(A \cap B \cap C) = 10,$ *find* $n(A \cup B \cup C)$

   (c) If A = {*all prime factors of* 30 }

   B = {*all prime factors of* 70 }

   C = {*all prime factors of* 42 }

   List the elements of A, B, C, and show their relationship in a Venn diagrams.

10. (a) (i) If R $\alpha \frac{1}{T}$ and T = 8 and R = 4, find the relationship between R and T.

   (ii) Given that x varies directly as y and inversely as the square root of z and when x = 300, y = 65 and z = 25. Calculate the value of x when y = 468 and z = 144.

   (b) Motor cyclist estimates that, her annual expenditure is inversely proportional to the distance covered. The cost when she covers 800 km is Tsh 1,000,000/=. Find the cost when she covers 1500km.

   (c) If 18 men can dig a trench in 4 days, how many men will dig the same trench for 9 days?