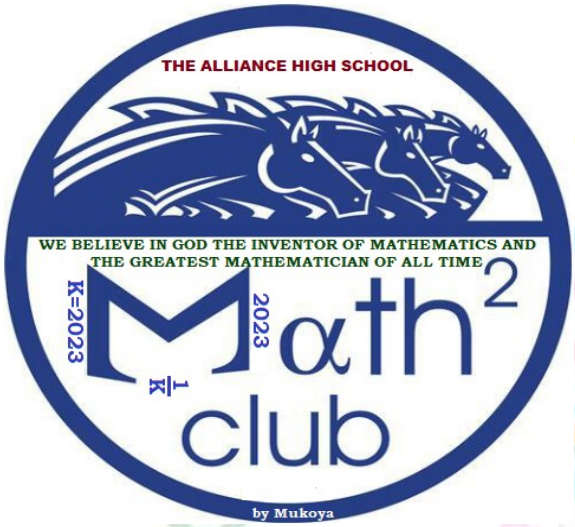
"We believe in God, The Inventor of Mathematics and The Greatest Mathematician of all time"

FORM THREE TEST

10:45 A.M–12:45 P.M SATURDAY.18TH FEBRUARY.2023.



NAME OF PARTICIPANT																
(STREAM)	**F1**	**F2**	**F3**	**F4**	**A**	**B**	**C**	**D**	**M**	**K**	**Q**	**G**	**R**			
CATEGORY					**SENIOR**						**JUNIOR**					
SIGNATURE																

TIME: 7,200,000,000,000ns

INSTRUCTIONS TO PARTICIPANTS

1. CALCULATORS AND MATHEMATICAL TABLES **ARE NOT PERMITTED.**
2. THE TEST CONSISTS OF **11** QUESTIONS, **5** IN SECTION **A** AND **6** IN SECTION **B.** YOU ARE REQUIRED TO ANSWER **ONLY 10** QUESTIONS**,5** IN SECTION **A** AND **ANY 5** IN SECTION **B.** EACH QUESTION IS WORTH 10 POINTS.
3. IN EVERY **K**TH NUMBERED QUESTION DIVIDE YOUR ANSWER BY **K**.
4. CRYING IS ALLOWED BUT SILENTLY.
5. ONLY RULE NUMBER ONE CAN BE BROKEN.

FOR OFFICIAL USE ONLY

QUESTION	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**GRAND TOTAL**
MAXIMUM POINTS	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**100**
PARTICIPANT'S SCORE												

SECTION A

1. Simplify completely. **[10 POINTS]**

$$\frac{18km-(3k-4m)(3k+4m)}{3k-8m}$$

2. The sum of two terms of an increasing Geometric Progression (GP) IS 20. The sum of the second term and third term of the same GP is 30.
   Determine the common ratio of the GP. **[10 POINTS]**

3. Let x and y be some positive integers such that $x - y = 75$ and the L.C.M of x and y is **360**. Find the value of $x + y$. **[10 POINTS]**

4. Solve the following sudoku square and hence determine the values of **A**, **B** and **C**.

6						7	9	4
	5	8		4				
							6	
	1				7			
3			B			1	7	6
	6							
			2			6		
A	7			8		3	1	
	4				6			C

[10 POINTS]

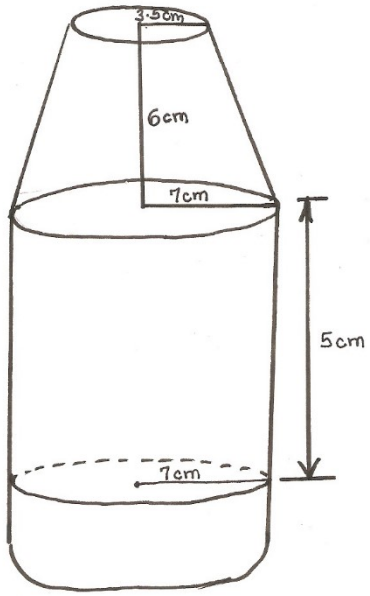
5. Given that a and b are some positive integers.

$$\frac{1}{a} - \frac{1}{b} - \frac{1}{a+b} = 0$$

   Then determine the value of $\left\{\frac{b}{a} + \frac{a}{b}\right\}^2$. **[10 POINTS]**

SECTION B

6. A right conical frustum of base radius 7cm and top radius 3.5cm, and height of 6cm is stuck onto a cylinder of base radius 7cm and height 5cm which is further attached to a hemisphere to form a closed solid as shown below.



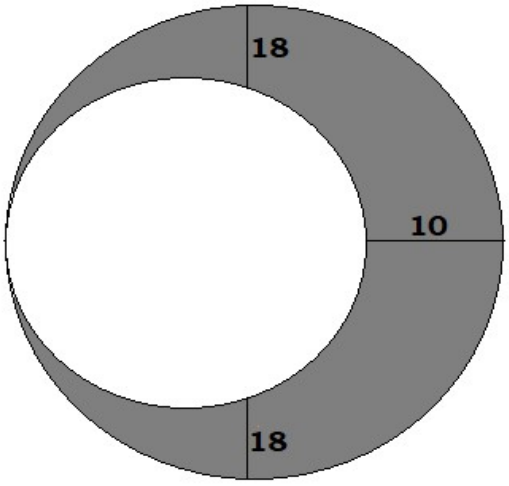
Find:

(a) The volume of the solid. **[5 POINTS]**

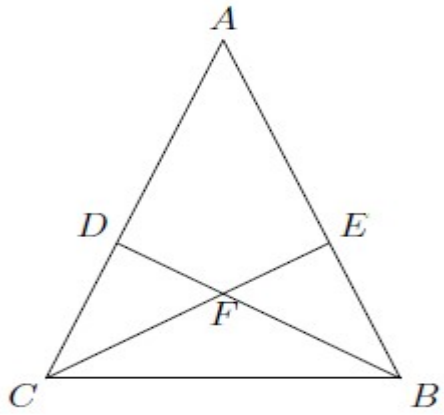
(b) The surface area of the solid. **[5 POINTS]**

7. Let $\boldsymbol{a}$ be the sum of the digits in $\mathbf{3^{2023}}$, let **b** be the sum of the digits in **a**, let **c** be the number of digits in **b** and let **d** be the sum of the digits in **c**. determine then the exact value of **d.** **[10 POINTS]**

8. The figure below shows Onsarigo's land, determine the exact area of the shaded region in hectares. Give a comment about Onsarigo's land. (The units are in kilometers). **[10 POINTS]**



9. In the diagram, $AB = AC = 20, AD = AE = 12$, and the area of $ADFE$ is **24**. Find the area of **BFC**. **[10 POINTS]**



10. Khisa wrote the positive integers **1** through **2022** on the whiteboard. Joel then inspected the written numbers from the smallest to the largest and erased each number that was not divisible by **3.** From the numbers left on the whiteboard, she then erased from the smallest to the largest each number that was not divisible by 3^2. From the remaining numbers she erased from the smallest to the largest each number that was not divisible by 3^3 and so on. Which number did Joel erase last? **[10 POINTS]**

11. Let $\frac{a}{b} = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \ldots + \frac{1}{1318} + \frac{1}{1319}$ such that $(a, b) = 1$. Show that $1979/a$. **[10 POINTS]**

The End

WE HOPE AND BELIEVE THAT THIS TEST HAS FILLED YOUR HEART WITH JOY AND LAUGHTER

MATHEMAGICS CLUB EXECUTIVE COMMITTEE

1. MUKOYA KHISA	CHAIRMAN	7. GEOFFREY GIKONYO	-FORM 3 REP 1
2. MATILU MUYEKU	VICE CHAIRMAN	8. CLIVE MAINA	-FORM 3 REP 2
3. IVAN MAYABI	SECRETARY	9. SAMWEL WAREGA	-FORM 3 REP 3
4. GODWINS OLOO	TEAM LEADER		
5. NIMROD NYABERI	ORGANISING SECRETARY		
6. ANDREW CHELIMO	TREASURER	**SETER: MUKOYA KHISA(CHAIRMAN)**	

– ALL THE BEST IN THIS TEST –

✓ The Executive Committee reserves the right to nullify results of any participant who commits any form of malpractices.