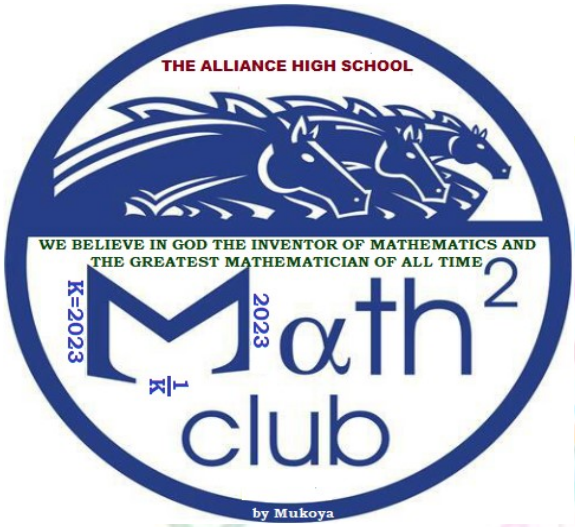
"We believe in God, The Inventor of Mathematics and The Greatest Mathematician of all time"

FORM TWO 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

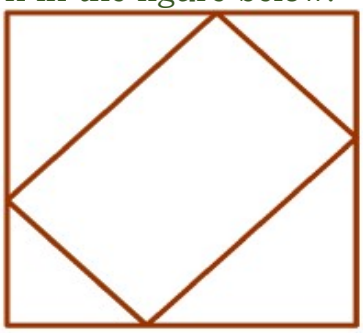
1. CALCULATORS AND MATHEMATICAL TABLES **ARE NOT PERMITTED.**
2. THE TEST CONSISTS OF **11** QUESTIONS, **5** IN SECTION **A** AND **6** IN SECTION **B.** YOU ARE REQUIRED TO ANSWER **ONLY 10** QUESTIONS**,5** IN SECTION **A** AND **ANY 5** IN SECTION **B.** EACH QUESTION IS WORTH 10 POINTS.
3. IN EVERY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

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

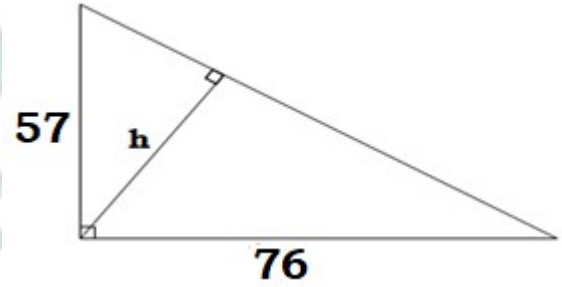
1. Four Isosceles right-angled triangles are removed from the 4 corners of a square piece of paper leaving a rectangle as shown in the figure below.



What is the length of the diagonal of the rectangle if the sum of the areas of the cut off pieces is 1682 cm^2. **[10 POINTS]**

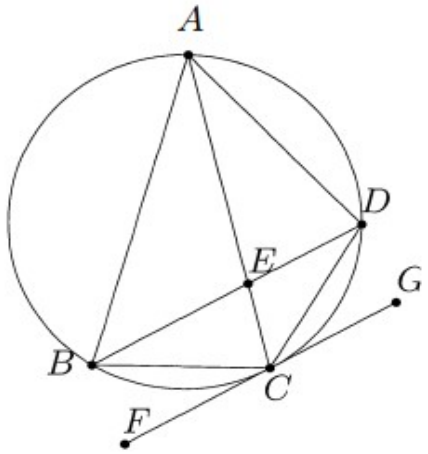
2. Alix starts writing down all integers one after another as follows**:**
12345678910111213141 51... What would be the 2023rd digit? **[10 POINTS]**

3. Determine the exact length of **h** in the figure below. **[10 POINTS]**



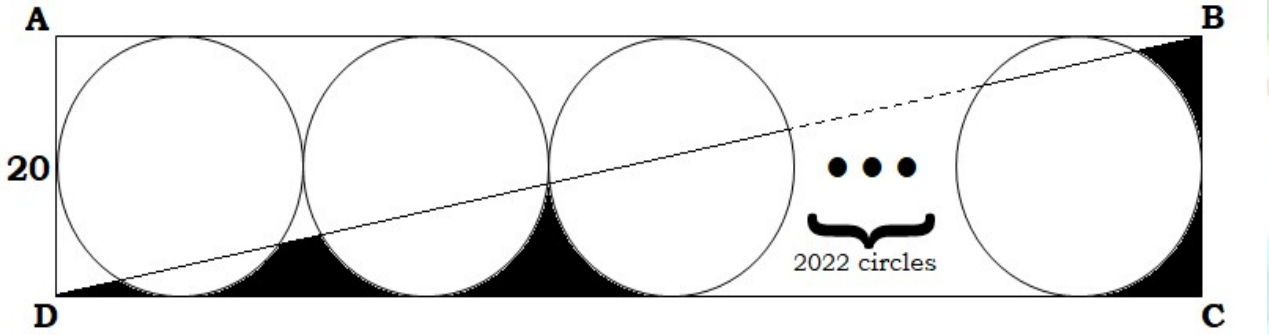
4. Two policemen were together at a road junction. Each had a walkie-talkie. The minimum distance at which one could communicate with the other was 2.5 km. one of the policemen walked due East at 3.2 km/h while the other walked due north at 2.4km/h. the policemen who headed East traveled for x km while the one who headed North travelled for y km before they were unable to communicate.
   a) Draw a sketch to represent the relative positions of the policemen. **[2 POINTS]**
   b)
      i) From the information above form two simultaneous equations in x and y. **[2 POINTS]**
      ii) Find the values of x and y. **[2 POINTS]**
      iii) Calculate the time taken before the policemen were unable to communicate. **[4 POINTS]**

5. In the diagram below, **ABCD** is a cyclic quadrilateral with **AB = AC**. The line **FG** is tangent to the circle at the point **C**, and is parallel to **BD**. If **AB = 12** and **BC = 8**, find the value of **2022AE**. **[10 POINTS]**



SECTION B

6. The figure below shows some circles that are tangent to each other and to the rectangle **ABCD**. Determine the exact area of the shaded region. **[10 POINTS]**



7. There are **30** multiple choice questions in The AHS Interhouse Math contest. **5** marks are awarded for each correct answer. **3** marks are deducted for each incorrect answer. No marks are awarded for questions left unanswered. If Jared scored **78** marks in the contest, what is the greatest number of questions he answered correctly? **[10 POINTS]**

8. A parent has two children whose age difference is 5 years. Twice the sum of the two children is equal to the age of the parent.
   a) Taking the age of the elder child to be x, write an expression for: **[4 POINTS]**
      i) The age of the younger child.
      ii) The age of the parent.

b) In twenty years', time, the product of the children's ages will be 15 times the age of their parent. **[6 POINTS]**

i) Form an equation in x and hence determine the present age of the elder child.

ii) Find the present possible ages of the parent.

iii) Determine the possible ages of the younger child in 20 years' time.

9. Mukoya has a magical patch of grass that doubles in area each day. If it covers his yard in some 14 days, how many days would 2 such patches take to cover his yard. **[10 POINTS]**

10. Given that $m + \frac{1}{m} = 7$ and $m^3 + \frac{1}{m^3} = 167$ then determine the exact value of $m^5 + \frac{1}{m^5}$. **[10 POINTS]**

11. In the forest of a magical island kingdom, there are three kinds of animals; lions, wolves and goats. Wolves can eat goats and lions can eat both wolves and goats. But since it is a magical island, if a wolf eats a goat it turns into a lion, if a lion eats a wolf it turns into a goat and a lion that eats a goat turns into a wolf. To begin with, there were 17 goats, 55 wolves and 6 lions on the island. After sometime, no more eating is possible. What could be the maximum number of animals that can still be on the island? **[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
2. MATILU MUYEKU — VICE CHAIRMAN
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4. GODWINS OLOO — TEAM LEADER
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8. CLIVE MAINA -FORM 3 REP 2
9. SAMWEL WAREGA -FORM 3 REP 3

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.