AIMSRW Quarantine
Junior Maths Challenge
May 8th 9:00am-11:30am

Time allowed: 2 hours 30 minutes / Ikizamini kigenywe gukorwa: Amasaha abiri n'igice

Each correct answer is worth 2 marks. Each incorrect answer means you lose 1 mark/ Nukora ikibazo urahabwa amanota 2, Nucyica urakurwaho inota.

Your answer sheet should contain the following information: 1. Name / Amazina yawe, 2. Gender / (Gabo/Gore), 3. Date of Birth / Itariki y'amavuko, 4. Whatsapp contact / Numero ya Whatsapp ukoresha, 5. Year in School / Umwaka wigamo, 6. Subject combination / Ibyo wiga, 7. School name / Ishuri wigaho, 8. Teacher name / Izina rya mwalimu wawe, 9. District of the school / Akarere wigamo

The competition is answer only. No rough work should be submitted. / Wirinde kwanduza aho ukorera, andika igisubizo gusa.

You should do this competition on your own, with no help from anyone. By submitting an answer sheet, you are saying that you did not cheat and everything you wrote was from your own brain. Icyitonderwa: Urasabwa gukora iki kizamini wenyine, wirinde gukopera. Mu gutanga urupapuro wakoreyeho, uraba wemeje ko ari wowe wikoreye ikizamini.

Section A: Multiple choice

1. Find the the slope (m) and y-intercept (c) from this equation:
$$\frac{3}{4}y + 4 = 2(x - 1)$$
   A : $m = \frac{8}{3}$, $c = -6$ **B** : $m = \frac{8}{3}$, $c = -8$ **C:** $m = 2$, $c = -8$ **D:** $m = -2$, $c = -6$

2. Simplify
$$(a + b)^3 - 3(a^2b + ab^2 + ab)$$
   A: $a^3 + b^3 - 3a^2b - 3ab^2 - ab$ **B:** $a^3 + b^3 - 3ab$ **C:** $a^3 + b^3 + 2a^2b + 2ab^2 + ab$ **D:** $a^3 + b^3$

3. Solve for x a real number.
$$\frac{x - 9}{2} - \frac{x - 9}{3} = 1$$
   A : 0   **B** : 10   **C** : 15   **D** : No solution

4. Given that $f(x) = 2x + 1$ and $g(x) = x^2 - 9$, find the value of x if $g(f(x)) = 0$
   A : $\frac{9 + \sqrt{79}}{2}$ and $\frac{9 - \sqrt{79}}{2}$ **B** : 1 and 2   **C** : 1 and -2   **D** : -1 and 2

5. $1 + 2 + 3 + \cdots + 99 + 100 = 5050$ And so, what is $10 + 20 + 30 + \cdots + 990 + 1000 =$?
   A : 10100   **B** : 5950   **C** : 50500   **D** : 6050

6. Solve for x over the set of real numbers,
$$\frac{x - 2}{x + 2} + \frac{8 - 4x}{x^2 - 4} = \frac{x + 2}{x - 2}$$
   A : $\frac{2}{3}$ **B** : $\frac{4}{3}$ **C** : 0 and 2   **D** : 0 and -2

7. A rectangle has a perimeter of 48 cm. It's length is 17 cm. What is the width?

    A : 14 cm   **B** : 31 cm   **C** : 15.5 cm   **D** : 7 cm

8. The number N is the product of all positive odd integers from 1 to 99 that do not end in the digit 5. That is, $N = 1 \times 3 \times 7 \times 9 \times 11 \times 13 \times 17 \times 19 \times \cdots \times 91 \times 93 \times 97 \times 99$. What is the last digit of N? (Last digit of 395 is 5)

    A : 1   **B** : 3   **C** : 7   **D** : 9

9. What is the value of: (dots $(\dots)$ means continue in same pattern)

$$\frac{1 \times 3}{2 \times 2} \times \frac{2 \times 4}{3 \times 3} \times \frac{3 \times 5}{4 \times 4} \times \cdots \times \frac{96 \times 98}{97 \times 97} \times \frac{97 \times 99}{98 \times 98} \times \frac{98 \times 100}{99 \times 99} \tag{1}$$

    A : 1   **B** : $\frac{50}{99}$ **C** : $\frac{1}{2}$ **D** : $\frac{100}{99}$

10. a and b are <u>positive integers</u>. $a + b = 11$. What is the biggest possible value of $a \times b$?

    A : 11   **B** : infinity   **C** : 35   **D** : 30

Section B

1. The numbers 3,5,7,12 and x together have a mean of 7, what is the value of x?

2. Jeannine does school work for either 3 hours or 5 hours a day. In one week (7 days) she did 27 hours of school work. On how many days did she do 5 hours of school work? (She is only allowed to do 3 or 5 hours a day, no other amount is possible.)

3. Jules and Remy are buying bananas. In total, they buy 12 bananas. Jules buys 4 more bananas than Remy. How many bananas did Remy buy?

4. Evaluate: $1 - 2 + 3 - 4 + 5 - 6 + 7 - 8 + \ldots\ldots\ldots + 2019 - 2020$

5. Find m such that $\frac{2020+m}{2020-m} = 100$

6. Draw three lines: $y = 5$, $y = 1 + x$, and $y = 1 - x$. What is the area of the triangle formed by these lines?

7. At G.S. Name, 20% of all girls took part in maths competitions and 15 % of all boys took part. If 60% of the students are boys, what percentage of all students took part in the competition?

8. Isaac tosses/flips a coin 6 times. what is the probability that he gets exactly 3 heads?

9. Add up all the factors of 2020

10. How many positive integers less than 2020 are divisible by 4 **and** 7? (56 is divisible by 4 and divisible by 7. 14 is divisible by 7, but not by 4.)