



RAMC 2022

Elementary II Tiebreaker Round

- **SCORING:** The questions in this round are used to break ties, and do not count towards overall scores.
- This round contains 10 questions. Problems towards the end tend to be more difficult than problems toward the beginning.
- No computational aids are permitted other than scratch paper, graph paper, and a pen/pencil. No calculators of any kind are allowed.
- All answers must be in a reasonably simplified form.
- Fill out your information, and sign/initial the honor code on the answer sheet provided.
- If you believe there is an error on the test, submit a challenge to the proctors. Please include your name, level (Elem I/II, MS, HS), and explanation of the problem and your solution.

Do not flip the page until the proctor begins the round!

1. Maggie has a 3 by 3 grid with 5 shaded tiles. Zoey has an 6 by 6 grid, but also has 5 shaded tiles. Jenny needs to guess which square is shaded on both boards. Let the probability that she guesses wrong, then right, on the 3 by 3 board be x , and on the 6 by 6 board be y , respectively. If Jenny can guess the same tile twice, find $x - y$.
2. What is the sum of the sum of the distinct prime factors of 2022?
3. Find the value of A such that the following system of equations has an infinite amount of solutions.

$$\begin{aligned}9x + 4(y + 3) &= 37 + y \\ \frac{4y + 100}{2} - Ax &= 8y\end{aligned}$$

4. Tom R-Vee loves to play volleyball. However, he gets injured a lot. Every time he hits the ball, there is a 20% chance of him getting injured. After he gets injured, he is not able to play for the rest of the day. Find the probability that Tom can not play for the rest of the day after his 4th shot.
5. How many integers between 1792 and 2022 are multiples of both 6 and 8?
6. The Lu Sports Shop sells different colored tennis balls. Of these, 40% are yellow balls, 25% are blue, 15% are orange balls, 10% are red, and 2022 are green. How many tennis balls are there in total?
7. The top of a tree is 5 feet taller than the top of a house. The ratio between the two heights is 4 : 5. How tall is the tree?
8. Sean chooses 15 even numbers from 2 to 1000, and Julie chooses 15 odd numbers from 2 to 1000. What is the minimum positive difference between the sum of Sean's numbers and the sum of Julie's numbers?
9. A square is circumscribed by a circle. If the area of the square is 64 units², what is the area of the circle, rounded to the nearest whole number, in units?
10. On Eraser island, the flamingo population uses fish and shrimp to feed themselves. The flamingos get their pink color from the shrimp they eat. Currently, there are 33 pink flamingos and 23 gray flamingos. A flamingo eating shrimp will consume 3 a day, while those eating fish will only consume one fish per day. If 11 flamingos eat only shrimp, what is the number of animals eaten over two days?