



RAMC 2023

Elementary II Tiebreaker Round

- **SCORING:** The questions in this round are used to break ties, and are not necessarily weighted the same.
- This round contains 10 questions to be solved in 30 minutes. All answers are integers.
- No computational aids are permitted other than scratch paper, graph paper, and a pen/pencil. No calculators of any kind are allowed.
- 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. Ben wants to paint his 30-foot by 20-foot bedroom wall. His friend Andrew, who sells paint, only sells cans of paint that cover 9 square feet of area. How many cans of paint does Ben need to buy?
2. Jane dislikes studying. Her parents give her a 1805-page workbook with pages numbered from 1 to 1805. Jane decides to rip out each page whose page number is a multiple of 5 or a multiple of 8. How many pages did she rip out?
3. Timmy and Tommy both work at a restaurant, where Timmy earns a salary of \$10 plus a tip of \$1 for every customer he serves. Tommy works for a salary of \$15 plus a tip of \$0.50 for every customer he serves. If Timmy and Tommy both made the same amount of money today serving the same number of customers, how many dollars did they earn together in total?
4. A 50-pound goat and four 25-pound goats want to cross a river using a boat that can only carry up to 50 pounds. If at least one goat must pilot the boat in order for the boat to cross, what is the minimum number of crossings needed to get all goats to the opposite bank of the river?
5. Five MIT students compete in 160 daily trivia competitions during the school year. Michelle wins 25% of the time, Andrew wins 45% of the time, and Matthew wins 5% of the time. Eric and Golden win the remaining ones, but Golden wins 20 more times than Eric. How many times did Eric win?
6. A shrimp can cook fried rice in 12 hours on its own. If a shrimp and chicken can cook fried rice working together in 4 hours, how many hours would it take the chicken to cook fried rice on its own?
7. Golden writes down the numbers from 1 to 500, inclusive. How many times will he write the digit 5?
8. Leo really likes hitting the gym and his favorite workout is the bench press. When Leo does bench press, there is a 50% chance that he can hit a new personal record. After 3 days of benching he starts a better workout routine and the chance he can hit a new personal record increases to 90%. The probability that Leo never hits a new personal record over the course of 5 days can be written as a fraction in simplest form, $\frac{a}{b}$. Find $a + b$.
9. In a dodecagon (12-sided polygon), three of the interior angles are right angles, and the remaining interior angles are congruent and measure X° . Find X .
10. Two spheres have radii in the ratio 5 : 3. The ratio of their volumes can be expressed as $a : b$, where a and b are positive integers who share no prime factors. Find $a + b$.