



RAMC 2022

Elementary II Team Round

- **SCORING:** The first 5 questions are worth 2 points each, and last 5 questions are worth 3 points each.
- This round contains 10 questions to be solved in 25 minutes. 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. Natalia is opening a book shop. She buys 300 books, and decides that she will sell each book for \$5 more than she bought it for. If she sells all 300 books, what will her profit be, in dollars?
2. Jimmy is starting a new job. The starting pay is \$40,000 per year, but his boss said that next year his salary will increase by 10%. What will his salary be next year, in dollars?
3. What is the sum of the mean, median, and mode of the numbers 3, 4, 1, 4, 2, 5, 1, 4, 12?
4. Vanessa has a square of area 25. Four equal sized 3-4-5 right triangles are attached to the exterior of the square, with the hypotenuse being attached to the square. What is the total area of all 5 shapes added together?
5. Beth's Card-N-Dice club has 100 members, some whom enjoy cards, some enjoy dice, and some enjoy both. The manager calculated that if 10 only-card enthusiasts changed to be only-dice enjoyers, there would be 3 times as many members who only like dice when compared to those who only enjoyed cards. Let x be the number of members who like dice, and y be the number of members who like cards. Given that there are 20 enjoyers for both card and dice, find xy .
6. Every morning, Tina has 180 choices of an outfit combination, which is made up of a colored shirt, pants, and a pair of shoes. Let the number of unique pants she has be x , and the number of different pairs of shoes be y . If the number of different colored shirts she has is 6, find the maximum value of $x + y$.
7. There exists a completely flat and straight train track, and on it lies 2 train stations; one is 1 km west of the other. The train from the western train station leaves at 2:25 pm for a city a long ways away, traveling west at 22 km/h. Another train leaves at 4:25 pm from the eastern train station, again traveling to a distance far away, heading east at 40 km/h. At what time will both trains be the same distance from the eastern train station? Express your answer in the form hour:minute, and include if it is am or pm.
8. Water flows into a swimming pool 3 times faster than it leaks out of a swimming pool. If the pool starts with no water, and after 30 minutes, there is 60 liters of water. How many liters of water leak out of the swimming pool every minute?
9. A magic rocket is launched from a platform 15 meters above the ground. It is launched directly straight up into the air, and its speed stays constant at a rate of 167 meters per second. If the magic rocket is immune to the effects of gravity, how far is the rocket from the platform after 17 seconds, in meters?

10. At the St. Dairy's Hospital, there are 10 medical support staff. Each member on staff wears either a regular surgical mask or a K95 mask. There are 3 support staff using a K95 mask. For any operation, three of the ten support staff are chosen to help, at random. What is the probability that any operation has at least 1 staff member wearing a surgical mask?