

7th Grade Individual

IMSA *Mu Alpha Theta*

June 7, 2026

1. What is $2 + 3 - 4 + 7$?
2. Ms. Meng asks her class to calculate $(3 + 7)^2$. Ian, following the proper order of operations, calculates the answer correctly. Eric forgets the parentheses rule and instead calculates $3^2 + 7^2$. What is the difference between Ian and Eric's answers?
3. In one day, how many times will either the minute or hour hand on a clock be pointed at the number 6?
4. If today is a Tuesday, what day was it 26 days ago?
5. The school soccer team has a bag of soccer balls. $\frac{4}{7}$ of the balls are old and the rest are new. The school then buys more new balls such that the total number of balls is doubled. What fraction of the balls are new?
6. What is the value of $2x$ if $|x - 3| = |x - 6|$? The absolute value $|x|$ of a number x is defined as the non-negative distance of a number from zero on a number line. For instance, $|-7| = 7 = |7|$.
7. A musical starts at 7:00 pm and ends at 8:45 pm. If there was a 15 minute intercession and 5 minutes of acknowledgments, how many minutes were the performers performing for?
8. Given that $(a + b)^2 = a^2 + 2ab + b^2$ and $x + \frac{1}{x} = \sqrt{10}$, what is the value of $x^4 + \frac{1}{x^2}$?
9. A 3 digit number has the following properties:
 1. All the digits are different.
 2. The number is divisible by 9.
 3. The reverse of the number is divisible by 9.

What is the second-smallest such number?

Hint: A number is divisible by 3 if the sum of the digits is divisible by 3. Think about if that can be extended to 9.

10. If the average of a and b is 3, and the average of ab and b^2 is 9, what is the average of ab and a^2 ?

11. Drew writes down four distinct positive integers. The product of the two smallest integers is 16, and the product of the two largest integers is 225. What is the sum of all four integers?
12. The sequence 1, 4, 5, 9, 14, 23, ... is an infinite sequence where each term is the sum of the previous two. How many of the first 50 terms are odd? **Hint:** Don't try computing the first 50 terms, come up with some rules!
13. A number, $\mathcal{X}$, is inserted into the sequence 3, 5, 9, 20. As a result, the mean is 3 times the median. What is the number inserted?
14. Factorials are defined for all whole numbers n such that $n! = n(n-1)(n-2)(n-3)\dots 3 \cdot 2 \cdot 1$. For example, $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$. Additionally, $0! = 1$. Drew starts from 0. He evaluates the factorial of that number and divides it by the next whole number, 1. Then he does the same for 1, 2, 3, and so on through 10. He counts the numbers that still come out to be a whole number after this process. What is the ratio of the resulting whole numbers to non-whole numbers?
15. Ian is addicted to fruit snacks. On any day, he eats between 2 and 4 packs, inclusive. He purchases a box of 12 packs. How many different ways are there for him to finish the box in 4 days or less?
16. Aarav is doing his calculus homework on his phone, and Roy is doing his calculus homework on his laptop. Aarav works at a constant rate of 4 problems per second. Roy starts his homework 5 seconds after Aarav. As Roy's laptop warms up, his speed increases, so during the t -th second (where t is the time since Aarav started), Roy completes $2t + 1$ problems. At the end of which second will Roy first have completed more total problems than Aarav?
17. How many trailing zeros are in $22!$? Factorials are defined for all whole numbers n such that $n! = n(n-1)(n-2)(n-3)\dots 3 \cdot 2 \cdot 1$. **Hint:** A number will have one trailing zero for every factor of 10. How can you count the number of factors of 10?
18. A 4-digit number is equal to 9 times the reverse of its digits. The reverse of 1234 is 4321. What is the smaller number?
19. Twelve teams play in a pickleball tournament, and each team plays every other team exactly once. Each win is worth 3 points, a tie is 1 point to each team, and a loss is 0. After all the games are played, the total number of points earned by all teams is 176. How many games ended in a tie? **Hint:** To find how many games are played, consider one team and how many different teams they can play. Repeat this with the other teams, and watch out for repetition!
20. Roy is writing a 650 word essay. In each minute, Roy has an 50% chance to think during that minute, a 25% chance to write 130 words, and a 25% chance to give up on the essay entirely. What is the probability that Roy finishes the essay?