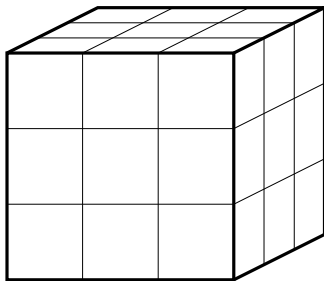


7th Grade Team

IMSA *Mu Alpha Theta*

June 7, 2026

1. What is the value of $\sqrt{27}\sqrt{9}$?
2. Roy bought decks of cards at a cost of \$2 per deck. He then sold them for \$5 each. If he made \$36 in profit, how many decks of cards did he buy?
3. In an enclosure of chihuahuas, $\frac{7}{8}$ have a brown coat and $\frac{1}{2}$ are male. What is the least possible number of male chihuahuas with brown coats in the enclosure?
4. Eric and Sonit ran a lemonade stand. Eric sold seven times as many cups as Sonit. On Monday, they sold 216 cups total. How many cups did Sonit sell?
5. To run their lemonade stand, Eric and Sonit need to purchase supplies. They buy packets of powder in containers of 5 packets each, with each container bought for \$3. Each cup of lemonade is made with 1.5 packets and is sold for \$1.50. If they sell 120 cups, how much profit do they earn?
6. A $3 \times 3 \times 3$ cube is painted on all its faces and then cut into 27 unit cubes. How many of the cubes are painted on only 2 faces?



7. If it takes Tyler 1 minute and 55 seconds to count from 1 to 69, after another 3 minutes and 15 seconds, what number has he counted to? Assume he takes the same amount of time to count each number.
8. What is the sum of $1 + 2 - 3 + 4 + 5 - 6 + 7 + 8 - 9 + 10 + 11 - 12 + 13 + 14 - 15$? Hint: can you find a pattern by calculating smaller portions of the equation?
9. Kalyan walks at a speed of x minutes per mile. When he isn't walking, he drives his moped, which can reach a top speed of x miles per hour. If his driving speed is fifteen times as fast as his walking speed, find the speed of Kalyan's moped in miles per hour.

10. How many numbers between 25 and 100, inclusive, are divisible by either 4 or 5?
11. Dr. Trimm is rearranging his bookshelf. He has 6 distinct books. 3 of the books are in the **How to Make a Wormhole** series. If the books in the series must be placed next to each other on the shelf, how many arrangements are possible? **Hint:** Think of the series as one book and then consider the number of ways to arrange the series.
12. Two jokers are added to a standard deck of cards. Then, the deck is shuffled. What is the probability that the Queen of Clubs is in-between the two jokers?
13. Metro tickets cost \$5 for a child, \$7 for an adult, and \$8 for a day pass. A station sold 8 more day passes than adult ticket, and 6 fewer child tickets than adult tickets. If the average ticket price per customer was \$7, how many adult tickets were sold?
14. How many 3-digit numbers exist such that the sum of any two adjacent digits is odd?
15. IMSA had 200 sophomores this year and they all took various classes.
 - 120 took Chemistry, 100 took Physics, and 90 took Methods of Scientific Inquiry
 - 50 took both Chemistry and Physics
 - 45 took both Physics and Methods of Scientific Inquiry
 - 40 took both Chemistry and Methods of Scientific Inquiry
 - 20 took none of the three classes

Knowing this, how many sophomores took all three classes?

16. What is the largest power of 2 that divides $11^4 - 7^4$?
17. What is the total number of 5 digit numbers that have the numbers 2, 0, 2, and 6 in any order? That is, there can be numbers inbetween them, so 52026 and 23026 are two valid numbers.
18. What is the least possible value of $|x| + |x + 2026| + |x + 2027|$? 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, $|-7| = 7 = |7|$.
19. Define the operation $a \diamond b = ab + a + b$. For example, $3 \diamond 5 = 15 + 3 + 5 = 23$. Compute the value of N if:

$$N = (1 \diamond 2 \diamond 3 \diamond \cdots \diamond 6) + 1$$

Hint: $(a + 1)(b + 1) = ab + a + b + 1$

20. A slithery snake slithers seamlessly through unit cubes that make up an $n \times n \times n$ cube. The snake can only visit adjacent cubes, and wants to visit every unit cube in the bigger cube. For $2 \leq n \leq 10$, how many of these $n \times n \times n$ cubes can the snake traverse such that at the end of visiting every cube, it ends in a cube adjacent to its starting position?