

2023




NC(SMC)²
Team Round

Team Round

Instructions: On this round, you will have 20 minutes to answer 10 questions. Each correct answer will contribute 5 points to your total score and questions that are incorrect or left blank will be marked as 0 points. Submit your answers here: <https://tinyurl.com/teamncsmc2>. Good luck!

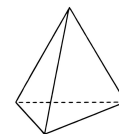
1. Find the digit A such that the seven digit number $197121A$ is divisible by 7.
2. How many axes of rotational symmetry does the type of quadrilateral that has equal diagonals and has two pairs of congruent, adjacent sides have?
3. Let $f(x) = (x + 64)(x^2 + 64)(x^3 + 64)$. How many real values of x are there such that $f(x) = 0$?

4.  In the 2018-19 NBA season, LeBron James made $p\%$ of his free throws. If the chance that he misses at least one of this two free throws is 50%, find p to the nearest 10 percent.

5. A hose starts pumping 2 liters per second, and linearly increases its rate to 6 liters per second over 5 seconds. How many liters does the hose pump over the 5 seconds?

6. Isabella picks a set of one-digit positive integers. She then claims that none of the integers in her set are divisible by any other integers in the set (except for itself). What is the largest possible size of Isabella's set?

7. Find the number of ways to color each face of a tetrahedron red or blue if rotations are not considered distinct.



8. In order to get to the next floor of NC(SMC)² Headquarters, one must climb 2 sets of stairs. Starting from the first floor, Anisha must climb x sets of stairs to get to her office on the y th floor. If x and y are consecutive positive square numbers, find x .

9. Jane and May are playing a game with a weighted dice. The probability that the weighted dice lands on a given side is proportional to the square of the number on that side. A player wins the game if they roll a prime number before the other. Given that Jane rolls first and the probability that Jane wins the game can be expressed as $\frac{m}{n}$ for relatively prime positive integers m and n , find $m + n$.

10. Let ABC be a triangle with $AB = 45$, $BC = 336$, and $AC = 339$. Let M be the midpoint of BC , let X, Y be the trisection points of AC closest to and furthest from A respectively, and D, E be the intersections of AM with BX and BY respectively. Compute the area of $XYDE$.

