

Denver Math Club
MATHCOUNTS Set: December 2016

1. How many distinct unit cubes are there with two faces painted red, two faces painted green and two faces painted blue? Two unit cubes are considered distinct if one unit cube cannot be obtained by rotating the other. (2014 Chapter Target #7)

2. Each term in the sequence that begins 13, 9, 18, \dots is the sum of three times the tens digit and two times the units digit of the previous term. What is the greatest value of any term in this sequence? (2014 Chapter Target #5)

3. Using each of the digits 1 to 6, inclusive, exactly once, how many six-digit integers can be formed that are divisible by 6? (2014 Chapter Team #9)

4. Marco's speed riding up a hill is 40% of his speed riding down the hill. It takes him two hours longer to ride up the hill than it takes him to ride down the hill. How long, in hours, does it take him to ride down the hill? Express your answer as a common fraction. (2010 School Target #8)

5. Four children are arguing over a broken toy. Ali says Barbara broke it. Barbara says Tyler broke it. Tyler and Jessica say they do not know who broke it. The child who broke the toy is aware that he/she did so and only the guilty child is not telling the truth. Who broke the toy? (2010 School Target #3)

6. Boar Ring gave a speech to an assembly of colleagues. After five minutes, half of the audience left; 10 minutes later a third of the remaining audience left. After twenty more minutes, half of the remaining audience left, leaving only three people in the audience. How many people were in the audience at the beginning of Mr. Ring's speech? (2007 School Target #8)

7. What is the mean of all possible three digit integers in which no digit is repeated and all digits are prime? (2013 Chapter Target #4)

8. What is the greatest common factor of $20!$ and 200,000? (2010 Chapter Team #7)

9. The sum of the perimeters of two equilateral triangles is 45 inches, and the area of the larger one is 16 times the area of the smaller one. What is the area, in square inches, of the larger triangle? (2010 Chapter Team #10)

10. Each day, the itchy-bitsy spider will travel 5 feet up the waterspout of a building. Each night, it will rain and wash the spider 3 feet down the waterspout. If the itchy-bitsy spider starts traveling up the 50-foot waterspout on the morning of April 1, on what date will it first reach the top of the spout? (2011 Chapter Target #6)

11. What is the value of x in the equation $6^{x+1} - 6^x = 1080$? (2009 Chapter Team #7)

12. What is the 200th term of the increasing sequence of positive integers formed by omitting only the perfect squares? (2009 Chapter Team #5)

13. In the fraction $\frac{x^5}{3^x}$, x is an integer greater than 4 and the entire fraction is equal to a positive integer. What is the value of x ? (2009 Chapter Target #8)

14. In how many zeroes does $75!$ end? (1999 Chapter Team #7)

15. How many different ways can nickels, dimes, quarters, or half-dollars be combined to equal one dollar if no more than four coins of any type may be used? (1999 Chapter Team #9)

16. A $5 \times 5 \times 5$ wooden cube is painted on exactly 5 of its six faces and then cut into 125 cubes. One unit cube is randomly selected and rolled. What is the probability that the top face of the unit cube that is rolled is painted? (2012 Chapter Target #7)

17. How many positive integers ≤ 2000 have an odd number of factors? (2012 Chapter Target #6)

18. Using the digits 2, 3, 4, 7, 8, how many 5 digit numbers can be formed using only the digit 2 more than once? (2007 Chapter Team #9)

19. Dr. Lease leaves his house at exactly 7:20 a.m. every morning. When he averages 45 miles per hour, he arrives at his workspace 5 minutes late. When he averages 63 mph, he arrives 5 minutes early. What speed should Dr. Lease average to arrive at his workplace precisely on time? (2007 Chapter Target #8)

20. What is the positive difference between the sum of the first 20 positive multiples of 5 and the sum of the first 20 positive multiples of 2? (2008 Chapter Target #4)