NorthSouth Advanced Mathcounts Week 1 Homework

1. In how many ways can I arrange 3 different math books and 5 different history books on my bookshelf, if I require that there is a math book on both ends? (*Introduction to Counting and Probability* by David Patrick)

2. Bob drove from work to his house at an average speed of 30 mph. From there, he took a private jet to a resort at an average speed of 60 mph. The total distance was 150 miles and the entire trip took 3 hours. What is the distance from Bob's house to the resort?

3. Mary got an 82, 89, 92, and 93 on her first 4 tests. She wants to bring her average test score up to a 90 percent in order to get an "A" in the class. What is the lowest score she can get on the fifth test to reach this goal?

4. Find the unit digit of the number 2^{218}.

5. Let A(4,-4) and B(9, -8) be the two ends of the diameter of circle *O.* Find the coordinates of *O.* Write your answers in the form (a, b) in decimal form.

6. The "Middle School Eight" basketball conference has 8 teams. Every season, each team plays every other conference team twice (home and away), and each team also plays 4 games against non-conference opponents. What is the total number of games in a season involving the "Middle School Eight" teams? (2014 AMC 8)

7. A circle with center *O* has area 156π. Triangle ABC is equilateral, BC is a chord on the circle, $OA = 4\sqrt{3}$, and point *O* is outside $\triangle ABC$. What is the side length of $\triangle ABC$? (2010 AMC 10B)

8. If m and n are positive integers such that $75m = n^3$. What is the minimum possible value of m + n? (2007 AMC 10A)

9. An integer between 1000 and 9999, inclusive, is chosen at random. What is the probability that it is an odd integer whose digits are all distinct? (2017 AMC 8)

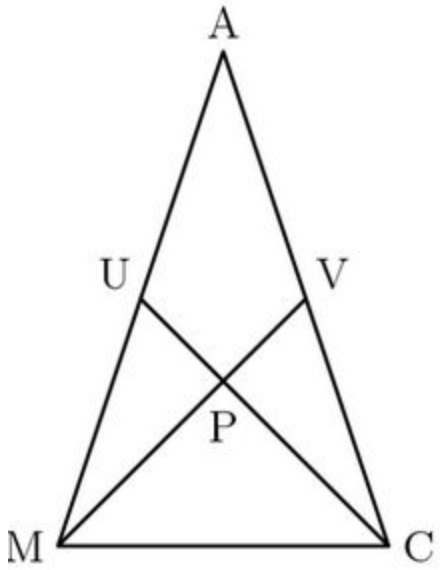
10. If *w, x, y,* and *z* are whole numbers such that $2^w * 3^x * 5^y * 7^z = 588$, then what does $2w + 3x + 5y + 7z$ equal? (2011 AMC 8)

11. The second term in a geometric sequence if positive numbers is 6 and the sixth term is 3/8. Find the common ratio of the sequence. (*Intermediate Algebra* by Richard Rusczyk and Matthew Crawford)

12. Three runners start running simultaneously from the same point on a 500-meter circular track. They each run clockwise around the course maintaining constant speeds of 4.4, 4.8, and 5.0 meters per second. The runners stop once they are all together again somewhere on the circular course. How many seconds do the runners run? (2012 AMC

10A)

13. Triangle AMC is isosceles with $AM = AC$. Medians MV and CU are perpendicular to each other, and $MV = CU = 12$. What is the area of $\triangle AMC$? (2020 AMC 10A)



14. If a, b and c are three (not necessarily different) numbers chosen randomly and with replacement from the set {1, 2, 3, 4, 5}, what is the probability that $ab + c$ is even? (1995 AHSME)

15. If five geometric means are inserted between 8 and 5832, then what is the fifth term in the geometric sequence? (1950 AHSME)