## DMC August 2020 Warmup

- 1. 2020 has been a pretty bad year, but let's hope that 2021 is better! What is the prime factorization of 2021? (hint: 45\*45=2025)
  - a. How many factors are there in 2021?
  - b. What is the sum of the factors of 2021?
- 2. Ricky the rectangle wants to be larger. If the length and the width of a rectangle are both increased by 10%, then by how many percent is the area of the rectangle increased?



- 3. Let A be the area of the triangle with sides of length 25, 25, and 30. Let B be the area of the triangle with sides of length 25, 25, and 40. What is  $\frac{A}{B}$ ?
- 4. A triangle has one side that is 5 inches long, and another side that is 15 inches long. How many integer lengths can the third side be?



5. Harold the hamster is working through his algebra textbook and is confused. Let's help him out! What is the sum of the factors of  $x^2 + 8x + 19$ ? The product? When you graph this on a coordinate plane, where is the vertex located?

6. [Bonus Challenge] Aiden is doing a practice problem and is stuck. He called Harold the hamster, but it was to no avail! So, it's up to us to help him out. If the system of inequalities  $x \ge 2x + 1$  and  $y > \frac{1}{2}x - 1$  is graphed in an xy-plane, which quadrant contains no solutions to the system?

