Bergen County Math League

Good Luck to You  **Good Luck to All**

Contest #3 **2021** **12 minutes** **Questions 1 & 2**

3-1. For all positive integers n, the symbol $n!$ denotes the product of the first n positive integers. Find the value of n for which $(3!)(5!)(7!) = n!$.

3-2. A line segment with endpoints $A(2, -2)$ and $B(14,4)$ is extended through B, to point C. If $BC = \frac{1}{4}AB$, what are the coordinates of point C?

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Contest #3 **2021** **12 minutes** **Questions 3 & 4**

3-3. Once upon a time, there lived a worm with two mouths, one at each end. Both mouths ate at the same rate, with equal efficiency. Thirty minutes after the worm began eating a leaf with one mouth, its other mouth joined in the feast. Thirty minutes later, the leaf was completely consumed. If both mouths had been eating at the start, and if one mouth had stopped when half the leaf was eaten, it would have taken the other mouth x minutes to finish the second half. What is the value of x?

3-4. In a numeration system with a positive integral base, the numerals 104 and 241 represent the degree measures of a pair of supplementary angles. What is the base of this numeration system?

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Contest #3 **2021** **12 minutes** **Questions 5 & 6**

3-5. Both legs of an isosceles triangle are radii of a circle, and the length of each radius is 6. The distance from the center of the circle to a point P on the base of the triangle is 4. If the distances from P to the triangle's other vertices are 5 and x, what is the value of x?

3-6. What are all ordered pairs of real numbers (x, y) for which

$$17x^2 - 10xy + 2y^2 - 6x + 2 = 0?$$