2015 Washington State Math Championship

$$B > \frac{1}{n}\sum_{i=1}^{n} x_i$$

(Be greater than average)

Potpourri – 8th Grade

1. **2 points:** What is the sum of the digits when the base-10 number 2015_{10} is written in base 3?

2. **2 points:** An 8×8 array of squares is filled from left to right and from top to bottom with the positive multiples of 4, starting with 4 in the upper left hand corner. What is the sum of the numbers that are in each of the four corners?

3. **2 points:** What is the sum of the distinct prime factors of 2015?

4. **3 points:** Candice has a mischievous way of making others believe they have her passcode to her locker: she hides a five-digit code, 24350 in plain sight, but such that one of the digits is not the correct one. She has given her best friend the following clues about the correct code:

   - The code is divisible by 3 and 5.
   - The code is not divisible by 100.
   - The incorrect digit is greater than its corresponding correct digit.

   What is the sum of the digits in the correct five-digit code?

5. **3 points:** If it takes 7 students 4 days to solve 21 WSMC problems, how many grueling days would it take only 3 students to solve 165 WSMC problems? **Express your answer to the nearest tenth of a day.**

6. **3 points:** The sum of 8 and p, the sum of 56 and q, and the sum of 95 and r are all equal. If p, q, and r are all prime, what is the value of $p + q + r$?

7. **3 points:** What is the sum of the digits in the number that is equal to the positive difference of 10^{50} and 15?

8. **4 points:** If a positive integer, x, is randomly selected from the integers from 1 to 100, inclusive, what is the probability that $x^2 + x$ will be even? **Express your answer as a percent.**

9. **4 points:** Ancient Egyptians preferred to express fractions as a sum of *unit fractions* – fractions whose numerators are always 1. If $\frac{3}{14}$ is written as the sum of unit fractions, what is the smallest possible sum of the denominators of the unit fractions?

10. **4 points:** How many unique pairs of non-zero integers have a product between 0 and 20, inclusively? Note that the pair of integers $\{1, 3\}$ is the same as the pair of integers $\{3, 1\}$.