

Student Name: \_\_\_\_\_

Please write your name on *every* page.

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## 4 Section D

### D1

What is the units digit in  $7^{2019}$  when expanded?

Answer to D1: \_\_\_\_\_

### D2

A square is inscribed inside a circle such that its four vertices touch the circle's circumference. If the circle has an area of  $128\pi$  cm<sup>2</sup>, what is the perimeter of the square?

Answer to D2: \_\_\_\_\_

### D3

The mean of five numbers is 6. You want to increase the highest and lowest numbers by the same amount in order to make the numbers have a mean of 8. What should you increase them by?

Answer to D3: \_\_\_\_\_

### D4

What is the smallest prime number  $p$  such that  $16p + 1$  is also prime?

Answer to D4: \_\_\_\_\_

### D5

The year 2019 has 365 days, and January 1st, 2019 is on a Tuesday. How many Fridays are there in 2019?

Answer to D5: \_\_\_\_\_

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**D6**

If we define the operation  $\frac{a}{b} \oplus \frac{c}{d} = \frac{a+b}{c+d}$ , with  $\frac{a}{b}$  and  $\frac{c}{d}$  fractions in lowest terms, then what is the difference between  $\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$  and  $\frac{1}{1} \oplus \frac{1}{2} \oplus \frac{1}{3} \oplus \frac{1}{4} \oplus \frac{1}{5}$ ?

Answer to D6: \_\_\_\_\_

**D7**

Find the number of five-digit positive integers  $n$  that satisfy the following conditions:

- The number  $n$  is divisible by 5
- The first and last digits of  $n$  are equal
- The sum of the digits of  $n$  is divisible by 5

Answer to D7: \_\_\_\_\_

**D8**

How many 3-digit numbers are there, with the property that the digits are in strictly increasing order and the first digit divides the last? (e.g. 123 but not 222)

Answer to D8: \_\_\_\_\_