Leap Frog Practice

1. The units digit of the number $9^{2006} - 3^{2006}$ is

   (a) 6
   (b) 4
   (c) 2
   (d) 0
   (e) None of these

2. How many 4-digit palindromic numbers *abba* are divisible by 9?

   (a) 7
   (b) 8
   (c) 9
   (d) 10
   (e) None of these

3. Suppose that when dividing the number n by 7, there results a remainder of 3. What then is the remainder if you were to divide the number $2015n$ by 7?

   (a) 0
   (b) 1
   (c) 2
   (d) 3
   (e) None of these

4. If a, b, $a+b$, and $a-b$ are all prime numbers, which of the following statements must be true about the sum of these four numbers?

   (a) The sum is odd and prime.
   (b) The sum is odd and divisible by 3.
   (c) The sum is odd and divisible by 7.
   (d) The sum is even.

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5. Suppose n, a and b are positive integers. In order for n to divide ab, it is _____ that n divides a or n divides b.

   (a) necessary and sufficient
   (b) necessary, but not sufficient
   (c) sufficient, but not necessary
   (d) neither necessary nor sufficient
   (e) None of these

6. The sum of eight consecutive integers is 212. What is the sum of the first and last integers?

   (a) 52
   (b) 53
   (c) 54
   (d) 55
   (e) None of these

7. For how many of the ten digits $x = 0, 1, 2, \ldots, 9$ is the 2017-digit number $n = 1\underbrace{xx...x}_{2015}0$ divisible by 24?

   (a) 0
   (b) 1
   (c) 2
   (d) 3
   (e) None of these

8. The digit sum of a number is the sum of its decimal digits. For example, the digit sum of the number 3206 is $3 + 2 + 0 + 6 = 11$. Determine the digit sum of the number $(10^{2014} + 1)^4$.

   (a) 10
   (b) 12
   (c) 14
   (d) 16
   (e) None of these