



Try these problems before watching the lesson.

1. Using each of the digits 1, 2, 5, and 7 once, what is the largest four-digit number you can create which is divisible by 4?

2. What is the units digit of the product $1 \times 3 \times 5 \times \cdots \times 2015$?

3. Evaluate the product

$$\frac{5}{3} \cdot \frac{6}{4} \cdot \frac{7}{5} \cdot \frac{8}{6} \cdots \frac{120}{118}$$

4. Consider any positive three-digit integer that has all of its digits distinct and none equal to zero. What is the largest possible difference between such an integer and any integer that results from rearranging its digits?



First Problem: One evening, Varun finishes reading a novel that he has been reading for several days and finds the ending so exciting that he immediately begins reading the novel's sequel. Each novel has pages numbered consecutively, starting with page 1. Each novel has fewer than 1000 pages. If Varun reads a total of 42 pages in one sitting and the sum of the page numbers he reads in that sitting is 2018, what is the number of the last page of the first novel?

Second Problem: Kevin writes a sequence of numbers starting with 1, and repeatedly adding 1 until a multiple of 2 is reached. He then repeatedly adds 2 to this value until a multiple of 3 is reached, then adds 3 until he gets a multiple of 4, and so on. The first four terms are 1, 2, 4, 6. What will be the last term Kevin writes down before he adds 2000 for the first time?

 *Follow-up Problems*

5. What is the smallest four-digit whole number divisible by 9 which has two even and two odd digits?
6. What positive four-digit integer has its thousands and hundreds digits add up to the tens digit, its hundreds and tens digits add up to its ones digit and its tens and ones digits add up to the two-digit number formed by the thousands and hundreds digits?
7. If $2015 + a = b$ for positive integers a and b , both of which are palindromes, what is the smallest possible value of a ?
8. If x , y and z are positive odd integers, what is the remainder when $x^2 + y^2 + z^2$ is divided by 4?

 *Share Your Thoughts*

Have some thoughts about the video? Want to discuss the problems on the Activity Sheet? Visit the MATHCOUNTS Facebook page or the Art of Problem Solving Online Community (www.artofproblemsolving.com).