

# MATHCOUNTS<sup>®</sup> Problem of the Week Archive

## Back to School (Part 2) – September 7, 2020

### Problems & Solutions

Friends Megan and Heather go to different schools. Megan has math class during first period on each of the 180 days she goes to school. She will be in math class a total of 8640 minutes this year. Heather's school year also has 180 days, but her math class only meets every other day, so her class periods are longer. (One day she'll have math class, and then the next day she won't.) If Megan and Heather end up with the same number of minutes of math class each year, how long are the class periods at Heather's school?

*We could solve this a couple of ways. We could see that Heather will only use 90 days to reach her 8640 minutes of math, so she will spend  $8640 \div 90 = 96$  minutes in math class each time it meets. We also could have seen that Megan will spend  $8640 \div 180 = 48$  minutes in math class each day, and if we double this number, we'll have the length of Heather's math classes:  $48 \times 2 = 96$  minutes.*

Carter received his locker combination from his first period teacher. He noticed that each of the three integers of the combination is a prime, the sum of the three integers is 50, and the three integers are in decreasing order. What is the value of the last integer of Carter's locker combination?

*The key to doing the least amount of work for this problem is to realize that only one prime is even, and all of the others are odd. If we add together three odd numbers, the sum will be an odd number. Since the sum is even (50), our combination must consist of the even prime and two of the odd primes. The even prime is 2, and no matter what the other numbers are in the combination, 2 is the smallest prime, so it is the last integer of the combination.*

Soon Yee was putting together her notebook after the first day of school. She bought a pack of 200 sheets of loose-leaf notebook paper and some dividers. She wanted to put the same amount of paper in each of the four sections for her core subjects: math, history, English and science. She figured that her two elective courses (art and music) each only needed half of the amount of paper that a core subject needed. How many sheets of paper did she put into the art section of her notebook?

*Since her art and music sections each only had half the number of sheets of paper as a core subject, together the two sections had the same amount of paper as a core subject. Therefore, it is almost like her notebook had five core subjects, rather than four core subjects and two electives. If she divided the 200 sheets equally among the five core subjects, there would be  $200 \div 5 = 40$  sheets in each section. Now we can see that art would actually have half of this amount, or 20 sheets of paper.*

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### ***Problems***

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