It's a New Year! – January 6, 2020

Problems & Solutions

Now that 2020 is finally here, let's see what we can do with this new number!

If the perimeter of a particular square is 2020 inches, what is the area of the square, in square inches? Express your answer as a decimal to the nearest hundredth.

> *Each of the four sides of a square is the same length. So, if one side is s inches, then the perimeter is 4s inches. If 4s = 2020, dividing both sides by 4 shows that s = 505 inches. The area of the square is A = s², so A = (505)² = **255,025 square inches**.*

What is the median of the first 2020 positive integers? Express your answer as a decimal to the nearest tenth.

> *Since we are considering the first 2020 positive integers, we can divide this in half and see that there are the first 1010 and then the second 1010, with no integer right in the middle. The median is then the average of the two middle-most terms, which would be the 1010th and 1011th terms, or 1010 and 1011. The average of these two values is **1010.5**.*

In the arithmetic sequence –7, –4, –1, …, what is the first term greater than 2020?

> *We can see that the terms are increasing by three each time. If we continue the pattern, we see the sequence is -7, -4, -1, 2, 5, 8, … and each term is one less than a multiple of 3. (Notice that starting with 2, we can consider that we need to add 3x to get as close to 2020 as we can, which will be one less than a multiple of 3.) Knowing our divisibility rules for 3, we know that 2001 is divisible by 3, and therefore, 2000 is a term in the sequence. This means that if we continue the sequence from here, we'll get 2000, 2003, 2006, 2009, 2012, 2015, 2018, and 2021. So, the first term in the sequence greater than 2020 is **2021**.*

If it is noon right now, what time will it be in 2020 hours? Be sure to indicate a.m. or p.m.

> *We can divide 2020 by 24 and see that there are 84.16666 full days in 2020 hours. This tells us that in 84 full days, it will again be noon. Then, we will have 0.16666 of a day left. Multiplying, we can see that 84 days used up 84 × 24 = 2016 of the 2020 hours, so there are 2020 – 2016 = 4 hours left. So, this puts our time at **4:00 pm**.*

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