CHES Math Club – 4th grade
Problems for 6 February 2020

Arithmetic Series

A true story. The students were behaving badly, so the teacher told them all to add up all the numbers from 1 to 100. Unfortunately for the teacher, one of the students was the mathematician Gauss. He immediately told the teacher the answer was 5050. When they checked, he was right. How did he figure it out so fast?

There are a couple of ways to figure this out. The first is to notice that we can write the sum in the following way, pairing up numbers so that the pairs always add to 101:

$$\begin{array}{cccccc} 1 & +2 & +3 & +\ldots & +49 & +50 \\ 100 & +99 & +98 & +\ldots & +52 & +51 \\ \hline 101 & +101 & +101 & \ldots & +101 & +101 \end{array}$$

There are 50 pairs, so the answer is $50 \times 101 = 5050$!

1. On the first day of Christmas, Olivia's dad gives her a partridge in a ear tree. On the second day, she gets 2 partridges in a pear tree. On the third day, 3, and so on until the 12th day of Christmas. At the end, how many partridges does she have?

2. Max is growing tomatoes. The first week of summer, 2 tomatoes grow. On the second week, 4 more grow. Every week after that the number of new tomatoes is two more than the last week. After 11 weeks, how many tomatoes did he grow in total?

3. The math club is doing pairwise competitions to see who's the best at remembering squares. If there are 12 kids and everyone competes against everyone else, how many total competitions are there?

4. What is the sum of the first 100 odd numbers?