Teaching Notes for Geometry
Homework #9

Preparation: Watch the videos “Gauss,” and “Finding the number of terms”

Tell the story of Carl Friedrich Gauss.

Carl Friedrich Gauss is sometimes referred to as the "Prince of Mathematicians" and the "greatest mathematician since antiquity". He has had a remarkable influence in many fields of mathematics and science and is ranked as one of history's most influential mathematicians. Although he made contributions in almost all fields of mathematics, number theory was always Gauss’ favorite area, and he asserted that “mathematics is the queen of the sciences, and the theory of numbers is the queen of mathematics”.

Gauss was a child prodigy. There are many anecdotes concerning his precocity as a child, and he made his first groundbreaking mathematical discoveries while still a teenager.

At just three years old, he corrected an error in his father payroll calculations, and he was looking after his father’s accounts on a regular basis by the age of 5. At the age of 7, he is reported to have amazed his teachers by summing the integers from 1 to 100 almost instantly (having quickly spotted that the sum was actually 50 pairs of numbers, with each pair summing to 101, total 5,050). By the age of 12, he was already attending gymnasium and criticizing Euclid’s geometry.

Provide students with the following to equation:

$$a_{Last} = a_{termbeforethefirst} + d(x)$$

a_{Last} – is the last term in the sequence

$a_{termbeforethefirst}$ – the term that would come before the first term in the sequence

d – the change from one term to the next

x – the number of terms

1 – Figure out what *d* is.
2 – Use *d* to figure out what the term before the first would be.
3 – find *x* by figuring out the number of terms in the sequence.

The third step is by far the trickiest part for students.
To find the number of terms:

- If the sequence is consecutive, subtract the first and last terms and add one

Teaching Notes for Geometry
Homework #9

Classroom Examples:

1) Find a formula to calculate any term and then find the 15^{th} term of the arithmetic sequence 7,10,13,16... **4 + 3x 49**

2) Find a formula to calculate any term and then find the 31^{th} term of the arithmetic sequence 86,80,74,68... **92 – 6x -94**

3) Find a formula to calculate any term and then find the 46^{th} term of the arithmetic sequence -65,-54,-43,-32… **–76+11x 430**

4) Realizing that she doesn't have any money saved up for college, Kristin starts a GoFundMe fundraising account to crowdfund her college education. She opens the account and gets her first pledge of $550 after one hour has passed. She then gets a $15 pledge every hour for the next several months. How much money will Kristin have fundraised exactly one week after opening the account? **$3,055**
***This is a sequence!**

Provide students with the following to equation:

$$Sum = \frac{x(a_1 + a_{Last})}{2}$$

a_1 – the first term

x and *a last* are the same in the pervious formula.

The trickiest part is still figuring out the number of terms and it's even more complicated by the issue of even and odd numbers.
To find the number of terms:

- If the sequence is consecutive, subtract the first and last terms and add one
- For the even/odd issue…modify list so there is the same amount of even and odd numbers without adding any extra evens for an even problem or odds for an odd problem so that the pattern of even, odd, even, odd… is completed. Then treat like a consecutive list, by subtracting the first and last terms and adding one. But because we only care about half the numbers on the list (either even or odd) when then have to divide by 2.

Teaching Notes for Geometry
Homework #9

Classroom Examples:

5) Find the sum of all of the whole numbers from 1 to 107. **5,778**

6) Find the sum of all of the whole numbers from 39 to 214. **22,264**
7) Find the sum of all of the even numbers from 8 to 36 without adding them all up. **330 ***actually change list to end at 37 but 36 is Alast because it is the last EVEN number!**

8) Find the sum of all of the odd numbers from 57 to 92 without adding them all up. **1332 ***Alast is 91 because it's the last ODD number on the list!**

9) Find the sum of all of the even numbers from 11 to 87 without adding them all up**. 1862 ***the first even is 12 and last even is 86!**

10) Your theater company is going to put on a play and it is your job to determine how many tickets can be sold for a performance based on how many seats there are in the theater. If there are 40 seats in the first row of the theater, 46 seats in the second row, 52 seats in the third row, 58 seats in the fourth row, and so on…and the theater has 26 rows, how many total seats are there in the theater? **2,990 seats *This is a series!**

***These last two problems require students to use each formula to solve one problem.**

11) Every year you ship a fruitcake to your grandmother for Christmas. This year, it will cost you $9.50 to ship the cake. If FedEx raises its shipping rates by $0.25 every year, how much will you end up paying for shipping over the next 10 years to send grandma her 11 cakes? **$118.25 *** Use sequence formula to figure out cost of 11th cake then use sum formula…**

12) Currently, it cost $24,985 to by a new car. If the cost of a new car goes up up $945 per year, every year, how much will a new car cost 20 years from now? ***This is a sequence and you have to use the sequence formula to figure out the cost of the 21st term… $43,885** If you bought a new car right now and then bought another brand new car every year for the next 20 years, how much money would you spend? ***This is a series… $723,135**