

Real-Life Application: When Will I Ever Use This?

For use with pages 3–9

Number Theory

Number Theory is a branch of mathematics that explores patterns in numbers. The mathematician Carl Friedrich Gauss (1777–1855) wrote, “Mathematics is the queen of the sciences and number theory the queen of mathematics.” A story about Gauss’s childhood illustrates his mathematical ability at an early age. In order to keep his students occupied, Gauss’s teacher instructed them to add the numbers from one to one hundred and place their slates on his desk as soon as the task was completed. Right away, Gauss had the correct answer. How did he complete this seemingly difficult task so quickly?

1. Examine the numbers one to ten below.

1	2	3	4	5	6	7	8	9	10
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To find their sum, you could simply add from left to right, or you could pair the numbers as illustrated and add each pair.

1	2	3	4	5
10	9	8	7	6

- a. What is the sum of each pair?
 - b. How many pairs are there?
2. Using the information in Exercise 1, what is the sum of the numbers one to ten?
 3. Explain how you could quickly compute the sum of the numbers from one to twenty. What is the sum?
 4. Generate a formula to compute the sum of the numbers from one to any number n . (*Hint:* Think of what each pair would add up to and how many pairs there would be.)
 5. What was the answer to Gauss’s problem?
 6. Suppose you only wanted to add the even numbers from two to twenty. How would that change the formula you generated in Exercise 4?