

# Student Worksheet for Ep. 20: Binary Counting



**Overview:** One day, my kid asked me how a calculator comes up with its answers. That's a great question, I thought. How does a calculator do math?

After thinking about it, I realized this was a great way to teach him about binary numbers. I am going to show you how to not only count in binary, but also help you understand the basis of all electronic devices by knowing this key element.

## Activity:

By asking questions, you can discover a lot of what you already know about a subject. In this case, students usually know how to count to 100 or even 1,000, but they don't consciously know *why* the numbers change in the sequence that they do. In this activity, we're going to explore how quantities are represented by numerals (digits 0 through 9), and then learn how you can change the number of numerals and count in different bases. In the instructional video, we're learning base 2 and 10, but you can use this to represent any base to count in.

## Exercises:

Write the following base 10 (the way we count here on Earth) numbers in base 2 (the way a two-fingered alien would count):

1. 15
2. 3
3. 11
4. 0
5. 9

Can you convert the two-fingered alien's numbers back to Earth numbers?

6. 1010
7. 1100
8. 0101
9. 0001
10. 1110