

The background of the top half of the page is a dense, repeating pattern of white icons on a light gray background. The icons represent various technology and education concepts, including smartphones, laptops, cameras, headphones, lightbulbs, musical notes, graduation caps, printers, and stylized figures of people and robots.

Geek Squad Academy

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**GEEK SQUAD ACADEMY
BENDING BINARY
ONLINE GUIDE**

Welcome to Bending Binary!

For best results, be sure to read the full guide first before you get to work!

Binary is a number system that provides a solid foundation for understanding how computers, and even our own brains, function. Binary is based off something called a “base-2 numbering system”. We’ll get into that later, but don’t worry - if you can count to ten, you’re well on your way. During this activity, experimentation is key - take the chance to discover, change things, and make mistakes! This is going to be awesome!

WHAT YOU’LL LEARN:

- What binary is, and what it can be used for
- How to convert a decimal number to a binary number
- How to convert words and names into binary using ASCII
- How to convert binary numbers to hexadecimal

MATERIALS NEEDED:

- ☐ Pencil
- ☐ Paper
- ☐ Binary Charts (see Appendix)

MODULE 1: INTRO TO BINARY

A computer can only understand two things, on and off. We use 1s and 0s to represent ON (1) and OFF (0), which are then converted into other numbers and even letters. Binary is the way that information is represented. That's why binary is important – it's how computers think!

BINARY IN ACTION

The “brain” of a computer, the central processing unit (CPU), talks to other parts of the computer by using a series of on/off commands (1s and 0s).

It's hard to imagine what binary does for us. But believe it or not, our own brains rely on a form of binary to talk to the rest of our body. Neurons in our brains either fire, or they don't. In this way, the brain is using something like binary signals.

BINARY VS. DECIMAL

In the decimal numbering system, we count from 0 to 9 before the count starts over and we add a 1 to the left side of the number (e.g. 11, 12, 13).

In binary, we only count from 0 to 1 before the count starts over, and we add a 1 to the left side of the number. What would happen if we counted past 10 in binary? It would continue to follow the same pattern, with binary digits continuing to extend to the left.

How to Count to 10 in Binary		11 to 20 in Binary	
Decimal	Binary	Decimal	Binary
1	1	11	1011
2	10	12	1100
3	11	13	1101
4	100	14	1110
5	101	15	1111
6	110	16	10000
7	111	17	10001
8	1000	18	10010
9	1001	19	10011
10	1010	20	10100

TRY THIS OUT:

Practice changing decimal numbers to binary numbers, using the chart. For a larger version of the chart, see the Appendix.

[Take me to more Bending Binary modules!](#)

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