

STEM in the lab

.....● Inspiring Idaho's future STEM workforce

BINARY CODE BRACELET



GRADE LEVELS

This activity is appropriate for grades 2-6.



MISSION

Use binary code to make a bracelet.



VOCABULARY

ABSTRACTIONS: taking the differences that have been found in pattern recognition and then discounting them because they didn't fit the pattern.

ALGORITHM: set of instructions designed to perform a specific task.

DECOMPOSITION: breaking something down into its basic parts.

ENCODING: the process of putting a sequence of characters (letters, numbers, punctuation, and certain symbols) into a specialized format for efficient transmission or storage.

PATTERN RECOGNITION: finding order to something and then analyzing the pattern to the logical answer.



MATERIALS

- » Three different colors of pony beads
- » Pipe cleaner or piece of string

ABOUT THIS ACTIVITY

Computer programmers at INL use code to tell computers what to do. Programmers write instructions, or code, which the computer then executes. Computer programmers solve real world problems by creating code that will analyze the problem and provide solutions.











Letters, numbers, pictures, and basically everything you see on the computer is made up of different combinations of zeros and ones. The combination of zeros and ones is how computers talk, and is called binary code. Binary code is centered on a base-two number system, which means it only uses two numbers: zero and one. These numbers are used in computers as a series of off and on switches. In binary code, think of these zeros and ones like light switches. Each light switch controls just one lightbulb. The light is either on, represented by a one, or off, represented by a zero. A computer reads these ones and zeros in groups of eight digits called a byte. Each byte can represent 256 different characters, including the alphabet and numbers. The letter A is represented by 01000001.

In this activity, you will use binary code to create a bracelet. This step-by-step strategy is important for you to learn how to become a successful problem solver. This method teaches you to think as if you were a computer. Through decomposition, pattern recognition, abstraction, and algorithms, you can learn how to approach new information and how to solve problems.

INSTRUCTIONS

- 1 Pick a color of pony bead to represent 0s and 1s, and write it on the lines below:
0 = _____ bead 1 = _____ bead
- 2 Pick a color of pony bead to represent the space between letters and write it on the line below:
Space between letters: _____ bead
- 3 Write down your initials:
First initial _____ Second initial _____ Third initial _____
- 4 Using the chart on the next page, find your first initial, then write the binary code for that letter on this worksheet. Then write the binary code for your next initials. For example, if your first initial was C, the binary code for this letter would be: 01000011.
First initial binary code: _____
Second initial binary code: _____
Third initial binary code: _____

Making the bracelet:

- 1 Using the pony beads you selected to represent zeros and ones, place a bead on each line to represent your first initial on this piece of paper. Example: 0 =  and 1 = 
First initial C:        
First initial _____: _____
- 2 Follow the same steps as above for your second and third initial.
Second initial _____: _____
Third initial: _____: _____
- 3 Once you have the beads in the correct order, one at a time, place each bead on your pipe cleaner (or string).
- 4 When you finish each initial, place a spacer bead on your bracelet before starting your next letter.
- 5 Once all beads are on the bracelet, you are finished and your bracelet is ready to wear.

BINARY ALPHABET

A	01000001	J	01001010	S	01010011
B	01000010	K	01001011	T	01010100
C	01000011	L	01001100	U	01010101
D	01000100	M	01001101	V	01010110
E	01000101	N	01001110	W	01010111
F	01000110	O	01001111	X	01011000
G	01000111	P	01010000	Y	01011001
H	01001000	Q	01010001	Z	01011010
I	01001001	R	01010010		

RESOURCES

- » Birthday Binary Code for Kids
<https://innovationkidslab.com/birthday-binary-code-kids>
- » Binary Code
<https://www.theproblemsite.com/reference/mathematics/codes/binary-code>
- » Math is Fun: Binary Number System
<https://www.mathsisfun.com/binary-number-system.html>
- » How to Make a Binary Code Project
<https://easycodesforkids.com/how-to-make-a-binary-code-project/>

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