



SfS Away from the Classroom!

T01: Binary Code (Recommended for Grades 3-8)

Please use the following resources to learn about binary code.

Watch this Video: <https://www.youtube.com/watch?v=USCBCmwMCDA>

Answer these questions:

- What kinds of data can be encoded in binary code?
- What do we call the on/off state of a single wire?
- How can letters (and words) be encoded in binary code?

Activities: Follow these directions to make a beaded bracelet or necklace that encodes a message, using 8-bit binary numbers and the real ASCII alphabet code! You will need:

<ul style="list-style-type: none"> • 3 different colors of beads 	<ul style="list-style-type: none"> • A length of lacing, string, yarn or thread 	<ul style="list-style-type: none"> • paper • pencil
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1. Choose a word or message to encode.
2. Make a table like the example below. Write the letters of your message in the first column.
3. Use the table at the end of this document to translate the message into numbers (decimal) then into 8-bit binary.

Example message: Hello World

Letter	Decimal	Binary code	Letter	Decimal	Binary code
H	72	01001000	W	87	01010111
e	101	01100101	o	111	01101111
l	108	01101100	r	114	01110010
l	108	01101100	l	108	01101100
o	111	01101111	d	100	01100100

4. Assign one color bead for 0s, another for 1s, and the third for the spaces between letters (1 bead) and words (2 beads). The picture shows all of the beads needed for "Hello" (black is 0s and blue is 1s).
5. String all the beads on one length of cord to make a necklace or a bracelet. Ask someone to read your code.



Reference: ASCII Alphabet Table

Symbol	Decimal	Binary	Symbol	Decimal	Binary
A	65	01000001	a	97	01100001
B	66	01000010	b	98	01100010
C	67	01000011	c	99	01100011
D	68	01000100	d	100	01100100
E	69	01000101	e	101	01100101
F	70	01000110	f	102	01100110
G	71	01000111	g	103	01100111
H	72	01001000	h	104	01101000
I	73	01001001	i	105	01101001
J	74	01001010	j	106	01101010
K	75	01001011	k	107	01101011
L	76	01001100	l	108	01101100
M	77	01001101	m	109	01101101
N	78	01001110	n	110	01101110
O	79	01001111	o	111	01101111
P	80	01010000	p	112	01110000
Q	81	01010001	q	113	01110001
R	82	01010010	r	114	01110010
S	83	01010011	s	115	01110011
T	84	01010100	t	116	01110100
U	85	01010101	u	117	01110101
V	86	01010110	v	118	01110110
W	87	01010111	w	119	01110111
X	88	01011000	x	120	01111000
Y	89	01011001	y	121	01111001
Z	90	01011010	z	122	01111010

Make observations & use Claims, Evidence, and Reasoning!

1. **Claim:** Binary code can be used to represent letters, words, and sentences.

- **Evidence:**

- **Reasoning:**

2. **Claim:** Binary code words are not easy for humans to read without a table.

- **Evidence:**

- **Reasoning:**