



CEMC at Home

Grade 7/8 - Wednesday, April 1, 2020

Secret Messages

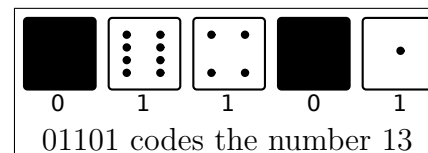
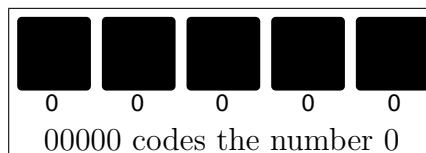
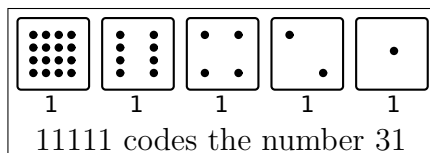
In yesterday's activity Building Numbers, we used cards and codes to represent counting numbers using only the digits 0 and 1. (If you didn't do this activity, please try it now. You may want the cards for today's activity too.) Today we will use these same ideas to write secret messages!

Our secret messages will have two "levels of secrecy" which are explained below.

First, we pair each letter of the alphabet with an integer from 1 to 26 as shown in the table.

A	B	C	D	E	F	G	H	I	J	K	L	M
1	2	3	4	5	6	7	8	9	10	11	12	13
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
14	15	16	17	18	19	20	21	22	23	24	25	26

Second, we pair each number between 1 and 26 with a sequence of five digits, all either 0 or 1. We can set up the five cards as in Building Numbers to help us with this part of the code. Remember that to determine the number represented by the cards, we count the total number of dots showing.



Activity 1: Decode the following secret messages.

- 01001 00001 01101 10111 10010 01001 10100 01001 01110 00111
01001 01110 00011 01111 00100 00101.
- 00011 00001 01110 11001 01111 10101
10010 00101 00001 00100 10100 01000 01001 10011?

Activity 2: Write your own secret messages for your friends and family to decode. Can they read your messages without knowing your coding plan? Explain to them how to decode your messages.

Extension: Can you make a similar coding scheme instead using the cards with 1, 3, and 9 dots from Building Numbers? You may notice that you cannot represent all of the integers from 1 to 26 by placing these cards face up or face down as usual. Can you fix this problem by using two copies of each card?

More Info:

Check out the CEMC at Home webpage on Thursday, April 2 to see a solution to Secret Messages.

Did you know that the codes we have been using (the sequences of 0s and 1s) are called *binary numbers*? Every counting number can be represented using a binary number and binary numbers are used by computers to store and share information.

Cryptography is the study of reading and writing secret messages. To learn more about cryptography, check out [this Math Circles lesson](#).