CEMC at Home

Grade 7/8 - Wednesday, April 1, 2020

Secret Messages - Solution

Answers for Activity 1: Here are the secret messages decoded.

1. 01001 00001 01101 10111 10010 01001 10100 01001 01110 00111 01001 01110 00011 01111 00100 00101.

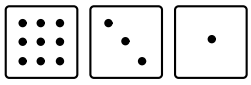
   I AM WRITING IN CODE.

2. 00011 00001 01110 11001 01111 10101 10010 00101 00001 00100 10100 01000 01001 10011?

   CAN YOU READ THIS?

Discussion of the Extension:

You can only represent eight numbers using the following three cards.

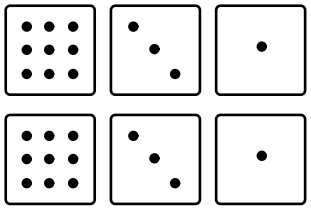


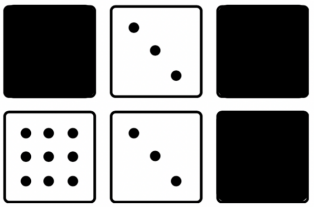
Remember that the digit 1 indicates that the card is face up and 0 indicates that the card is face down.

Code	Number
000	0
001	1
010	3
011	4

Code	Number
100	9
101	10
110	12
111	13

This is not enough to assign a different code to each letter in the alphabet, but we can fix this issue if we instead use two of each card to make our codes.





Again, let's use sequences of three digits to represent numbers, but this time we will use the digits 0, 1, and 2 according to the following rules:

- If both cards (of the same type) are face down, then the digit is 0.
- If exactly one card (of the two cards of the same type) is face up, then the digit is 1.
- If both cards (of the same type) are face up then the digit is 2.

In the example above, we see that the code 120 represents the number $1 \times 9 + 2 \times 3 + 0 \times 1 = 15$. Can you represent all of the integers from 1 to 26 using this new coding strategy?