CEMC at Home
Grade 7/8 - Wednesday, April 1, 2020
Secret Messages - Solution

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

1. \[01001\ 00001\ 01101\ 10111\ 10010\ 01001\ 01110\ 00111\ \]
   \[01001\ 01110\ 00011\ 01111\ 00100\ 00101\ .\]

   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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>0</td>
</tr>
<tr>
<td>001</td>
<td>1</td>
</tr>
<tr>
<td>010</td>
<td>3</td>
</tr>
<tr>
<td>011</td>
<td>4</td>
</tr>
</tbody>
</table>

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

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?