CODE YOUR COMMUNICATION

Make a bracelet with a binary code that only those who know programming code can crack!
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About the Activity

Satellites that orbit our earth are able to do complex scientific work because they can send and receive information. But how do they do that? By using codes written by computer programmers that have every tiny detail needed to allow computers to understand complex data.

Computer code is very complicated – but at its core is surprisingly simple: Computers assign a series of 0s and 1s to each letter, number and symbol. This is called binary code. In this activity you will create a bracelet with your initials in binary code.

Supplies

These simple supplies are all you’ll need for this activity.

• Pony beads or seed beads in three colors
• Beading cord or elastic
• Paper
• Pen or pencil

Grades: 2-5

Topic: Computer Programming

Time: 30 minutes
Activity Steps

Before we start, here’s what you should know:
Computers assign a series of 1s and 0s to each letter, number, and symbol. This is called binary code. For example, the letter “A” is created by this code (or series of 1’s and 0’s): 1000001. The letter B is represented like this: 1000010. Can you see the difference? For our activity, we will be using the ASCII binary code for the capital letters A to Z.

1. Take a look at the ASCII Binary Alphabet. Find the first letter of your first name. What is the code? Write it on your paper.

   DID YOU KNOW? In ASCII code, each letter is represented by a combination of seven 0s and 1s.

2. Now, find the first letter of your last name. Write the code on your paper.

3. Now, it’s time to make a bracelet with your code. In your kit, you have three colors of beads. Choose one color to represent 1 and another color to represent 0. Your third color of bead will be the spaces between your letters. For example, if your name started with a B, you could choose green for 1 and white for 0. You would then line up your beads like this: GWWWWGW

   DID YOU KNOW? ASCII code was developed in the 1960’s. It was based on Morse code, which was used by telegraph systems. Morse code is also used to send messages using light or sound.

4. Now, do the same thing with the first letter of your last name, keeping the color of your 1s and 0s the same.

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### ASCII Binary Alphabet

<table>
<thead>
<tr>
<th>Letter</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1000001</td>
</tr>
<tr>
<td>B</td>
<td>1000010</td>
</tr>
<tr>
<td>C</td>
<td>1000011</td>
</tr>
<tr>
<td>D</td>
<td>1000100</td>
</tr>
<tr>
<td>E</td>
<td>1000101</td>
</tr>
<tr>
<td>F</td>
<td>1000110</td>
</tr>
<tr>
<td>G</td>
<td>1000111</td>
</tr>
<tr>
<td>H</td>
<td>1001000</td>
</tr>
<tr>
<td>I</td>
<td>1001001</td>
</tr>
<tr>
<td>J</td>
<td>1001010</td>
</tr>
<tr>
<td>K</td>
<td>1001011</td>
</tr>
<tr>
<td>L</td>
<td>1001100</td>
</tr>
<tr>
<td>M</td>
<td>1001101</td>
</tr>
</tbody>
</table>

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Activity Steps

1. Cut a piece of string about 6 inches longer than you need to wrap around your wrist.

2. Tie a bead at the end of the bracelet so that the beads don’t fall off as you make your bracelet.

3. Begin by stringing on one of your spacer beads (the color that you DIDN’T choose for your 1s or 0s)

**DID YOU KNOW?** Most programmers now write code using computer languages like “C”, “Java” or “.Net”. These languages use specific series and words that are easier to remember and reuse. The software for the computer language then breaks the commands into the 1’s and 0’s of binary code.

4. Now, put your 1 and 0 beads on the string in order of the code for your first initial. For example, if you were making the code for B, you would put your beads in this order: green, white, white, white, white, green, white.

5. Now, add another spacer bead.

6. Add the beads for your second letter. Make sure to keep them in order!

7. Finally, add another spacer bead to the end!

8. If you have extra beads, you can add the code for another letter or fill it in with spacer beads. Once you are happy with your bracelet, remove the bead you tied to the end and have someone help you tie your bracelet onto your arm.

**DID YOU KNOW?** Satellites communicate by sending radio waves to antennas on earth. Satellites communicate with earth using transponders: devices that can both send and receive radio signals.

9. There you have it! Your initials coded onto your own bracelet!
Visit [https://4-h.org/CodeYourCommunication](https://4-h.org/CodeYourCommunication) to put your knowledge to the test with an interactive game.

### Reflection Questions

**Bonus questions to inspire wonder:**

- What other things could you code using ASCII?
- Why do you think binary code uses only 1’s and 0’s?
- What other skills do you think coders need to do their job?
- Why are the spacer beads important in reading your code?
Investigate & Explore

Take your new knowledge to the next level.

There are many other ways you could leave a message in ASCII code without using a computer. Try using colored candy to leave a message for your parents or friends.

What are other types of code that can be used to communicate? Make up your own secret code using symbols or numbers in place of letters.

The next time you go camping or somewhere else very dark, try sending morse code signals to a friend or family member using a flashlight. It takes some practice!

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