

## Activity 04-1: Understanding Binary and Hexadecimal Number Systems using Binary Bead Bracelets

### Big Idea

This activity is centered around the concept of binary representation, a fundamental principle in computing and digital systems. It aims to teach students how binary codes can represent data, in this case, letters of the alphabet. By translating their initials into binary code using ASCII values, students will gain hands-on experience with binary representation and understand how computers use binary to store and process information.

### Materials

- Two different colored beads - One color to represent '0' (e.g., black) and another for '1' (e.g., white).
- String - For stringing the beads to create the bracelets.
- A device with internet to access the [ASCII table](#).

### Vocabulary

Binary Code

ASCII (American Standard Code for Information Interchange)

Digit

### Background

Before participating in the Binary Bead Bracelets activity, students should have a foundational understanding of binary code and its role in computing. They should be familiar with the concept that binary consists of only two digits, 0 and 1, and how these digits can represent different values. An introduction to the ASCII table is essential, as it demonstrates how letters and characters are encoded in binary. Basic computing principles, particularly how computers use binary for processing and storing information, should also be covered. This background knowledge will ensure that students are well-prepared to engage with and benefit from the bracelet-making activity.



## Activity Directions - Binary Bead Bracelets

### **Task 1:** Introduction to ASCII and Binary

1. Explain [ASCII table](#) and binary code.
2. Show examples of letters and their corresponding ASCII and binary values.

### **Task 2:** Find ASCII Values for Initials

1. Students use the [ASCII table](#) to find values for their initials.

### **Task 3:** Translate ASCII to Binary

1. Students convert ASCII values of their initials into binary code.

### **Task 4:** Prepare Materials

1. Distribute strings and two colors of beads to students.
2. Ensure each student has enough beads for their binary-coded initials.

### **Task 5:** Create the Bracelet

1. Students string beads onto the string, following the binary code of their initials.
2. Black bead for '0' and white bead for '1', or vice versa.

### **Task 6:** Complete the Bracelet

1. Students finish stringing beads to represent all binary digits of their initials.
2. Ensure the sequence of beads correctly matches the binary code.

### **Task 7:** Closure and Discussion

1. Discuss the bracelet-making process.
2. Explore insights on binary representation and its use in technology.

### **Task 8:** Extension Activity (Optional)

1. Challenge students to encode full names or words into binary for more complex creations.

### **Task 9:** Cleanup

1. Students tidy their work areas.
2. Bracelets are stored or taken home.

