## Class Activity: ASCII Encoding and Decoding

**Objective:**
- Understand how characters are represented in computers using the ASCII system.
- Practice converting between decimal, binary, and hexadecimal number systems.
- Decode and encode full sentences using ASCII.

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## Part 1: Introduction to ASCII and Basic Encoding/Decoding

### *Step 1: Understanding ASCII and Number Systems*

- **Explanation:**
  Computers represent characters as numbers. The ASCII system assigns each character a unique number. These numbers are typically represented in three formats:
  - **Decimal:** Base-10 (e.g., 65)
  - **Binary:** Base-2 (e.g., 01000001)
  - **Hexadecimal:** Base-16 (e.g., 41)
- **Example Character:**
  - Character: 'A'
  - ASCII Decimal: 65
  - Binary: 01000001
  - Hexadecimal: 41

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### *Step 2: Basic Character Encoding*

**Activity:**
Convert the following characters into their ASCII representations in decimal, binary, and hexadecimal:

- **Characters:** 'H', 'e', 'l', 'o', '!', '3'

**Instructions:**
1. Find the ASCII code in decimal for each character.
2. Convert the decimal value to binary.
3. Convert the decimal value to hexadecimal.

**Example:**
- Character: 'H'
- Decimal: 72
- Binary: 01001000
- Hexadecimal: 48

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## Part 2: Decoding a Full Sentence

**Activity:**
Decode the following binary string into its corresponding text:

```
01001001 00100000 01001100 01101111 01110110 01100101 00100000 01000011
01101111 01101101 01110000 01110101 01110100 01100101 01110010 00100000
01010011 01111001 01110011 01110100 01100101 01101101 01110011 00100000
01000011 01101100 01100001 01110011 01110011
```

**Instructions:**
1. Convert each binary value to its decimal equivalent.
2. Use the ASCII table to decode each decimal value into a character.
3. Write down the decoded sentence.

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## Part 3: Encoding a New Sentence

**Activity:**
Encode the sentence "**Learning is Fun**!" into its binary and hexadecimal representations.

**Instructions:**
1. Convert each character into its ASCII decimal value.
2. Convert the decimal values into binary.
3. Convert the decimal values into hexadecimal.

**Example:** - Character: 'L'
- Decimal: 76
- Binary: 01001100
- Hexadecimal: 4C

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### *Checkpoint: Sharing and Discussion*

**Activity:**

- Share your encoded sentences with the class.
- Discuss the process and any challenges you encountered.
- Clarify any questions about converting between number systems and ASCII.

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## Part 4: Advanced Challenge (Optional)

### *Step 7: Encoding a Custom Quote*

**Activity:**
Choose a short sentence or quote of your own and encode it in binary and hexadecimal.

**Instructions:**

- Encode your chosen sentence into binary and hexadecimal.
- Share your encoded sentence with a partner.
- Decode your partner's sentence and see if you both got it right!

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## Summary and Wrap-Up:

- Review the key concepts learned: ASCII, number systems (binary, decimal, hexadecimal), encoding, and decoding.
- Discuss how understanding these concepts is crucial for working with data in computer systems.