Discussion [0b10] [2₁₀] [0x2]: Number Representation

Conversion

(a) Convert the following binary numbers into decimal.

11001 → ____________________
1001001 → ____________________

(b) Convert the following decimal numbers into binary.

12 → ____________________
64 → ____________________
127 → ____________________

(c) Convert the following binary numbers into hex.

10011001 → ____________________
11110111 → ____________________
11000001111111101110 → ____________________

Limits

(a) What is the biggest number that can be represented with two decimal digits?

(b) What is the biggest number that can be represented with three binary digits?

(c) What is the biggest number that can be represented with four hexadecimal digits?

(d) How many different numbers can you represent using three binary digits?
More Conversion Practice

Fill in the blanks.

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Binary</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>C</td>
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</tr>
<tr>
<td>5</td>
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<td>11</td>
<td>1011</td>
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<tr>
<td>25</td>
<td>11001</td>
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<tr>
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<td>11</td>
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<tr>
<td></td>
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<td>1B</td>
</tr>
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<td>8</td>
<td>1110</td>
<td>1E</td>
</tr>
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<td></td>
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<td>49</td>
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</tbody>
</table>

Challenge Problems

(a) The original Pokemon are numbered 1-150. We want to store a binary encoding for all original Pokemon where each Pokemon has a binary code equivalent to their decimal number. How many bits do we need to use?

(b) What is the encoding for Pikachu (#25)?

(c) Ternary utilizes base 3 instead of base 2. For example, 10 in ternary is equivalent to 3 in decimal. Imagine that we wanted to store a ternary encoding for all 150 Pokemon where each Pokemon has a ternary code equivalent to their decimal number. What is the ternary encoding for Pikachu (#25)?