1 Binary and Decimal Systems Review

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Learning Goals:

- Be able to describe how computers process data using the binary number system
- Be able to describe binary numbers
- Be able to convert between the binary system and decimal system

Everyone is familiar with the concept of a number. The numbers that you would commonly think about belong to a number system called the **decimal system**, or **base 10**. However, computers need much simpler input in order to be able to function.

What is the binary system?

Binary is a way of expressing information in terms of 1s (ones) and 0s (zeros) **only**. Computers store data and perform calculations in combinations of these 1s and 0s.

In general, 1 represents _____ and 0 represents _____

Key Terms:

- Bit: A single 1 or 0
- Byte: Represents 8 bits of data combinations of 0s and 1s

Binary is also referred to as _______. This is because a byte is not just 8 values (1s or 0s) but

rather, it could be a ______ of 1s and 0s in each "slot". If you are trying to find how many decimal numbers a series of bits can possibly represent, use the pattern:

 2^n where *n* is the number of bits

A byte can therefore represent the decimal numbers 0 to 255. (28 = 256, which is 0, 1, 2, 3....255)

Some examples of bytes:

10110101 = 181 | 00000001 = 1 | 00010011 = 19

Watch this **Binary Counter** video

Mathmo14159

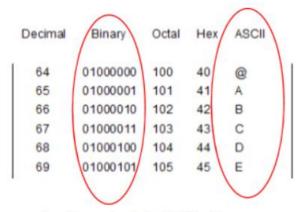
How do computers process data using this system?

In other words, how do computers know how to store characters like "A", "?"

The ASCII Standard!

Imagine if my computer tried to store "A" as 10100101 but yours tried to store it as 00000001... We would never

be able to read each other's files because the two computers wouldn't share the same binary! ASCII ("American Standard Code for Information Interchange") helps solve this problem.



Small sample of the ASCII table

Converting from Binary to Decimal and back

Example 1: Convert 8 to binary

Example 2: Convert 25 to binary

Example 3: Convert 1010₂ into decimal (radix method)

