BITS AND BYTES

To understand how a computer works, you need to understand the BINARY SYSTEM. The binary system is a numbering system that uses only two digits—0 and 1. Although this may seem strange to humans, it fits the computer perfectly!

A computer chip is made up of circuits. For each circuit, there are two possibilities:

- ✓ An electric current flows through the circuit (ON), or
- ✓ An electric current does not flow through the circuit (OFF)

The number 1 represents an "on" circuit. The number 0 represents an "off" circuit. The two digits, 0 and 1, are called bits. The word bit comes from binary digit:

<u>Binary digi**t**</u> = **bit**

Every time the computer "reads" an instruction, it translates that instruction into a series of bits (0's and 1's). In most computers every letter, number, and symbol is translated into eight bits, a combination of eight 0's and 1's. For example the letter A is translated into 01000001. The letter B is 01000010.

Every single keystroke on the keyboard translates into a different combination of eight bits. A group of eight bits is called a byte. Therefore, a byte is a combination of eight 0's and 1's.

Eight bits = 1 byte

Capacity of computer memory, storage such as USB devices, DVD's are measured in bytes. For example a Word file might be 35 KB while a picture taken by a digital camera might be 4.5 MG. Hard drives normally are measured in GB or TB:

- ✓ Kilobyte (KB)   approximately 1,000 bytes
- ✓ MegaByte (MB)   approximately 1,000,000 (million) bytes
- ✓ Gigabtye (GB)   approximately 1,000,000,000 (billion) bytes
- ✓ Terabyte (TB)   approximately 1,000,000,000,000 (trillion) bytes

01000101101010010010100

The binary code that computers use is called the ASCII (American Standard Code for Information Interchange) code. This code allows computers to talk to each other through the Internet, even if they are different models or makes.

Use a copy of the ASCII code to complete the following assignment: Write the letters of your first name on the appropriate lines. Write the corresponding letters of your name in binary code.

(1ˢᵗ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

(2ⁿᵈ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

(3ʳᵈ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

(4ᵗʰ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

(5ᵗʰ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

(6ᵗʰ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

(7ᵗʰ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

(8ᵗʰ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

(9ᵗʰ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

(10ᵗʰ letter) _____ = ___ ___ ___ ___ ___ ___ ___ ___

Use the ASCII code to interpret the following bytes. First, convert the binary numbers to decimal numbers. Then refer to the chart to determine the corresponding letter. All letters are in capitals.

01010110 = number _____ = letter _____

01001001 = number _____ = letter _____

01001011 = number _____ = letter _____

01001001= number _____ = letter _____

01001110 = number _____ = letter _____

01000111 = number _____ = letter _____

01010011 = number _____ = letter _____