SR 1.1

What is hardware? What is software?

The hardware of a computer system consists of its physical components such as a circuit board, monitor, or keyboard. Computer software consists of the programs that are executed by the hardware and the data that those programs use. Hardware is tangible, whereas software is intangible.

SR 1.2

What are the two primary functions of an operating system?

The operating system provides a user interface and efficiently coordinates the use of resources such as main memory and the CPU.

SR 1.3

The music on a CD is created using a sampling rate of 44,000 measurements per second. Each measurement is stored as a number that represents a specific voltage level. How many such numbers are used to store a three-minute-long song? How many such numbers does it take to represent one hour of music?

It takes 7,200,000 numbers for a three-minute song (40,000 × 60 × 3) and 144,000,000 numbers for one hour of music (40,000 × 60 × 60).

SR 1.4

What happens to information when it is stored digitally?

The information is broken into pieces, and those pieces are represented as numbers.

SR 1.5

How many unique items can be represented with the following?

In general, N bits can represent 2 unique items. Therefore:

a. 2 bits

2 bits can represent 4 items because 22 = 4.

b. 4 bits

4 bits can represent 16 items because 24 = 16.

c. 5 bits

5 bits can represent 32 items because 25 = 32.

d. 7 bits

7 bits can represent 128 items because 27 = 128.

SR 1.6 Suppose you want to represent each of the 50 states of the United States using a unique permutation of bits. How many bits would be needed to store each state representation?

Why?

It would take 6 bits to represent each of the 50 states. Five bits is not enough because 2 = 32 but six bits would be enough because 2 = 64.

SR 1.7 How many bytes are there in each of the following?

a. 3 KB

3 KB = 3 \* 1,024 bytes = 3,072 bytes = approximately 3 thousand bytes

b. 2 MB

2 MB = 2 \* 1,048,576 bytes = 2,097,152 bytes = approximately 2.1 million bytes

c. 4 GB

4 GB = 4 \* 1,073,741,824 bytes = 4,294,967,296 bytes = approximately 4.3 billion byte3

SR 1.8 How many bits are there in each of the following?

a. 8 bytes

8 bytes = 8 \* 8 bits = 64 bits

b. 2 KB

2 KB = 2 \* 1,024 bytes = 2,048 bytes = 2,048 \* 8 bits = 16,384 bits

c. 4 MB

4 MB = 4 \* 1,048,576 bytes = 4,194,304 bytes = 4,194,304 \* 8 bits = 33,554,432 bits

SR 1.9 The music on a CD is created using a sampling rate of 44,000 measurements per second. Each measurement is stored as a number that represents a specific voltage level. Suppose each of these numbers requires two bytes of storage space. How many MB does it take to represent one hour of music?

SR 1.10 What are the two primary hardware components in a computer? How do they interact?

SR 1.11 What is a memory address?

SR 1.12 What does volatile mean? Which memory devices are volatile, and which are nonvolatile?

SR 1.13 Select the word from the following list that best matches each of the following phrases: controller, CPU, main, network card, peripheral, RAM, register, ROM, secondary.

a. Almost all devices in a computer system, other than the CPU and the main memory, are categorized as this.

b. A device that coordinates the activities of a peripheral device.

c. Allows information to be sent and received.

d. This type of memory is usually volatile.

e. This type of memory is usually nonvolatile.

f. This term basically is interchangeable with the term “main memory.”

g. Where the fundamental processing of a computer takes place.