Guided Reading in CODE

The reading in **Code** builds up to how we can use binary and transistors to build a computer. Essentially the history of representing information using alternative methods such as Morse code and Braille, were technology breakthroughs. Automating alternative information representations with electricity continued this progress.

Keep reading...

Chapter 11

1. Briefly describe the four gates explained in Chapter 11. Describe the behavior of each gate based on the input values to the gate.
    - And Gate: in order for a signal to be produced, all switches must be closed. If all n switches are closed, then a signal is produced.
    - OR Gate: Either switch in the circuit can be closed and a signal will be produced. If one switch of n switches is closed, then a signal is produced.
    - NOR Gate: all switched must be open in order to produce a signal. If switch 1 and switch 2 and switch n are open, then a signal will be produced.
    - NAND Gate: if any of n switches are open, then a signal will be produced.

Chapter 12

2. A half adder is built from how many "sub components" and has how many inputs and outputs?
    - A half adder has two sub-components, two inputs, and two outputs.

3. A full adder is built from how many "sub components" and has how many inputs and outputs?
    - A full adder has 5 components, three inputs, and two outputs.

4. How many total inputs and outputs are there for an 8-bit adding circuit?
    - 17 inputs, including the initial carry in. 9 outputs counting the overflow or carry out.
5. How many total transistors are needed for the ripple version of the 8-bit adder?
    - An eight bit ripple adder uses 144 transistors.

Chapter 13

1. Design the following circuits with Logisim and post a snapshot of the circuit (a jing video of showing the circuit in action would be nice).
    a. Half Adder and Full Adder
    b. 8 Bit Adder
    c. 8 Bit Adder with the Ones' Complement circuit and the Sub input to the circuit for subtraction

Chapter 14

1. Design the following circuits with Logisim and post a snapshot of the circuit (a jing video of showing the circuit in action would be nice).
    a. Adding machine (page ~~159~~**168**). A bit of a challenge
    b. Edge Triggered D FlipFlop (page ~~163~~**172**)
    c. 8 Bit ripple counter (use Logisim D FF, page ~~168~~**177**)

Chapter 15

1. Define byte.
    - A byte is 8 bits of data.
2. What is the range of an unsigned byte? A signed two's complement byte?
    - 0 to 255, -128 to 127
3. What does the X in the following binary number represent 1010**X**10101?
    - 32.
4. What is the base 16 number system called?
    - Hexadecimal.
5. Why is base 16 a good choice for representing binary numbers?
    - One byte can be represented by two hexadecimal numbers.
6. What base 16 number is 101011000011? What is an easy way to determine this without using a calculator?
    - AC3, break the binary number into four digit groups and determine hex symbols.
7. What does the X represent in the following base 16 number D4A**X**F0?
    - 256
8. The book describes how to convert decimal to base 2 or base 16. Research and describe a technique that allows conversion of decimal to any base (2-36).
    - 1. Convert number to base 10: n * (base ** (log10(number))
    - 2 convert base 10 to desired base: n mod (desired base), record result as first digit, base 10 number / desired base = i, repeat replacing n with I until i = 0.

Chapter 16

1. What do the prefix names kilo, mega, giga, tera, and peta represent in bytes and what were the Greek origins of the words?
    - Kilo, ~10^3 bytes, from greek word for thousand.
    - Mega, ~10^6 bytes, from greek word for great.
    - Giga, ~10^9 bytes, from greek word for giant.
    - Tera, ~10^{12} bytes, from greek word for monster.
    - Peta, ~10^{15}, from the greek word for five (as in 1000^5).
2. At the end of Chapter 16 the author reminds the reader about something that is "very important," what is this?
    - The author reminds us that RAM is volatile, it will lose any stored value once it loses power.