

Physical Computing Self-Quiz

The following are questions you should be able to answer by the respective weeks in Introduction to Physical Computing. Try to answer all of the questions without resorting to copying external code or diagrams.

If you don't know where to start on a given question, first review the lab and material from the syllabus and then consult with your instructor in office hours.

Quiz 1, Week 2: Basic Electronics

- Give a definition for physical interaction.

- Explain the flow of electrical energy in a circuit.

- What is a short circuit?

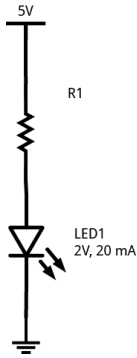
- What are the following components most commonly used for:
 - Transistor

 - Diode

 - Resistor

 - Potentiometer

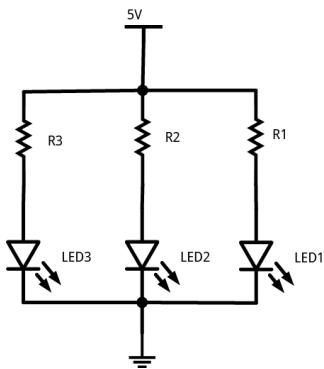
- What formula would you use to calculate the value for the resistor in the following circuit? What is the value? What happens if you don't use enough resistance?



- If you wanted to make the LED in the circuit above dimmer, what change would you make?

- When absolutely nothing works on your breadboard, what is the most basic thing to check using a multimeter?

- Identify the components that are in series below, and those that are in parallel:



- Fill in the blanks:

When components are in series, the _____ through them is the same.

When components are in parallel, the _____ across them is the same.

When you put batteries in series the _____ adds up.

When you put batteries in parallel the _____ adds up.

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Quiz 2, Week 3: Functions, variables, voltage dividers

- Explain the difference between an analog sensor and a digital sensor. Give examples of both.

- Describe how you might make a homemade switch.

- Draw a circuit for a digital input to a microcontroller. What does the resistor (called a *pull down resistor*) do?

- For analog input we often use variable resistors. Can you give 3 examples of variable resistors?
- What is the maximum range your Arduino can give for an *analog input* reading? How many bits of memory does this take up?
- Do you get that full resolution from most sensors? What sensor is most likely to give you the full resolution?
- Draw a schematic of an analog input circuit using a variable resistor with a second resistor to make a *voltage divider*.
- Draw the circuit for connecting a potentiometer to a microcontroller's analog input pin.
- How do you determine the range of values from any given sensor?

- What can you do to improve the resolution of the voltage divider circuit for a variable resistor?

- Write a program to read a digital input and an analog input on an Arduino and print the result out to the serial monitor.