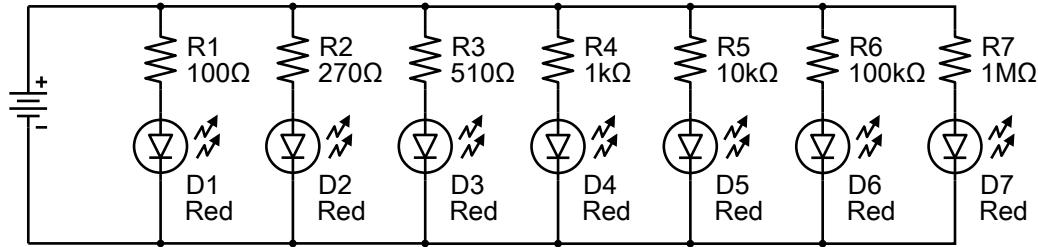


In this activity, we will see the effect of current through the resistor on the brightness of the LED. To maintain consistency, ensure all LEDs are the same type and color. Understand the operation of the following circuit and answer the pre-activity questions. Note that each branch differs in the resistor value.



1. As the resistance in a branch is increased, what happens to the current in that branch? Use Ohm’s law to explain.

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Now measure and record the voltage across the resistor and diode in the circuit, and calculate the current through each branch and power consumed by the diode. The relevant formulas are:

$$I = \frac{V}{R} \text{ and } P = VI$$

Branch		1	2	3	4	5	6	7
5V	Resistor Value [Ω]	100	270	510	1k	10k	100k	1M
	Resistor Voltage [V]							
	Diode Voltage [V]							
	Current [mA]							
	Diode Power [mW]							

Repeat the experiment using a 3.3V supply.

Branch		1	2	3	4	5	6	7
5V	Resistor Value [Ω]	100	270	510	1k	10k	100k	1M
	Resistor Voltage [V]							
	Diode Voltage [V]							
	Current [mA]							
	Diode Power [mW]							

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2. Given an LED with a typical forward voltage of $V_f = 2.5\text{ V}$, and a maximum forward current of $I = 30\text{ mA}$, calculate the minimum resistor value for a supply voltage of 5 V.

3. Perform the same calculation as in question (2) for a supply voltage of 3.3 V.

4. Designing circuitry for an LED flashlight, what resistor value might you choose (5 V supply, the LED as specified in question (2))? Why would you not choose a higher value? A lower value?

5. Imagine you are going to be using the same LED as you experimented with in this activity to design some circuitry. The circuitry is for an indicator light on a battery pack that will show that the battery is being used. What value of resistor would you choose? Why would you not choose a higher value? Why would you not choose a lower value?

6. Plot diode forward voltage versus current.

