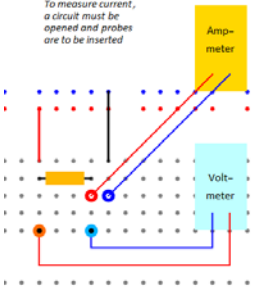
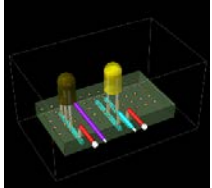
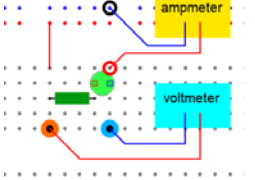
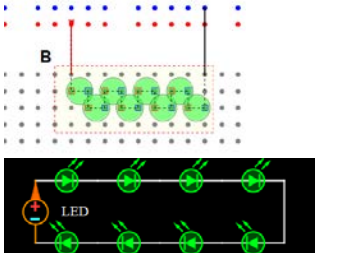
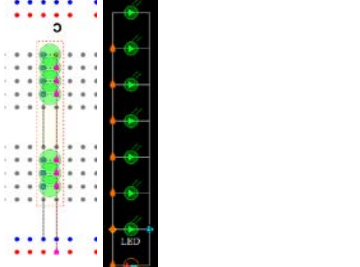
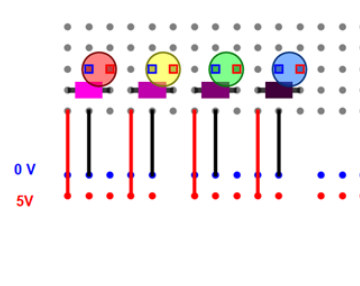


Circuits of Lab 1 – Home-Based

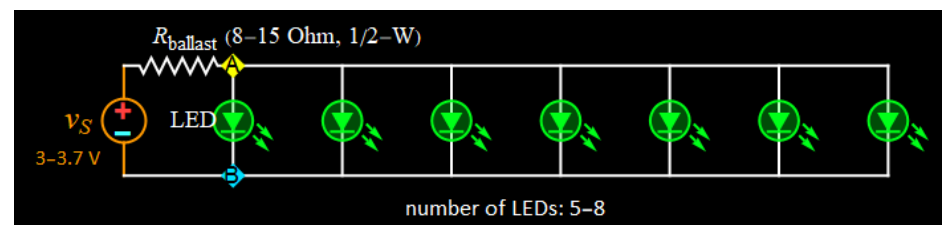
Battery guide and other suggestions

Contact instructor ece2100uh@gmail.com if need more info

	Circuit	Need	Suggestion
B-2	 <p>To measure current, a circuit must be opened and probes are to be inserted</p>	Any battery combo: 1.5-V to 3-V. Use any resistor, from 100 Ohm to 330 Ohm.	Typical consumer product hand-held meter is OK. Just one measurement of voltage and current is sufficient in the report, however, it is best if you practice doing a few: e. g. different values of voltage (if convenient, such as you have several battery combinations). Use a few resistors of different values. The idea is actual practice (eye-hand coordination and manual dexterity for doing electronics). The circuit and Ohm's law are trivial and not that important. No need to write much on Ohm's law.
B-3		Don't have to do anything unless you have variable voltage source (e. g. DAC from Arduino or Raspberry Pi.)	If you can program the digital-analog-converter (DAC) output, vary the voltage from 1.5 to 2.5 V for most LED. The blue one requires a bit higher, up to 3 V. The key criterion is to measure the current and monitor it. Use enough voltage to have up to ~ 20 mA or bright enough to your liking. Take pics, report the measurement results. Again, it's all about practice.
B-4		Any combo: a. 3 x 1.5-V batteries b. One 3.7-V Li battery c. Any 5-V charger/USB d. Rasp Pi, Arduino...	Again, just practice measurement. Use any measurement configuration you like, make sure to report exactly how you did both V and I measurements. Recommend: resistor: between 100 – 200 Ohm. LEDs: your choice. See the above about LED current. (No big deal if your burn one or two, it is a good experience to remember).
B-5	theoretical only	Don't have to demo unless you want.	Don't do it: which is to short across the resistor of circuit B-4 above (by inserting a wire parallel to it). But if you do, get ready to capture what might be the last bright shining moment of your LED to put it in the report. (Red and some green LEDs are very hardy and may survive.).

C-3a		<p>Any combo to give you:</p> <ol style="list-style-type: none"> ~9-10 V for 4-5 LEDs 12-V adapter for 5-6 LEDs 4 or 5 x 3.7-V Li batteries for 6-8 LEDs 2 x 9-V for 8-10 LEDs 	<p>Mixed color LEDs are OK. Just remember that the shorter the wavelength is, i. e. the bluer a LED is, the more voltage it takes, hence you will have fewer LEDs. Conversely, if you use the red ones, you can put in the most number of LEDs for the same voltage. The key thing is: monitor the current, <20 mA, more or less depending on your desire of brightness.</p>
C-3b		<p>Only if you have a real V-controlled power supply. DAC from Arduino or Rasp Pi may not have enough current for more than 4 LEDs, but that's good enough. See suggestion.</p>	<p>If you have ONLY batteries, you can still do it by putting in a "ballast" resistor in series. When go to the campus for parts, ask for a few $\geq \frac{1}{2}$-W (bigger than the $\frac{1}{4}$ W in your kit) 8- to 15-Ohm resistors (in the boxes behind the ASA's desk). A single 3.7-V Li or 2 x 1.5-V (C or D-size) can be used. See the circuit in the figure below. But you don't have to do it. If you do, put in the report for extra credits. All LEDs must be of the same color.</p>
D		<p>See B-4 above. Any combo:</p> <ol style="list-style-type: none"> 3 x 1.5-V batteries One 3.7-V Li battery Any 5-V charger/USB Rasp Pi, Arduino... 	<p>You have done this in B-4. The only difference is that you make 4 of them, different colors, using different resistors, each is appropriate to each LED to keep the current in the range 10 to < 20 mA. OK to do by trial-and-error. Actually you are encouraged to do by trial-and-error to get the right amount of current that gives the LEDs the brightness to your liking. Every one's LEDs are different and one's circuit is not likely similar to another's. It's the trial-and-error part that you will learn the most. This is a parallel of 4 B-4 circuits, and hence, the total current is the sum of that of each LED branch: this is Kirchoff's current law.</p>

Circuit C-3b: parallel LEDs with fixed voltage source (2 x 1.5-V, C or D-size, or one 3.7-V Li-ion battery). The value of the ballast resistor is such that the voltage across the LED gives ~ 10-20 mA each LED. More LEDs: use less ballast resistance and vice versa.



Miscellaneous:

1. While you are in S-383/385, ask for a few resistors between 50-200 Ohm, (you already have 2 100-Ohm and 2 120-Ohm). Select few other values.
2. Also obtain a few capacitors between 0.1 – 1 uF, the ceramic type.
3. You should acquire test leads like the one in this pictures, although some may come with the Digilent. One can always use a few extra ones. This one is advertised ~ \$3-5 on eBay but from oversea, not the US and may take a long “lead” time. The banana-to-alligator below is \$7 and shipped from the US. These things are for long term use and not just for this course, of course.
4. If you purchase batteries, I recommend the rechargeable type. They can be used throughout the semester not to mention for general household use.
5. I saw a digital multimeter on Amazon for \$11. (1/2 of what I bought years ago from Home Depot).

All these are good enough to do Lab 1 and Lab 2. (Except for one demonstration in Lab 2).



6PCS Banana Plug to Crocodile Alligator Clip Test Lead Wire Cable Double Ended

Condition: New

Quantity: 1 More than 10 available \$55.99 / See Item Back

Price: US \$6.85

[Buy It Now](#)

[Add to cart](#)

[Add to Watchlist](#)

100% buyer satisfaction 644 sold Free shipping and returns

Shipping: FREE Economy Shipping (see details)
Item location: Portland, Ore. Ships to United States

Delivery: Estimated between Fri, Sep, 11 and Mon, Sep, 14
Use Expedited Shipping to get it by Sep, 11

Payments:

Returns: Free 30 day returns (see details)