

## Terminal Voltage

**Purpose:** To investigate the relationship between terminal voltage and current.

**Materials:** 2 D-cells, 4 light bulbs, alligator clips, voltmeter, ammeter

### Procedure:

- 1) Use the voltmeter to measure the voltage across each cell. Each one should have a voltage of approximately 1.50 V.
- 2) Connect all two cells in series and record the terminal voltage (actually the EMF). You can double check this using a voltmeter.
- 3) Create a circuit with one light bulb and record the terminal voltage and current through the battery.
- 4) Add light bulbs in parallel up to a total of 4 and repeat the measurements as in step 3 each time you add a bulb. Your bulbs might dim and fade as you add more of them in series but as long as your circuit is completely connected, you should get the appropriate current and terminal voltage reading.
- 5) Draw a schematic showing the circuit with 4 light bulbs. Include the placements of the voltmeter and ammeter used for taking measurements.
- 6) Plot a graph of terminal voltage vs. current. Include the equation of the line on your graph.

### Discussion (short):

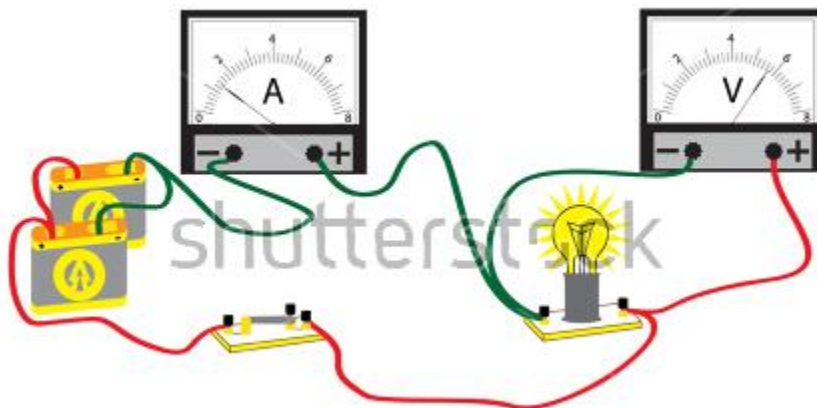
Answer the following questions.

1) As you add more lights in parallel, what happens to:

- a. The total resistance?
- b. The total current?
- c. The terminal voltage?

2) Chemical cells generate a certain voltage. The amount of voltage depends only on the reactants in the cell and is essentially constant. Terminal voltage refers to how much voltage actually leaves the battery. Explain why the terminal voltage decreases as current through the battery increases.

3) State the EMF and internal resistance of your battery. (Hint: Use your graph)



**Due:** raw data, data analysis, and discussion on separate sheets of paper

**Due date:** May 9, 2018