Simulation
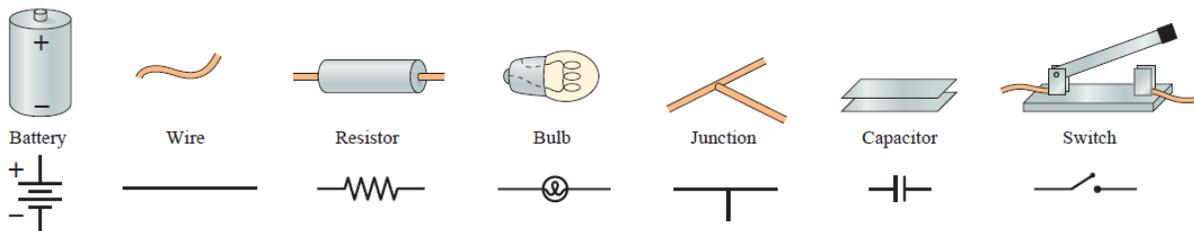
http://simbucket.com/circuitbuilder/   DC Circuit Builder   *Mobile friendly*

Lab Purpose

To investigate current, circuit diagram, series and parallel circuits, and bulb brightness.
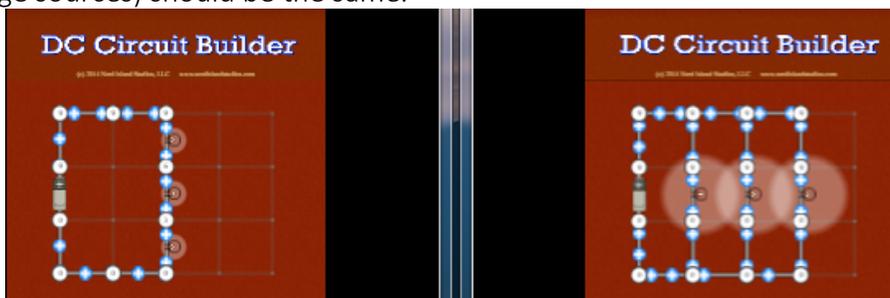
Reference – Circuit elements

Source: Physics for Scientists and Engineers, Knight, 3rd

Initial Setup

Create a series and parallel circuit. Place them side by side on your screen.
All bulbs should have the same resistance.
Both batteries (voltage sources) should be the same.

Series Circuit   Parallel Circuit

Task 1: Introduction to circuit diagrams and modeling with Simbucket
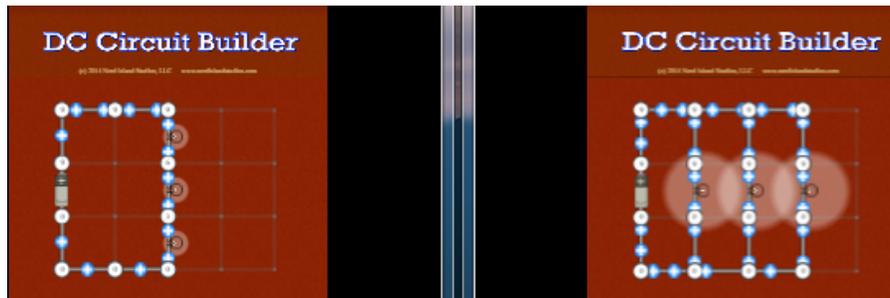
1. Sketch a circuit diagram for both a series and parallel arrangement below. You may search basic circuit diagrams in Google to help you.

Series Diagram   Parallel Diagram

Task 2: Investigate current and bulb brightness for a series and parallel circuit

Build the following circuits.

Series Circuit   Parallel Circuit

1. Observe the blue positive moving charges. This is conventional current (electrons flow the opposite directions)

   a. Which circuit has the most current flowing (moving charge)?   [series or parallel]

   b. Which circuit has the brightest bulbs?   [series or parallel]

   c. Make a brief statement (1 to 2 sentences) relating current and bulb resistance (assuming all bulbs have the same resistance)

2. Replace 1- bulb from the series circuit with a wire. Remove 1-bulb from the parallel circuit. Record your observations about current and bulb brightness for each circuit (series and parallel).

   Series circuit observations:

   Parallel circuit observations:

Task 3: Vary resisting elements to investigate current and bulb brightness for a <u>series</u> circuit

Build 3 separate series circuits.

Investigate what happens to current and bulb brightness if you vary the number of resisting elements (bulbs in this case) while keeping all other elements the same.

For each case below

1) Build the circuit with the simulator
2) Draw a circuit diagram
3) Record and observe what happens to current and bulb brightness.

Case 1:   Circuit with 1-voltage source. 1 light bulb.
Case 2:   Circuit with 1-voltage source. 2-light bulbs having the same resistance.
Case 3   Circuit with 1-voltage source. 3-light bulbs having the same resistance.

*Tip: If you build the simulator for case 1 you can just add bulbs for case 2 and case 3.

Task 3: Vary resisting elements to investigate current and bulb brightness for a <u>parallel</u> circuit

Build 3 separate parallel circuits.

Investigate what happens to current and bulb brightness if you vary the number of parallel branches each having 1-bulb (resisting element) while keeping all other elements the same.

For each case below

1) Build the circuit with the simulator
2) Draw a circuit diagram
3) Record and observe what happens to current and bulb brightness.

   Case 1:   Circuit with 1-voltage source. 2 parallel branches having 1-bulb.
   Case 2:   Circuit with 1-voltage source. 3 parallel branches having 1-bulb.
   Case 3   Circuit with 1-voltage source. 4 parallel branches having 1-bulb.

   *Tip: If you build the simulator for case 1 you can just add branches for case 2 and case 3.

'