SNC 1DI

Date: _____

Simulation Lab: Series and Parallel Batteries

Dry cells can be connected together to increase the amount of energy available or increase the time a battery will last. In this investigation you will study the characteristics of each of the two basic kinds of battery combinations

Purpose: To determine the effect connecting batteries in series or parallel will have on voltage

Hypothesis:

What happens to the voltage supplied when cells are placed in series?

voltage increases

What happens to the voltage supplied when cells are placed in parallel?

voltage stays the same

Materials: Online simulation -
http://phet.colorado.edu/simulations/sims.php?sim=Circuit_Construction_Kit_DC_Only

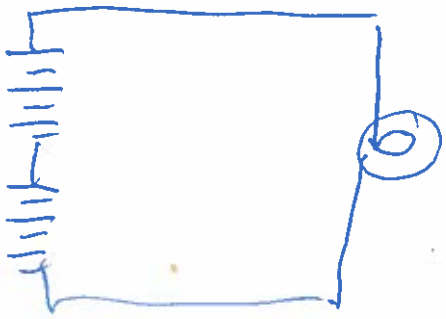
Part A: Series Circuits

1. Create a circuit with a battery and one light bulb. What is the voltage of the battery? 9V

Draw a circuit diagram.

2. Create a circuit with <u>two batteries</u> connected in series and one light bulb. What is the voltage of the battery? 18V

Draw a circuit diagram.

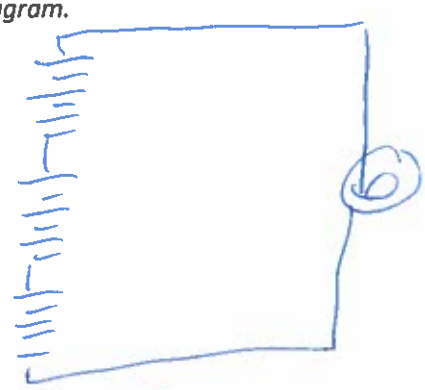


Is the light brighter? Yes

27V

3. Create a circuit with <u>three batteries</u> connected in series and one light bulb. What is the voltage of the battery? _____

Draw a circuit diagram.

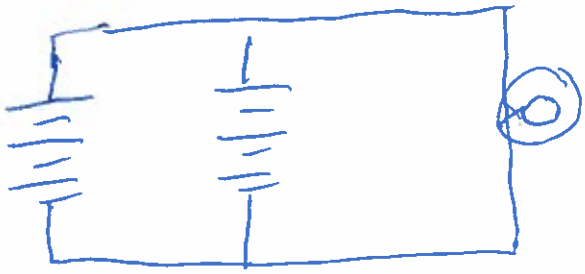


Is the light brighter? yes

Part B: Series Circuits

1. Create a circuit with <u>two batteries</u> connected in parallel and one light bulb.
   What is the individual voltage of battery 1? 9V battery 2? 9V light bulb? 9V

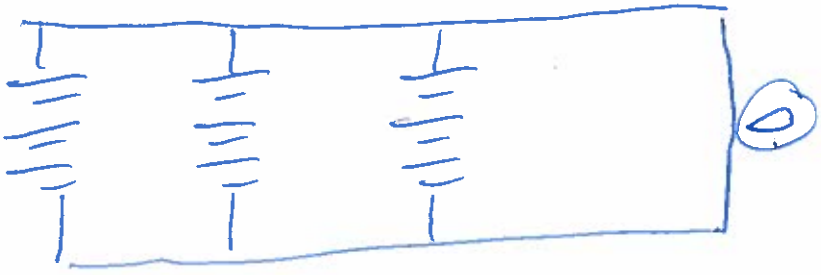
Draw a circuit diagram.



Is the light brighter? no

2. Create a circuit with <u>three batteries</u> connected in parallel and one light bulb.
   What is the individual voltage of battery 1? 9V battery 2? 9V battery 3? 9V light bulb? 9V

Draw a circuit diagram.



Is the light brighter? no

Questions:

1. Do your observations agree with your hypothesis that were made at the beginning of the activity? Explain.

Yes - series - voltage increases
- parallel - voltage remains same

2. What happens to the total voltage of a battery when cells are connected in series?

$V_S = V_1 + V_2 + V_3 + \ldots$

3. What happens to the light brightness when cells are connected in series? Explain.

brightness increases

4. What happens to the total voltage of the battery when cells are connected in parallel?

$V_P = V_1 = V_2 = V_3 = \ldots$

5. What happens to the light brightness when cells re connected in parallel? Explain

stays the same

6. What type of battery combination will allow the cells (batteries) to last a longer time?

parallel - one battery used at a time