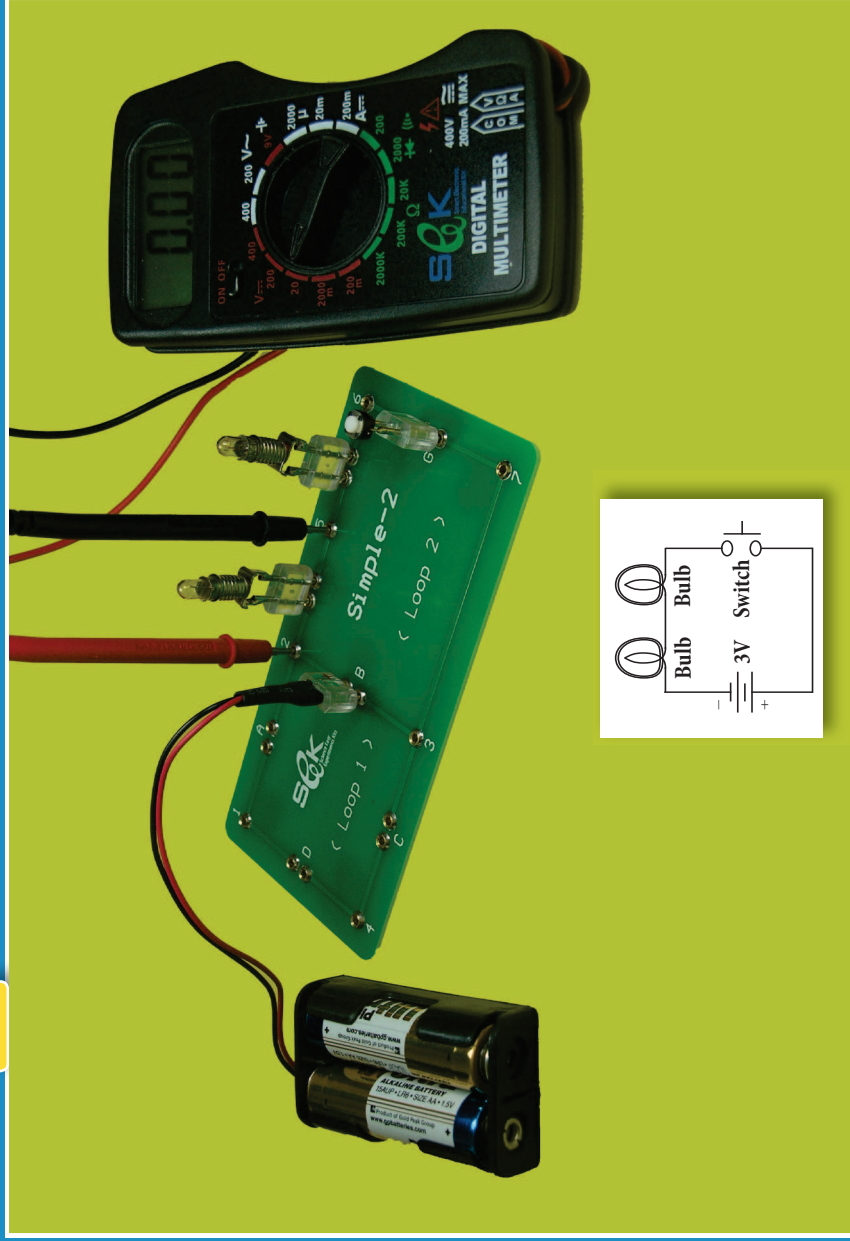


# Experiment

## 16

### Bulbs in Series & in Parallel



## Objectives

1. The student will build and explain the operation of simple series and parallel bulb circuits.
2. The student will investigate and compare the brightness of identical bulbs connected in series and in parallel.

## Apparatus

- Experiments Board (Simple-2)
- 2xAA Battery Holder w/AA batteries
- Two identical Bulbs
- DMM
- Switch
- Jumpers

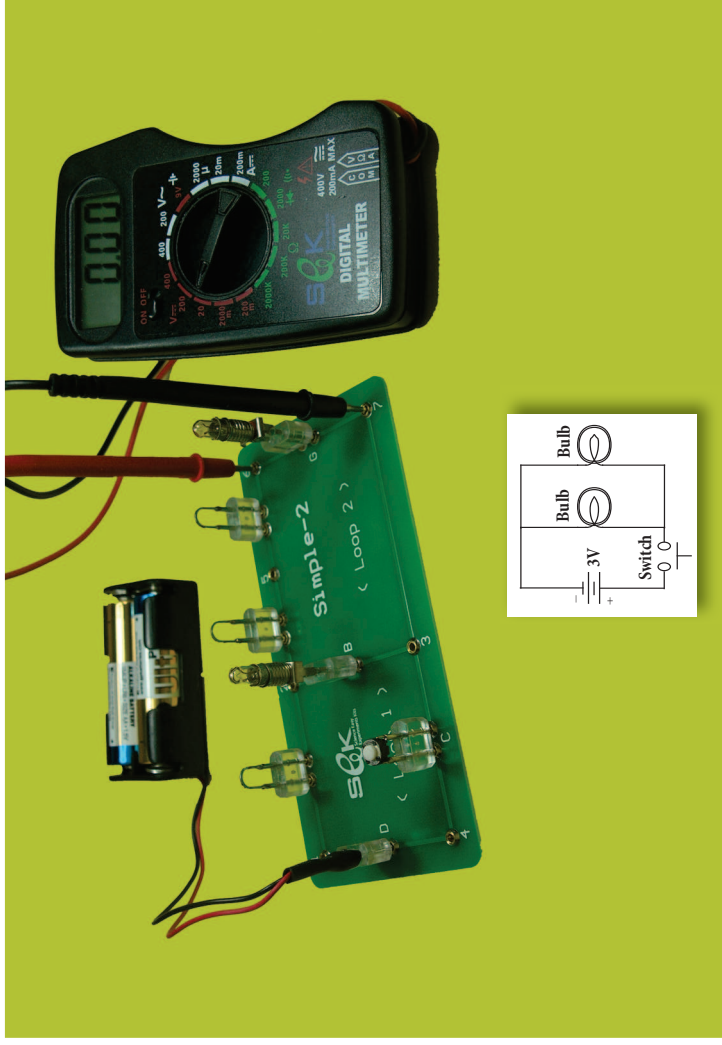
## Procedure & Conclusions

### Bulbs in Series:

1. Build a simple circuit by inserting 2xAA battery holder at the pair (B), a bulb at the pair (E), a switch at the pair (G) and a jumper at the pair (F).
2. Press the switch button and see if the bulb glows.
3. Set the mode of the DMM to (DVC) (range 20), insert its probes at the points (2) & (5) to measure the voltage drop between the terminals of the bulb.

4. Press the switch button and see the DMM reading.
  - The voltage drop across the bulb is .....
5. Insert another identical bulb at the pair (F) instead of the jumper, as shown in the photo.
6. Press the switch button and see the brightness of the two in series identical bulbs.
  - The bulbs are ... **brighter / dimmer ...** than when you just had one bulb in the circuit, because the current ... **increases / decreases ...** due to ... **increase / decrease ...** in the equivalent resistance of the circuit.
  - The brightness of two identical bulbs connected in series is ... **different / the same ...**
7. Record the DMM reading (the voltage drop across the first bulb)
8. Insert the DMM probes at points (5) & (6), press the switch button and record the DMM reading (the voltage drop across the second bulb).
  - The voltage drop across the first bulb is .....
  - The voltage drop across the second bulb is .....
9. Take off one of the two bulbs and press the switch button, watch if the remaining bulb glows.
  - In series circuits, if one of the bulbs removed or destroyed the electric circuit becomes ... **open / closed ...**, and hence other bulbs remaining in the circuit ... **glow / don't glow ...**

## Bulbs in Parallel:



10. Build a simple circuit consisting of a battery, two identical bulbs connected in parallel and a switch as shown in the above photo.

11. Press the switch button and watch the brightness of the two bulbs and compare it with what you have got in step 6
  - The brightness of two identical bulbs connected in parallel is ... **higher / lower ...** than the brightness of the same bulbs when connected in series, which can be explained by the equivalent resistance of the circuit.
  - The brightness of two identical bulbs connected in parallel is ... **different / the same ...**
12. Set the mode of the DMM to (DVC) (range 20), insert its probes at the points (2) & (5)
13. Press the switch button, record the DMM reading (the voltage drop between the terminals of the first bulb).
14. Insert the DMM probes at the points (6) & (7), press the switch button, record the DMM reading (the voltage drop between the terminals of the second bulb).
  - The voltage drop across the first bulb is .....
  - The voltage drop across the second bulb is .....

15. Take off one of the two bulbs and press the switch button, watch the if the remaining bulb glows.

- In parallel circuits, if one of the bulbs removed or destroyed the electric circuit becomes ... open / closed ..., and hence other bulbs remaining in the circuit ... glow / don't glow ...
- Each one of the two bulbs is ... brighter / dimmer / the same brightness ... as when you only had one bulb in the circuit.
- Explain .....

## Discussion

1. Discuss the advantages and disadvantages of using a series circuit for a string of lights.
2. Is the electric circuit in your house a series circuit or parallel circuit? Discuss why are electric circuits in houses wired in parallel.