Series and Parallel Lamp Circuits Lab

PSI Physics

Objectives:

- Learn how to build circuits
- Discover the properties of series and parallel circuits

Description:

In this lab, you're going to:

- figure out how to make an electric circuit that lights up 1 lamp
- design two different circuits with 2 lamps:
    - one where the lamps burn as bright as in the circuit with only one lamp
    - one where the lamps are dimmer than in the circuit with only one lamp

Materials:

- Battery (or other DC voltage source)
- Connecting wires
- 2 or 3 Lamps (bulbs and bulb holders)
- Knife switch

Circuit 1:

1) Connect the battery, one lamp and switch with wires to make the lamp light up when the switch is in one position and go dark in the other position.
2) Draw a diagram of the working circuit.

3) Describe the switch position when the lamp is on versus when the lamp is off.

4) If the lamp is lit and you disconnect a wire in the circuit, what happens to the lamp?

5) What do your answers to 3) and 4) tell us is a necessary condition for the lamp to be on?

Circuit 2 (Series):

1) Add one more bulb to your circuit so both bulbs are lit (on) but a lot dimmer than one bulb in a circuit of its own.
2) Draw a diagram of the working circuit.

3) With both bulbs lit, what happens when you remove one of the lamps from its holder? How does this relate to your finding for Circuit 1 question 5)?

Circuit 3 (Parallel):

1) Rearrange the two bulbs in your circuit so that both bulbs are lit (on) and burn about as bright as one bulb in a circuit of its own.
2) Draw a diagram of the working circuit.

3) With both bulbs lit, what happens when you remove one of the lamps from its holder? How does this relate to your finding for Circuit 1 question 5)?

Conclusion and Application:

1) Looking back at circuit 2, what are two properties of lamps connected in a series?

2) Looking back at circuit 3, what are two properties of lamps connected in parallel?

3) Which of the 3 circuits you built do you think will run down the battery fastest? How can you tell?

4) Do you think the lights (or outlets) in your home are connected in series or parallel? Why?

5) Name at least one more experiment you would try if you had more batteries, switches and/or lamps? For each experiment, say what you would expect to see and why!