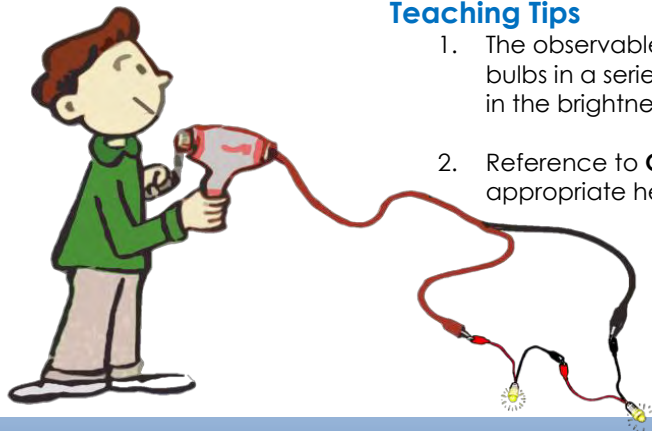


### Key Concepts

1. The bulbs in this circuit are wired **in series** (one after the other), providing only one path for the current.
2. When a bulb burns out or is removed from the circuit, the flow of electricity stops.
3. As bulbs are added to a series circuit, there is an increase in resistance and a corresponding decrease in current.
4. Bulbs and other electrical devices are considered as **loads** on the circuit in that they convert electricity into some other form of energy while altering the characteristics of the circuit itself.

### Teaching Tips

1. The observable result of adding bulbs in a series circuit is a decrease in the brightness of the bulbs.
2. Reference to **Ohm's Law ( $I=V/R$ )** is appropriate here.



### Materials

- 1 GENECON with output cord
- 4 Bulbs (3.8V, .3A) in sockets with leads

### Procedure

1. Connect one of the bulbs to the GENECONs and light it up to moderate brightness. (Caution! Excessive rotation may burn out the bulb.)
2. Add another bulb to the circuit by inserting it between the first bulb and the GENECON (as in the sketch). Light up both bulbs by rotating the handle **at the same rate** as before. Note any change in brightness.
3. Add a third and then fourth bulb in a similar manner, noting any changes in brightness.
4. While one student is operating the GENECON to illuminate the four bulbs wired in series, another student should unscrew any bulb in that circuit. What happened to the other bulbs?

# Bulbs in Parallel

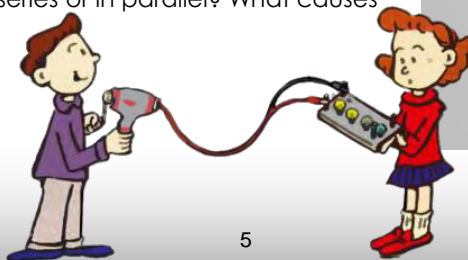
## Activity 8

### Key Concepts

1. The Parallel Bulb Base consists of 4 bulbs wired in parallel, which provides more than one path for the electricity.
2. When one of the bulbs in a parallel circuit burns out or is removed from the circuit, the other bulbs remain lit. The current does not have to pass through one bulb to get to the next one.
3. As bulbs (or other loads) are added to a parallel circuit, there is a decrease in resistance and a corresponding increase in current.
4. As the load (more bulbs) increases, the mechanical energy to operate the GENECON must also be increased.

### Teaching tips

1. Additional bulbs, and even another GENECON, can be added as loads in parallel using the terminal at the opposite end of the Bulb Base. However, the circuit can easily become overloaded.
2. Relate the results of this activity and the preceding one to **Ohm's Law ( $I=V/R$ )**
3. Compare the results of these two activities to familiar experiences. What are two different ways to wire up Christmas strings of lights? Are the circuits in most homes wired in series or in parallel? What causes overloaded circuits?



### Materials

- GENECON with output cord
- Parallel Bulb Base
- 4 Bulbs (3.8V, 0 .3A)

### Procedure

1. Connect the alligator clips on the output cord of the GENECON to either pair of terminals on the Parallel Bulb Base.
2. Put a bulb in the socket nearest the terminals being used. Light the bulb by rotating the handle of the GENECON briskly, but not excessively.
3. Place bulbs loosely in each of the three remaining sockets. As one student continues to operate the GENECON at constant speed, another student should screw in these bulbs one at a time. As the bulbs light one after the other, what effect is felt by the GENECON operator?
4. This effect can be experienced again as each of the bulbs is taken out of the circuit one-by-one in reverse order.