

We Need More Power

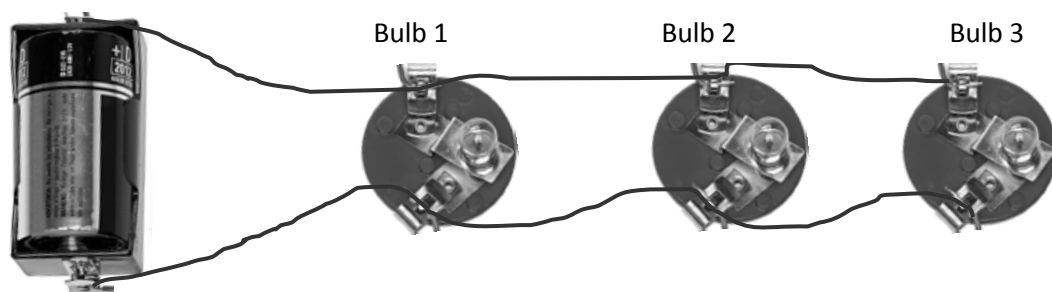
Testable Question: What happens to the electricity output when new users of electricity are added to a power grid with limited energy input?

Prediction and rationale (what do you think will happen and why?):

Materials: wires, batteries, rubber bands, light bulbs, bulb and battery holders, insulators, conductors

Directions

1. Build a parallel circuit similar to the one below, beginning with one bulb and adding one additional bulb at a time. A rubber band may be used to hold the wire ends to the battery if battery holders are not available.



2. Record observations of the light output from the bulbs as additional bulbs are added. In your observations, be as specific as possible regarding the output of light from each bulb.
3. Place various materials into the circuit and record observations of how different conductors and insulators affect the output from the bulbs. In your observations, be as specific as possible regarding the output from each bulb.
4. Add a battery to the circuit. If time permits, combine your “power grid” with those of other groups.

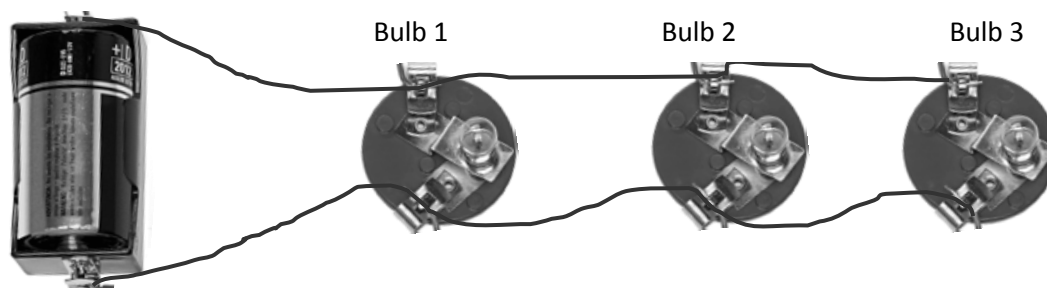
Observations

Set-up	Observations
One bulb	
Add a bulb (two total)	
Add a bulb (three total)	

Material	Observations
Circle: <i>Insulator or Conductor</i>	
Circle: <i>Insulator or Conductor</i>	
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Circle: <i>Insulator or Conductor</i>	

Analysis

1. There were several energy transformations in the electrical circuit that you built, including heat (thermal), electrical, chemical, and electromagnetic. **Label the diagram below to show the energy transformations that occurred in the circuit. Begin with the battery.**



2. When you added a bulb, the lights dimmed. How did you solve the problem?
3. How does the solution developed in Question 2 compare to what is required to address actual power grid problems?

What is Electricity?

It all starts with atoms. Atoms are the building blocks of all matter. Each atom has a nucleus which contains positively charged protons and neutrons with no charge. Around the nucleus are negatively charged electrons. Electrons are the key to electricity. Sometimes electrons will move from one atom to another. As the electrons move, an electrical current is created. Some materials are better than others at allowing electrons to move through. Materials that allow electrons to flow freely are called *conductors*. Materials that do not allow much electron flow are called *insulators*.