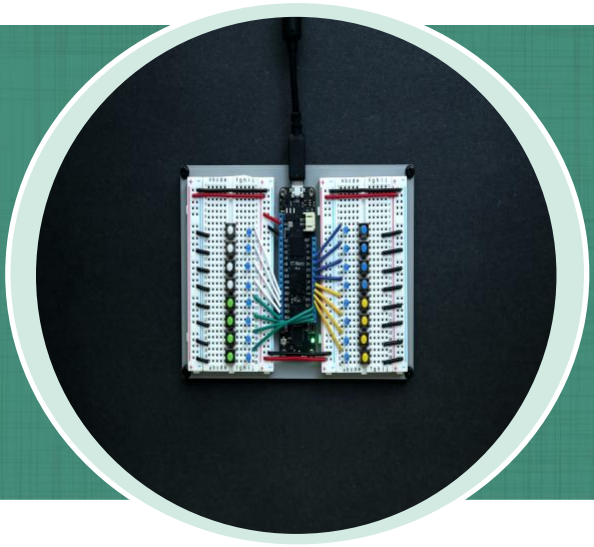
Building Parallel and Series Circuits



Electricity All Around Us
Learner Activity Instructions
Grade Level: 5-8

What you will learn:

In this activity, you will learn the difference between series and parallel circuits. Have you ever used Christmas lights and found that if one light burns out, the rest no longer works? This is an example of a series circuit. The electricity flows from one light to the next. For the string to work, all the lights must be able to conduct electricity. A parallel circuit is very different. In parallel circuits, several bulbs (or other appliances) have their own connection to the power supply. Each one can receive a supply of electricity, regardless of what happens to the others.

What you will need:

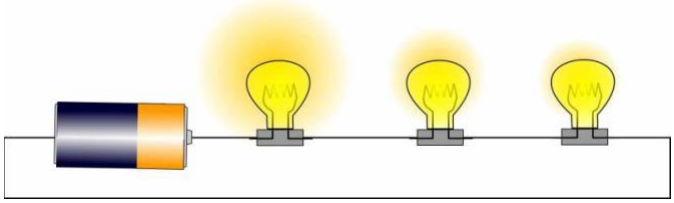
Building Parallel and Series Circuits Learner Worksheet
2 Bulb holders
2 Batteries 1.5 volts
2 Bulbs
6 Insulated copper wires (10-20 cm long)
2 Battery holder

Background

Series Circuits

In the following diagram, three lamps have been connected in a series. In a series circuit, the electrons must all flow from one appliance to the next. Each lamp in the series causes the electrons to slow down so that the lamps do not all light up with the same brightness. The last lamp in the series is the dimmest because the electrons moving through it are moving more slowly than in the first lamp. You can also connect batteries in series. Batteries in a series do the exact opposite of lamps. Each battery adds more electrons to the flow so that the voltage in the circuit is increased. Two batteries increase the voltage to 3 volts, and 3 batteries would raise the voltage to 4.5 volts. The greater the voltage, the brighter the lamp.

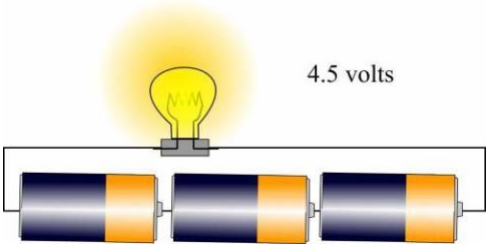
Many battery-powered appliances have batteries that are connected in series in order to increase the voltage. Try opening a flashlight. You will find that the batteries are arranged in series. Most contain two batteries and produce 3 volts in order to make the lamp shine more brightly.



Parallel Circuits

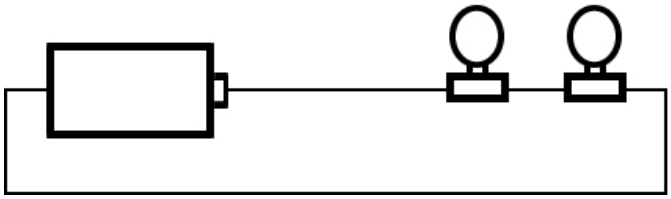
Parallel circuits are used extensively in homes, computers, automobiles, and other electrical devices. In three lamps connected in parallel, electrons flow at the same speed through all three lamps. The result is that all three lamps will shine at the same brightness. The circuits that provide electricity to the outlets and appliances in your home are all parallel circuits. A single circuit may have 3 or more appliances or outlets connected to it. All the appliances on that circuit must share the electricity equally.

You can connect batteries in parallel as well. In this case, the voltage of the circuit is not increased, but more electrons are available to the appliances on the circuit. The appliance can run for much longer because there is a larger supply of electrons. Connecting several batteries in parallel allows the batteries to last much longer than if they were connected in series.

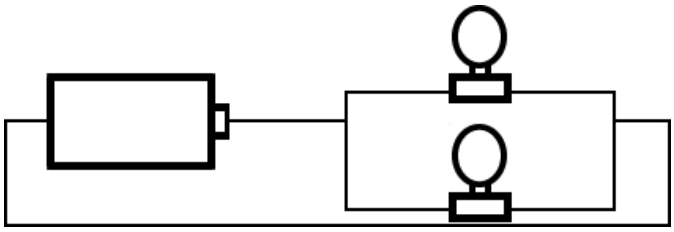


How to do it

1. First, set up a series circuit using light bulbs. You will need two light bulbs, one battery, two lamp holders and three pieces of wire. The illustration below will assist you in building the series circuit.



2. Record your observations on your worksheet.
3. Now, set up a parallel circuit. You will need two light bulbs, one battery, two battery holders and six pieces of wire. The illustration below will assist you in building the parallel circuit.



4. Record your observations on your worksheet. Also, answer any remaining questions on the worksheet.

As you explore and complete this activity think about these questions:

1. What role does a circuit play in the electricity we use every day? Think of examples of circuits in the home or at school.
2. What happens to a light bulb in a series? Is the light as bright as the light that is wired in a parallel?
3. Can you think of examples of a parallel circuit in the household or school?
4. Can you think of examples of a series circuit in the household or school?