

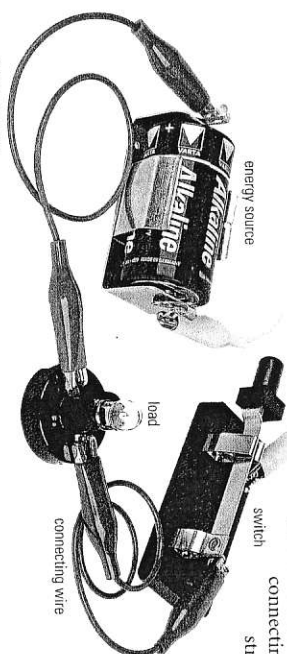
Series and Parallel Circuits

An electric circuit can be represented in several ways. The four main parts of the electric circuit (i.e., energy source, load, control device or switch, connecting wires) are shown as pictures in

Figures 1 and 2. Another way to represent a circuit is using a circuit diagram (Figure 3).

Circuit diagrams are drawings of circuits using symbols. See section D3 of the Skills Handbook for the circuit symbols.

connecting wire



connecting wire

Figure 1
A series circuit has only one path for electricity to follow.

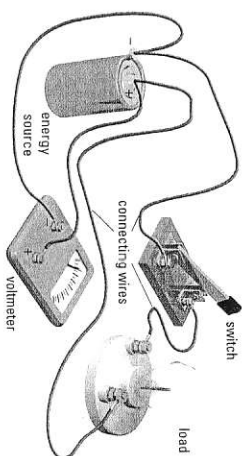


Figure 2

A parallel circuit has more than one path for electricity to follow.

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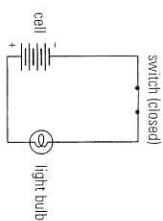


Figure 3
Circuit diagrams use symbols to represent the parts of an electric circuit.

In Figure 4, circuit symbols are used to draw an electric circuit. Notice that the connecting wires are drawn as straight lines, with right-angled corners, to make it easier to understand. Since only one path is shown, this circuit is wired in series.

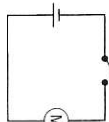


Figure 4

An electric circuit that has one dry cell, a switch, and two motors wired in parallel would look like Figure 5.

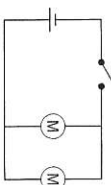


Figure 5

Electric circuits can be wired in **series** or in **parallel**. It is easy to tell which is which when you look at three things (Table 1):

1. The number of paths the electricity has to follow.
2. Whether the electrical energy is shared.
3. How the devices are controlled (on or off).

Series Circuits

Figure 1 shows a simple series circuit. The electricity has only one path to follow. Many simple electrical devices, such as flashlights, are arranged in series. So are most battery-operated devices, such as toys and cordless tools. Since there is only one electrical device (load) in the circuit, it has to be wired in series. A circuit can be wired in parallel only if there is more than one electrical device. However, a circuit with more than one electrical device can also be wired in series.

Parallel Circuits

Figure 2 shows an example of a parallel circuit. One path leads to the voltmeter, while the other path supplies electricity to the switch and light bulb, making two paths. Houses are wired in parallel because of the advantages this type of circuit has over series circuits. The most important advantage is that devices can be switched on or off individually. For example, you do not have to turn on the stereo to switch on the kitchen light.

Table 1

Circuit type	Number of paths for electric current to follow	Electrical energy shared/not shared	Devices on/off
series	one path	electrical energy shared	all electrical devices must be either on or off at the same time
parallel	more than one path	electrical energy is not shared	each electrical device can be on or off within the circuit

Understanding Concepts

1. Explain, in your own words, the differences between a series and a parallel circuit.
2. What is a circuit diagram?
3. Draw circuit diagrams for the following circuits:
 - (a) two cells, one open switch, and a light wired in series
 - (b) one cell, two lights, and a clock wired in parallel
 - (c) a series circuit of your own design
 - (d) a parallel circuit of your own design

Making Connections

4. Why are homes wired in parallel? Give two reasons.
5. Why are battery-operated toys wired in series?

Exploring

6. Produce a circuit diagram for one room of your home. Remember that your home is wired in parallel.

Reflecting

7. Why are circuit diagrams used rather than drawings of the actual parts of a circuit?

Challenge

1. Draw circuit diagrams of your brainstormed ideas to make an electric circuit do something. Keep these diagrams until you make a final choice.

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