

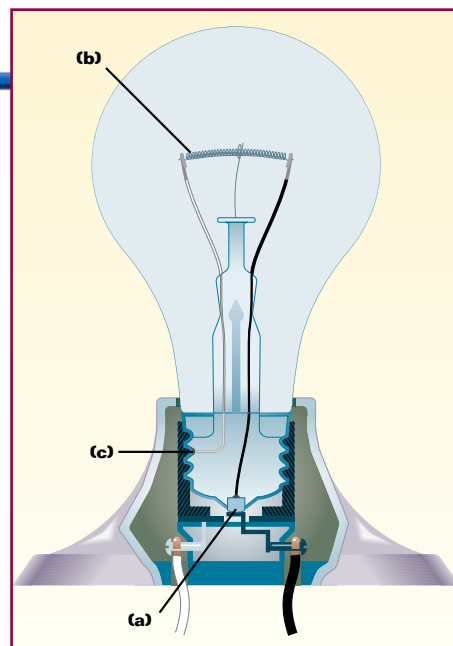
Light Bulbs

How does a light bulb contain a complete conducting path? When you look at a clear light bulb, you can see the twisted filament inside that provides a portion of the conducting path for the circuit. However, the bulb screws into a single socket; it seems to have only a single contact, the rounded part at the bulb's base.

Closer examination of the socket reveals that it has two contacts inside. One contact, in the bottom of the socket, is connected to the wire going to one side of the filament. The other contact is in the side of the socket, and it is connected to the wire going to the other side of the filament.

The placement of the contacts within the socket indicates how the bulb completes the circuit, as shown on the right. Within the bulb, one side of the filament is connected with wires to the contact at the light bulb's base, **(a)**. The other side of the filament is connected to the side of the metal base, **(c)**. Insulating material between the side of the base and the contact on the bottom prevents the wires from being connected to each other with a conducting material. In this way, charges have only one path to follow when passing through a light bulb—through the filament, **(b)**.

When a light bulb is screwed in, the contact on one side of the socket touches the threads on the side of the bulb's base. The contact on the bottom of the socket touches the contact on the bottom of the bulb's base. Charges then enter through the bulb's base, move through the bulb to the filament, and exit the bulb through the threads. For most light bulbs, the bulb will glow regardless of which direction the charges move. Thus, the positive terminal of a



Light bulbs contain a complete conducting path. When a light bulb is screwed in, charges can enter through the base **(a)**, move along the wire to the filament **(b)**, and exit the bulb through the threads **(c)**.

battery can be connected to either the base of the bulb or the threads of the bulb, as long as the negative terminal is connected to the threads or base, respectively. All that matters is that there is a complete conducting path for the charges to move through the circuit.



Short circuits can be hazardous

Without a load, such as a bulb or other resistor, the circuit contains little resistance to the movement of charges. This situation is called a *short circuit*. For example, a short circuit occurs when a wire is connected from one terminal of a battery to the other by a wire with little resistance. This commonly occurs when uninsulated wires connected to different terminals come into contact with each other.

When short circuits occur in the wiring of your home, the increase in current can become unsafe. Most wires cannot withstand the increased current, and they begin to overheat. The wire's insulation may even melt or cause a fire.

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