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Making a Light-Bulb Telegraph

Directions: Work in teams of two as you perform this activity. Gather these materials as directed by your teacher.

Team Materials

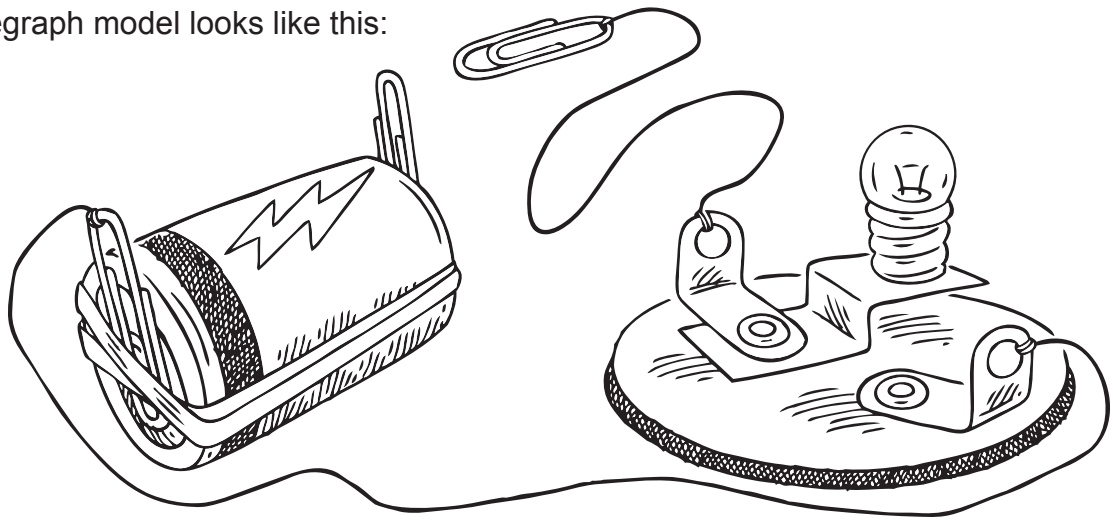
- 2 large paper clips or 2 pieces of thin metal
- 2 pieces of coarse sandpaper cut into 2-inch-by-2-inch squares
- aluminum foil
- D cell batteries
- D cell battery holders of any type or large rubber bands
- flashlight bulbs and sockets
- scissors and a ruler
- thin bell wire (22 gauge works well)

NOTE: If you use small C, AAA, or AA batteries in a large plastic battery holder, use a spongy wad of aluminum foil to fill out the rest of the space in the battery holder and keep the paper clips or metal flanges upright and next to the batteries or aluminum foil.

Getting Started

1. A light-bulb telegraph uses the same basic materials and arrangement as a complete circuit.
2. Use a battery holder or two large rubber bands to tightly hold the battery. Firmly place the metal flanges or large paper clips in the holder or between the battery and the rubber bands on both metal poles of the battery.
3. Screw the small flashlight bulb securely into the socket.
4. Attach 1 wire to one large paper clip or flange on one side of the battery. Make sure there is metal-to-metal contact between the paper clip or flange and the bare end of the wire. Attach the other bare end of the wire to one metal flange on the socket.
5. Attach one bare end of the remaining wire to the other flange of the socket.
6. Wrap another large paper clip securely with the other bare end of this wire. This will be the telegraph key used to tap coded messages. Touch the paper clip to the flange to get the light bulb to light up.

The telegraph model looks like this:



Make Your Own Cloud

Getting Started

Weather is a critical element of life on Earth, and the behavior of water in its three states—solid, liquid, and gas—is a basic part of Earth's many weather features.

Directions: Work in teams of two as you perform your first activity. Gather these materials as directed by your teacher.

Team Materials

- baggies
- chalk dust
- flour
- hot water
- ice
- jar tops or lids (or small plates)
- jars or water glasses

1. Fill a glass jar or a water glass about $\frac{1}{3}$ full of hot water.
2. Sprinkle some chalk dust, flour, or both in the air above the hot water.
3. Cover the glass or jar with an upside-down lid or plate.
4. Place a baggie with ice cubes on top of the upside-down lid or plate.
5. Observe what occurs in the jar or glass.
6. Describe the cloud that forms. How much of the space in the jar does it fill?

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_____

7. What do you think happened to form the cloud?

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8. What conditions in the atmosphere do you think are necessary to create clouds?

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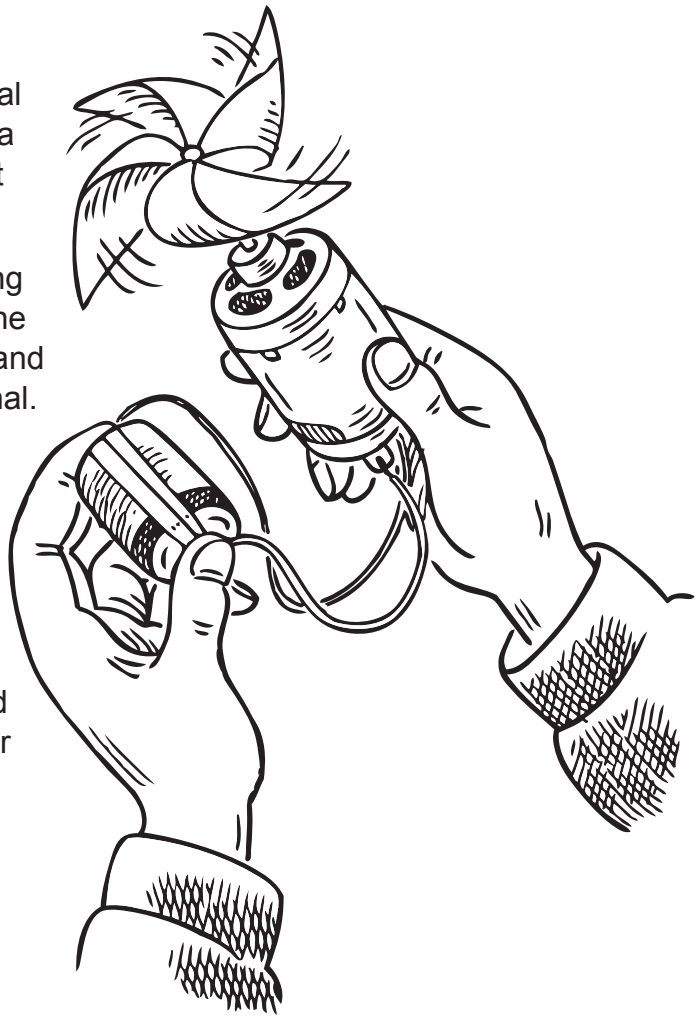
Getting Acquainted with Motors

Assembling the Fan



1. Place the fan you just made on the central pole of the motor. You may need to use a little masking tape to attach it to the shaft if it is loose or if the hole is too large.

2. If your motor has two wire leads extending from the body, just connect one lead to the positive terminal of a C or D cell battery and the other wire lead to the negative terminal. The fan will move rapidly as the motor starts. Wrap a wide rubber band tightly around the terminals of the battery and place the bare wire leads under the rubber band to keep them firmly connected to the power source.

   You can also wrap each wire lead around a metal paper clip and then slip the paper clip under the rubber band.

NOTE: If your motor does not have the two wire leads, cut two pieces of thin coated wire each about three inches long. Using the sandpaper, strip the rubber, plastic coating, or cover from the last inch of each end of each wire (see page 22). Insert one end of each wire into the two small holes on top of the motor. Twist each wire until it is firmly in place on each side of the motor. Wrap the other end of each wire around a small or large paper clip, then insert each paper clip between the rubber band and the terminals of the battery. You may want to cover the wires attached to the motor with a strip of masking tape to keep them in place.

Constructing a Truss Bridge

Directions *(cont.)*

6. Use one straw to connect the tips of the first two triangles. (You can use the pins already there to attach this straw.)

7. Connect the second and third triangles in the same manner.

8. Repeat what you did on this side of the bridge by adding and connecting straws on the other side, in the same way.

9. Use one straw to connect the top points (vertices) of the first two triangles at the front of the bridge. The triangles now form a triangular prism.

10. Use a straw to connect the two middle triangles and another to connect the two last triangles. Your final truss bridge should look like the illustration below.

11. If needed, cover the flat deck of the bridge as you did in the first activity with three large index cards, pieces of poster board, or pieces of Bristol board cut to fit each section.

12. Cut a piece of masking tape 3 mm by 3 cm long to attach the front of the first card to a straw and one more to attach the back of the card. Do the same for the second card in the middle section and the third card at the rear of the bridge.