

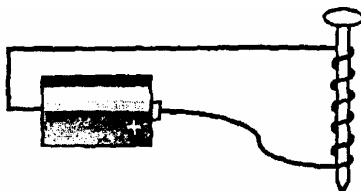
Name: _____

Date: _____

Teacher: _____

Electricity and Magnetism:

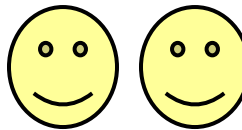
Tom and Jetta discovered that by looping a wire around a nail and connecting the ends of the wire to a battery, they were able to attract paper clips to the nail. A diagram of their battery-wire-nail circuit is shown below.



In groups of two, you will try to duplicate Tom and Jetta’s discovery. Each group will share a kit containing the following materials:

- ✓ 1 D cell battery
- ✓ 1 length of wire
- ✓ 1 iron nail
- ✓ 6 paper clips
- ✓ battery holder

Use the list above to check that your group has all the materials.

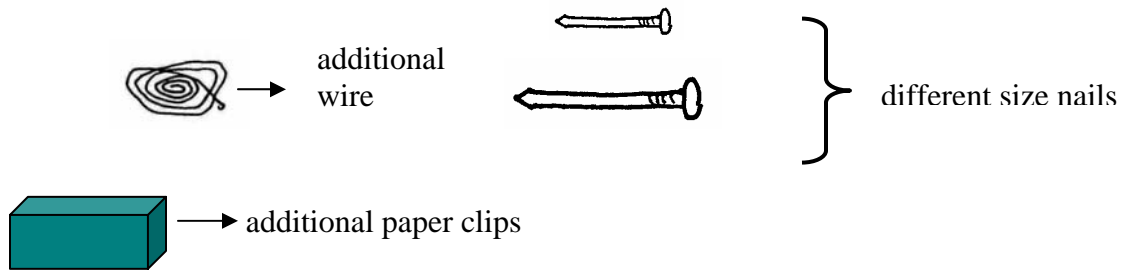


With a Partner

Construct Tom and Jetta’s electromagnet circuit that is shown in the diagram above and see if the nail will attract paper clips. Make sure that each person gets to try to lift paper clips with the electromagnet circuit. **Caution: The metal wire that is connected to the battery holder will become hot. Only touch the insulated part of the wire when connecting and disconnecting the wire to the battery.**

1. Describe your observations here.

In addition to the materials that you used in the exploration on page 1, you will have these other materials available for use in the investigation that you will develop below.



You do not need to use **all** of these additional materials in your investigation. You will probably need some, but not others.



Alone

Check the variable that you will change in your investigation.

- I will change the size of the nail in my investigation.
- I will change the number of coils of wire around he nail.
- I will change the poles of the battery that connect to the wire.

2. Write an investigation question for the variable that you choose.

3. Write a testable prediction for your question. Explain your thinking for that outcome.

- 4. Design an experiment that tests your prediction. In the space below, write the steps of your plan. Use the space in the box if you would like to draw a diagram of your plan.

Use this space to diagram your experimental set up.

- 5. Use this space to record the data and observations from your experiment.

Date and Observations:

6. In the space below, choose and construct the best way to organize your observations and represent your data so that they are clear and show any important patterns or trends.

7. Do the results of your experiment support your prediction? Explain why or why not.

8. Use your understanding of electricity and magnetism to explain the observations and data you collected in your investigation.

9. Tell whether the event below is an example of a magnetic force, a gravitational force, electrostatic force or a contact force. Write the word **magnetic, gravitational, electrostatic, or contact** next to the event.

- _____ a. A woman parachutist jumps out of a plane and falls toward earth.
- _____ b. A man uses a hand held metal detector to locate objects hidden under the sand.
- _____ c. The woman's parachute opens and the woman's fall slows down.
- _____ d. A snow plow pushes snow out of the road .
- _____ e. The hair on your arm raises before a lightning storm.
- _____ f. The needle on a compass points north.

10. In this experiment, energy was transferred from electrical energy to heat energy as the wire becomes hot. The heat energy was conducted from the wire into your finger.

Choose another example of heat energy being conducted. Draw a diagram of the example and include:

- The objects through which the heat is conducted.
- The direction that the heat energy flows.
- The relative temperature of the objects when the system reaches equilibrium.

[Relative temperature means higher, lower, or the same. It does not mean an actual temperature such as "20 degrees C".]

