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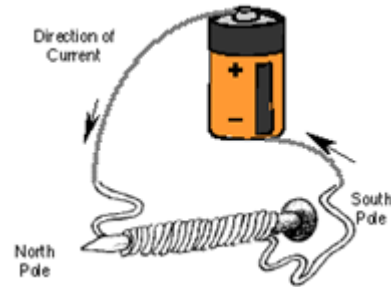
Class:

## Building an Electromagnet Worksheet **Answers**

1. Draw the battery, wire coil and magnetic field. Label the positive and negative ends of the battery, and the poles of the coil's magnetic field.

Diagram should look like this →

Students can use arrows for the magnetic field.



2. Describe what happens if you hold a nail or paper clip near the coil.

The object vibrates, or gets pulled into the coil.

3. Reverse the connection of the coil. Draw the battery, coil and magnetic field. Label the positive and negative ends of the battery, and the poles of the coil's magnetic field.

Physical objects are the same, but the magnetic field has a reversed polarity – the poles are switched.

4. Describe what happens if you hold a nail or paper clip near the coil.

The object vibrates, or gets pulled into the coil.

5. How did you test the strength of your electromagnet?

Answers will vary; check individually.

6. Can your electromagnet pick up paper clips when the current is disconnected?

No

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### Electromagnet Engineering

7. What did you modify in building your electromagnet (number of coils or size of battery)?

Answers will vary.

8. Fill in the table below with how many paper clips your electromagnet was able to pick up.

Electromagnet	How Many Paperclips Did It Pick Up?
<b>With 10-12 coils</b>	Answers will vary.
<b>With fewer coils</b> How many coils? _____	
<b>With more coils</b> How many coils? _____	
<b>With a different battery #1</b> What size battery? _____	
<b>With a different battery #2</b> What size battery? _____	

9. Write a sentence about how changing the number of coils or battery size affects how many paper clips the electromagnet could pick up.

While answers will vary, in general, students should show an understanding that more coils and/or a larger battery increases magnetic force, as shown by being able to pick up more paper clips.

10. What are some ways that engineers might be able to use electromagnets?

Answers will vary. Engineers use electromagnets to create motors, which are found in every use in cars, appliances, clocks, and computers.

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