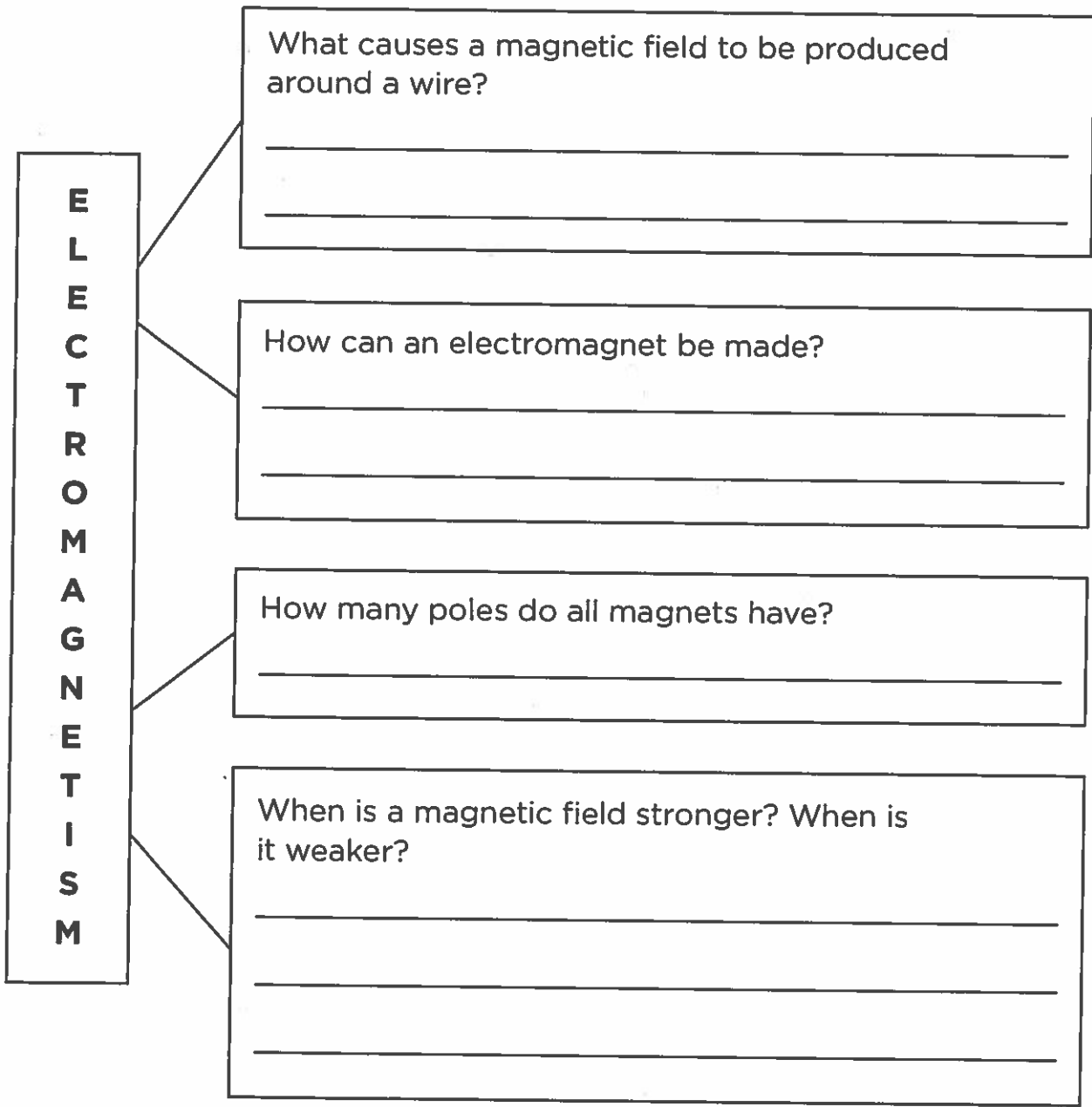


Magnetism



What items in your house use electromagnetics?

Cruising on Air

Read the Literature feature in your textbook.



Write About It

In this article, you learned that Maglev trains use magnets to travel at very fast speeds. What are some ways you use magnets? Write a report about uses of magnets. Include facts and details from this article and your experience to support your writing.

Magnets

Use your textbook to help you fill in the blanks.

What is a magnet?

1. When you bring two magnets together, they will either _____ or attract each other.
2. A magnet is an object with _____.

Magnetic Poles

3. The strongest parts of the magnet are called the _____.
4. When two magnets are brought together, a north pole and a _____ attract each other.
5. The magnetic force between two magnets is _____ when the magnets are far apart.

How do magnets attract?

6. Most magnets are made of _____.
7. Inside a magnet, the tiny particles are lined up with _____ facing one direction and south poles facing another.

What is a magnetic field?

8. A _____ is the area of magnetic force around a magnet.
9. The magnetic field allows a magnet to _____ an object without even touching it.
10. Much of the inside of Earth is made of _____.
11. The iron creates a magnetic field which _____ our planet.
12. Earth spins on its _____, an imaginary line through the center of Earth.
13. The _____ is a display of lights near the South Pole.

What is a compass?

14. A _____ is an instrument that uses Earth's magnetic field to help people find directions.
15. Magnets point north because they line up with _____ magnetic field.

Summarize the Main Idea

16. How does a compass work?

Magnets

- | | | |
|------------|-------------------|--------------|
| a. attract | d. iron | g. magnetite |
| b. axis | e. magnet | h. poles |
| c. compass | f. magnetic field | |

Use your textbook to help you fill in the blanks.

1. The inside of the Earth is made up of melted _____ .
2. Earth spins around on a(n) _____ , which is an imaginary line through the center of Earth.
3. A(n) _____ is any object with magnetic force.
4. A(n) _____ is the area of magnetic force around a magnet.
5. When two magnets are brought together, the north pole and the south pole _____ each other.
6. A(n) _____ is an instrument that uses Earth's magnetic field to find direction.
7. The parts of a magnet where the magnetic force is strongest are called the magnetic _____ .
8. _____ is a natural magnet containing iron.

Magnets

magnetite

permanent

push

metal

poles

repel

north

pull

temporary

Fill in the blanks.

Magnets come in many shapes and sizes. _____ magnets always have magnetic force. The strongest part of a magnet is the _____. Like poles attract each other and unlike poles _____ each other. The mineral _____ is a natural magnet containing iron. When you bring a magnet near certain _____ objects like paper clips, tiny particles in the metal will line up. The tiny particles _____ and _____ in all different directions until they come in contact with a magnet. Then, the tiny particles line up facing the _____ pole and the south pole. The paper clip becomes a _____ magnet. It can attract other metal objects as well!

Electromagnets

Use your textbook to help you fill in the blanks.

What is an electromagnet?

1. When an electric current flows through a wire, it creates a _____ around the wire.
2. An _____ is a coil of wire wrapped around a core, usually an iron bar.
3. The magnetic field in the coil of wire causes _____ inside the metal core to become magnetic.
4. When a current in an electromagnet stops, the metal core is no longer _____.

How does a loudspeaker work?

5. A _____ is a device that changes electrical energy into sound.
6. The _____ is the part of the loudspeaker that vibrates to create sound.
7. When electric current flows through the electromagnet, it is pushed and pulled by the _____.
8. The movement of the diaphragm produces _____.

Telephones

9. A telephone receiver is actually a _____ .
10. The telephone mouthpiece is like a loudspeaker in _____ .
11. A _____ is a magnet used to convert sound into electric signals.

How else are electromagnets used?

12. Electromagnets are often more useful than ordinary magnets because they can be _____ .
13. Electromagnets are used in _____ that increase or decrease the voltage of electric currents.
14. They are also found in many household _____ such as doorbells, vacuum cleaners, and dishwashers.

Summarize the Main Idea

15. Why are electromagnets more useful than permanent magnets?

Electromagnets

- | | | |
|---------------------|------------------|---------------|
| a. current | d. electromagnet | g. microphone |
| b. diaphragm | e. generate | |
| c. electric signals | f. loudspeaker | |

Match the correct letter with the description.

1. _____ When a friend calls you on the phone, his or her voice is changed into this.
2. _____ This device uses a magnet to convert sound into electrical signals.
3. _____ The part of the loudspeaker that vibrates to create sound
4. _____ A device that changes electrical energy into sound
5. _____ To make an electric current
6. _____ When this is turned off, the electromagnet is no longer magnetic.
7. _____ A coil of wire wrapped around a core of iron

Electromagnets

diaphragm	electromagnet	Michael Faraday
electric current	loudspeaker	microphone
electric signals	magnetic field	sound

Electromagnets are very useful in our daily lives. In the 1820s, _____ and Joseph Henry made discoveries about electric current and magnets. They discovered that magnets could generate an _____. When the current is flowing, it creates a _____ around the wire. When the current is turned off, the _____ is no longer magnetic.

A loudspeaker is a device that changes electrical energy into _____. The _____ is the part of the loudspeaker that vibrates to create sound. A telephone also has a tiny _____. A friend's voice on the phone is changed into _____. The mouthpiece of the phone contains a _____ that uses a magnet to convert sound into electrical signals. Electromagnets are used in many household appliances and toys.

Motors and Generators

Use your textbook to help you fill in the blanks.

What is an electric motor?

1. A motor is a device that changes energy into _____ or motion.
2. A simple electric motor has a power source, a permanent magnet, a rotating loop of wire, and a _____.
3. The _____ is a rod that can spin and move.
4. The electric current runs through the wire loop, making a _____.
5. In larger motors, the _____ is made into a coil that is wound hundreds of times around an iron cylinder.

What is a generator?

6. An electric generator is a device that turns motion into _____.
7. A generator changes _____ into electrical energy.
8. Generators produce nearly all of our _____.

9. Fossil fuels, like _____, coal, and _____, can be burned to heat water, producing steam.
10. _____ power splits atoms that contain large amounts of energy.
11. _____ heat is used from inside Earth to produce steam.
12. Hydropower uses _____ to turn turbines and create energy.

What kinds of electric current are there?

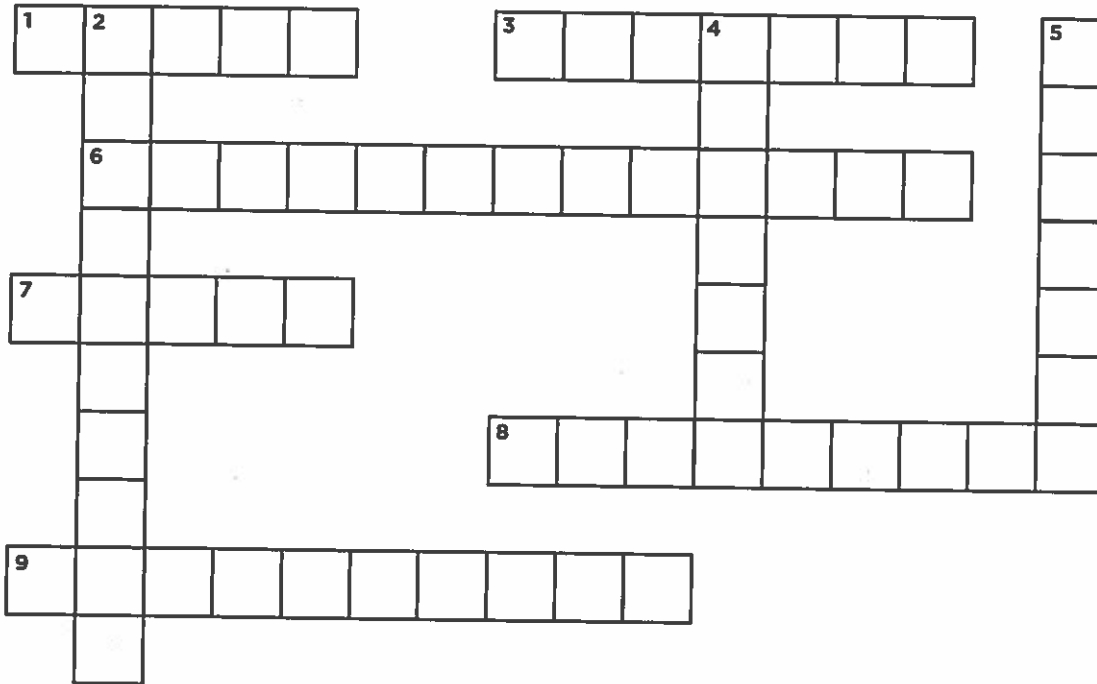
13. AC or _____ flows in one direction and then flows in the opposite direction.
14. When the flow of current is always in one direction, it is called _____, or DC.
15. A _____ is an example of a DC power source.

Summarize the Main Idea

16. How is an electrical generator the opposite of a motor?

Magnets in Motion

Use words from the lesson to solve the crossword puzzle.



Across

1. A rod that can spin and move _____

3. An example of a DC power source _____

6. When the flow of a current is always in one direction _____

7. A device that changes energy into motion _____

8. A device that changes motion into electrical energy _____

9. Heat used from inside Earth to produce steam _____

Down

2. Flowing water used to create energy _____

4. A simple electric fan _____

5. Power source that splits atoms that contain large amounts of energy _____

Magnets in motion

alternating current

mechanical energy

shaft

battery

motor

turbines

direct current

nuclear

generator

power source

Fill in the blanks using the words in the box above.

An electric _____ is a device that changes electrical energy into _____. It has a _____, a permanent magnet, a rotating loop of wire, and a motor _____. The opposite of an electric motor is an electric _____, which changes motion into electrical energy. Different power plants use different sources of energy. Flowing water can turn _____ and create electrical energy. _____ power plants split atoms that contain large amounts of energy. Most generators produce _____, which flows in one direction and then flows in the opposite direction. _____ always flows in one direction. A _____ is an example of a DC power source.

**Write About It**

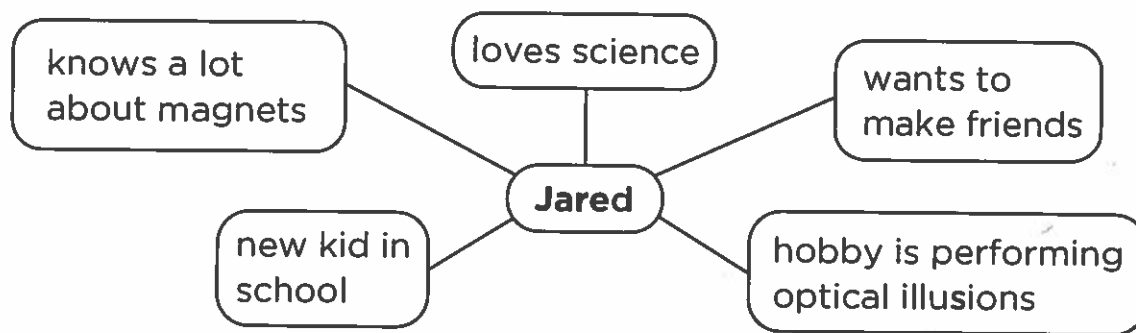
Write a story about a special way that a character uses a magnet.

Getting Ideas

A good story contains a problem that must be solved. On a separate piece of paper, make a list of problems you could solve using a magnet.

Planning and Organizing

Sam decided that his main character would be Jared. Here are some notes he made.



Now help Sam plan his story. Answer these questions:

1. What problem does Jared have?

2. What does Jared know a lot about?

3. What is his hobby?

4. Put together everything you know about Jared. How do you think he can solve his problem?

Drafting

Write a sentence to begin your story. Introduce your main character and the problem.

Now write the first draft of your story on a separate piece of paper. Introduce your main character and the problem. Tell how the character uses magnets to solve the problem. Put the events in order. At the end, show how the problem is solved.

Revising and Proofreading

Sam used dialogue in his story, but he didn't use punctuation correctly. Here is part of his story. Proofread it. Add quotation marks where needed.

I'll show you how the trick works, said Jared to his new friend. It's really a simple trick.

First, let me guess, Jorge cut in. I bet it has something to do with magnets.

Jared laughed. The chess pieces have magnets in their base. You can make them move by moving a magnet under the table.

Now revise and proofread your story. Ask yourself:

- Have I provided details that create a vivid setting?
- Have I included a plot with a problem?
- Have I developed my characters, or made them seem like real people?
- Have I put the events in sequence?
- Have I included a believable solution to the problem?
- Have I corrected all grammar errors?
- Have I corrected all spelling, punctuation, and capitalization errors?

Motors at Work

Refrigerators, vacuum cleaners, hair dryers, and fans have one thing in common. They all have a motor. You can use those motors today because of people such as Joseph Henry and Michael Faraday. In 1831 these two scientists discovered how to use electromagnets to turn electrical energy into motion.

A few years later, Thomas Davenport, a blacksmith in Vermont, learned about electromagnets and built the first simple motor. He used the device to separate iron from iron ore.

It wasn't long before people started inventing new devices that used motors. Washing machines, invented in the 1930s, use a motor to turn and wash your clothes. Another motor in a washing machine turns the water faucet on and off. Some of the first automobiles ran on electrical energy. Today many new cars use electric motors in addition to gasoline engines. Motors are useful for a lot of things! Can you think of any other machines that use electrical motors?

Problem and Solution

- A problem is something that needs to be solved.
- A solution is a plan that helps you solve a problem.

**Write About It**

Problem and Solution How did Thomas Davenport first use his motor?

- 1831 Michael Faraday and Joseph Henry each produce motion using electromagnets.
- 1834 Thomas Davenport builds motors for his tools, as well as an electric model train.
- 1888 The electric car, or “horseless carriage,” is invented.
- 1891 Electric fans are sold by Westinghouse Electric & Manufacturing Company.
- 1901 H. Cecil Booth patents the vacuum cleaner.
- 1908 Washing machines use motors to spin and clean clothes.

Write about a problem you have had such as a messy room or a really hot summer day. How did an electric motor help you solve it? Brainstorm and write your ideas on a separate piece of paper.

Write a lengthy paragraph on a separate piece of paper. Discuss how an electrical motor helped you solve the problem you were facing. Directly answer the prompt in your topic sentence. Use details and your personal observations to clearly explain why this electrical motor helped you. Smoothly move from one idea to the next with transitional words. Wrap up your paragraph with a closing sentence that restates the main idea of your paragraph—how an electrical motor helped you solve a problem.

Magnetism

Choose the letter of the best answer.

1. Magnetic force is strongest at the
 - a. axis.
 - b. center.
 - c. magnetic field.
 - d. poles.
2. A device that changes sound into electrical signals is a
 - a. generator.
 - b. loudspeaker.
 - c. microphone.
 - d. motor.
3. The device that changes electrical energy into mechanical energy is a
 - a. generator.
 - b. loudspeaker.
 - c. motor.
 - d. turbine.
4. Objects with magnetic force are called
 - a. alternating.
 - b. fields.
 - c. generators.
 - d. magnets.
5. Electric current that flows back and forth is called
 - a. alternating current.
 - b. direct current.
 - c. magnet.
 - d. open current.

Choose the letter of the best answer.

6. Which device changes mechanical energy into electrical energy?

- | | |
|----------------|------------|
| a. generator | c. motor |
| b. loudspeaker | d. turbine |

7. Electric current that flows in one direction is called

- | | |
|-------------------------|------------------------|
| a. alternating current. | c. turbine. |
| b. direct current. | d. common wall outlet. |

8. A magnet can attract or repel another object that enters its

- | | |
|-------------------------|--------------------|
| a. alternating current. | c. pole. |
| b. direct current. | d. magnetic field. |

9. A device that changes electrical energy into sound is a

- | | |
|-----------------|----------------|
| a. turbine. | c. microphone. |
| b. loudspeaker. | d. motor. |

10. An electromagnet is a magnet that

- | | |
|--------------------------------|------------------|
| a. attracts any object. | c. is permanent. |
| b. can be switched on and off. | d. is weak. |

11. A compass needle points

- | | |
|-----------|----------|
| a. east. | c. down. |
| b. north. | d. west. |