

Name:

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## Introduction & Chapter 1: Matter

### Section 1 – WHAT IS MATTER?

Use pages 3–5 of the student text to complete the worksheet.

**Choose the Answer.** Circle the answer that correctly completes each sentence.

1. Matter is anything that has (mass, motion) and takes up space.
2. (Volume, Matter) is the amount of space that something takes up.
3. A (balance, scale) is a tool used to measure mass.
4. A (graduated cylinder, balance) is used to measure the volume of liquids.
5. A standard (matter, mass) is a small cylinder used with a balance to find the mass of other objects.

**True/False.** Decide if each statement is true or false, and write **true** or **false** in the blank.

- \_\_\_\_\_ 6. Mass is a measure of how hard gravity is pulling on an object.
- \_\_\_\_\_ 7. Air does not have mass.
- \_\_\_\_\_ 8. A property is a characteristic that helps identify a substance.
- \_\_\_\_\_ 9. You can use a ruler and some simple math to calculate the volume of a solid.
- \_\_\_\_\_ 10. Mass is the amount of material that something is made up of.

## Chapter 3 Demonstration

## NEWTON'S THIRD LAW OF MOTION

**Background:** Newton's third law says that if an object exerts a force on another object, the second object will always exert an equal and opposite force on the first object. For every action force, there is an equal and opposite reaction force. The action and reaction forces happen at the same time. For example, as you sit on your chair, you are exerting a downward force on the chair. In turn, the chair pushes upward on you with an equal force. This relationship is not always easy for students to visualize. Illustrate equal and opposite forces with a toy car and a balloon.

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### Materials:

- *toy car*
- *balloon*
- *adhesive tape*
- *clothespin*

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### Directions:

1. Tear off a strip of adhesive tape and make a sticky-side-out loop. Stick the loop of tape to the top of the car. Put the car on a tabletop that all students can see.
2. Blow up the balloon. Use the clothespin to keep the air from escaping from the end of the balloon.
3. Attach the balloon to the top of the car with the end of the balloon pointing in the same direction as the back of the car.
4. Release the clothespin. Have the students observe the car as it is propelled across the table. Explain that the car moved because of equal and opposite forces. The air coming out of the balloon propelled the car by exerting a force opposite to the motion of the car. The air went one way, and the car went the opposite way. Explain to students that this is how rockets work, too.

# Convection Spinner

## Chapter 5 – LAB ACTIVITY

**Purpose:** Students will observe convection.

**Materials Needed:**

- *spiral spinner pattern (page 101)*
- *25 cm piece of lightweight string*
- *toothpicks*
- *adhesive tape*
- *scissors*
- *safety goggles (one pair for each student)*
- *heat source such as a light bulb or radiator — DO NOT use an open flame*



**Time Required:** 15–20 minutes

**Directions:**

1. Give each student or group of students the following materials:
  - *spiral spinner pattern*
  - *25 cm piece of lightweight string*
  - *1 toothpick*
  - *adhesive tape*
  - *scissors*
  - *safety goggles*
2. Explain the lab directions on the following page to the students. Have students follow the step-by-step instructions.
3. Have students answer the questions on the following pages.

**Answer Key:**

1. The spinner rotates.
2. The movement is caused by moving air. The air moves because the warm air is lighter than the surrounding air.
3. Warm air from a heat source rises and is replaced with cooler air, which is heated and rises.
4. The spinner moves because of a current, which is only produced by convection. The spinner is not in direct contact with the light bulb (conduction) and radiation does not produce a current.
5. Answers will vary.

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# Convection Spinner

## Chapter 5 – LAB DATA SHEET

**Problem:** What happens to air when it is heated?

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**Materials:**

- *spiral spinner pattern*
  - *25 cm piece of lightweight string*
  - *1 toothpick*
  - *adhesive tape*
  - *scissors*
  - *safety goggles*
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**Hypothesis:** What do you think the spiral will do when it is held over a heat source? Explain your answer.

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**Conduct an Experiment:**

1. Cut out the spiral.
  2. Punch a small hole through the black dot at the center of the spiral.
  3. Push one end of the piece of string through the hole. Once you have threaded it through, tie the end of the string to the toothpick.
  4. Tape the toothpick behind the hole in the center of the spinner.
  5. Put on your safety goggles.
  6. Holding the free end of the string, hold the spinner two inches above the heat source. DO NOT use an open flame.
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**Data Collection and Analysis:**

1. What movement did you observe?

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# Convection Spinner

## Chapter 5 – LAB DATA SHEET

### Conclusion:

2. What caused the movement?

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3. How does convection work?

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4. Why does this experiment illustrate convection rather than radiation or conduction?

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5. Was your hypothesis correct? Explain your answer.

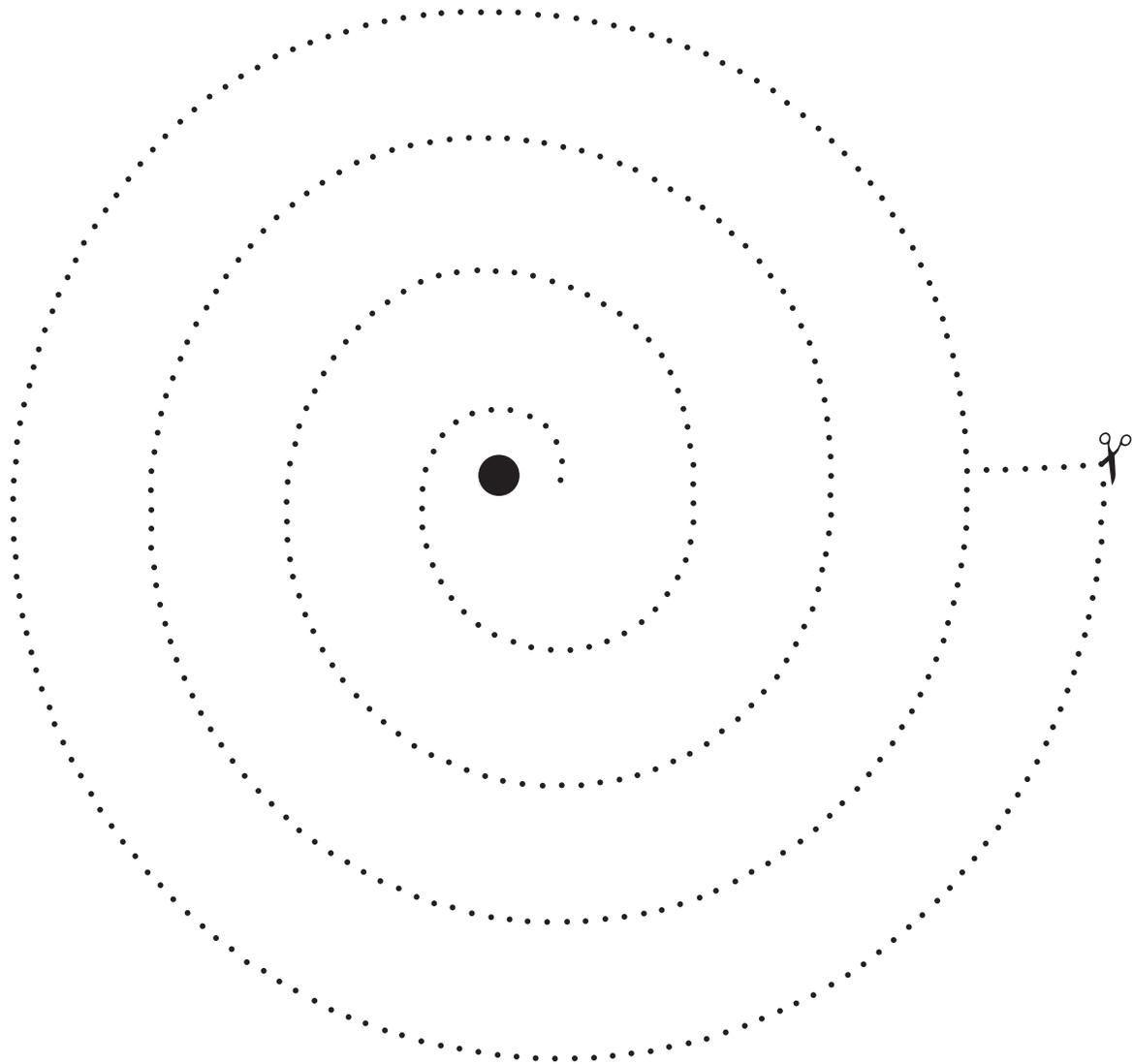
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## Convection Spinner Template

## Chapter 5 – LAB ACTIVITY

**Directions.** *Cut the spiral out along the dotted lines. Start cutting where you see the scissors below, and cut towards the middle of the spiral.*



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## Chapter 7: Light

REVIEW

**Choose the Answer.** *Circle the answer that correctly completes each sentence.*

1. Light waves are different from other waves because they (do, do not) need a medium to travel.
2. Humans see different wavelengths of (light, sound) as different colors.
3. A transparent object that refracts light is called a (lens, prism).
4. If a material absorbs all the light that shines on it, it will reflect nothing and is (black, white).
5. White light is a combination of all the colors of the (visible, electromagnetic) spectrum.

**Fill in the Blank.** *Use the words in the word bank to complete the sentences.*

transmitted   scattering   opaque   translucent   transparent

6. Light can be \_\_\_\_\_ through solids, liquids, and gases.
7. \_\_\_\_\_ matter does not allow any light to pass through.
8. \_\_\_\_\_ matter allows light to pass through completely.
9. \_\_\_\_\_ matter allows only some light to pass through.
10. When an object absorbs light and then releases it again, \_\_\_\_\_ has occurred.

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## Chapter 7: Light

REVIEW

**Short Answer.** Write the answer to each question in complete sentences.

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1. List the colors of the visible spectrum.

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2. List two examples of transparent objects.

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3. List two examples of opaque objects.

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4. List two examples of translucent objects.

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5. What are gamma rays used for?

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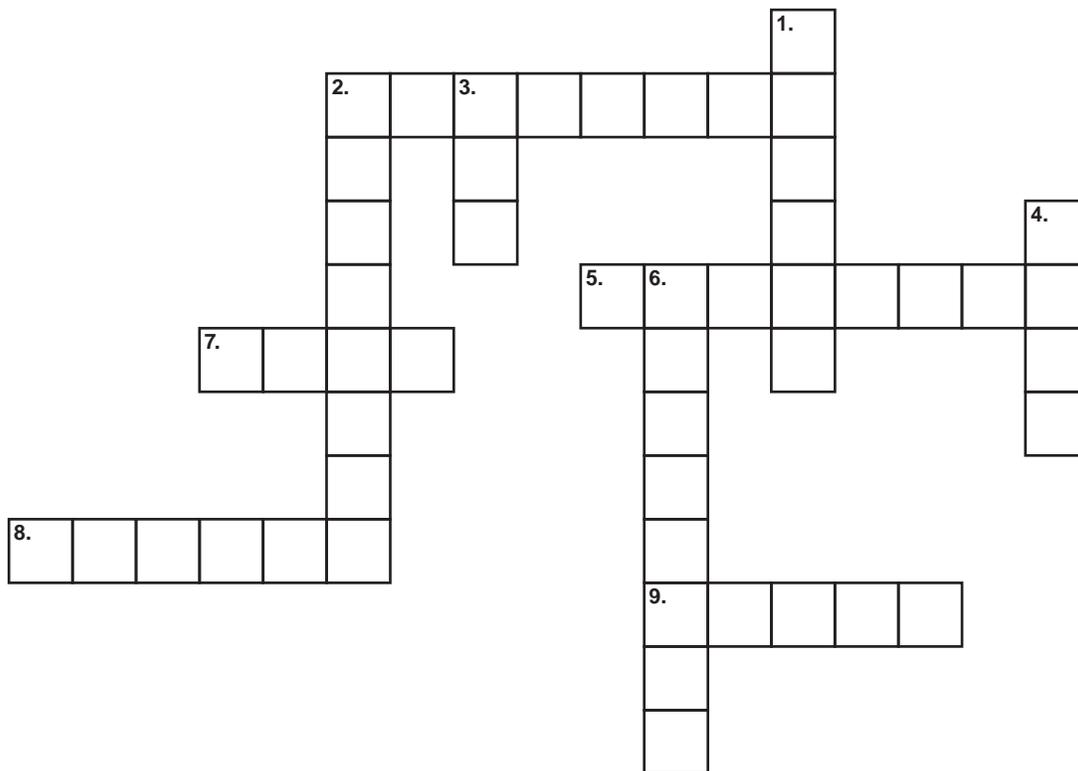
Name: \_\_\_\_\_

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# Chapter 7: Light

**REVIEW**

**Crossword Puzzle.** Use the clues to complete the crossword puzzle.



**ACROSS**

2. The electromagnetic \_\_\_\_\_ includes electromagnetic waves at all possible amplitudes, frequencies, and wavelengths.
5. The \_\_\_\_\_ light travels in a year is called a light-year.
7. If a material absorbs the light of all other wavelengths and reflects \_\_\_\_\_, the material will appear blue.
8. When light reflects off a rough surface, the waves reflect back at many different \_\_\_\_\_.
9. \_\_\_\_\_ waves include TV signals and AM and FM radio signals.

**DOWN**

1. When light reflects off a/an \_\_\_\_\_ surface, like a mirror, it reflects back at the same angle, which creates a clear and focused image.
2. Ultraviolet light causes \_\_\_\_\_.
3. The human \_\_\_\_\_ is a lens.
4. A magnifying glass is an example of a/an \_\_\_\_\_.
6. \_\_\_\_\_ light is felt as warmth.

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Date: \_\_\_\_\_

## Chapter 9: Magnetism

**TEST**

**Matching.** Match each word to its definition, and write the letter in the blank.

- |       |  |                   |
|-------|--|-------------------|
| _____ | 1. a tool that uses a magnet to determine direction                          | A. magnetic field |
| _____ | 2. area around a magnet in which a magnetic force is exerted                 | B. magnetic force |
| _____ | 3. the attraction and repulsion between magnets                              | C. domain         |
| _____ | 4. a group of atoms whose magnetic fields are lined up in the same direction | D. compass        |
| _____ | 5. object that has the property of attracting certain metals                 | E. magnet         |

**Fill in the Blank.** Use the words in the word bank to complete the sentences.

electromagnet    magnetic field    Earth    like    opposite

6. \_\_\_\_\_ poles attract each other.
7. \_\_\_\_\_ poles repel each other.
8. \_\_\_\_\_ can be thought of as a giant magnet.
9. When a magnet enters a magnetic field, it will naturally line up with the \_\_\_\_\_.
10. A/an \_\_\_\_\_ only works if the current is flowing.

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## Chapter 9: Magnetism

TEST

**Multiple Choice.** *Circle the best answer, and write the letter in the box.*

11. Magnetic force is strongest at a magnet's \_\_\_\_\_.
- A. center
  - B. poles
  - C. compass
  - D. middle
12. The strength of two magnets' attraction or repulsion depends on \_\_\_\_\_.
- A. how far apart they are
  - B. their color
  - C. gravity
  - D. how many iron filings there are
13. A current-carrying coil of wire with many loops wrapped around a magnetic rod is called a/an \_\_\_\_\_.
- A. solenoid
  - B. magnetic pole
  - C. electromagnet
  - D. magnetic field

**Short Answer.** *Write the answer to each question in complete sentences.*

14. List two things that use electromagnets.

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15. How can you magnetize a piece of iron?

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