Name _____

# STATIC ELECTRICITY
## from the series *Electricity and Magnetism*

PRE-TEST

**A. Directions: Pick the definition in column B that best matches the word in column A. Write the letter of the definition on the blank line.**

| A | B |
|---|---|
| 1. repel _____ | a. A part of an atom that has a positive charge. |
| 2. proton _____ | b. When two objects rub and gain or lose electrons. |
| 3. electron _____ | c. All things are made of these. They are the "building blocks of matter." |
| 4. static electricity _____ | d. A part of an atom that has a negative charge. |
| 5. atom _____ | e. Objects with like charges jump apart. |
| 6. attract _____ | f. Objects with opposite charges come together. |

**II. Directions: Answer the following questions about static electricity.**

1. Why will you sometimes get a shock after walking across a carpet and then touching a metal object, such as a door knob?

2. If you pull a wool sweater over your head, you will often end up with a wild hairdo. Your hair is hard to comb and wants to stand up. Why?

3. Name the three primary particles of an atom and give their charges.

4. **Fill in the missing words:**

Like charges (charges that are the same) _____ each other.

Unlike charges (opposite charges) _____ each other.

Name _____


# STATIC ELECTRICITY
## from the series *Electricity and Magnetism*

PROGRAM QUIZ

**Directions: At the end of the program, there is a short quiz. You can record your answers on this sheet.**

1. Electricity is defined as the flow of _____.
   a. protons b. neutrons c. electrons d. atoms

2. The center of an atom is called the _____.
   a. nucleus b. proton c. orbit d. electrons

3. Objects that don't allow electrons to flow easily through them are called _____.
   a. protons b. insulators c. conductors d. neutrons

4. There are two kinds of electricity called static and _____.
   a. protons b. conductors c. electrical d. current

5. Charges that are unlike will _____.
   a. repel b. attract c. conduct d. current

6. What kind of charge does a proton have?
   a. repel b. neutral c. positive d. negative

7. What kind of charge does a neutron have?
   a. repel b. neutral c. positive d. negative

8. What kind of charge does an electron have?
   a. repel b. neutral c. positive d. negative

9. Name some things you should avoid if a lightning storm approaches.

Name _____

3

# STATIC ELECTRICITY
## from the series *Electricity and Magnetism*

STATIC ELECTRIC TRANSFER

**Purpose**: To demonstrate how electric charges can be transferred from one object to another.

**Materials**: block of wax
wood block about the size of the wax block
two coffee or juice cans
thumbtack
string
plastic wrap
wool hat, scarf, or glove

**Procedures**:

1. Put one can on the block of parafin wax.
2. Tie the string onto the thumbtack point.
3. Tape the other end of the string to the wood block so that the string and tack hang over the side.
4. Place the wood block on the other can.
5. Place the cans so that they are across from each other with the tack hanging between them.
6. Take a piece of plastic wrap and lay it flat on a table. Charge the plastic with a static charge by rubbing the wool over the plastic wrap briskly.
7. Carefully bring the charged plastic wrap onto the metal can which is resting on the wax.

**Observations**:

1. What happens when the plastic wrap touches the metal can?

2. Time how long you can keep the tack moving back and forth on one charge of the plastic wrap.

**Conclusions**:

1. Why does the tack move back and forth between the two cans?

2. What purpose does the wax serve?

Name _____

4

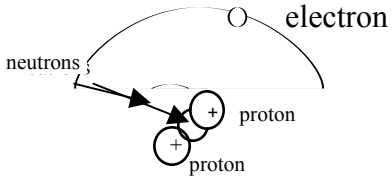
# STATIC ELECTRICITY
## from the series *Electricity and Magnetism*

**MATTER OF FACT**

All things are made of matter. Anything that has weight and takes up space is matter.

Matter is made up of atoms. Atoms are so tiny that in a little pencil dot (.) there are more atoms than you could even count.

Atoms are made up of even smaller things called electrons, protons, and neutrons. Electrons and protons have electrical charges. Neutrons, which are next to the protons, have no electrical charge.




electron

Electrons have a negative charge.
Protons have a positive charge.
Neutrons have no charge.

Atoms normally have the same number of electrons and protons, so they have a balanced charge.

However, when objects rub together, they can lose or gain electrons. In other words, when one object rubs against another, some electrons may go out of one object and into the other object. This throws the balance of protons and electrons off for each object. One object has lost electrons, so it has more protons and an overall positive electrical charge. The other object has gained electrons, so has more electrons than protons and a resulting negative electrical charge.

If you rub a comb with wool, the comb gains electrons from the wool. Then, when you bring the comb near pieces of paper, the charged comb attracts the paper. (The electrical charge causes the paper to cling to the comb.)

Name _____

5

# STATIC ELECTRICITY
## from the series *Electricity and Magnetism*

CAN YOU EXPLAIN IT?

**Directions: Try these demonstrations and then give an explanation of how they work.**

1. Rub a comb with wool and bring it close to pieces of paper.

2. Put a page from a newspaper against a wall and rub it all over with the edge of a pencil.

3. If you rub your feet across a carpet during the winter, you will often get a shock when you touch a metal object.

4. Sometimes when you pull a sweater over your head, your hair will stick up. You might even hear a crackle.

All of these are examples of static electricity. See if you can think of some other examples.

***My examples of static electricity:***

Name _____

# 6 STATIC ELECTRICITY
## from the series *Electricity and Magnetism*

POST-TEST

**I. Directions: Define the following terms.**

1. repel-
2. attract-
3. static electricity-
4. current electricity-
5. atom-

**II. Directions: Answer the following questions with short answers.**

1. What are the three primary particles of an atom and their charges?

2. Describe how the electric ferry is set up and how it works.

3. Why does a balloon cling to a wall after you rub it in your hair?

4. Why do we sometimes get a small shock after walking across a carpet and touching a doorknob?

5. What should you do to protect yourself during a lightning storm?

Name _____

# ELECTRICITY AND MAGNETISM
## Unit Test

**I. Directions: Pick the definition in column B that best matches the word in column A. Write the letter of the definition on the blank line.**

| Column A | Column B |
|---|---|
| 1. electricity _____ | a. When two objects come toward each other. |
| 2. conductor _____ | b. The Greek philosopher who named electricity. |
| 3. insulator _____ | c. A positively charged particle found in the nucleus of an atom. |
| 4. attract _____ | d. The flow of electrons. |
| 5. repel _____ | e. An atomic particle found in the center of an atom. It has no charge. |
| 6. electron _____ | f. Material that will not allow the flow of electricity. |
| 7. proton _____ | g. A particle found orbiting around the nucleus of an atom. It has a negative charge. |
| 8. neutron _____ | h. Material that allows electricity to go easily through it. |
| 9. Thales _____ | i. When two objects move apart. |

**II. Directions: Answer the following questions in the space provided.**

1. Name three good conductors of electricity.

2. Name three good insulators.

3. Describe some uses for insulators.

4. How does a generator work?

5. Describe how a simple electromagnet could be made.

6. How is an electromagnet different from a regular bar magnet?

7. What three things are needed for a complete circuit?

8. There are two kinds of circuits: series and parallel. Finish the drawings below by adding wires.

| | |
|---|---|
| series battery | battery parallel |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# ELECTRICITY AND MAGNETISM
## Unit Test (Page 2)

9. What are the differences between a series circuit and a parallel circuit?

10. How do fuses or circuit breakers help protect homes?

11. Mechanical energy of the spinning turbine and generator produce electrical energy at a power station. Give some examples of electrical energy being changed to other forms of energy around your home.

12. Fossil fuels (oil, coal, and natural gas) are the main sources of fuels used to power the electric plants of today. What are some other sources of energy that can be used to make electricity?

13. If these two magnets were to be brought near each other, how would the lines of force look?


14. If one of the magnets was flipped over, how would the lines of force be changed?


15. Amperage is equal to wattage divided by voltage. Calculate the number of amps for each of these electrical appliances.

| | | | |
|---|---|---|---|
| a. electric toothbrush | 480 watts | 120 volts | _____ amps |
| b. electric blender | 960 watts | 120 volts | _____amps |
| c. microwave | 720 watts | 120 volts | _____amps |