



*Electricity and Magnetism*  
4<sup>th</sup> Grade Science Study Guide

Name \_\_\_\_\_

Test Date: **Thursday, January 12<sup>th</sup>**

Parent Signature \_\_\_\_\_

SOL 4.3 The student will investigate and understand the characteristics of electricity. Key concepts include

- a) conductors and insulators;
- b) basic circuits (open/closed, parallel/series);
- c) static electricity;
- d) the ability of electrical energy to be transformed into heat, light, and mechanical energy;
- e) simple electromagnets and magnetism; and
- f) historical contributions in understanding electricity.

**Magnet Vocabulary:**

**Magnetic Field** – the invisible force around a magnet.

**Electromagnet** - a device consisting of an iron or steel core that is magnetized by electric current in a coil that surrounds it.

**Repel** – to push away. Magnets with the same poles facing each other will repel.

**Attract** – to bring together. Magnets with opposite poles will attract to each other.

**Poles**- where the magnetic field on a magnet is the strongest.

**Electricity Vocabulary:**

**Amperes**- the flow of electricity is measured in this.

**Insulators**- do not allow electricity to flow easily through them.

**Conductors** – allow electricity to flow through them easily.

**Circuit** – the path in which electricity is allowed to travel.

Be able to recognize and draw an **open, closed, parallel and series circuit**

**Static Electricity** – an electric charge that builds up on the surface of an object.

**Magnets**- are materials that will attract objects made of certain metals such as iron, steel, cobalt, and nickel.

**Voltage** – moves electricity along wires.

**People to Know:**

**Benjamin Franklin** – conducted a famous experiment with a kite and a key during a thunderstorm. Proved that lightning was electrical current in nature. Also invented the lightning rod.

**Michael Faraday** – his experiments with creating electrical charge using a magnet and wire are used in electric motors today.

**Thomas Edison** – invented the “incandescent lamp” also known as the light bulb. Also helped to plan the construction of electrical power plants so homes and businesses could receive electricity.

**Magnet Questions:**

4.3e

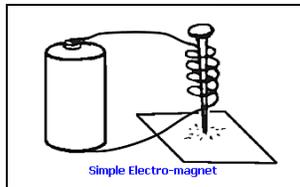
**1. Which of the following can you pick up with a magnet?**

- A** rubber tire patch
- B** a paper clip
- C** a wooden pencil
- D** work gloves

4.3e

**2. When you have a wire wrapped around a magnet is an example of a/an —**

- A** parallel circuit.
- B** electromagnet.
- C** open circuit.
- D** series circuit.



4.3e

**3. The area called the \_\_\_\_\_ on a magnet have the strongest magnetic force —**

- A** regions
- B** flux
- C** repulsive area
- D** poles

Electricity Questions:

4.3a

**4. Which of these is not a conductor?**

- A copper
- B plastic
- C water
- D the human body

4.3b

**5. Which type of electrical circuit results when this object is screwed in?**

- A an open circuit
- B a closed circuit
- C a parallel circuit
- D a series circuit



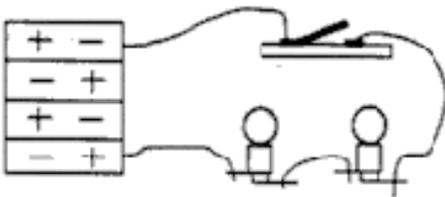
4.3c

**6. How is static electricity formed?**

- A Electrical charges build up on the surface of a material.
- B Electrical charges are collected from the air.
- C Electrical charges are flowing through the materials.
- D Electrical charges build up in the air and then flow into an object.

4.3b

**7. This circuit, using 2 bulbs, 4 batteries, and a switch, is wired so that when you unscrew one bulb, the other one goes out. This circuit is a —**



- A series circuit.
- B parallel circuit.
- C circuit condition.
- D switch circuit.

4.3c

**8. How does static electricity occur *in nature*?**

- A During a rain
- B during thunderstorms
- C while your clothes are drying in a dryer
- D by rubbing a balloon with water.

4.3f

**9. Ben Franklin suspected that lightning was —**

- A an electromagnet in nature.
- B an electrical current in nature.
- C a freak occurrence in nature.
- D not important in nature.

4.3b

**10. The *flow* of electricity is measured in —**

- A amperes (amps).
- B volts.
- C watts.
- D ohms.