

Electricity Unit Organizer

Fourth Grade

Vocabulary: electricity, flow, electrons, protons, static electricity, current, circuit, battery, wire, light bulb, filament, switch, fuse, closed circuit, open circuit, short circuit, conductor, insulators, electromagnets

Thinking Frame Work Key: K=Knowledge, P=Patterns, M=Modeling, C=Creativity

I. Core Knowledge Content Guidelines

- A. Students will be able to explain that electricity is the flow of electrons. (K,P)
- B. Students will be able to explain what causes static electricity. (K,P,M,C)
- C. Students will be able to explain what an electric current is and what causes it. (K,P)
- D. Students will be able to explain how electrons flow in an electric current and be able to conduct experiments with simple circuits. (K,P,M,C)
- E. Students will be able to explain the difference between closed, open, and short circuits. (K,P,M)
- F. Students will be able to explain the function of conductors and insulators. (K,P)
- G. Students will be able to explain how electromagnets work and name some common uses for electromagnets. (K,P,M,C)
- H. Students will be able to explain how to use electricity safely. (K,P,M,C)

II. Procedures and Assessments

- A. Notes
- B. Labs
- C. Class discussions and explanations

III. Character Education

- A. **Responsibility**
 - 1. using electricity safely and responsibly
- B. **Perseverance**
 - 1. takes perseverance to figure out, during the lab, how to make the circuits work
- C. **Cooperation**
 - 1. use cooperation when working with a group during lab time

IV. Colorado State Standards

Standard 1: Scientific Investigation

Students understand the processes of scientific investigation and design as well as conduct, communicate about, and evaluate such investigations.

1.1 Scientific investigations

Understand and practice the process of scientific investigation.

With teacher facilitation and in small groups the student will learn and follow the steps in the Scientific

Method:

- identify the problem.
- form a hypothesis (make a prediction).
- identify a procedure (list materials, steps, plan or strategy).
- test (experimentation).

-make observations (use tables, pictures and charts to explain in written form).

-collect data.

-interpret and draw conclusions.

Continue to develop appropriate questions and identify likely resources (For example: encyclopedia, atlases, nonfiction books and electronic media).

Standard 2: Physical Science

Students know and understand common properties, forms, and changes in matter and energy.

2.1 Characteristics of matter

Know that matter has characteristic properties which related to its composition and structure.

Examine, describe, classify and compare tangible objects in terms of common physical properties (For example: state of matter, size, shape, texture, flexibility and color).

Measure common physical properties (length, mass, volume and temperature).

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

-the nature of electricity (conductors and insulators circuits: open/closed, parallel/series, magnetism and magnetic field, static electricity.

-electricity and Safety.

2.2 Forms of energy

Know that energy appears in different forms and can move (be transferred) and change (be transformed).

Compare interactions of electricity and magnetism with different materials.

2.3 Interactions of objects in a system

Understand that interactions can produce changes in a system, although the total quantities of matter and energy remain unchanged.

Observe and describe parts of a system (For example: a circuit must include; battery, wire, motor, light bulb).

Describe and observed change (For example: circuits).

Standard 5: Science, Technology and Human Activity

Students know and understand interrelationships among science, technology, and human activity and how they can affect the world.

5.1 Science, technology and human activity

Understand the connections between science, technology, human activity and their impact on the world.

Design a device that addresses a problem or task, communicate the problem or task and develop a solution (For example: GIS).

Identify careers that use science and technology.

Standard 6: Scientific Connections

Students understand that science involves a particular way of knowing and understanding common connection among scientific disciplines.

6.1 Scientific connections

Understand that science is a changing body knowledge driven by a process of observation and investigation.

Recognize that when a science experiment is repeated with the same conditions, the experiment generally works the same way.

Identify observable patterns and changes in their lives and predict future events based on the patterns.

Compare a model with what it represents.

V. Science Habits of Mind

THIRD THROUGH FIFTH GRADE

A. VALUES AND ATTITUDES

By the end of fifth grade, students should:

1. Keep records of their investigations and observations and not change the records later.
2. Offer reasons for their findings and consider reasons suggested by others.

B. COMPUTATION AND ESTIMATION

By the end of the fifth grade, students should be able to:

1. Judge whether measurements and computations of quantities such as length, area, volume, weight, or time are reasonable in a familiar

C. MANIPULATION AND OBSERVATION

By the end of the fifth grade, students should be able to:

1. Choose appropriate common materials for making simple mechanical constructions and repairing things.
2. describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.
3. Make safe electrical connections with various plugs, sockets, and terminals.

D. COMMUNICATION SKILLS

By the end of the fifth grade, students should be able to:

1. Write instructions that others can follow in carrying out a procedure.
2. Make sketches to aid in explaining procedures or ideas.

E. CRITICAL-RESPONSE SKILLS

By the end of fifth grade, students should:

1. Buttress their statements with facts found in books, articles, and databases, and identify the sources used and expect others to do the same.
2. Recognize when comparisons might not be fair because some conditions are not kept the same.
3. Seek better reasons for believing something than "Everybody knows that..." or "I just know" and discount such reasons when given by others.

SCIENCE HABITS OF MIND

SIXTH THROUGH EIGHTH GRADE

A. VALUES AND ATTITUDES

By the end of eighth grade, students should:

1. Know why it is important in science to keep honest, clear, and accurate records.
2. Know that hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.
3. Know that different explanations can be given for the same evidence, and it is not always possible to tell which one is correct.

B. MANIPULATION AND OBSERVATION

By the end of the eighth grade, students should be able to:

1. Inspect, disassemble, and reassemble simple mechanical devices and describe what the various parts are for; estimate what the effect that making a change in one part of a system is likely to have on the system as a whole.

C. CRITICAL-RESPONSE SKILLS

By the end of the eighth grade, students should:

1. Be aware that there may be more than one good way to interpret a given set of findings.