ELEMENTARY
CORE Academy
UTAH STATE OFFICE OF EDUCATION & UTAH STATE UNIVERSITY

ELEMENTARY CORE ACADEMY • ELEMENTARY CORE ACADEMY •

5TH GRADE

PARTICIPANT HANDBOOK
2004

UTAH STATE OFFICE OF EDUCATION

UtahState UNIVERSITY

ELEMENTARY CORE ACADEMY
6517 Old Main Hill
Logan, UT 84322-6517

435-797-0939
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Utah State Office of Education (USOE)
Utah State University (USU)
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Individuals:

Academy Coordination Committee: Max Longhurst, Brett Moulding, Nicole Paulson, Marv Tolman, Pat Beckman

Academy Director: Max Longhurst

Academy Coordinator: Megan Richards

Academy Facilitators: Prent Klag, Kathy Railsback, Darrell Spendlove, Marv Tolman

Academy Presenters and Contributors: Bob Hoopes, Ann Houmand, Diane Johnson, Terri Mitchell, Connie Nink, Jan Rymer, Geoffrey Smith, Amy Spencer, Patty Spigarelli, Suraj Syal, Stacie Williamson

Credits for editing, compiling, and formatting these materials are given to Kerry Bair, Jennifer Downs, Heidi Draper, James Evans, Andrae Ferguson, Eric Rowley, Weylin Richards, and Meagen Williams.

UTAH STATE OFFICE OF EDUCATION

250 East 500 South/P.O. Box 144200 Salt Lake City, Utah 84114-4200
Steven O. Laing, Ed.D. State Superintendent of Public Instruction
Voice: (801) 538-7500 Fax: (801) 538-7521 TDD: (801) 538-7876

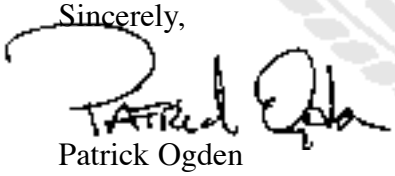
Dear CORE Academy Teachers:

Involvement in the CORE Academy represents a significant investment by you, your school, and district in educational excellence for the students of Utah. The goal of the Academy is to provide a high quality opportunity for teachers to engage in meaningful professional growth.

The Academy will help you gain expertise in the collection and use of accurate data and analysis of each student's level of achievement, teach sound instructional methods specifically aligned to the state Core Curriculum, and provide an opportunity for collegial support.

I commend you for your dedication and willingness to engage in meaningful professional development. It is my belief that educators care deeply about their students and work hard to create successful experiences in the classroom. Despite some challenges facing our schools, dedicated and professional educators make profound differences each day.

Sincerely,



Patrick Ogden
Interim State Superintendent
of Public Instruction

Funding Sources

Appreciation is expressed for the tremendous educational input and monetary commitment of several organizations for the successful delivery of the Elementary CORE Academy. This year's Elementary CORE Academy was developed and funded through a variety of sources. The Utah State Office of Education (USOE), in collaboration with Utah State University (USU) and local school districts of Utah, have supported kindergarten through sixth grade teachers with professional development experiences that will enhance the educational experience for Utah children.

Major funding for the Academy comes from the following sources:

Federal/State Funds:

Utah State Office of Education
Staff Development Funds
Special Education Services Unit

ESEA Title II

Utah Math Science Partnership

WestED Eisenhower Regional Consortium

District Funds:

Various sources including Quality Teacher Block, Federal ESEA Title II, and District Professional Development Funds

School Funds:

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Utah State Office of Education Special Education Services

The state and district funds are allocations from the state legislature. ESEA is part of the "No Child Left Behind" funding that comes to Utah.

Additionally, numerous school districts, individual schools, and principals in Utah have sponsored teachers to attend the Academy. Other educational groups such as the Utah Division of Water Resources, National Energy Foundation, Utah Energy Office, and the Utah Mining Association have assisted in the development and delivery of resources in the Academy.

Most important is the thousands of teachers who take time from their summer to attend these professional development workshops. It is these teachers who make this program possible.

Goals of the Elementary CORE Academy

Overall

The purpose of the Elementary CORE Academy is to create high quality teacher instruction and improve student achievement through the delivery of professional development opportunities and experiences for teachers across Utah.

The Academy will provide elementary teachers in Utah with:

1. Models of exemplary and innovative instructional strategies, tools, and resources to meet newly adopted Core Curriculum standards, objectives, and indicators.
2. Practical models and diverse methods of meeting the learning needs of all children, with instruction implementation aligned to the Core Curriculum.
3. Meaningful opportunities for collaboration, self-reflection, and peer discussion specific to innovative and effective instructional techniques, materials, teaching strategies, and professional practices in order to improve classroom instruction.

Learning a limited set of facts will no longer prepare a student for real experiences encountered in today's world. It is imperative that educators have continued opportunities to obtain instructional skills and strategies that provide methods of meeting the needs of all students. Participants of the Academy experience will be better equipped to meet the challenges faced in today's classrooms.

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Fifth Grade Science and Language Arts Core Curriculum

Utah Elementary Science Core Curriculum

Introduction

Science is a way of knowing, a process for gaining knowledge and understanding of the natural world. The Science Core Curriculum places emphasis on understanding and using skills. Students should be active learners. It is not enough for students to read about science; they must do science. They should observe, inquire, question, formulate and test hypotheses, analyze data, report, and evaluate findings. The students, as scientists, should have hands–on, active experiences throughout the instruction of the science curriculum.

The Elementary Science Core describes what students should know and be able to do at the end of each of the K–6 grade levels. It was developed, critiqued, piloted, and revised by a community of Utah science teachers, university science educators, State Office of Education specialists, scientists, expert national consultants, and an advisory committee representing a wide variety of people from the community. The Core reflects the current philosophy of science education that is expressed in national documents developed by the American Association for the Advancement of Science, the National Academies of Science. This Science Core has the endorsement of the Utah Science Teachers Association. The Core reflects high standards of achievement in science for all students.

Organization of the Elementary Science Core

The Core is designed to help teachers organize and deliver instruction.

The Science Core Curriculum's organization:

- Each grade level begins with a brief course description.
- The INTENDED LEARNING OUTCOMES (ILOs) describe the goals for science skills and attitudes. They are found at the beginning of each grade, and are an integral part of the Core that should be included as part of instruction.
- The SCIENCE BENCHMARKS describe the science content students should know. Each grade level has three to five Science Benchmarks. The ILOs and Benchmarks intersect in the Standards, Objectives and Indicators.

- A STANDARD is a broad statement of what students are expected to understand. Several Objectives are listed under each Standard.
- An OBJECTIVE is a more focused description of what students need to know and be able to do at the completion of instruction. If students have mastered the Objectives associated with a given Standard, they are judged to have mastered that Standard at that grade level. Several Indicators are described for each Objective.
- An INDICATOR is a measurable or observable student action that enables one to judge whether a student has mastered a particular Objective. Indicators are not meant to be classroom activities, but they can help guide classroom instruction.

Guidelines Used in Developing the Elementary Science Core

Reflects the Nature of Science

Science is a way of knowing, a process of gaining knowledge and understanding of the natural world. The Core is designed to produce an integrated set of Intended Learning Outcomes (ILOs) for students. Please see the Intended Learning Outcomes document for each grade level core.

As described in these ILOs, students will:

1. Use science process and thinking skills.
2. Manifest science interests and attitudes.
3. Understand important science concepts and principles.
4. Communicate effectively using science language and reasoning.
5. Demonstrate awareness of the social and historical aspects of science.
6. Understand the nature of science.

Coherent

The Core has been designed so that, wherever possible, the science ideas taught within a particular grade level have a logical and natural connection with each other and with those of earlier grades. Efforts have also been made to select topics and skills that integrate well with one another and with other subject areas appropriate to grade level. In addition, there is an upward articulation of science concepts, skills, and content. This spiraling is intended to prepare students to understand and use more complex science concepts and skills as they advance through their science learning.

Developmentally Appropriate

The Core takes into account the psychological and social readiness of students. It builds from concrete experiences to more abstract understandings. The Core describes science language students should use that is appropriate to each grade level. A more extensive vocabulary should not be emphasized. In the past, many educators may have mistakenly thought that students understood abstract concepts (such as the nature of the atom), because they repeated appropriate names and vocabulary (such as electron and neutron). The Core resists the temptation to tell about abstract concepts at inappropriate grade levels, but focuses on providing experiences with concepts that students can explore and understand in depth to build a foundation for future science learning.

The Core is:

- **Coherent**
- **Developmentally Appropriate**
- **Encourages Good Teaching Practices**
- **Comprehensive**
- **Feasible**
- **Useful and Relevant**
- **Encourages Good Assessment Practices**

Encourages Good Teaching Practices

It is impossible to accomplish the full intent of the Core by lecturing and having students read from textbooks. The Elementary Science Core emphasizes student inquiry. Science process skills are central in each standard. Good science encourages students to gain knowledge by doing science: observing, questioning, exploring, making and testing hypotheses, comparing predictions, evaluating data, and communicating conclusions. The Core is designed to encourage instruction with students working in cooperative groups. Instruction should connect lessons with students' daily lives. The Core directs experiential science instruction for all students, not just those who have traditionally succeeded in science classes. The vignettes listed on the "Utah Science Home Page" at http://www.usoe.k12.ut.us/curr/science for each of the Core standards provide examples, based on actual practice, that demonstrate that excellent teaching of the Science Core is possible.

Comprehensive

The Elementary Science Core does not cover all topics that have traditionally been in the elementary science curriculum; however, it does provide a comprehensive background in science. By emphasizing depth rather than breadth, the Core seeks to empower students rather than intimidate them with a collection of isolated and eminently forgettable facts. Teachers are free to add related concepts and skills, but they are expected to teach all the standards and objectives specified in the Core for their grade level.

Feasible

Teachers and others who are familiar with Utah students, classrooms, teachers, and schools have designed the Core. It can be taught with easily obtained resources and materials. A Teacher Resource Book (TRB) is available for elementary grades and has sample lessons on each topic for each grade level. The TRB is a document that will grow as teachers add exemplary lessons aligned with the new Core. The middle grade levels have electronic textbooks available at the Utah State Office of Education's "Utah Science Home Page" at http://www.usoe.k12.ut.us/curr/science.

Useful and Relevant

This curriculum relates directly to student needs and interests. It is grounded in the natural world in which we live. Relevance of science to other endeavors enables students to transfer skills gained from science instruction into their other school subjects and into their lives outside the classroom.

Encourages Good Assessment Practices

Student achievement of the standards and objectives in this Core are best assessed using a variety of assessment instruments. One's purpose should be clearly in mind as assessment is planned and implemented. Performance tests are particularly appropriate to evaluate student mastery of science processes and problem-solving skills. Teachers should use a variety of classroom assessment approaches in conjunction with standard assessment instruments to inform their instruction. Sample test items, keyed to each Core Standard, may be located on the Utah Science Home Page. Observation of students engaged in science activities is highly recommended as a way to assess students' skills as well as attitudes in science. The nature of the questions posed by students provides important evidence of students' understanding of science.

The Most Important Goal

Elementary school reaches the greatest number of students for a longer period of time during the most formative years of the school experience. Effective elementary science instruction engages students actively in enjoyable learning experiences. Science instruction should be as thrilling an experience for a child as seeing a rainbow, growing a flower, or holding a toad. Science is not just for those who have traditionally succeeded in the subject, and it is not just for those who will choose science–related careers. In a world of rapidly expanding knowledge and technology, all students must gain the skills they will need to understand and function responsibly and successfully in the world. The Core provides skills in a context that enables students to experience the joy of doing science.

Fifth Grade Science Core Curriculum

In the Fifth Grade students begin to understanding concepts of **Change and Cause and Effect**. Students will learn about the constantly changing Earth's surface. They will investigate physical and chemical changes in matter. They will begin to relate causes for changes with their effects. Students will have opportunity to investigate the effects of various forces, such as magnetism and electricity upon materials. They will begin to learn how traits passed from parent organisms to their offspring effect their survival.

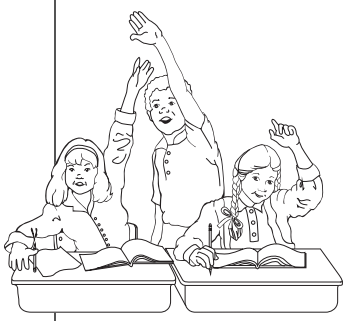
Students should learn to value the scientific processes as means of obtaining knowledge. They should be encouraged to maintain an open and questioning mind and should be helped and encouraged to pose their own questions about objects, events, processes and results. Fifth graders should have the opportunity to plan and conduct their own experiments and come to their own conclusions as they read, observe, compare, describe, infer and draw conclusions.

- **Value the scientific process**
- **Maintain an open and questioning mind**
- **Pose questions about objects, events, processes and results**

Good science instruction requires hands–on science investigations in which student inquiry is an important goal. Teachers should provide opportunities for all students to explore many things. Fifth graders should have sufficient understanding of Earth Science to point out an interesting landform to others and hypothesize its origin; feel the success of connecting batteries and wire to make the lights come on; learn about chemical change as they mix baking soda and vinegar and test changes in acidity of liquids using the juice of red cabbage leaves. They should come to enjoy science as a process of learning about their world.

Science Core concepts should be integrated with concepts and skills from other curriculum areas. Reading, writing and mathematics skills should be emphasized as integral to the instruction of science. Technology issues and the nature of science are significant components of this Core. Personal relevance of science in students' lives is always an important part of helping students to value science and should be emphasized at this grade level.

This Core was designed using the American Association for the Advancement of Science's *Project 2061: Benchmarks For Science Literacy* and the National Academy of Science's *National Science Education Standards* as guides to determine appropriate content and skills.



The fifth grade Science Core has three online resources designed to help with classroom instruction; they include *Teacher Resource Book*—a set of lesson plans, assessment items and science information specific to fifth grade; *Sci-ber Text*—an electronic science textbook specific to the Utah Core, and the science test item pool. This pool includes multiple-choice questions, performance tasks, and interpretive items aligned to the standards and objectives of the fifth grade Science Core. These resources are all available on the Utah Science Home Page at: http://www.usoe.k12.ut.us/curr/science

SAFETY PRECAUTIONS:

The hands–on nature of this science curriculum increases the need for teachers to use appropriate precautions in the classroom and field. Teachers must adhere to the published guidelines for the proper use of animals, equipment, and chemicals in the classroom. These guidelines are available on the Utah Science Home Page.

Intended Learning Outcomes for Fifth Grade Science

The Intended Learning Outcomes (ILOs) describe the skills and attitudes students should learn as a result of science instruction. They are an essential part of the Science Core Curriculum and provide teachers with a standard for evaluation of student learning in science. Instruction should include significant science experiences that lead to student understanding using the ILOs.

The main intent of science instruction in Utah is that students will value and use science as a process of obtaining knowledge based upon observable evidence.

By the end of fifth grade students will be able to:

1. **Use Science Process and Thinking Skills**
   a. Observe simple objects, patterns, and events and report their observations.
   b. Sort and sequence data according to criteria given.
   c. Given the appropriate instrument, measure length, temperature, volume, and mass in metric units as specified.
   d. Compare things, processes, and events.
   e. Use classification systems.
   f. Plan and conduct simple experiments.
   g. Formulate simple research questions.
   h. Predict results of investigations based on prior data.
   i. Use data to construct a reasonable conclusion.
2. **Manifest Scientific Attitudes and Interests**
   a. Demonstrate a sense of curiosity about nature.
   b. Voluntarily read and look at books and other materials about science.
   c. Pose science questions about objects, events, and processes.
   d. Maintain an open and questioning mind toward new ideas and alternative points of view.
   e. Seek and weigh evidence before drawing conclusions.
   f. Accept and use scientific evidence to help resolve ecological problems.

- **Use Science Process and Thinking Skills**
- **Manifest Scientific Attitudes and Interests**
- **Understand Science Concepts and Principles**
- **Communicate Effectively Using Science Language and Reasoning**
- **Demonstrate Awareness of Social and Historical Aspects of Science**
- **Understand the Nature of Science**

3. **Understand Science Concepts and Principles**
   a. Know and explain science information specified for the grade level.
   b. Distinguish between examples and non-examples of concepts that have been taught.
   c. Solve problems appropriate to grade level by applying science principles and procedures.
4. **Communicate Effectively Using Science Language and Reasoning**
   a. Record data accurately when given the appropriate form (e.g., table, graph, chart).
   b. Describe or explain observations carefully and report with pictures, sentences, and models.
   c. Use scientific language in oral and written communication.
   d. Use reference sources to obtain information and cite the source.
   e. Use mathematical reasoning to communicate information.
5. **Demonstrate Awareness of Social and Historical Aspects of Science**
   a. Cite examples of how science affects life.
   b. Understand the cumulative nature of science knowledge.
6. **Understand the Nature of Science**
   a. Science is a way of knowing that is used by many people not just scientists.
   b. Understand that science investigations use a variety of methods and do not always use the same set of procedures; understand that there is not just one "scientific method."
   c. Science findings are based upon evidence.

Fifth Grade Science Standards

Science Benchmark

The weight of an object is always equal to the sum of its parts, regardless of how it is assembled. In a chemical reaction or physical change matter is neither created nor destroyed. When two or more materials are combined, either a chemical reaction or physical change may occur. Chemical reactions are often indicated when materials give off heat or cool as they take in heat, give off light, give off gas, or change colors. In a chemical reaction, materials are changed into new substances. In a physical change a new substance is not formed.

Standard I: **Students will understand that chemical and physical changes occur in matter.**

Standard I:
Students will understand that chemical and physical changes occur in matter.

Objective 1: Describe that matter is neither created nor destroyed even though it may undergo change.

a. Compare the total weight of an object to the weight of its individual parts after being disassembled.

b. Compare the weight of a specified quantity of matter before and after it undergoes melting or freezing.

c. Investigate the results of the combined weights of a liquid and a solid after the solid has been dissolved and then recovered from the liquid (e.g., salt dissolved in water then water evaporated).

d. Investigate chemical reactions in which the total weight of the materials before and after reaction is the same (e.g., cream and vinegar before and after mixing, borax and glue mixed to make a new substance).

Objective 2: Evaluate evidence that indicates a physical change has occurred.

a. Identify the physical properties of matter (e.g., hard, soft, solid, liquid, gas).

b. Compare changes in substances that indicate a physical change has occurred.

c. Describe the appearance of a substance before and after a physical change.

Objective 3: Investigate evidence for changes in matter that occur during a chemical reaction.

a. Identify observable evidence of a chemical reaction (e.g., color change, heat or light given off, heat absorbed, gas given off).

b. Explain why the measured weight of a remaining product is less than its reactants when a gas is produced.

c. Cite examples of chemical reactions in daily life.

d. Compare a physical change to a chemical change.

e. Hypothesize how changing one of the materials in a chemical reaction will change the results.

Science language students should use:
heat, substance, chemical change, dissolve, physical change, matter, product, reactants, solid, liquid, weight

Science Benchmark

The Earth's surface is constantly changing. Some changes happen very slowly over long periods of time, such as weathering, erosion, and uplift. Other changes happen abruptly, such as landslides, volcanic eruptions, and earthquakes. All around us, we see the visible effects of the building up and breaking down of the Earth's surface.

Standard II: Students will understand that volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.

Standard II: Students will understand that volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.

Objective 1: Describe how weathering and erosion change Earth's surface.

a. Identify the objects, processes, or forces that weather and erode Earth's surface (e.g., ice, plants, animals, abrasion, gravity, water, wind).

b. Describe how geological features (e.g., valleys, canyons, buttes, arches) are changed through erosion (e.g., waves, wind, glaciers, gravity, running water).

c. Explain the relationship between time and specific geological changes.

Objective 2: Explain how volcanoes, earthquakes, and uplift affect Earth's surface.

a. a. Identify specific geological features created by volcanoes, earthquakes, and uplift.

b. Give examples of different landforms that are formed by volcanoes, earthquakes, and uplift (e.g., mountains, valleys, new lakes, canyons).

c. Describe how volcanoes, earthquakes, and uplift change landforms.

d. Cite examples of how technology is used to predict volcanoes and earthquakes.

Objective 3: Relate the building up and breaking down of Earth's surface over time to the various physical land features.

a. Explain how layers of exposed rock, such as those observed in the Grand Canyon, are the result of natural processes acting over long periods of time.

b. Describe the role of deposition in the processes that change Earth's surface.

c. Use a time line to identify the sequence and time required for building and breaking down of geologic features on Earth.

d. Describe and justify how the surface of Earth would appear if there were no mountain uplift, weathering, or erosion.

Science language students should use:
earthquakes, erode, erosion, faults, uplift, volcanoes, weathering, buttes, arches, glaciers, geological, deposition

Science Benchmark

Earth and some earth materials have magnetic properties. Without touching them, a magnet attracts things made of iron and either pushes or pulls on other magnets. Electricity is a form of energy. Current electricity can be generated and transmitted through pathways. Some materials are capable of carrying electricity more effectively than other materials. Static electricity is a result of objects being electrically charged. Without touching them, materials that are electrically charged may either push or pull other charged materials.

Standard III: Students will understand that magnetism can be observed when there is an interaction between the magnetic fields of magnets or between a magnet and materials made of iron.

Standard III:
Students will understand that magnetism can be observed when there is an interaction between the magnetic fields of magnets or between a magnet and materials made of iron.

Objective 1: Investigate and compare the behavior of magnetism using magnets.

a. Compare various types of magnets (e.g., permanent, temporary, and natural magnets) and their abilities to push or pull iron objects they are not touching.

b. Investigate how magnets will both attract and repel other magnets.

c. Compare permanent magnets and electromagnets.

d. Research and report the use of magnets that is supported by sound scientific principles.

Objective 2: Describe how the magnetic field of Earth and a magnet are similar.

a. Compare the magnetic fields of various types of magnets (e.g., bar magnet, disk magnet, horseshoe magnet).

b. Compare Earth's magnetic field to the magnetic field of a magnet.

c. Construct a compass and explain how it works.

d. Investigate the effects of magnets on the needle of a compass and compare this to the effects of Earth's magnetic field on the needle of a compass (e.g., magnets effect the needle only at close distances, Earth's magnetic field affects the needle at great distances, magnets close to a compass overrides the Earth's effect on the needle).

Standard IV: Students will understand features of static and current electricity.

Objective 1: Describe the behavior of static electricity as observed in nature and everyday occurrences.

a. List several occurrences of static electricity that happen in everyday life.

b. Describe the relationship between static electricity and lightning.

c. Describe the behavior of objects charged with static electricity in attracting or repelling without touching.

d. Compare the amount of static charge produced by rubbing various materials together (e.g., rubbing fur on a glass rod produces a greater charge then rubbing the fur with a metal rod, the static charge produced when a balloon is rubbed on hair is greater than when a plastic bag is rubbed on hair).

e. Investigate how various materials react differently to statically charged objects.

Objective 2: Analyze the behavior of current electricity.

a. Draw and label the components of a complete electrical circuit that includes switches and loads (e.g., light bulb, bell, speaker, motor).

b. Predict the effect of changing one or more of the components (e.g., battery, load, wires) in an electric circuit.

c. Generalize the properties of materials that carry the flow of electricity using data by testing different materials.

d. Investigate materials that prevent the flow of electricity.

e. Make a working model of a complete circuit using a power source, switch, bell or light, and a conductor for a pathway.

Science language students should use:
battery, complete circuit, incomplete circuit, current, conductor, insulator, pathway, power source, attract, compass, electromagnetism, magnetic force, magnetic field, natural magnet, permanent magnet, properties, repel, static electricity, temporary magnet, switch, load

Standard IV: Students will understand features of static and current electricity.

Science Benchmark

All living things inherit a set of characteristics or traits from their parents. Members of any given species transfer traits from one generation to the next. The passing of traits from parent to offspring is called heredity and causes the offspring to resemble the parent. Some traits differ among members of a population, and these variations may help a particular species to survive better in a given environment in getting food, finding shelter, protecting itself, and reproducing. These variations give the individual a survival advantage over other individuals of the same species.

Standard V: Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

Objective 1: Using supporting evidence, show that traits are transferred from a parent organism to its offspring.

a. Make a chart and collect data identifying various traits among a given population (e.g., the hand span of students in the classroom, the color and texture of different apples, the number of petals of a given flower).

b. Identify similar physical traits of a parent organism and its offspring (e.g., trees and saplings, leopards and cubs, chickens and chicks).

c. Compare various examples of offspring that do not initially resemble the parent organism but mature to become similar to the parent organism (e.g., mealworms and darkling beetles, tadpoles and frogs, seedlings and vegetables, caterpillars and butterflies).

d. Contrast inherited traits with traits and behaviors that are not inherited but may be learned or induced by environmental factors (e.g., cat purring to cat meowing to be let out of the house; the round shape of a willow is inherited, while leaning away from the prevailing wind is induced).

e. Investigate variations and similarities in plants grown from seeds of a parent plant (e.g., how seeds from the same plant species can produce different colored flowers or identical flowers).

Standard V:
Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

Objective 2: Describe how some characteristics could give a species a survival advantage in a particular environment.

a. Compare the traits of similar species for physical abilities, instinctual behaviors, and specialized body structures that increase the survival of one species in a specific environment over another species (e.g., difference between the feet of snowshoe hare and cottontail rabbit, differences in leaves of plants growing at different altitudes, differences between the feathers of an owl and a hummingbird, differences in parental behavior among various fish).

b. Identify that some environments give one species a survival advantage over another (e.g., warm water favors fish such as carp, cold water favors fish such as trout, environments that burn regularly favor grasses, environments that do not often burn favor trees).

c. Describe how a particular physical attribute may provide an advantage for survival in one environment but not in another (e.g., heavy fur in arctic climates keep animals warm whereas in hot desert climates it would cause overheating; flippers on such animals as sea lions and seals provide excellent swimming structures in the water but become clumsy and awkward on land; cacti retain the right amount of water in arid regions but would develop root rot in a more temperate region; fish gills have the ability to absorb oxygen in water but not on land).

d. Research a specific plant or animal and report how specific physical attributes provide an advantage for survival in a specific environment.

Science language students should use:
inherited, environment, species, offspring, traits, variations, survival, instincts, population, specialized structure, organism, life cycle, parent organism, learned behavior

Fifth Grade Language Arts Standards

Standard I: ***Oral Language*—Students develop language for the purpose of effectively communicating through listening, speaking, viewing, and presenting.**

Objective 1: Develop language through listening and speaking.

a. Identify specific purpose(s) for listening (e.g., to gain information, to be entertained).

b. Listen and demonstrate understanding by responding appropriately (e.g., follow multiple-step directions, restate, clarify, question, summarize, elaborate formulating an opinion with supporting evidence, interpret verbal and nonverbal messages, note purpose and perspective).

c. Speak clearly and audibly with expression in communicating ideas (i.e., effective rate, volume, pitch, tone, phrasing, tempo).

d. Speak using complex sentences with appropriate subject-verb agreement, correct verb tense and syntax.

Objective 2: Develop language through viewing media and presenting.

a. Identify specific purpose(s) for viewing media (i.e., to identify main idea and details, gain information, distinguish between fiction/nonfiction, distinguish between fact/opinion, form an opinion, determine presentation's accuracy/bias).

b. Use a variety of formats in presenting with various forms of media (e.g., pictures, posters, charts, ads, newspapers, graphs, videos, slide shows).

Standard I:
***Oral Language*—Students develop language for the purpose of effectively communicating through listening, speaking, viewing, and presenting.**

Standard II: ***Concepts of Print*—Students develop an understanding of how printed language works.**

Objective 1: Demonstrate an understanding that print carries "the" message.

a. Recognize that print carries different messages.

b. Identify messages in common environmental print (e.g., signs, boxes, wrappers).

Objective 2: Demonstrate knowledge of elements of print within a text.

a. Discriminate between letters, words, and sentences in text.

b. Match oral words to printed words while reading.

c. Identify punctuation in text (i.e., periods, question marks, and exclamation points).

Standard II: ***Concepts of Print*—Students develop an understanding of how printed language works.**

Standard III: ***Phonological and Phonemic Awareness*—Students develop phonological and phonemic awareness.**

Objective 1: Demonstrate phonological awareness.

a. Count the number of syllables in words.

b. Count the number of syllables in a first name.

Objective 2: Recognize like and unlike word parts (oddity tasks).

a. Identify words with same beginning consonant sounds (e.g., man, sat, sick) and ending consonant sounds (e.g., man, sat, ten) in a series of words.

b. Identify words with same medial sounds in a series of words (e.g., long vowel sound: take, late, feet; short vowel sound: top, cat, pan; middle consonant sound: kitten, missing, lesson).

Objective 3: Orally blend word parts (blending).

a. Blend syllables to make words (e.g., /ta/…/ble/, table).

b. Blend onset and rime to make words (e.g., /p/…/an/, pan).

c. Blend individual phonemes to make words (e.g., /s/ /a/ /t/, sat).

Objective 4: Orally segment words into word parts (segmenting).

a. Segment words into syllables (e.g., table, /ta/…/ble/).

b. Segment words into onset and rime (e.g., pan, /p/…/an/).

c. Segment words into individual phonemes (e.g., sat, /s/…/a/…/t/).

Objective 5: Orally manipulate phonemes in words and syllables (manipulation).

a. Substitute initial and final sound (e.g., replace first sound in mat to /s/, say sat; replace last sound in mat with /p/, say map).

b. Substitute vowel in words (e.g., replace middle sound in map to /o/, say mop).

c. Delete syllable in words (e.g., say baker without the /ba/, say ker).

d. Deletes initial and final sounds in words (e.g., say sun without the /s/, say un; say hit without the /t/, say hi).

e. Delete initial phoneme and final phoneme in blends (e.g., say step without the /s/, say tep; say best without the /t/, say bes).

Standard III: ***Phonological and Phonemic Awareness*— Students develop phonological and phonemic awareness.**

Standard IV: ***Phonics and Spelling*—Students use phonics and other strategies to decode and spell unfamiliar words while reading and writing.**

Objective 1: Demonstrate an understanding of the relationship between letters and sounds.

a. Write letters to represent spoken sounds of all letters of the alphabet in random order.

b. Identify and pronounce sounds for consonants, consonant blends (e.g., br, st, fl) and consonant digraphs (e.g., ch, sh, wh, th) accurately in words.

c. Identify and pronounce sounds for short and long vowels, using patterns (e.g., vc, vcv, cvc, cvvc, cvcv, cvc-silent e), and vowel digraphs (e.g., ea, ee, ie, oa, ai, ay, oo, ow) accurately in words.

d. Identify and pronounce sounds for r–controlled vowels accurately in one-syllable words (e.g., ar, or, er).

e. Identify and blend initial letter sounds with common vowel patterns to pronounce one-syllable words (e.g., /g/…/oa/…/t/, goat).

Objective 2: Use knowledge of structural analysis to decode words.

a. Identify and read grade level contractions and compound words.

b. Identify sound patterns and apply knowledge to decode one-syllable words (e.g., blends, digraphs, vowel patterns, r-controlled vowels).

c. Demonstrate an understanding of representing same sound with different patterns by decoding these patterns accurately in one-syllable words (e.g., ee, ie, ea, e).

d. Use knowledge of root words and suffixes to decode words (i.e., -ful, -ly, -er).

e. Use letter patterns to decode words (e.g., phonograms/word families/onset and rime: -ack, -ail, -ake).

Standard IV: ***Phonics and Spelling*—Students use phonics and other strategies to decode and spell unfamiliar words while reading and writing.**

Objective 3: Spell words correctly.

a. Use knowledge of word families, patterns, syllabication, and common letter combinations to spell new words.

b. Spell multisyllable words with roots, prefixes, and suffixes.

c. Spell an increasing number of high-frequency and irregular words correctly (e.g., language, tongue).

d. Learn the spellings of irregular and difficult words (e.g., hundredths, legislative, digestive).

Objective 4: Use spelling strategies to achieve accuracy (e.g., prediction, visualization, association).

a. Use knowledge about spelling to predict the spelling of new words.

b. Visualize words while writing.

c. Associate spelling of new words with that of known words and word patterns.

d. Use spelling generalities to assist spelling of new words.

Standard V: ***Fluency*—Students develop reading fluency to read aloud grade level text effortlessly without hesitation.**

Objective 1: Read aloud grade level text with appropriate speed and accuracy.

a. Read grade level text at a rate of approximately 120-150 wpm.

b. Read grade level text with an accuracy rate of 95-100%.

Objective 2: Read aloud grade level text effortlessly with clarity.

a. Read grade level text in meaningful phrases using intonation, expression, and punctuation cues.

b. Read grade level words with automaticity.

Standard V: ***Fluency*—Students develop reading fluency to read aloud grade level text effortlessly without hesitation.**

Standard VI: ***Vocabulary*—Students learn and use grade level vocabulary to increase understanding and read fluently.**

Objective 1: Learn new words through listening and reading widely.

a. Use new vocabulary learned by listening, reading, and discussing a variety of genres.

b. Learn the meaning and properly use a variety of grade level words (e.g., words from literature, social studies, science, math).

Objective 2: Use multiple resources to learn new words by relating them to known words and/or concepts.

a. Use multiple resources to determine the meanings of unknown words (e.g., dictionaries, glossaries, beginning thesauruses).

b. Determine gradients of meanings between related words and concepts (e.g., ambassador: official, representative).

Objective 3: Use structural analysis and context clues to determine meanings of words.

a. Identify meanings of words using roots and affixes.

b. Use words, sentences, and paragraphs as context clues to determine meaning of unknown key words, similes, metaphors, idioms, proverbs, and clichés.

c. Use context to determine meanings of synonyms, antonyms, homonyms (e.g., your/you're) and multiple-meaning words (e.g., beat).

Standard VI: ***Vocabulary*— Students learn and use grade level vocabulary to increase understanding and read fluently.**

Standard VII: ***Comprehension*—Students understand, interpret, and analyze narrative and informational grade level text.**

Objective 1: Identify purposes of text.

a. Identify purpose for reading.

b. Identify author's purpose.

Objective 2: Apply strategies to comprehend text.

a. Relate prior knowledge to make connections to text (e.g., text to text, text, to self, text to world).

b. Generate questions about text (e.g., factual, inferential, evaluative).

c. Form mental pictures to aid understanding of text.

d. Make and confirm or revise predictions while reading using title, picture clues, text, and/or prior knowledge.

e. Make inferences and draw conclusions from text.

f. Identify theme/topic/main idea from text; note details.

g. Summarize important ideas/events; summarize supporting details in sequence.

h. Monitor and clarify understanding applying fix-up strategies while interacting with text.

i. Compile, organize, and interpret information from text.

Objective 3: Recognize and use features of narrative and informational text.

a. Identify characters, setting, sequence of events, problem/resolution.

b. Compare and contrast elements of different genres: fairy tales, poems, realistic fiction, fantasy, fables, folk tales, tall tales, biographies, historical fiction, science fiction).

c. Identify information from text, headings, subheadings, diagrams, charts, captions, graphs, table of contents, index, and glossary.

d. Identify different structures in text (e.g., description, problem/solution, compare/contrast, cause/effect, order of importance, time, geographic classification).

e. Locate information from a variety of informational text (e.g., newspapers, magazines, textbooks, biographies, Internet, other resources).

Standard VII: ***Comprehension*—Students understand, interpret, and analyze narrative and informational grade level text.**

Standard VIII: ***Writing*—Students write daily to communicate effectively for a variety of purposes and audiences.**

Objective 1: Prepare to write by gathering and organizing information and ideas (prewriting).

a. Generate ideas for writing by reading, discussing, researching, and reflecting on personal experiences.

b. Select and narrow a topic from generated ideas.

c. Identify audience, purpose, and form for writing.

d. Use a variety of graphic organizers to organize information from multiple sources.

Objective 2: Compose a written draft.

a. Draft ideas on paper in an organized manner utilizing words, sentences, and multiple paragraphs (e.g., beginning, middle, end; main idea; details; characterization; setting; plot).

b. Use voice to fit the purpose and audience.

c. Use strong verbs and precise and vivid language to convey meaning.

d. Identify and use effective leads and strong endings.

Objective 3: Revise by elaborating and clarifying a written draft.

a. Revise draft to add details, strengthen word choice, clarify main idea and reorder content.

b. Enhance fluency by using transitional words, phrases to connect ideas, and a variety of complete sentences and paragraphs to build ideas (e.g., varied sentence length, simple and compound sentences).

c. Revise writing, considering the suggestions from others.

Objective 4: Edit written draft for conventions.

a. Edit writing for correct capitalization and punctuation (i.e., introductory and dependent clauses, dialogue, singular and plural possessives).

b. Edit for spelling of grade level-appropriate words.

c. Edit for standard grammar (e.g., subject-verb agreement, verb tense, irregular verbs).

d. Edit for appropriate formatting features (e.g., margins, indentations, titles, headings).

Standard VIII: ***Writing*—Students write daily to communicate effectively for a variety of purposes and audiences.**

Objective 5: Use fluent and legible handwriting to communicate.

a. Write using upper- and lower-case cursive letters using proper form, proportions, and spacing.

b. Increase fluency with cursive handwriting.

c. Produce legible documents with manuscript or cursive handwriting.

Objective 6: Write in different forms and genres.

a. Produce personal writing (e.g., journals, personal experiences, eyewitness accounts, memoirs, literature responses).

b. Produce traditional and imaginative stories, narrative and formula poetry.

c. Produce informational text (e.g., book reports, cause and effect reports, compare and contrast essays, observational/research reports, content area reports, biographies, historical fiction, summaries).

d. Produce writing to persuade (e.g., essays, editorials, speeches, TV scripts, responses to various media).

e. Produce functional texts (e.g., newspaper and newsletter articles, e-mails, simple PowerPoint presentations, memos, agendas, bulletins).

f. Share writing with others incorporating relevant illustrations, photos, charts, diagrams, and/or graphs to add meaning.

g. Publish 6-8 individual products.

Facilitated Activities

Time Line

Science Standard II:
Students will understand that volcanoes, earthquakes, uplift, weathering and erosion reshape Earth's surface.

Objective 3:
Relate the building up and breaking down of Earth's surface.

Intended Learning Outcome:
1. Use Science Process and Thinking Skills

Content Connections:
Math I-1

Science Standard II

Objective 3

Connections

Background Information

In this activity, teams of students place the four Geologic Eras in order and locate them on a time line.

The time line can be made using the scale 1cm = 10,000,00 years. The line will need to be 4.5 meters long. Using a meter stick, draw the line on the board, placing a mark every 50 cm. Label the right hand side of the line 0 and the first mark to the left 500 MYA, the next marks are labeled 1000 MYA, 1500 MYA, 2000 MYA, 2500 MYA, and so on. The last mark on the left will be 4500 MYA.

From various lines of evidence, we know that Earth is about 4.6 billion years old. The oldest dated rock is about 4.2 billion years old. For much of Earth's history, life consisted of simple organisms.

Instructional Procedures

1. Distribute materials to the teams.
2. Allow time to read instructions and place *Geologic Time Line Cards* (p. 2-5) in order.
3. After the teams have the cards in order, add the eras to the time line.
4. Have students check to see if the cards are in the correct order. Tape them onto the time line.
5. Allow students to share observations about the amount of time represented on the time line. Discuss some of the major events of each era.

Materials

Each team will need:

- ❑ A set of 4 *Geologic Time Line Cards* (without times)
- ❑ One *Time Line Team Instruction Card*

6. Place other items on the time line such as: 206-144 MYA dinosaurs dominate; 65-50 MYA Rocky Mountains form; 24-25 MYA modern birds appear; 1.8 million –10,000 years ago Great Ice Age; 10,000 years ago human civilization develops.

Additional Resources

www.sdnhm.org/fieldguide/fossils/timeline.html

Geologic Time Line Cards

In Million Years Ago (MYA)

Precambrian

Time: _____MYA

Geologic Events:
- **First ice age occurs**
- **First sedimentary rocks are formed**
- **Oceans form**
- **Earth forms**

Life Events:
- **Simple life begins**

Team name _____

Paleozoic

Time: _____MYA

Geologic Events:
- **Appalachian Mountains begin to form**
- **Warm, shallow seas cover much of North America**
- **Two ancient continents are found near the equator**

Life Events:
- **Age of ocean life (fish and reptiles develop)**
- **Hard bodied animals**

Team name _____

Mesozoic

Time: _____MYA

Geologic Events:
- **Widespread volcanic activity**
- **American and Europe/African continents move apart**

Life Events:
- **Age of dinosaurs**

Team name _____

Cenozoic

Time: _____MYA

Geologic Events:
- **Thick glaciers in much of the world**
- **Rocky Mountains, Alps, Andes, and Himalayas form**
- **Glaciers cover North America**

Life Events:
- **Age of mammals**

Team name _____

Geologic Time Line Cards (with dates)

In Million Years Ago (MYA)

Precambrian **Time: 4,600–544 MYA** **Geologic Events:** • First ice age occurs • First sedimentary rocks are formed • Oceans form • Earth forms **Life Events:** • Simple life begins **Team name _____**	**Paleozoic** **Time: 544–248 MYA** **Geologic Events:** • Appalachian Mountains begin to form • Warm, shallow seas cover much of North America • Two ancient continents are found near the equator **Life Events:** • Age of ocean life (fish and reptiles develop) • Hard bodied animals **Team name _____**
Mesozoic **Time: 248–65 MYA** **Geologic Events:** • Widespread volcanic activity • American and Europe/African continents move apart **Life Events:** • Age of dinosaurs **Team name _____**	**Cenozoic** **Time: 65–0 MYA** **Geologic Events:** • Thick glaciers in much of the world • Rocky Mountains, Alps, Andes, and Himalayas form • Glaciers cover North America **Life Events:** • Age of mammals **Team name _____**

Time Line Team Instruction Card

The four cards in your bag represent four periods of Earth's development, or *Geologic Eras*. Since Earth is very old, geological time is measured using Million Years Ago (MYA).

Your assignment is to make a geologic time line by placing the cards in order from oldest era to the most recent era. Since the times have been left off of your cards, you will need to study the information on the cards carefully in order to place them in the correct order.

Work as a team and include all team members in your discussion. When your team has placed the cards in order, wait for directions from your teacher

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Reaching All Learners in Our Classrooms

Background Information

There are approximately six to ten percent of children who have learning disabilities (LD) in the United States. In order to be effective in the classroom, educators need to understand the struggles of the LD students.

Understanding the LD student enables the educator to incorporate strategies to help the student be more successful. The educator must present lessons incorporating best practices with accommodations for LD students.

Invitation to Learn

Why do some students not want to answer questions? Why do others always answer with an "I don't know" answer? Why do some answer the first question when you have asked the second question and moved to a follow-up answer? Do you have students who are able to learn, mentally intact, not disturbed, but are not functioning? Do your lesson plans incorporate accommodations for all learners?

Instructional Procedures

Materials

- ❑ *How Difficult Can This Be?* video
- ❑ *Standard-Driven Lesson Design*
- ❑ *Teacher Checklist of Effective Instruction*
- ❑ *Barrier Buster Lesson Evaluation*
- ❑ *Working With Students—Modifications*

Play *How Difficult Can This Be?* and pause between posted sections. You will view *Introduction, Rules, Experiences, Processing, Risk Taking, Visual Perception,* and *Reading Comprehension*. (Plan on approximately 20 minutes of viewing.) Have short discussions about how this applies to the classroom.

Proceed to *Standard-Driven Lesson Design* (p. 2-10). Educators must be prepared for the LD students before any instruction takes place.

The *Teacher Checklist of Effective Instruction* (p. 2-12) helps all learners. Educators must incorporate a variety of these strategies in all lessons.

The *Barrier Buster Lesson Evaluation* (p. 2-13) is a rubric to assist educators in evaluating their lesson plans and/or lesson delivery.

The *Working With Students—Modifications* list (p. 2-14) is helpful after evaluating particular classroom needs.

Summary

Educators must continually be prepared to meet the learning needs of all students. They must make accommodations in lesson plans, teaching habits, and evaluations.

Assessment Suggestions

The use of the *Barrier Buster Lesson Evaluation* rubric.

Additional Resources

Program Resources

- Title I
- Speech Language Therapy
- Medical Intervention
- DIBELS
- Read Naturally
- Special Education
- ELL Services
- AIMs
- Hands-on-Equations

Book

Differentiated Instructional Strategies, by Gayle H. Gregory; ISBN 0-7619-4551-2

Video

How Difficult Can This Be? The F.A.T. City Workshop, (http://ldonline.learningstore.org/); Item #LD1001

Web site

www.updc.org

Standard-Driven Lesson Design

Core Standard:
Objective:

Lesson Focus: (Specific part of standard or objective to be taught.)

Competencies: ALL students
(Essential Information: What students will know or be able to do after this lesson.)

1.

2.

Reduced Competencies: STRUGGLING students (most critical, basic information on topic.)

3.

4.

Minimum Competencies: MOST students (What most students will know and be able to do.)

5.

6.

Extended Competencies: ADVANCED students (Worth being familiar with, nice to know.)

Preview/Review:

Model (I-DO):

Guided Practice (WE-DO):

Independent Practice (YOU-DO):

Review/Preview:

Core Standard: *Students will develop understanding of environment.*

Objective: *Demonstrate how symbols and models are used to represent features of the environment.*

Lesson Focus: (Specific part of standard or objective to be taught.) *Conventions of maps.*

Competencies: ALL students
(Essential Information: What students will know or be able to do after this lesson.)

1. *What maps are used for.*
2. *3 common map symbols.*

Reduced Competencies: STRUGGLING students (most critical, basic information on topic.)

3. *Where students might encounter maps.*
4. *Students draw an accurate map of the classroom.*

Minimum Competencies: MOST students (What most students will know and be able to do.)

5. *Identify several types of maps.*
6. *Create a map using 10 symbols.*

Extended Competencies: ADVANCED students (Worth being familiar with, nice to know.)

Preview/Review: *Show several maps of familiar areas (school, city). Review what a symbol is, common symbols. Ask: "What are maps used for?" "How can they help us?"*

Model (I-DO): *Read "Me On the Map" to students. Emphasize how book starts (small to big). Compare to bird's view from above an area. Explain how maps can help us locate places and things. 1. Show maps. 2. Display and explain symbols (locate key). 3. Find locations.*

Guided Practice (WE-DO):

1. Show map of school and have students point out features (symbols).
2. Show map of classroom; students help you recreate that map on overhead.
3. Repeat with a smaller section of the room (small groups; teacher monitor).

Independent Practice (YOU-DO): *1. Give students paper, pencil, markers, rule, etc.*
2. Students draw a map of their home (option: another room at school).
3. Students must add a key (colors and symbols) and follow it.

Review/Preview: *Review how maps can help us, common symbols, key.*
Preview other types of maps that can help us.
Read "The Armadillo from Amarillo" (optional).

Teacher Checklist of Effective Instruction

BEFORE A Lesson

- ❑ Review big ideas from previous lesson(s).
- ❑ Have students think/pair/share what they have learned.
- ❑ Announce what the students are going to learn.
- ❑ Describe the purpose of learning the information or skill.
- ❑ Discuss how/when the information/skill can be used.
- ❑ List key words/concepts for the lesson on the board.
- ❑ Develop questions students may have about the topic.
- ❑ Provide advance organizers.
- ❑ Preview materials (headings, chapter summary, questions, etc.).

DURING A Lesson

- ❑ Use visual cues (gestures, pointing, graphic organizers, pictures, etc.).
- ❑ Use auditory cues (most important, number one, etc.).
- ❑ Provide examples.
- ❑ Allow think time.
- ❑ Provide hands-on models, maps, graphs, etc. when possible.
- ❑ Give short, clear directions verbally and in writing. Model directions.
- ❑ Check for understanding.
- ❑ Encourage discussion.
- ❑ Ask questions that promote all levels of thinking.
- ❑ Use methods that actively engage every learner and require individual/group responses.

AFTER A Lesson

- ❑ Summarize what was learned in three to five points.
- ❑ Ask student to pair/share what they learned.
- ❑ Ask additional questions and discuss information the students want to know.
- ❑ Relate the lesson to homework assignments.
- ❑ Give clear directions for the assignment, including a model of your expectations for projects or tasks.
- ❑ Remind students of how the lesson applies to their lives today.
- ❑ Set the stage for the next lesson.

Barrier Buster Lesson Evaluation

Can be used to evaluate lesson plans or lesson delivery. ***Place a check mark in the column that most accurately describes lesson at this time.***	**YES**	**Could be better**	**NO**
1. Lesson is **aligned with Core Standards** and is connected to previous or upcoming lesson/activities.			
2. Connection is drawn between lesson and **real-life**.			
3. Lesson uses an **explicit instruction model** (I-DO, We-Do, You-DO) to teach new skills or knowledge.			
4. Necessary **background knowledge/vocabulary** is identified, taught and/or reviewed.			
5. A **variety of cues/representations** are used (visual, auditory, kinesthetic, tactile, etc.).			
6. Clear **examples and non-examples** are given.			
7. Instruction is given in **short, intense learning sessions**, with opportunities for brief breaks.			
8. **Written/oral directions are clear**, uncluttered, and use familiar vocabulary.			
9. Written/oral directions are given **one at a time**, allowing for **adequate response time.**			
10. **Adequate guided practice** is used (e.g., 90/90 rule: 90% of students have mastered skill at 90% accuracy).			
11. A variety of **options** for student demonstration of learning are available (differing learning styles and abilities).			
12. **Homework, worksheets, and bookwork** are utilized appropriately.			

Working With Students—Modifications

There are some regular classroom demands, instructional activities, and materials that many paraprofessionals are asked to modify or adapt. The following lists provide a few helpful suggestions for making these modifications. These lists are not exhaustive. Space is provided in each list for you to write in your own suggestions and those you learn from others.

IF THE STUDENT HAS TROUBLE

TAKING WRITTEN TESTS,

YOU CAN TRY...

- ❑ allowing more time.
- ❑ going over the directions.
- ❑ reviewing notes, sheets, or textbook.
- ❑ reading the test aloud.
- ❑ explaining or rewording test questions.
- ❑ allowing the student to answer in his/her own words or to answer orally.
- ❑ allowing the student to use textbook or other materials such as formulas and diagrams.
- ❑ providing vocabulary list or word bank.
- ❑ allowing the student to dictate essay question answers.
- ❑ allowing the student to work with another student.
- ❑ allowing the student to write on the test instead of the answer sheet.
- ❑ providing second try or grading twice.
- ❑ adding more "white space" by rewriting or retyping.
- ❑ using blanks to cue answers (number of blanks or length of blanks corresponds to the number of letters or the length of words).
- ❑ breaking long lists of matching into more groups of short lists.
- ❑ deleting inappropriate or repeated items (cross out on student's test).
- ❑ allowing breaks in testing time.

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IF THE STUDENT HAS TROUBLE

TAKING NOTES,

YOU CAN TRY...

- ❑ giving the student a copy of the notes.
- ❑ giving the student a partial outline to complete during note taking.
- ❑ having another student make a copy of his/her notes.
- ❑ using a tape recorder.
- ❑ trading the student's incomplete notes for a copy of complete notes.
- ❑ giving additional instruction on note taking.
- ❑ allowing the student to listen without taking notes and conclude with a short oral or written summary of main points.
- ❑ keying class notes to pages in textbook.

_____
_____
_____
_____
_____
_____

IF THE STUDENT HAS TROUBLE

COMPLETING STUDY GUIDES OR WORKSHEETS,

YOU CAN TRY...

- ❑ providing page numbers for location of answers in reading material.
- ❑ making sure questions are in the same order as the reading material.
- ❑ selecting or marking out items (based on appropriateness for each student).
- ❑ highlighting or underlining answers.
- ❑ providing a word bank.
- ❑ breaking material into smaller parts.
- ❑ allowing students to form study groups.
- ❑ taking turns: you do one, the student does the next one, etc.

_____
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_____
_____

IF THE STUDENT HAS TROUBLE

USING A TEXTBOOK,

YOU CAN TRY...

- ❑ reading the textbook aloud to the student.
- ❑ using a peer as a "reading buddy."
- ❑ using computer programs with audio.
- ❑ using visuals (films, videotapes, computer programs, etc.).
- ❑ providing summaries or outlines.
- ❑ using a parallel textbook (same subject, lower reading level).
- ❑ providing preview questions.
- ❑ going over important vocabulary.
- ❑ finding out what the student already knows about the information (activating prior knowledge).
- ❑ developing study guides.
- ❑ highlighting the textbook.
- ❑ asking questions during and after reading (to check comprehension and reinforce information).
- ❑ teaching the student to use specific parts of the textbook (glossary, index, table of contents, diagrams, charts, etc.).

IF THE STUDENT HAS TROUBLE

KEEPING TRACK OF MATERIALS OR ASSIGNMENTS,

YOU CAN TRY...

- ❑ helping the student develop self-checking or self-monitoring skills for remembering classroom supplies and assignments.
- ❑ writing assignments on board for the student to copy.
- ❑ requiring envelopes for big projects or projects with separate parts.
- ❑ asking the student what materials s/he will need.
- ❑ keeping an extra set of materials in the room.
- ❑ making sure all returned papers are immediately put in the notebook.
- ❑ giving rewards for bringing materials and assignments each day or class period.
- ❑ developing nonverbal cues to remind the student to self-check for materials.
- ❑ keeping an assignment calendar, checklist, or diary.
- ❑ using Post-it® notes to mark assignments in text books.
- ❑ writing assignment requirements on Post-it® notes marking assignments.

IF THE STUDENT HAS TROUBLE

KEEPING AN ORGANIZED NOTEBOOK,

YOU CAN TRY...

- ❑ checking the notebook often.
- ❑ having the student number all pages.
- ❑ checking the notebook daily.
- ❑ requiring the student to keep one notebook for each subject, or using one large ring binder with a divider for each subject.
- ❑ color-coding pages by subject area or by weeks, months, etc.
- ❑ having the student immediately file pages following instruction or being given the sheets.
- ❑ requiring the student to keep a hole-punch device.
- ❑ assigning a "notebook buddy" from the class (choose someone who has good notebook keeping skills).

IF THE STUDENT HAS TROUBLE

COMPLETING WORK ON TIME,

YOU CAN TRY...

- ❑ reducing the amount of work or allowing more time for the work.
- ❑ reminding the student of time periodically.
- ❑ writing schedules and helping the student plan use of time.
- ❑ helping the student keep a calendar.
- ❑ breaking assignments up and having several "due dates" for the pieces.
- ❑ developing checklists.
- ❑ using a kitchen timer to define work times.

IF THE STUDENT HAS TROUBLE

STAYING ON TASK,

YOU CAN TRY...

- ❑ reducing distractions.
- ❑ rewarding on-task behavior.
- ❑ providing shortened tasks.
- ❑ providing checklists.
- ❑ making sure the student's workspace is clear of extra materials.
- ❑ reducing the amount of work.
- ❑ using peer helpers or peer tutors.
- ❑ varying activities often.
- ❑ isolating the student.

IF THE STUDENT HAS TROUBLE

READING WRITTEN MATERIAL,

YOU CAN TRY...

- ❑ finding a text written at a lower reading level.
- ❑ providing highlighted material.
- ❑ taping student reading material.
- ❑ using a peer or parent to read important material.
- ❑ decreasing the amount of required reading.
- ❑ finding the same information in another form (videotapes, audiotapes, filmstrips, etc.).
- ❑ making oral reading optional: find another way the student can contribute (role-playing or storytelling).
- ❑ prearranging oral reading and allowing the student time to practice.
- ❑ allowing extra time for reading.
- ❑ substituting one-page summaries or study guides that identify key terms and ideas of the reading assignment.
- ❑ using material that the student finds relevant and interesting so s/he will want to try to read.
- ❑ providing questions before the student is to read.
- ❑ preteaching vocabulary.
- ❑ putting main ideas on index cards and organizing them.
- ❑ using larger print type or copies.
- ❑ allowing student to use pictures and manipulatives.
- ❑ controlling the introduction of new ideas.
- ❑ questioning the student often as s/he reads.

IF THE STUDENT HAS TROUBLE

GETTING INTERESTED OR GETTING STARTED,

YOU CAN TRY...

- ❑ telling stories that relate the lesson to real-life.
- ❑ relating the lesson to things the student already knows or has experienced.
- ❑ seating the student near the teacher—distance affects interest.
- ❑ using cues to begin work.
- ❑ giving work in smaller amounts.
- ❑ providing lots of encouragement.
- ❑ sequencing work with easiest answers first.
- ❑ making sure the student has all needed materials.
- ❑ making sure the student knows exactly what is expected.
- ❑ checking on progress often in the first few minutes of work.
- ❑ giving clear directions.
- ❑ providing a checklist of the steps involved.
- ❑ having another student talk about the material or start reading the material to the student.
- ❑ asking the student to help someone else.

Fifth Grade Cooperative Learning

What is Cooperative Learning?

Cooperative learning is much more than just throwing students into groups and telling them to work together. Cooperative learning is a method of teaching students the skills and strategies they need to work effectively as a member of a learning team. Although cooperative learning methods have been around for many years, teachers often neglect to implement them fully. This brief discussion and review of cooperative learning techniques is intended to provide teachers with a reminder of the impact cooperative learning can have in the science classroom.

- **Cooperative learning is much more than just throwing students into groups and telling them to work together.**

Why Cooperative Learning?

Just as going on a low carb diet can help a person shed unwanted pounds, a cooperative learning diet can help your classroom shed unwanted actions and behaviors that distract from learning.

The "Before Cooperative Learning" Classroom

This classroom has five straight rows of desks that, hopefully, encourage students to face the front of the room. The front wall is covered with a well-used whiteboard, flanked by colorful bulletin boards displaying neat rows of students' artwork. In front of the whiteboard stands a well-used teacher, armed with a textbook in one hand and a dry-erase marker in the other.

The teacher asks a question carefully designed to first, test her students' knowledge of the subject and, second, to determine who is awake. Ten hands pop up. Four pairs of eyes intently study the mysteries waiting to be discovered inside their desks, while five kids in the back of the room daydream about wonders to be found outside the classroom walls. The teacher calls on one of the students with upheld hands, who answers the question. The teacher repeats the student's answer for all to hear, praises the student, and asks another question.

After the discussion an assignment is given. Ten students go right to work, four students continue to seek the hidden treasures in their desks, while the five in the back of the room, after a friendly reminder from the teacher, work three problems before returning to the land of daydreams. While working on the assignment, six students raise their hands to get help from the teacher. Six more need help but plow ahead because it's

easier to get one wrong than to get the teacher. Twenty minutes later ten papers are turned in, the teacher gives a not-so-friendly reminder to the five students in the back of the room, while the four explorers continue on their quest of discovery.

In the classroom that does not use cooperative learning, students are placed in a competitive environment where the primary goal is to perform better than those around them. Learning is equated with silence. Students are expected to complete their work by themselves. If they need help they get it from the teacher. Some students fare well under this competitive system, and some of its components still have a valuable place in today's classrooms.

The "After Cooperative Learning" Classroom

The desks in this classroom are arranged in groups of four with the students facing each other. The front of the room still has a well-used whiteboard, but the well-used teacher is not always standing in front of it. While moving from group to group, the teacher asks a question. Half of the students turn to their partners and answer the question. Many of the students praise their partners for giving a good answer, and some even suggest additional information to improve the answer. The teacher then calls on someone to share his/her answer with the class. Everyone stops and listens to the responding student.

An assignment is given after the discussion. Each group puts their heads together to complete the assignment. In the group, each student fills a different role. One student is assigned to be the leader, s/he takes charge. Another student may be the encourager, s/he gives encouragement to his team members. If someone in the group doesn't understand part of the assignment, help is received from a team member. If the whole group has a question, the team leader takes the group's question to the teacher. When all of the groups have finished the assignment, each group evaluates their performance and suggests things they can do to improve.

Research suggests that, "If you want more students to learn more material, if you want students to feel more confident about themselves and to be motivated to learn, if you want them to accept differences among students, then you should have your students learn cooperatively."

(R.T. Johnson and D.W. Johnson, *The Science Teacher*, September 1987, p. 46)

Advantages of Cooperative Learning

1. **Increased communication**
   Students get to talk to each other (about content).
   Increases participation levels of many more students.
   More language involvement.
   Reduced isolation.
2. **Classroom management**
   Students monitor peer behavior and keep themselves on-task.
   Increases motivation.
   Decreases absences.
   Students take more responsibility for learning.
   Everyone is held accountable.
3. **Increased interpersonal skills**
   Students learn how to work with others.
   Fosters success and acceptance, especially in mainstreamed classrooms.
   Classroom atmosphere becomes more supportive.
4. **Benefits for teachers**
   Enlarges teachers' instructional repertoire.
   More efficient organization for teachers.
   Can accommodate large class sizes when needed.
5. **Other benefits**
   Teaches division of labor.
   Students like it.

(Summarized from the writing of Nattiv, 1987 and Johnson, Johnson, Holubec, and Roy, 1985)

- **Increased communication**
- **Classroom management**
- **Increased interpersonal skills**
- **Benefits for teachers**
- **Other benefits**

Classroom Management in Cooperative Learning Settings

Teams

Short-Term Teams

Cooperative learning teams that will work together for a short period of time (one lesson) are usually formed randomly and quickly. Short-term teams are used to provide opportunities for review, drill, or practice when long-term teams have not been formed.

Long-Term Teams

More success in developing cooperative skills can be achieved when students work as a team over a period of time. Greater care must be taken when forming teams that may work together for up to six weeks. Each group should be as equivalent as possible and should reflect the makeup of the entire class. Achievement levels, ability, gender, and ethnicity should be considered when establishing teams.

Size of Teams

Teams of four usually work well. However, most classrooms do not come in multiples of four, so teams of three or five may also be used effectively.

Team Building

Once groups have been formed, team building techniques should be used to change the group of students into a team that will work well together, know each other, and care about each other. **Just because a group of students are thrown together and told they are a team does not make it so.** Team building requires a little class time, but is essential to successful cooperative learning and pays great dividends in the long run. Here are a few ideas to help your group members begin the process of becoming a team.

Team names are an important part of the team building process. A team name gives students something to identify with and develops a sense of belonging. Students should be given the opportunity to choose their own team names. However, it is important to let students know that it is not acceptable to choose names that are a put-down or negative. It may be helpful to place specific guidelines on names. For example, if the class is studying Earth Science, groups could choose names that relate to the content, such as *The Volcanoes, The Earthquakes,* or *Landslides*. Each team can then become "experts" on the content dealing with their names and be a source of information for the whole class.

Logos that represent the team can be designed. If logos are kept simple, members can draw them on their papers to identify them as a member of a certain team.

Team banners can be hung from the ceiling above the team or on the classroom wall. Banners should include the team's name and the names of the team's members.

A team handshake or a cheer will allow the team to celebrate the success of a team member or the whole team. Cheers should be kept short and simple, and handshakes quick and easy.

Get acquainted time should be given to newly formed teams. Activities such as the *Three-Step Interview* work well for this purpose:

Step 1

Students interview a partner, asking questions that are designed to help the students learn things about their classmates. Questions may be asked about a student's interests, hobbies, and family. Questions like "If you could visit anywhere in the world where would you go? Why?" or "If you had to move to an alien planet, what three things would you take with you to show the inhabitants of that planet?" can reveal a lot about the student in a fun way

Step 2

Students change roles and repeat the interview.

Step 3

Each person shares with the group some of the things they learned about his/her partner.

Synergy, the idea that a team of four people working together can accomplish more than four people working separately, is a powerful concept for students to learn. One activity that can be used to illustrate the effects of synergy in your classroom is to have each student list as many birds (or anything else) as they can think of. Then have the team members make a team list by combining everyone's answers. The team's list will always have more names than any of the individual lists, and usually each student will have a unique contribution to add to the list. As students work together, remind them often to look for synergy.

Roles in Cooperative Learning Groups

Roles are an important part of successful cooperative learning. Each student should be given the opportunity to play every role. It is also important that, as the teacher, you use roles to provide for individual student needs. By tailoring roles to individual students, it is possible to provide physically/learning disabled and low achieving students with a positive learning experience and allow them to feel needed by the group.

To be successful in filling their roles, students need to be given direct instructions, practice, and evaluation concerning the duties for each of the roles.

Four Basic Roles for the Science Classroom

Team Leader: The team leader keeps the team on task, attempts to make sure that all members contribute, guides the discussion, and makes any additional assignments, if needed.

Scribe: The scribe records team answers and data, takes notes and keeps written material for later reference. If all team members are taking notes and recording data, the scribe's record becomes the official team record that is used for reporting to the class.

Reporter: The reporter reports team findings to the class and reads aloud information needed by the group.

Materials Manager: The materials manager gets, keeps track of, and returns, the materials and/or equipment needed to do the activities. For activities that do not require hands-on materials or equipment the materials manager can be replaced by an *encourager*, who encourages team members to work together, share ideas, and to work hard. The encourager says things like, "Thank you for sharing that idea," "Good job, keep up the good work," etc. (If an encourager is not assigned, the team leader should assume that role as part of his/her responsibilities.)

Other Roles

Other roles that may be used to meet individual or group needs are:

Checker: The checker makes sure that everyone agrees with the group's answers and understands how it was reached.

Evaluator: The evaluator keeps notes on the group's process and how well individuals in the group are working together. S/he also leads the group process evaluation at the end of the working session.

Noise Monitor: A noise monitor reminds group members to work quietly.

Timekeeper: The timekeeper monitors time when needed.

Developing Students' Cooperative Skills

Cooperative social skills need to be taught and reinforced. There are many ways to do this. One effective approach is to pick a skill that the teams need to work on. Then model the skill for the class prior to a cooperative activity and look for the use of that skill during the activity. Record your observations. Following the activity, the teacher and teams should evaluate each team's performance using that skill. Reward teams that demonstrated appropriate use of the skill.

Listed below are some social skills that can be taught and reinforced during cooperative learning activities.

Avoiding Put-Downs: Students need to understand how to give and receive positive remarks. Only positive comments about other students are allowed as group members interact with each other.

Sharing Participation: Two distinct problem behaviors often arise in cooperative teams. Some students tend to start taking over the group while others withdraw. These two behaviors can be referred to as "bullying" and "vegetating." To help "bullying" students learn to involve others, coach them to ask questions such as "How do you feel about this?" "What do you think the answer is?" or, "What are your opinions on this subject?" Look for and reward vegetative students and teams who have increased participation.

Using Quiet Voices: Noise level can be a problem in a crowded classroom with everyone involved in an activity. Teaching students to use quiet voices can be effective. To reinforce the use of quiet voices, assign a team member to be a noise monitor who reminds team members to lower their voices if they become too loud. Reward teams that maintain an acceptable noise level. Use a quiet signal to get everyone's full attention while teams are working together. Raising your hand and having students do the same when they see the sign is one effective quiet signal.

Staying On-task: Students should not leave their groups to go visit a friend or see what other teams are doing. Reinforce this skill by rewarding teams who stay on-task until the assignment is completed.

Reaching Consensus: Teach students to respectfully listen to others ideas, compromise, give in, and use majority rule, as they work to come to consensus. When disagreement occurs, they need to disagree in a cooperative fashion. No member should be allowed to overpower the group. And no member in the group should be overpowered.

Additional issues that may need to be addressed include: more than one member talking at once, checking others' understanding of the work, asking questions, following directions, responding to ideas, making eye contact, showing appreciation, and sharing feelings.

Cooperative Learning Strategies

Numbered Heads Together

This strategy can be used as a substitute for the whole-class question and answer session. Using this method, every student gets an opportunity to communicate and respond, instead of just a few the teacher calls on. Students in the team are given a number (1, 2, 3, 4,). The teacher asks a question. Students in each team put their heads together to discuss the question and reach consensus on the answer. The teacher randomly calls out a number. Students with that number raise their hands to give the team's answer. A variation of this strategy is to have the students whose number is called write their teams' answer on the team white board and hold it up for the teacher to see.

Peer Tutoring

This approach works well when students review material and study for quizzes and tests. Students are divided into pairs. Using a textbook or other source, one student acts as the tutor and asks the question, the other student answers the question. If needed, the tutor gives help in reaching a correct answer. The students then reverse roles and the other student becomes the tutor.

Student Teams Work Together

This strategy can be used to review material, but works best when students have been given a problem to solve or an experiment to conduct. The teacher begins by defining the desired outcomes for each team. *Team roles* are assigned, materials are distributed, and work on the task begins under the direction of the team leader. The teacher assumes the role of facilitator, moving through the room to monitor progress and answer questions. If a team needs to ask a question, they tell the team leader who asks the question to the teacher. (There are no individual questions, only team questions.) The teacher might also use this time to assess the strengths and weaknesses of the group as they work together. At the end of the work period, the teacher reinforces strengths demonstrated by the teams as they worked together, during a *debriefing* session. Students are called on to report progress and results. Teams share answers and ask questions at the conclusion of the lesson.

Group Discussion

This strategy is used during whole-group instruction when open-ended brainstorming results are desired. It encourages students to look for novel and unique solutions to problems and to generate hypotheses. A teacher uses this design just like *Numbered Heads Together*, but the

question/answer process is much different. For example, when doing an experiment, the teacher might ask, "What do you think will happen?" "Why do you think this happened?" Opinions about issues and problems adapt themselves well using this method. The key is to get the students to put their heads together and to discuss. Every student becomes an active learner as they are challenged to communicate their feelings and opinions with others.

Think-Pair-Share

In *Think-Pair-Share*, the students listen while the teacher poses a question. Students are then given time to think about the question and to generate a response. Students are then paired with another student to discuss their responses. Finally, students are invited to share their responses with the group or the entire class. Using this strategy, every student gets a chance to communicate his/her answer, instead of the teacher calling on just a select few.

Debriefing

During *Debriefing,* students assess how well they worked together as a team. They set goals for improvement for the next time they work together. This analysis and goal setting can be accomplished in a number of ways. For example, the teacher can have team members or groups choose one social skill they practiced well and another one that they needed to improve on. Their goals are then written down by the team scribe to be reviewed before the next work session. Groups assess their progress, teammates assess each other's contributions, individuals evaluate themselves, and the groups are be assessed by each other and by the teacher. Regardless of how it is approached, during successful debriefing, students begin to see the benefits of collaboration and set goals for improving their cooperative skills. *Successful debriefing is the fundamental difference between typical classroom groups and cooperative learning groups.*

Sample Debriefing Questions

- ❏ Did we stay on task?
- ❏ Were our decisions based on everyone's views?
- ❏ Did everyone participate?
- ❏ What is one skill that we need to improve on?
- ❏ What is one skill that we used well?
- ❏ Did we use any put-downs?
- ❏ Did we use our time wisely?
- ❏ Did we encourage each other?

- ❑ Did I ask my teammates for help when I needed it?
- ❑ Did I push my ideas on others?
- ❑ How well did I complete my role today?
- ❑ Did I follow directions?

Sponge Activities

In the cooperative classroom, groups often finish their tasks at different times, creating a classroom management problem. Sponge activities can be used to soak-up this time with interesting and educational activities. When planning a cooperative learning activity, plan a sponge activity that can be done by early finishers. Below are a few ideas.

- Form as many words as you can from the letters in HEREDITY.
- List all the objects in the classroom that weigh less than five grams.
- List all the objects in the classroom that weigh more than one kilogram.
- List all the objects in the classroom that would sink in water.
- List all the objects in the classroom that would float in water.
- List all the objects in the classroom that would be attracted to a magnet.
- List all of the objects in the classroom that would conduct electricity.
- List all the objects in the classroom that are electrical insulators.
- Invent, name, and draw an animal that could survive in the mantle of Earth.
- Invent, name, and draw an animal that could survive in your desk.
- Continents move about one cm per year. How long would it take for a continent to move across our classroom?
- Discuss what would happen if the Earth's magnetic field stopped working.
- Discuss how life would be different if there was no electricity.
- Draw a picture of something you would like to see invented.

Adapted from *Problem Solving with Elementary Earth Science*, by Alan M. Hofmeister, Project Director, Utah State University.

Uses of Magnets

Science Standard III:
Students will understand that magnetism can be observed when there is an interaction between the magnetic fields of magnets or between a magnet and materials made of iron.

Objective 1:
Investigate and compare the behavior of magnetism using magnets.

Intended Learning Outcome:
1. Use Science Process and Thinking Skills

Content Connections:
Math V-1

Science Standard III

Objective 1

Connections

Background Information

Magnets are used in various ways. Since many of these applications are hidden, students may only be able to think of refrigerator magnets when asked to name ways magnets are used. This activity will help students uncover the many ways we use magnets.

Invitation to Learn

Show the class a speaker magnet and ask if anyone knows what it is. Explain that most speakers have a permanent magnet in them. Ask the class if they can name other ways permanent and temporary magnets are used.

Instructional Procedures

1. Have students brainstorm how they can learn other ways magnets are used. List their ideas. Ideas may include: asking family members, searching the Internet, using reference books, etc.
2. Assign students to use their ideas to learn as many uses of magnets as they can.
3. Help the class design a table for collecting and organizing their data (see *Uses of Magnet Data Table* p. 2-28 for a model of one possible table).
4. Allow students to share and display what they have learned.

Materials
- ❑ Speaker magnet

Additional Resources

The Way Things Work, by David Macaulay (Houghton Mifflin Co. Boston); ISBN 0-590-42989-2

Uses of Magnets Data Table

Use of Magnet	Type of Magnet Temporary or Permanent	Resource Used

Animal Look-Alikes

Instructional Procedures

Write the following instructions and pairs of animal names on the chalkboard. Give time for students to ponder and write notes, then discuss their responses.

Which of the following pairs of animal names are synonyms? If you think they are not synonyms, describe the distinguishing characteristics.

1. Hare/Rabbit
2. Alligator/Crocodile
3. Camel/Dromedary
4. Bison/Buffalo
5. Tortoise/Turtle

ANSWER: None of them!

Hare/Rabbit

Distinguishing characteristics include: Hares, often known in North America as "jackrabbits," are larger than rabbits, have longer legs, ears, and tails. At birth, the hare has teeth, open eyes, is fully furred, and receives minimal care. The rabbit is born fully dependent on its mother—blind, deaf, toothless, and naked.

Alligator/Crocodile

Distinguishing characteristics include: While they both have thick, bumpy skin, the alligator head is blunt, whereas the crocodile head is long and narrow. The crocodile moves briskly, with the alligator being slower and clumsier, both in water and on land. For both, the fourth tooth on either side of the lower jaw is exceptionally long. When the crocodile closes its mouth these teeth protrude outside the upper jaw; with the alligator, the long teeth disappear into sockets in the upper jaw.

Camel/Dromedary

Distinguishing characteristics include: The camel with two humps stems from Asia and is correctly called "camel." On the other hand, the animal with one hump is referred to as a "dromedary," and is Arabian. Both types of camels are famous for having approximately 36 kg of fat stored in the humps, which is converted to nutrition at times of limited food supply. The hump diminishes in size as the fat is used.

Bison/Buffalo

Distinguishing characteristics include: The animal that is native to the North American plains, often called "buffalo," is more correctly termed "bison." They average approximately two meters in height at the shoulders and often weigh up to 900 kg. Despite their large size, they have been clocked at speeds around 50 km per hour.

Buffalo, on the other hand, are native to Asia and Africa. In addition to their long, curving horns, shorter height, darker color, and less shagginess, they have only 13 pair of ribs, compared to 14 pair in the bison.

Tortoise/Turtle

Although the name "turtle" is used to refer to all of the similarly-structured reptiles in shell houses, the two terms are not synonymous. "Tortoise" refers to a particular subset: turtles that live on land. Another type of turtle is the terrapin, which can be found in either fresh water or salt water.

Source

What's the Difference?: A Guide to Some Familiar Animal Look-Alikes, by Ellizabeth A. Lacey (Clarion Books, New York); ISBN 0395561825

Animal Characteristics and Behaviors

Instructional Procedures

Write the following instructions and statements on the chalkboard. Give time for students to ponder and write notes, then discuss their responses.

Which of the following statements are fact and which are misconceptions? Write notes that will justify your response.

1. Bees sting only once.
2. Owls are wise birds.
3. Raccoons wash their food.
4. The archer fish shoots down its food.
5. Bats are blind.
6. Temperature is revealed in the chirp of a cricket.
7. The color red makes bulls angry.
8. Porcupines can shoot their quills.
9. Ostriches hide their heads in the sand.
10. Elephants fear mice.
11. Bats are a threat to humans.

Answers

1. Bees sting only once.

   It depends on which bee you're talking about—some bees sting only once. The stinger of some bees have barbs, causing the stinger to be left behind. When the bee loses its stinger, it soon dies. The honeybee can sting over and over again—its stinger has no barbs.

2. Owls are wise birds.

   Misconception. The owl has a tiny brain for its size, but its wide-open eyes give it the appearance of being unusually alert. To suggest that a person is as wise as an owl is to call him/her a birdbrain!

3. Raccoons wash their food.

   Misconception. A raccoon will swallow a mushy piece of fruit no matter how dirty it is. This animal has a small throat though, and will often dip a larger morsel that is hard into water, making it softer and easier to swallow.

4. The archer fish shoots down its food.

   Fact. From near the surface of the water the archer fish squirts a spray of water at an insect (perhaps on a low-hanging blade of grass) and knocks the insect into the water, where it becomes an easy meal.

5. Bats are blind.

   Misconception. The darting motion in the night sky appears random as bats accurately detect and capture insects on the wing.

6. Temperature is revealed in the chirp of a cricket.

   Fact. The speed of the cricket's chirps change rather consistently with the ups and downs of the surrounding temperature.

7. The color red makes bulls angry.

   Misconception. Bulls are color-blind. They get angry when anything is waved in front of them. Bullfighters wear a red cape, so we associate the color red with the bull's angry behavior.

8. Porcupines can shoot their quills.

   Misconception. When threatened by a predator, the porcupine turns around and backs up to its enemy. Few predators bother a porcupine twice!

9. Ostriches hide their heads in the sand.

   Misconception. When an enemy approaches, the ostrich runs. It does not bury its head in the sand, pretending the enemy will disappear.

10. Elephants fear mice.

    Misconception. Elephants seem to pay no attention to mice. If a mouse did run up an elephant's trunk, the elephant could easily eject it with a good sneeze.

11. Bats are a threat to humans.

    Misconception. Bats are an important element in the food chain, devouring insects (often hundreds per hour) and providing the critical service of pollination to many plants. They won't fly into your hair, they are not aggressive, they are not often infected with rabies, and they are not known to transmit other diseases to

humans. Vampire bats rarely make humans their victims. Bats are not a danger to humans; instead, they're endangered by humans. They are creatures of the night and live in places we think are scary.

Sources

Animal Fact/Animal Fable, by Seymour Simon (Crown Publishers, Inc., New York); ISBN 051753794X

"Bats – Threatened, Not a Threat." Bat Conservation International. *Science and Children* (October 1988, pp. 18-19).

Mixed Perceptions of Characteristics and Behaviors

1. Create and provide a mixed list of some human and/or animal characteristics that are hereditary and some that are not.
2. Have individual students sort these into the two categories.
3. Members of each group should now compare their lists, discuss their differences, and try to produce a list the group can agree on. Write these on a chart or transparency.
4. Share group lists with the class. Discuss differences and see if the class can arrive at a consensus.
5. Each group considers the original list and the things that were discussed. Were any common misconceptions involved in the discussion? Make note of these.
6. Still working in groups, add to your notes:
   a. Additional inherited traits (human and/or animal).
   b. Additional common misconceptions pertaining to heredity.
7. Have each group share the additional information with the class.

Helpful Hints for Supporting All Learners

The following information is provided as a resource for teachers as they work with the diverse learners they encounter in their classrooms. Most ideas presented are for use in any content area and at any grade level, including the K-2 Content, Math, and Science Core curricula that are the focus of the 2004 Elementary CORE Academy.

Common barriers to learning and ways to overcome those barriers are presented, as well as the basic fundamentals of differentiating instruction. Also included is a checklist for highlighting appropriate student-specific adaptations and modifications designed to help struggling students, including the gifted.

There is also a chart that describes weaknesses in cognitive processes that could explain why a student struggles with particular reading or other academic skills. This information should be provided through formalized assessment.

For more information, please contact curriculum or special education specialists at the Utah State Office of Education or the specialists at the Utah Personnel Development Center.

- **Barriers Students Face**
- **Engaging All Learners**
- **Adaptation/ Modification Checklist**
- **Why Students Struggle in the Classroom**

Barriers Students Face

1. Barriers exist that encumber the path to academic achievement for students.
2. The way to get around the barriers is by employing effective instructional practices that utilize differentiation strategies.
3. Two elements of a learning setting can be points of differentiation.
   a. Person—learner
      These characteristics are out of the control of the teacher, but can be positively influenced by differentiation.
      - *Learning Preference* (style or strength)
      - *Learning Ability* (enhanced or impaired)

   b. Process—instruction
      These practices during the instructional cycle are within the control of the teacher and can positively influence student achievement.
      - *Input* (instructional delivery)
      - *Output* (demonstration of learning)

Common Barriers

PERSON—Student	What to do about it	PROCESS—Instruction	What to do about it
Limited language skills	Pre-teach critical or potentially troublesome vocabulary. Provide visual or kinesthetic cues.	**Unclear directions and expectations**	Reduce instructional clutter. Provide simple clear directions. Teach and maintain consistent routines.
Trouble maintaining attention	Provide short, intense learning sessions, vary tasks, break down complex tasks.	**Over-reliance on worksheets/bookwork**	Provide explicit instruction, examples, and relevant practice. Provide adequate guided practice.
Inadequate mastery of prerequisite skills	Provide experience or background knowledge Do not assume anything.	**Inadequate Guided Practice during lesson sequence**	Continue with guided practice until 90% of your students are performing skill at 80%-90% or better.
Inefficient processing skills	Allow think time, provide physical cue to respond, rehearse responses, use simple vocabulary, check for understanding, give one direction at a time, wait time.	**Use of abstract examples**	Use clear, easily recognizable examples during initial phases of instruction. Use visual, auditory, and kinesthetic representations. Relate to real-life.
Impaired academic learning ability	Make tasks less complex, reduce amount of content to be leaned, relate to real-life experience of student.	**Only one option for students to demonstrate learning**	Provide more than one way for students to show what they know. Same criteria, demonstration is different.
Advanced academic learning ability	Make tasks more complex. Increase amount of content to be learned.	**Inappropriate use of homework**	Homework is review, not new learning. Do not use as busy work. Provide feedback.

Engaging All Learners

Hints for Differentiating Instruction

1. **INPUT—instruction**

   Visual Learners—use pictures, videos, diagrams, maps, guided notes, flow charts, demonstration, flash cards, study cards

   Auditory Learners—use lecture, telling, discussion, audio tracks, read aloud, debate, listen to news reports

   Kinesthetic Learners—use underlining, manipulatives, tracing, highlighting, dramatize, pantomime, mimic actions, field trips, information walks, actions, sign language.

2. **OUTPUT—demonstration of learning**

   Visual Learners—allow collages, drawings, diagrams, symbols, posters, cartoons, photos, maps, flow-charts, video

   Auditory Learners—allow storytelling, debates, speech, song/rap, interview, newspaper article, discussion, essays, journaling

   Kinesthetic Learners—allow painting, dancing, molding, model building, role play, pantomimes, games, creations, raps

Hints for Extending Instruction: for Academically Advanced Students

1. **INPUT—instruction**

   More Content—more elements to master, more independent study, supplementary materials, use less obvious examples, give more abstract examples and ideas, less practice on material given

   More Complex Task—more responses, more complex directions, more examples, more opportunities to generalize, less teacher direction

2. **OUTPUT—demonstration of learning**

   More Content—more concepts to demonstrate, require broad generalization, group work, complex assignments, generation instead of recognition, proficiency on more skills

   More Complex Task—require more responses, increase number of examples demonstrated, student must reorganize information, student develops more strategies for remembering—shares with others, teaches others

Hints for Accommodating Instruction: for Academically Struggling Students (Spec. Ed, 504, ELL, other)

Changes HOW student accesses or demonstrates learning.

NO change in HOW MUCH learning is expected.

1. **INPUT—instruction**

   Math—provide photocopy of assignment to write on, break down complex tasks, allow calculator use, use fact charts, give prompts for remembering steps, "think" out loud when instructing, increase amount of guided practice, teach strategies, identify and teach critical elements, peer partners, relate to real-life, guided notes

   Science—provide text reader, graphic organizers, teach prerequisite vocabulary, read written directions aloud, provide guided notes, explanations, clear examples and non examples, identify and teach critical elements, cloze procedure note taking, experiential activities, chunk instructional periods, multi-sensory approach, break-down complex tasks, relate to real-life, teach memory strategies

2. **OUTPUT—demonstration of learning**

   Math—allow extra time, partial assignments, use calculator, give prompts for formula steps, use a "do/redo/turn-in" option, do not mix examples and non-examples without clear warning, photocopy of assignment to write answers on, a copy of book for home, mix current lesson with basic skill review problems, check for understanding, homework partner, accept work done in class

   Science—allow verbal responses, posters, models, reduce choices on matching, give more time, short answer instead of essay, type instead of write, proofreader, do not penalize for spelling errors, demonstrations, provide a task analysis or completion checklist, review needed materials or steps, reduce writing load on assignments, allow a "do/re-do" option

Hints for Modifying Instruction for students with disabilities (Spec. Ed-must have an IEP)

Changes in WHAT/HOW MUCH a student is expected to learn.

1. **INPUT—instruction**

   Less Content—instruct on one or two basic skills/ideas, parallel curriculum on same topic, use simple real-life examples, simplify guided notes, provide concept summaries with easy to understand words, provide more practice with less material, use more examples with less material, reduce content clutter in lessons

   Less Complex Task—use words with literal meanings, break tasks down then teach each part to mastery, provide more prompts during guided practice, highlight basic information, keep tasks to one to three steps, provide guidance for remembering/associating information, provide easy diagrams or templates

2. OUTPUT—demonstration of learning

Less Content—fewer elements to master, one or two concepts to demonstrate, reduce assignment length, relate assignment to functional/real-life skills, assign easiest job during group work, have students recognize instead of generate information, require proficiency on only one or two skills

Less Complex Task—break down task, require only one or two responses, limit choices on matching, provide high level of prompting, outline necessary steps, allow strategies for remembering, give fewer practice exercises, reduce number of test items, give a modified test, highlight basic information, allow student to point to or say instead of write out, give extra time

Adaptation/Modification Checklist

Student: _____ Teacher: _____

Testing Adaptations: ❑ Change essay questions to multiple choice. ❑ Reduce multiple choice to _____ choices. ❑ Avoid True or False questions. ❑ Avoid essay questions. ❑ Provide a word bank. ❑ Accept short answers. ❑ Give open book/notes tests. ❑ Allow student to record or dictate answers. ❑ Reduce spelling list for spelling tests. ❑ Extend time frame or shorten length of test. ❑ Avoid Scantron answer sheets. ❑ Read test to student. ❑ Provide study guide prior to test. ❑ Type tests and/or use large print. ❑ Test smaller units of material. ❑ Highlight key directions. ❑ Give test in an alternate site. ❑ Allow student to use calculator. ❑ Allow a test retake. ❑ Other: _____.	**Presentation of Subject Matter:** ❑ Teach to the student's learning style: _____ ❑ Read text aloud. ❑ Provide small group instruction. ❑ Provide an accurate copy of notes or key points written on the board or overhead. ❑ Model lesson being taught. ❑ Utilize manipulatives. ❑ Highlight critical information. ❑ Pre-teach the vocabulary. ❑ Do not call on the student to read aloud in class. ❑ Check student's understanding during the lesson. ❑ Provide study guides. ❑ Assign a study buddy. ❑ Allow time for student to process directions/information. ❑ Other: _____.	**Assignment Accommodations:** ❑ Give directions in writing and verbally. ❑ Avoid penalizing for spelling errors, except on spelling tests/assignments. ❑ Show an example of what the completed assignment should look like. ❑ Reduce assignment. ❑ Read written work to student. ❑ Provide alternate assignment/strategy when demands of assignment conflict with student capabilities. ❑ Allow student to word process assignment. ❑ Avoid penalizing for poor penmanship. ❑ Allow student to use manuscript. ❑ Communicate homework expectations with parents. ❑ Check for student's understanding of the task. ❑ Chunk tasks. ❑ Allow a scribe or note taker. ❑ Other: _____.
Materials: ❑ Taped textbooks or other class material. ❑ Highlighted textbooks. ❑ Special equipment: calculator, computer, word processor/spell checker, other _____ ❑ Large print books. ❑ Special paper (wide-lined, graph, etc.) ❑ Two sets of books; second one for home. ❑ Assignment sheet or planner. ❑ Behavior monitoring sheet. ❑ Other: _____	**Grading:** ❑ Use pass/fail grading system. ❑ Use a modified scale. ❑ Give credit for partial completion. ❑ Consider effort in assigning grade. ❑ Give credit for participation. ❑ Give copies of midterms to parents. ❑ Notify special education teacher when grades drop below a C-. ❑ Other: _____	**Miscellaneous:** ❑ Avoid timed activities. ❑ Implement preferential seating. ❑ Provide cues for staying on task. ❑ Provide a quiet place to work. ❑ Allow short breaks during assignments. ❑ Seat student next to a good role model. ❑ Provide daily check-in time with teacher. ❑ Consider Assistive Technology and Services. ❑ Other: _____.

Why Do Some Students Struggle in Your Classroom?

In explaining deficits in learning, there are weaknesses in cognitive processes that should be ruled in or ruled out through formalized assessment.

Cognitive Processes:	What it looks like in the classroom:
Auditory Processing—Perception, analysis, and synthesis of auditory stimuli.	❑ Confuses words and phrases that sound alike (e.g., "blue" with "blow" or "ball" with "bell"). ❑ Finds it hard to pick out an auditory figure from its background and it may seem that they are not listening or paying attention. ❑ Processes sound slowly and cannot keep up with the flow of conversation, inside or outside the classroom. ❑ Difficulty with phonics (decoding), spelling, and reading fluency.
Visual Perception—Recognizing the position and shape of what is seen (The "Mind's Eye").	❑ Reverses/rotates letters, jumps over words, reads the same line twice, or skip lines. ❑ Difficulty distinguishing a significant form from its background.
Short-Term Memory—Ability to hold information in immediate awareness and use it within a few seconds.	❑ Difficulty learning from lecture, listening and following directions. ❑ Cannot remember information long enough to process for comprehension and retrieval.
Long-Term Retrieval—Ability to store information and retrieve it later over extended time periods.	❑ "I know it but I can't think of it" phenomena. ❑ Demonstrate mastery of information one day and unable to recall it on test day (poor test performance/inconsistent grades).
Comprehension-Knowledge—Breadth and depth of acquired cultural knowledge and experience.	❑ Low vocabulary and reading comprehension. ❑ Difficulty in listening comprehension and in answering factual questions.
Processing Speed—Fluent performance of cognitive tasks automatically when under pressure to maintain attention.	❑ Can't process symbols fast enough to enhance decoding or comprehension. ❑ Does poorly on timed tasks.
Visual-Spatial Thinking—Perception, analysis, synthesis, and manipulation of visual stimuli.	❑ Weakness: rapid sound/symbol associations, copying tasks, and recognizing whole words.
Fluid Reasoning—Involves inductive and deductive reasoning, identifying relations, and drawing inferences.	❑ Difficulty in transfer and generalization. ❑ Poor flexibility in thinking. ❑ Low abstract problem solving.
Attention/Concentration—Ability to filter and prioritize external/internal stimuli to attend.	❑ Poor task/work completion. ❑ Assignments are partially completed, often items are skipped. ❑ Seems disorganized during instruction and practice.
Working Memory—Ability to temporarily store and perform a cognitive operation on a set of information.	❑ Problems with sequencing. ❑ Not flexible in use of strategies to solve problem/task. ❑ Attempts task but only understands a part of it. ❑ Seems unmotivated.
Cognitive Academic Language Proficiency—Proficiency in academic situations and those aspects of language that emerge from formal schooling.	❑ Understands more than can express. ❑ Difficulty in receptive and expressive language. ❑ Language "different" rather than language "disability". ❑ Poor vocabulary knowledge.

Mather, Nancy, Wendling, Barbara J., & Woodcock, Richard W. Essentials of WJ III Tests of Achievement Assessment. John Wiley & Sons, Inc. New York, 2001, pp. 111-112

Put Reading First: The Research Building Blocks of Reading Instruction, Second Edition, June 2003 [On-Line, PDF] http://www.nifl.gov/partnershipforreading/publications/k-3.html, page 2

Reading Fluency, Mather, N., & Goldstein, S. (2001). [On-Line] http://www.ldonline.org/ld_indepth/reading/reading_fluency.html

Silver, Larry B., M.D. A Look at Learning Disabilities in Children and Youth, [On-Line] http://www.ldonline.org/ld_indepth/reading/reading-2.html

Writing in Science Activities

Introducing Text Structures in Science Writing

Language Arts Standard VIII:
Students write daily to communicate effectively for a variety of purposes and audiences.

Objective 1:
Prepare to write by gathering and organizing information and ideas (prewriting).

Objective 6:
Write in different forms and genres.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Language Arts Standard VIII

Objectives 1 & 6

Connections

Background Information

Reading and writing are essential skills in science. This activity introduces students to the idea that science writing is organized in identifiable patterns called *text structures*. Understanding and using these different text structures help refine students' abilities to both read and write in science. The following five patterns are commonly found in science writing:

Description	Cause and Effect
Sequence	Problem Solution
Compare and Contrast	

A close reading of the Science Core Curriculum Standards, Objectives, and indicators suggests when writing might be used as part of science instruction. Verbs such as "describe," "compare," and "explain" signal that writing is an appropriate activity for that objective. That is not to say writing should be the only activity. Inquiry experiences and other hands-on science activities should be the center of science instruction. Writing is a good way to help students clarify their thinking, unite the big ideas in an objective, and to assess learning.

Because this lesson focuses on writing skills, it may actually be best taught in the language arts block. Writing is the perfect way to integrate science and language arts. Science gives students something—topics—to write about. Writing helps solidify understanding in science.

Invitation to Learn

Show students the *Text Structure Sample Sentence Strips* (p. 3-10), then post them on a chart or the board. Explain that science writing is often *expository writing*—writing that explains information and ideas—and that it is organized in different patterns called text structures. Show them the *Text Structure Word Cards* (p. 3-13). Have students read the *Text Structure Sample Sentence Strips* and match them with the *Text Structure Word Cards*.

This activity may be done with the whole class or in a small group setting.

TEXT STRUCTURE	EXAMPLE
DESCRIPTION	Golden Eagles are powerful raptors with large dark brown bodies and small heads with golden crowns.
SEQUENCE	First Golden Eagles soar high along ridges near their nests. They search for prey. When a meal is spotted, they attack in a long swoop.
COMPARE AND CONTRAST	Golden Eagles are apt to hunt for prey while Bald Eagles are more likely to take an easy meal.
CAUSE AND EFFECT	So many Bald Eagles were killed by pesticides and illegal hunting that they were in danger of becoming extinct.
PROBLEM AND SOLUTION	When a raptor species declines, scientists take wild bird eggs to raise in captivity and increase the number of birds.

Instructional Procedures

Materials

- ❑ *Text Structure Sample Sentence Strips*
- ❑ *Text Structure Word Cards*
- ❑ Science text materials such as textbooks, trade books, and magazine articles
- ❑ *Text Structure Samples*
- ❑ *Text Structure Definition* posters
- ❑ *Text Structure Graphic Organizer* posters

These procedures use direct instruction to explicitly teach students different science text structures. The same general process is used for teaching each text structure. Ideally, you should introduce and model each text structure separately. Next, give repeated practice in identifying the structure and then continue to reinforce it as it is encountered in science texts. When the students are proficient at identifying and understanding the organization of the structure, teach them to use it in their own science writing. Three writing activities that use specific text structures are included in this handbook: *Using Description to Write in Science* (p. 3-27), *Using Compare and Contrast to Write in Science* (p. 3-35), and *Using Cause and Effect to Write in Science* (p. 3-40).

1. Select a short passage of science writing that exhibits the kind of text structure you want to teach. The writing may be from a science text you use, a science trade book, a magazine article, or a piece of student writing. *Text Structure Samples* that go with the fifth grade Science Core are included on p. 3-14. Representative trade books are listed in *Additional Resources*.
2. Provide students with copies of the text you are going to read. This may be a textbook, a set of books for a small reading group, a student news magazine, a photocopy of a science article, or an overhead transparency of a short text.
3. Tell students that you want them to follow along as you read a piece of science writing. Explain that you will think out loud as you read it. Share your thoughts about the things you notice about the structure of the writing. Point out words and phrases that signal how the passage is organized. You may want to use a second piece of writing with the same text structure and have students share their thinking as you read and look for clues about how it is organized.
4. Show students a *Text Structure Definitions* poster (p. 3-17) and a *Text Structure Graphic Organizers* (p. 3-22) for text structure. Display the poster and graphic organizer. Or you may create your own definition of the text structure with your class and display it.
5. Reread the passage with the class. Look for the features of the particular text structure. Have students use highlighters or sticky notes to mark text features. The following chart summarizes the main features of the text structures.

TEXT STRUCTURE	FEATURES OF THE TEXT STRUCTURE
DESCRIPTION	Main idea, unique features, supporting ideas, examples.
SEQUENCE	Lists in order a series of events, steps in a process.
COMPARE AND CONTRAST	Lists and explains similarities and differences of two ideas.
CAUSE AND EFFECT	Explains causes or reasons and the results or effects.
PROBLEM AND SOLUTION	States a problem and possible solutions or answers.

6. Have students look for words or phrases that help signal what kind of text structure a passage is. These are often transition words that lead from one sentence or idea to the next. Have students mark the words with a highlighter or sticky note. Make a class list of these signal phrases. The chart below summarizes the signal words and phrases typical of each text structure.

TEXT STRUCTURE	KEY WORDS FOUND IN THE TEXT STRUCTURE
DESCRIPTION	for example, involves, can be defined, for instance, on, over, next to, also, within
SEQUENCE	to begin with, first, second, in addition, next, then, last, finally, another, also, earlier, later
COMPARE AND CONTRAST	different from, same as, alike, like, similar to, unlike, as well as, yet, either…or, not only…but also, although, most, however, on the other hand, opposite, opposed to, while
CAUSE AND EFFECT	because, so that, thus, unless, therefore, since, in order to, as a result of, this led to, then, reasons for, then…so, for this reason, consequently, an explanation for
PROBLEM AND SOLUTION	problem is, a solution is, solved by, alternative, possible answer, therefore, conclusion, evidence is, a reason for

7. Refer to the graphic organizer for the text structure you are teaching. Together with the class, separate the parts of the text and write them in the graphic organizer. It might be drawn on the board, chart paper, or on an overhead transparency. Display the graphic organizer for the class to refer to.
8. Have students practice looking for other examples of the text structure in their science reading.
9. Repeat the process with other text structures throughout the year.

Possible Extensions/Adaptations/Integration

- Teach the science text structures in small reading groups for more individualized instruction and practice.
- Post *Text Structure Definition* posters and/or *Text Structure Graphic Organizer* posters on a bulletin board for reminders and easy reference.
- Use the text structures for other informational reading and writing, for example, in social studies.
- Show samples of student work that are examples of different text structures.
- Coordinate instruction with special education teachers to reinforce ideas taught.

Assessment Suggestions

- Use informal assessment to check for understanding in reading discussions. Reteach in small guided-reading groups as necessary. Give students examples of several different text structures and have them identify the text structures.

Additional Resources

Teacher Resources on Nonfiction Writing

Books

6+1 Traits of Writing: The Complete Guide (Grades 3 and Up), by Ruth Culham (Chapter 3, Organization-Herding Cats, p. 68-99); ISBN 0-439-28038-9

Guiding Readers and Writers (Grades 3-6): Teaching Comprehension, Genre, and Content Literacy, by Irene C. Fountas and Gay Su Pinnell (2001); ISBN 0-325-00310-6

Nonfiction Matters: Reading, Writing, and Research in Grades 3-8, by Stephanie Harvey (1998); ISBN 1571100725

Supporting Struggling Readers and Writers: Strategies for Classroom Intervention, 3-6, by Dorothy S. Strickland, Kathy Ganske, Joanne K. Monroe (2002); ISBN 1-57110-055-5

Raptor! A Kid's Guide to Birds of Prey, by Christyna Laubach, Rene Laubach, and Charles W.G. Smith (2002); ISBN 1580174450

Web site

http://www.writedesignonline.com
This is a resource with a variety of text organizing graphic organizers

Informational Science Trade Books

As you develop resources for teaching text structures, begin with texts you already have in your classroom. You will find text structures in all expository writing. The following list of trade books has fifth grade science core connections that contain examples of the text structure listed.

Description

Electricity (Science Alive!), by Darlene Lauw (2002); ISBN 0-77870-561-7

Extremely Weird Animal Defenses (Extremely Weird), by Sarah Lovett (1997); ISBN 1-56261-358-8

Volcanoes, Seymour Simon; ISBN 0-688-14029-7

Mixtures & Compounds (Library of Science), by Alastair Smith, Phillip Clarke, and Corinne Henderson (Usborne Pub. Ltd., 200s); ISBN 0-7945-0082-X

Why Do Volcanoes Blow Their Tops?: Questions and Answers about Volcanoes and Earthquakes, by Melvin and Gilda Berger (1999); ISBN 0-439-09581-6

Sequence

Glaciers, by Larry Dane Brimner (2000); ISBN 0516271911

I Didn't Know that Quakes Split the Ground Open, by Clare Oliver; ISBN 0-7613-0795-8

Zap It! Exciting Electricity Activities, by Keith Good; ISBN 0-8225-3565-3

Volcano: The Eruption & Healing of Mount St. Helens, by Patricia Lauber (1986); ISBN 0689716796

Electricity (Science Alive!), by Darlene Lauw (2002); ISBN 0-77870-561-7

Chemistry, by Chris Oxlade (1999); ISBN 0-8172-4948-6

Compare and Contrast

How Plants Survive, by Kathleen V. Kudinski (2002); ISBN 0791074226

Chemistry, by Chris Oxlade (1999); ISBN 0-8172-4948-6

Cause and Effect

The Seven Wonders of the Natural World (Wonders of the World), by Reg Cox and Neil Morris (2001); ISBN 0-7910-6049-7

Zion National Park, by Mike Graf (2004); ISBN 0-7368-2222-4

Electricity (Science Alive!), by Darlene Lauw (2002); ISBN 0-77870-561-7

Planet Earth: All the Wonders of Our Blue Planet and the Secrets of a Vast Universe, by Diane Costa De Beauregard; ISBN 0 88682-953-4

Bryce Canyon National Park, by David Peterson (1996); ISBN 0-516-26094-4

Problem and Solution

Shocking Science: Fun & Fascinating Electrical Expertiments, by Shar Levine and Leslie Johnstone (1999); ISBN 0806922710

Text Structure Sentence Strips

Golden Eagles are powerful raptors with large dark brown bodies and small heads with golden crowns.

Golden Eagles soar high along ridges near their nests. They search for prey. When a meal is spotted, they attack in a long swoop.

Golden Eagles are apt to hunt for prey while Bald Eagles are more likely to take an easy meal.

Many Bald Eagles were killed by pesticides and illegal hunting. They were in danger of becoming extinct.

When a raptor species declines, scientists take wild bird eggs to raise in captivity and increase the number of birds.

Text Structure Word Cards

DESCRIPTION
SEQUENCE
COMPARE AND CONTRAST
CAUSE AND EFFECT
PROBLEM AND SOLUTION

Text Structure Samples

Description	1 "The earth's crust is made up mostly of hard, rocky substances, though some of these substances have crumbled into dirt from years of exposure to wind and rain and roots of plants. That crust is many miles thick (though the part under the ocean is thinner than the part on the land). Underneath the crust is a layer called the mantle. The mantle is about 1,800 miles thick. Below the mantle is the earth's core, which is made up of two layers called the inner core and outer core." Christopher Lampton, Earthquake, 1991 ISBN 0-395-63642-6
Description	2 "Do volcanoes erupt under the sea? Yes indeed. In fact, many more volcanoes may erupt underwater than erupt on land. They are called rift volcanoes. Rift volcanoes occur where two plates are pulling apart, usually between 1 and 2 miles below sea level. These volcanoes form as magma oozes up between the two plates. The magma fills in the gap, pushing the plates further apart. Rift volcanoes pop up under the Atlantic Ocean. The North American plate and the Eurasian plate are slowly separating. This means the Atlantic Ocean is growing wider! Friends on opposite sides of the Atlantic will be 1 inch farther apart next year." Berger, Melvin and Gilda. Why Do Volcanoes Blow Their Tops? 1999. p. 13 ISBN 0-439-09561-6
Description	3 "Would it surprise you to learn that corn is also a type of grass? It was first grown in Central America thousands of years ago. Its seeds are called kernels. Very few kernels grew on wild corn grass. It took thousands of years of choosing the corn grass plants with the biggest seeds, or kernels, to make what we enjoy today as corn on the cob." Ken Cameron, Plant Genetics, 2002, p. 11 ISBN 1-58344-938-8
Sequence	1 "Imagine you have a solid substance, such as ice. Heat it, which makes its temperature rise. When it reaches a certain level, the temperature stops rising and the substance begins to turn into a liquid. This temperature is called the substance's melting point. You keep heating. When all the solid has turned to liquid, the temperature begins to rise again. Eventually the temperature stops rising and the liquid begins to turn into a gas. The temperature at which this happens is called the boiling point. If you keep heating the temperature stays the same until all the liquid is gone. Then the temperature begins to rise again." Christ Oxlade, Chemsitry, 1999, p. 12-13 ISBN 0-81724-948-6

Compare/Contrast	1 "All matter has both physical and chemical properties and chemical properties. Physical properties are those that can be observed without changing the make-up, or identity of the matter. For example, clay is malleable, which means it will bend or flatten when squeezed. Squeezing changes the shape of the clay but does not change what the clay is made of. Malleability is an example of a physical property. Chemical properties describe matter based on its ability to change into a new kind of matter with different properties. For example, paper is flammable: it is capable of burning in the presence of oxygen. Flammability is a chemical property of paper. A chemical property of iron is its tendency to rust. Rusting occurs when iron reacts with oxygen to produce iron oxide. Reactivity to acid and to water are two more examples of chemical properties." ScienceSaurus, A Student Handbook, Great Source Educational Group, 2002, p. 251-252 ISBN 0-669-48191-2
Compare/Contrast	2 "An electrical circuit is made up of electrons moving in a circuit. Electrons are tiny bits of negative electricity that are found in all matter. In certain materials such as iron, electrons can move freely. These materials are good electrical conductors. In materials such as plastic, electrons are attached to larger particles and cannot move freely. These materials do not conduct electricity well, and are called non-conductors, or insulators. That is why a plastic spoon did not allow electrical current to pass through it in the Electric Stoppers experiment." Darlene Lauw, Science Alive Electricity. 2002, p. 10 ISBN 0-7787-0561-7
Compare/Contrast	3 "High overhead, plants such as orchids and ferns grow. They are adapted to life on tree branches where there's plenty of sunlight. They grew from windblown seeds or spores that once landed on the tree… These plants get the water they need from rain. They get minerals from dust and decaying leaves. They take nothing from the tree at all. Mistletoe lives in treetops, too, but it is a thief. Birds carry the plant's sticky seeds to a tree branch. The mistletoe's roots grow into the living wood and steal all the water and minerals the plant needs from the tree. Its leaves cast shade on the tree's leaves. It is a good thing for trees that mistletoe does not grow very large. " Kudlinski, Kathleen V. How Plants Survive. 2002. p. 12-13 ISBN 1-58273-708-8
Cause/Effect	1 "How do mountains like these disappear? The process begins with rain. As it rains, water seeps through cracks and joints in the stone. Chemicals in the water dissolve small grains of rock. Later on, the water freezes and thaws, prying loose bigger pieces of rock. These rocks grind against other rocks as they slide downhill. The wind carries away particles of dust left behind by these grinding rocks. In the end it can be said that wind, water, and gravity have hauled away these mountains." Peter Anderson, A Grand Canyon Journey: Tracing Time in Stone, 1997, p. 45, ISBN 0-531-20259-3

Cause/Effect	2 "Scientists think that at some point an early farmer noticed that some of the wild grass plants made larger seeds than others... The farmer picked out these larger seeds to plant. Then more plants with large seeds grew. The instructions for making plants with larger seeds were in the nucleus of each cell in the plant. After planting more and more of these large seeds each year, the ancient farmers would sometimes find one or two plants in their fields that had seeds that were a little bit bigger than the others. They used most of the seeds for flour, but kept the largest seeds they could find each year. Those seeds were saved for planting. After thousands of years of selecting, or choosing the biggest seeds, farmers ended up with what we know today as wheat. It came from nothing more than an ordinary grass." Cameron, Ken. Plant Genetics. 2002. p.8-9 ISBN 1-58344-938-8
Cause/Effect	3 "Earthquakes happen all over the world in areas called seismic zones. Seismic zones occur where the plates of crust covering the Earth's surface meet each other. Inside the Earth, the mantle is always moving, which in turn moves the plates. These plates push against each other, building up tension between them. When the tension between plates becomes too great, they grind against each other, causing the Earth's surface to tremble and shake." Robert Neumiller, Planet Earth, Creative Discoveries, 2001, p. 52 ISBN 0-886-82953-4
Cause/Effect	4 "As soon as mountains rise, they begin to be worn down steadily and slowly by the forces of erosion: wind, rain, moving water, and ice, as well as temperature and chemical changes. Some kinds of rocks, such as limestone, dissolve in water, but most water erosion on mountains is caused by streams and rivers that plunge down the steep sides, lifting up rocks and pushing them along to rub and scrape against other rocks. In cold climates, slowly moving rivers of ice called glaciers, also carve away at mountains. Rocks expand daily in the heat of the sun and then contract again during the cold nights. These constant temperature changes begin to crack the rock. Water gets into the tiny cracks, freezes at night, expands, and opens the cracks wider. Finally, the rock breaks off from the mountain. Sometimes the wind blows sand, which wears away mountains to produce towers such as these in Zion National Park in Utah." Simon, Seymor. Mountains, 1994. p. 19-20. ISBN 0-688-15477-8
Problem/Solution	1 "In summer, when long daylight hours stimulate growth in the sparse vegetation, musk oxen live well and grow fat. In winter, food plants lie deep under hard-packed snow, which the oxen scrape away with their hooves. This is the hungry time, when they survive mainly on the fat that they stored during the summer. Others, too, are hungry, including bands of timber wolves, which sometimes follow the musk oxen. In spring, when the calves are born, the wolves become particularly menacing. The musk oxen form a defensive ring, with calves and young animals in the middle. Even a dozen wolves attacking together stand little chance against that circle of lowered heads and sturdy horns." Stonehouse, Bernard. Defenders., 1999, p.26 ISBN 0-439-15347

Text Structure Definitions

DESCRIPTION

The writer explains phenomenon and processes by listing examples and unique characteristics.

SEQUENCE

The writer presents a series of events or explains a procedure or process in the order they happen.

COMPARE and CONTRAST

The writer discusses the similarities and differences of two ideas, objects, or processes.

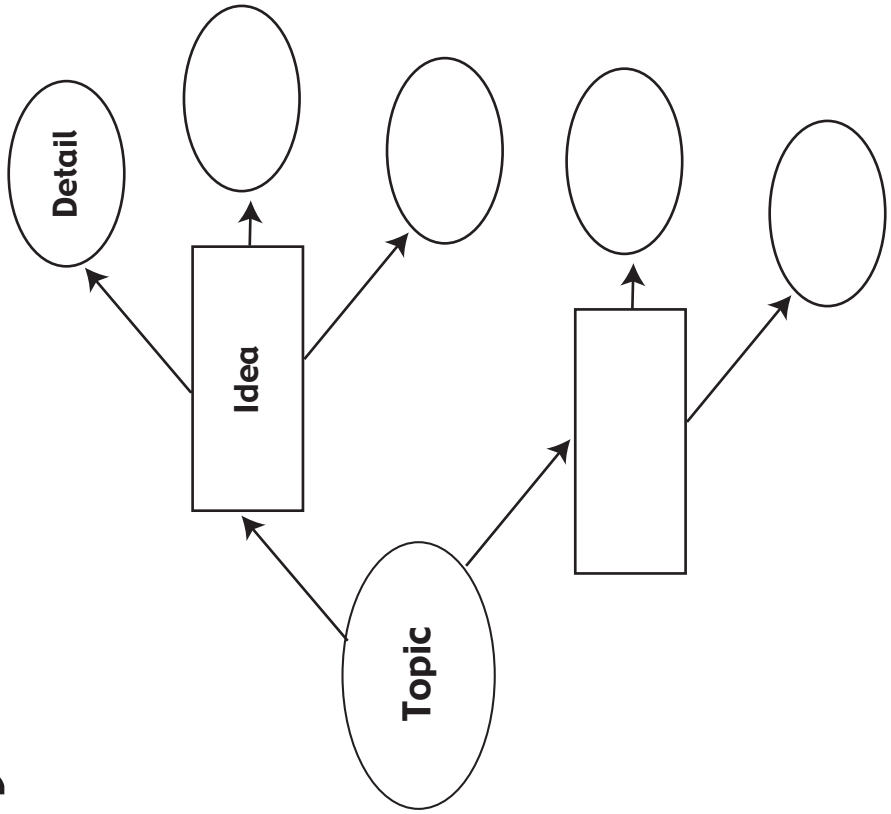

CAUSE and EFFECT
The writer explains the reasons for an event or phenomenon.

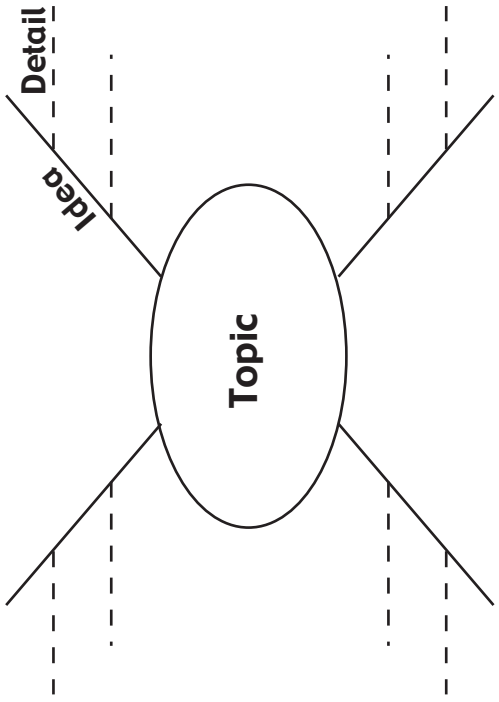
PROBLEM and SOLUTION

The writer presents a problem and one or more possible ways that it can be solved.

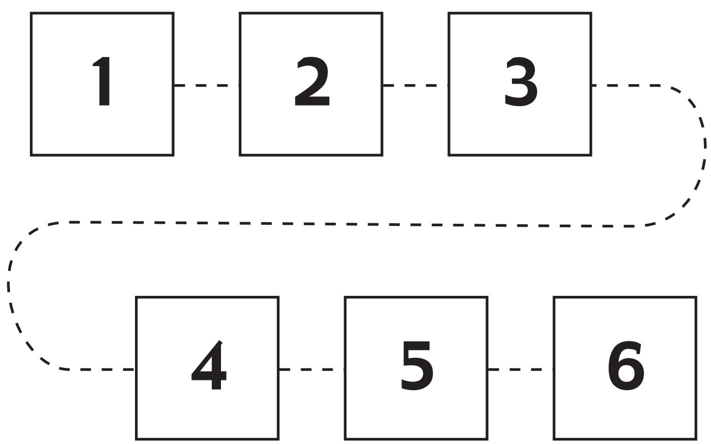
Text Structure Graphic Organizers

Description Graphic Organizers

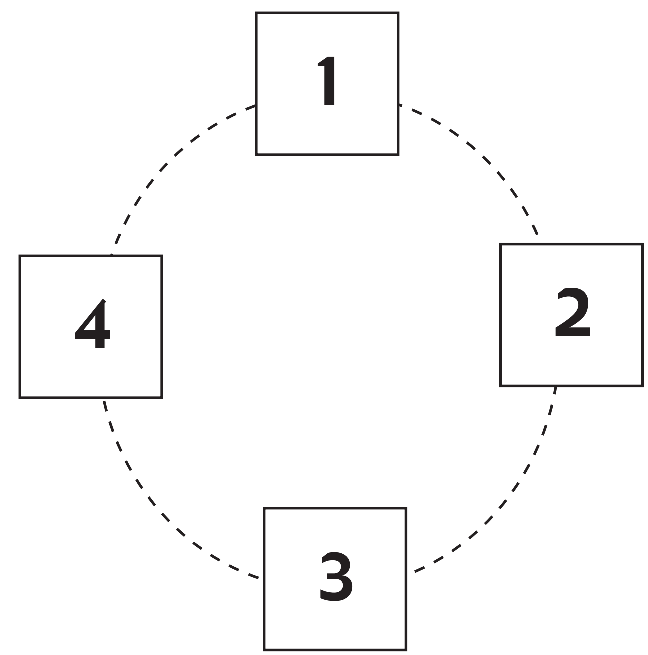




Sequence Graphic Organizers

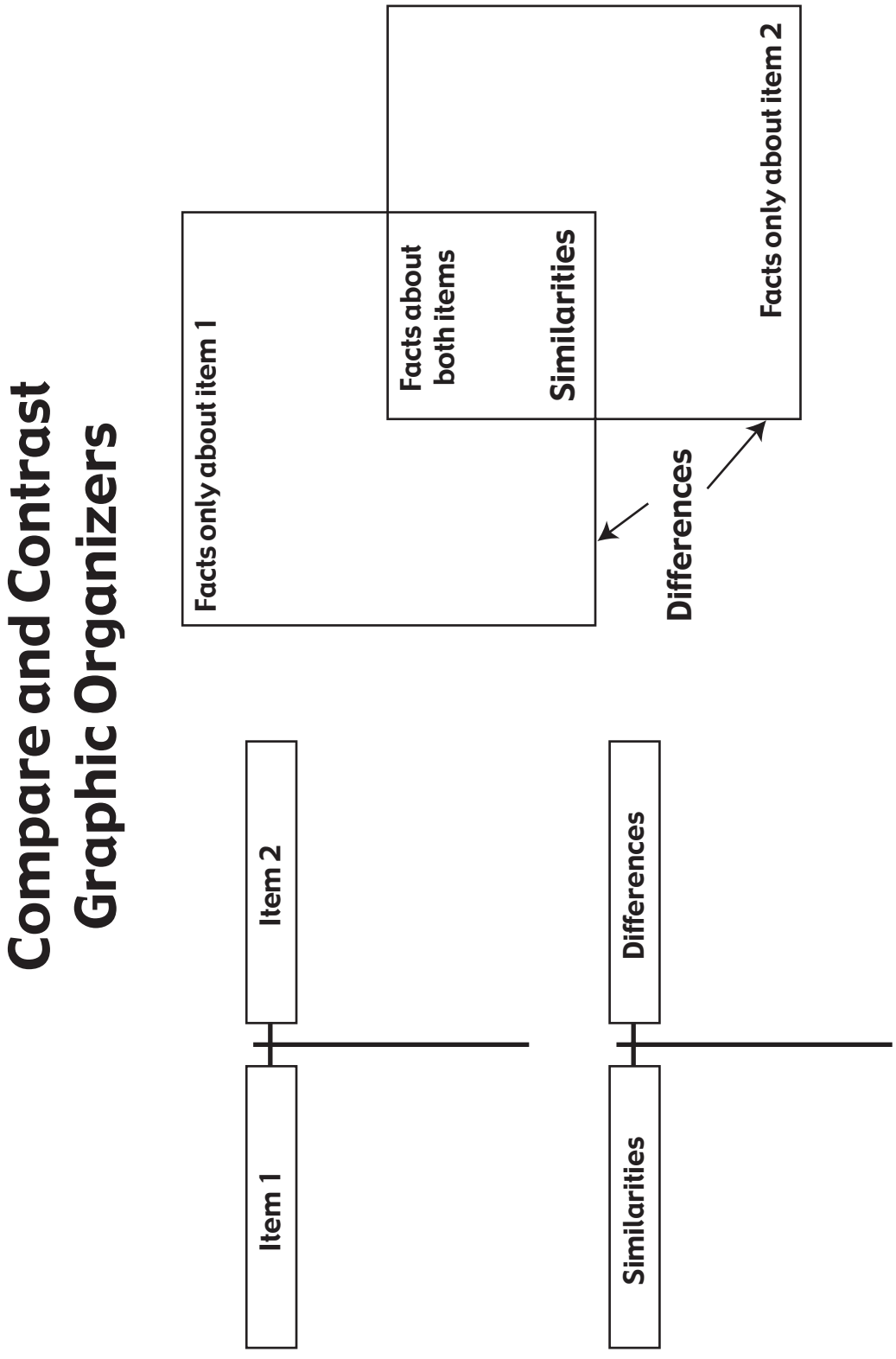


Series of Events

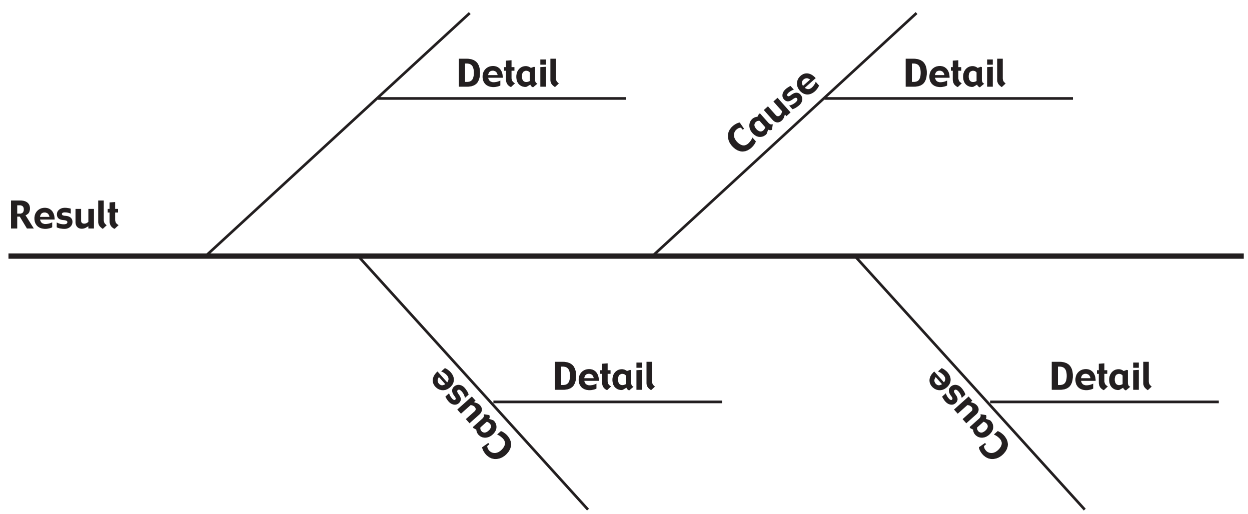


Cycle

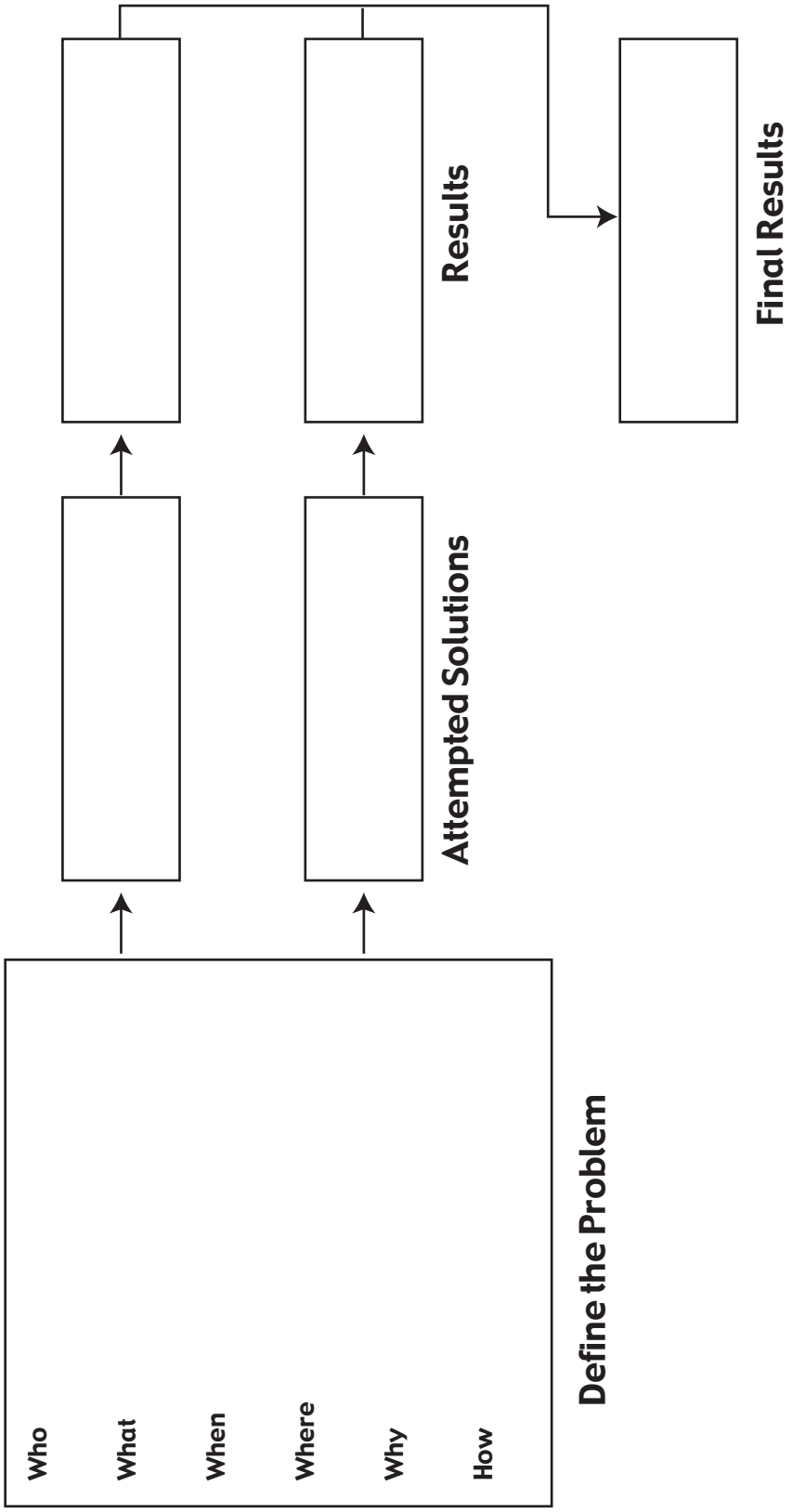
Compare and Contrast Graphic Organizers



Cause and Effect Graphic Organizers



Problem and Solution Graphic Organizer



Using Description to Write in Science

Science Standard V:
Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

Objective 2:
Describe how some characteristics could give a species a survival advantage in a particular environment.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts VIII-6

Science Standard V

Objective 2

Connections

Background Information

The purpose of this activity is to teach the text structure of *descriptive writing* in the science context of animal adaptations. It is assumed that *Introducing Text Structures in Science* (p. 3-3) has already been taught using descriptive text structure examples. This lesson is intended to be a model lesson and is not expected to be the only occasion where students write descriptive texts in science. The principles taught in this lesson may be adapted for use in any of the Science Core Curriculum Objectives where description is emphasized.

This activity is intended to mesh with the activities about heredity in Standard V. You will be organizing physical and behavioral adaptations of burrowing owls. The text for this activity is a four-page booklet from the *Project Wild Wildlife Notebook Series* and can be downloaded from their Web site (see *Additional Resources*). The *Wildlife Notebook Series* includes booklets for 18 different animals. Several books listed in *Additional Resources* describe more animal adaptations.

Invitation to Learn

Show students a poster or drawing of a burrowing owl (you may choose other animals as your focus for this lesson). Form groups of three to five and have students work together to review the poster and identify adaptations they see in this animal.

Materials

For each student:

- ❑ "Burrowing Owl" Wildlife Notebook Series No. 11
- ❑ Poster of Burrowing Owl (optional)
- ❑ Highlighters

For each group:

- ❑ *Burrowing Owl Word Strips*
- ❑ Chart paper
- ❑ Tape

For the class:

- ❑ Transparency of "Burrowing Owl"

Instructional Procedures

1. Give students highlighters and copies of "Burrowing Owl" from the *Wildlife Notebook Series*.
2. Begin by reading the first section, *Description*, to the class and thinking out loud as you read. Make note of the physical features, especially those that are survival adaptations. Model thinking about what is important and underline those observations.
3. Next read the sections *Food Habits* and *Behavior*. Read it as a shared reading where you read aloud and students follow along. Have students look for food gathering behavior and underline these behaviors.
4. Have students share the important ideas about food habits and behavior.
5. Have students read the *Reproduction* section independently or with partners. Look for breeding habits and underline these behaviors.
6. Show students a clustering graphic organizer (see p. 3-22). Discuss how the graphic organizer helps organize descriptive information in the text. Give each group a piece of chart paper and the *Burrowing Owl Word Strips* (p. 3-31). Have groups organize word strips in a clustering hierarchy. Tape word strips to chart paper.
7. Compare the charts of the different groups. Adjust any errors in organization. Discuss how these various features are adaptations that help a burrowing owl survive.
8. Choose one section of the cluster. For example, you may choose the physical features cluster. As a class, write a short paragraph that describes how a burrowing owl uses these adaptations to survive.
9. Have each group work together to write a second paragraph about another section of the cluster, such as the food habits cluster. Share the paragraphs with the class.
10. Finally, have each student write a third paragraph about the third cluster. Again, share the paragraphs.
11. Look for additional opportunities to write about other ideas in the science core using the description text structure. The word "describe" in the text of the core signals that descriptive writing would be an appropriate activity.

Possible Extensions/Adaptations/Integration

- Rather than giving students all of the *Burrowing Owl Word Strips*, use a list generated with the class. Ask students to look for and make a list of adaptations in the following categories: physical features, food habits, and breeding habits. Have them organize the pieces of information and write paragraphs.
- If students are experienced with organizing and finding details in text, have them make their own categories and text strips based on their reading. Organize them in clusters and write corresponding paragraphs.
- Have students choose an animal and investigate its adaptations. Have them make a cluster to organize their thinking about the animal. Next, have them write a three-paragraph description about the animal's unique adaptations. Make a class book of the different animals.
- Visit Hogle Zoo, Tracy Aviary, a natural history museum, or other animal site to observe different animals. Have students choose an animal and make a list of its adaptations. Have them use this information to write their description about the animal's adaptations.
- Investigate different plant adaptations such as roots, leaves, stems, etc. Bring in plant samples to investigate adaptations. Organize and write about these adaptations.
- In the other fifth grade Science Core Curriculum standards, descriptive text structures would be useful in describing physical and chemical changes, explaining Earth's surface changes, or describing static electricity.
- Modify the graphic organizer to show other ways of organizing the text. For example, you may use a hierarchal chart rather than a web or cluster diagram.
- This activity could be taught in a small, guided reading or writing group with more teacher scaffolding. The teacher could also model writing by thinking aloud.
- Use descriptive writing in social studies and other content areas to reinforce the text structure.

Assessment Suggestions

- Use informal assessment strategies to determine if students understand this text structure.
- Use the *Science Writing Rubric* (p. 3-34). Adapt as necessary for descriptive writing.

Additional Resources

Books

Plant Genetics, by Ken Cameron (2002, Benchmark Education, Item #9388, http://www.benchmarkeducation.com/); ISBN 1-58344-938-8

How Plants Survive, by Kathleen V. Kudlinski (2002, Newbridge, Item # 820156, http://www.newbridgeonline.com); ISBN 1-58273-708-8

Extremely Weird Animal Defenses (Extremely Weird), by Sarah Lovett (1997); ISBN 1-56261-358-8

Sciencesaurus: A student handbook, (Great Source Education Group); ISBN 0669481920

Camouflage, by Bernard Stonehouse (1999); ISBN 0-439-09591-3

Defenders, by Bernard Stonehouse (1999); ISBN 0-439-15347-6

Partners, by Bernard Stonehouse (1999); ISBN 0-439-20658-8

Showoffs, by Bernard Stonehouse (1999); ISBN 0-439-15346-8

Web sites

Project Wild Wildlife Notebook Series, http://www.wildlife.utah.gov/publications/notebook.html

Tracy Aviary-outreach programs and fieldtrips http://www.tracyaviary.org

Burrowing Owl Word Strips—Physical Features

sparsely feathered legs
variegated plumage
large eyes; cannot move
20”–24” wingspan
head rotates 270°
sharp talons

Burrowing Owl Word Strips–Breeding Habits

males select burrows
prefer mammal burrows
courtship dances
preening and bill rubbing
line nests with dung
lay five to nine eggs
female incubates eggs
male provides food

Burrowing Owl Word Strips–Food Habits

mainly eat insects
eats mice, voles, toads, small birds and carrion
active day and night
find prey from a perch and by hovering above ground
hunt by hopping, walking, or running along ground
feed at dawn and dusk
use talons to kill prey

Name _____

Science Writing Rubric

Exceptional

- ❑ Information from the text or science activity is complete, accurate, and thoughtfully synthesized.
- ❑ Information is presented originally and purposefully.
- ❑ The writing demonstrates deep understanding of the content.
- ❑ Writing is well organized and cohesive.
- ❑ Conjectures are explicit, clearly stated, and fully supported.

Thorough

- ❑ Information from the text or science activity is complete, accurate, and well summarized.
- ❑ Information is presented clearly.
- ❑ The writing demonstrates clear understanding.
- ❑ Writing is organized and cohesive.
- ❑ Conjectures are clear, specific, and supported.

Adequate

- ❑ Information from the text or science activity is mostly accurate and is present but minimal.
- ❑ Information is presented reasonably well.
- ❑ The writing demonstrates understanding.
- ❑ Writing is somewhat organized and cohesive.
- ❑ Conjectures are reasonable and at least minimally supported.

Inadequate

- ❑ Information from the text or science activity is incomplete, inaccurate, and/or confusing.
- ❑ Information is presented poorly.
- ❑ The writing demonstrates lack of understanding.
- ❑ Writing is unorganized and fragmented.
- ❑ Conjectures are incomplete, vague and/or unsupported.

Using Compare and Contrast to Write in Science

Science Standard III:
Students will understand that magnetism can be observed when there is an interaction between the magnetic fields of magnets or between a magnet and materials made of iron.

Objective 1:
Investigate and compare the behavior of magnetism using magnets.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts VIII-6

Science Standard III

Objective 1

Connections

Background Information

The purpose of this activity is to teach writing in a science context using the text structure of *compare and contrast*. It is assumed that *Introducing Text Structures in Science* (p. 3-3) has already been taught using descriptive text structure examples. This lesson is intended to be a model lesson and is not expected to be the only occasion where students write compare and contrast texts in science. The principles taught in this lesson may be adapted for use in any of the Science Core Curriculum Objectives where compare and contrast is emphasized. The use of the verb "compare" in the Core Curriculum signals that this text structure will be useful.

This activity is intended to mesh with the activities about permanent magnets and electromagnets found in Standard III. Students will write about the similarities and differences of these magnets. This activity should be used after students have had several experiences with permanent magnets and electromagnets. For information about permanent and electromagnets, consult the *Teacher Resource Book*.

Note: During these activities, an emphasis should be placed on the observations that are needed to report effectively.

Invitation to Learn

Review the permanent and electromagnets students have experimented with. Recall some of the experiments the class has done with the two kinds of magnets. Discuss how the two kinds of magnets are alike and different.

Instructional Procedures

Materials

- ❑ Chart paper
- ❑ Tape
- ❑ *Magnetism Fact Strips*

1. Give chart paper, tape, and a set of *Magnetism Fact Strips* (p. 3-39) to each group. Ask the group to place the strips in three categories:
   - True only for permanent magnets.
   - True only for electromagnets.
   - True for both permanent and electromagnets.

Similarities	Only Permanent Magnets	Only Electromagnets
Have a magnetic field Attract iron and steel Have a N and S Pole	Work constantly Cannot be turned off and on Loose magnetism if dropped Magnetic field is strengthened if stroked by a stronger magnet	Must connect to an electrical circuit Stronger if electricity increased Keep a constant amount of strength Can be turned off and on

2. Have students in one group share their charts with another group. Have them look for areas of disagreement and come to a consensus. Tape their strips in the place.
3. Share charts the whole class. Come to a class consensus.
4. Discuss how to organize a paragraph that compares the two kinds of magnets. Explain that you will write about both similarities and differences in the paragraph.
5. If this is first time writing a compare and contrast paragraph, use a shared writing approach. On chart paper, or an overhead transparency, write a short paragraph as a class that compares and contrasts permanent magnets and electromagnets. Use the strips from the chart to guide your organization and writing. Depending on the experience of your students, have them complete the paragraph after you begin it together.
6. Have students check to see if all the ideas in the chart are written in their paragraphs. Have them share their paragraphs with each other.

Possible Extensions/Adaptations/Integration

- Have more experienced writers write their own paragraph to compare and contrast permanent magnets and electromagnets. Have them share their paragraphs with each other.
- If students are very inexperienced writers, you may want to model the writing process and write the paragraph yourself, thinking aloud as you compose the writing. Share the writing as you complete the paragraph. Have students try their own paragraphs and share.
- Have students generate their own comparisons of permanent and electromagnets rather than using teacher-made fact strips. First, have students list facts about permanent and electromagnets in a T-chart. Next have them place the facts in a Venn Diagram that separates them into three categories:
  1. true only for permanent magnets,
  2. true only for electromagnets, and
  3. true for both.
- Revise and edit the original draft to complete the writing process and make a final written piece. Illustrate the text. You may add this to a science portfolio or publish in it some other form, such as a class book.
- Use compare and contrast text structure to write about other comparisons in the Science Core Curriculum. For example, have students write compare and contrast paragraphs about physical and chemical changes, or to compare inherited and learned traits of different species.
- This activity could be taught in a small, guided reading or writing group with more teacher scaffolding.
- Use the compare and contrast text structure in social studies and other content areas to reinforce the text structure.

Assessment Suggestions

- This writing lesson focuses on the writing trait of organization. Use informal assessment strategies to determine if students understand and use this text structure. Look for sentences with similarities and sentences with differences.
- If you complete the entire writing process with this piece, create or use an informational writing rubric to assess the final written paper. A *Science Writing Rubric* is provided on p. 3-34. Adapt as necessary for compare and contrast writing.

Additional Resources

Working with Electricity and Magnetism, by Kathy Furang (2004); ISBN 1-4108-0438-0

Magnets (Science Alive!), by Darlene Lauw (2002); ISBN 0-7787-0609-5

Magnetism Fact Strips

Attracts iron and steel.
Has a north and south pole.
Has a magnetic field.
Works constantly.
Must be turned on in order to work.
Must connect to an electrical circuit.
Looses magnetism if dropped.
Keeps a constant amount of strength.
Cannot be turned off and on.
Can be turned off and on.
Strength increases if contact with wire increases.

Using Cause and Effect to Write in Science

Science Standard II

Objective 1

Connections

Science Standard II:
Students will understand that volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.

Objective 1:
Describe how weathering and erosion change Earth's surface.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts VIII-6

Background Information

The purpose of this activity is to teach writing in a science context using the text structure of *compare and contrast*. It is assumed that *Introducing Text Structures in Science* (p. 3-3) has already been taught using descriptive text structure examples. This lesson is intended to be a model lesson and is not expected to be the only occasion where students write cause and effect texts in science. The principles taught in this lesson may be adapted for use in any of the Science Core Curriculum Objectives where cause and effect is emphasized. Look for the phrase "explain the reasons" in the Science Core Curriculum.

This activity is intended to mesh with the activities about weathering and erosion in Standard II. Students will write about the causes and effects of a simple Earth process. The geologic processes of Earth are the result of forces within Earth and on the surface of Earth. The cause and effect structure is ideal to explain about these processes. This activity should be used after students have had several experiences learning about weathering and erosion. For information about weathering and erosion, consult the *Teacher Resource Book*.

Invitation to Learn

Show a picture of a rock formation that shows evidence of erosion. If possible, show a poster from one of Utah's national parks such as Arches, Bryce, Capital Reef, Canyonland, or Zion National Park. Discuss the processes that made the formation as it appears today.

Instructional Procedures

1. Brainstorm all the processes or forces that cause Earth's surface to be changed (e.g. ice, water, rain, wind, gravity, plants, animals, uplift, volcanic action, etc.). As an optional activity, review by reading a passage or showing a video clip about the effects of water, wind, and frost on the land.
2. Arrange the class in groups of three to four students. Give each group an envelope containing *Erosion Word Strips* (p. 3-43). Challenge students to arrange the phrases in order in a cause and effect chain of events (or flow chart).
3. Have groups share their cause and effect charts. Correct any errors.
4. Use the charts as the organization structure for writing a paragraph. Depending on the experience of the class, you may write the paragraph as a class shared writing activity or have individual students write their own paragraphs.
5. Share the paragraphs with the class.

Materials

- ❏ Utah land formation poster
- ❏ *Erosion Word Strips*—Rock Slide Set
- ❏ *Erosion Word Strips*—Desert Wind Set
- ❏ *Erosion Word Strips*—Land Slide Set
- ❏ *Erosion Word Strips*—Wave Action Set
- ❏ Chart paper
- ❏ Tape

Possible Extensions/Adaptations/Integration

- Rather than giving students all of the word strips, use a list generated with the class. You may start with the final event such as a rockslide, an arch, a canyon, etc. Have students go backward to discover the actions that lead to the particular event. Then make a list of the actions (causes). Finally, write a paragraph that explains the causes and effects.
- If students are very inexperienced writers you may teach this activity in a small guided reading or writing group with more teacher scaffolding. You may want to model the writing process and write the paragraph thinking aloud as you compose the writing.
- As students become experienced with organizing cause and effect writing, have them make their own cause and effect charts based on experience or reading and write paragraphs from these charts.
- Look for cause and effect structures in other fifth grade science core standards. For example, consider the cause and effect in changes in the states of matter, the action of magnets, or the effects of parents' traits on their offspring.

- Revise and edit the original draft to complete the writing process and make a final written piece. Illustrate the text. You may add this to a science portfolio or publish in it some other form, such as a class book.
- Use cause and effect organization to write in social studies and other content areas to reinforce the text structure.

Assessment Suggestions

- Use informal assessment strategies to determine if students understand this text structure.
- Use the *Science Writing Rubric* (p. 3-34). Adapt as necessary for cause and effect writing.

Additional Resources

Books

A Grand Canyon Journey: Tracing Time in Stone, by Peter Anderson (1997); ISBN 0-531-20259-3

Planet Earth (Creative Discoveries Vol. 12, by Diane Costa de Beauregard (2001); ISBN 0-88682-953-4

The Seven Wonders of the Natural World (Wonders of the World), by Reg Cox and Neil Morris (2001); ISBN 0-7910-6049-7

Web site

Utah Travel Council. http://www.utah.com;
They have a selection of beautiful travel posters for about $3.00 each that show some of Utah's geologic formations.

Erosion Word Strips—Rock Slide Set

1	Rain seeps into cracks in rock.
1	Rain freezes in crack.
1	Ice expands in crack.
1	Rock breaks apart.
1	Gravity causes part of rock to roll down hill.
1	Rock bumps into other rocks as it rolls.
1	Many rocks move down hill causing a slide.

Erosion Word Strips–Desert Wind Set

2	Wind blows over desert.
2	Wind picks up grains of sand as it blows.
2	Fine sand blasts against rock.
2	Rock formations erode away.
2	Arches, pinnacles, sand dunes form.
2	Sand and rock fill in low places like valleys.

Erosion Word Strips—Land Slide Set

3	Rainstorm falls over land.
3	Rainwater percolates through the soil.
3	Rainwater runs away over rocks.
3	Water carries rock, mud, or sand grains.
3	The whole side of a mountain gives way.
3	Landslide carries away fragments of rock.

Erosion Word Strips–Wave Action Set

4	Wind and water currents form waves.
4	Waves beat against the shore.
4	Waves hurl pebbles and boulders against cliffs.
4	Rocks wear away to form sandy beach.
4	Soft rock wears away forming caves and inlets.
4	Hard rock forms steep, rugged headlands.

Science Standard I Activities

Diaper Inquiry

Science Standard I:
Students will understand that chemical and physical changes occur in matter.

Objective 2:
Evaluate evidence that indicates a physical change has occurred.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests
4. Communicate Effectively Using Science Language and Reasoning
6. Understand the Nature of Science

Content Connections:
Math IV-2, V-1

Science Standard I

Objective 2

Connections

Background Information

Diapers contain fluffy filler that absorbs some liquid, but a white crystal mixed with the filler does most of the job. That crystal is *sodium polyacrylate*, a product developed for use in astronaut diapers. It is now used not only in baby diapers and a variety of personal products, but in gardening as well. Potting soil containing these water-holding crystals can is available at many garden centers. It is also marketed as something to be injected under lawns in our drought-prone state in order to conserve water.

A physical change is seen as the crystals absorb water. They expand to many times their original size. If left to dry out over a period of time, they decrease in size. **Because the crystals swell in water it is <u>not</u> be a good idea to rinse them down the sink.**

Warning: Caution students not to rub their eyes, noses, or face while working on this activity. Sodium polyacrylate has the same effect on body fluids and may be harmful to the students.

Invitation to Learn

As a class, list the physical properties of diapers in a group discussion. Physical properties may include size, shape, color, odor, or texture.

Instructional Procedures

1. Discuss any chemical properties from the *Invitation to Learn*. The diaper cover will burn or melt. Filler will burn or melt.

Materials

- ❑ Diapers
- ❑ Thermometers
- ❑ Cups
- ❑ Graduated cylinders
- ❑ Scale
- ❑ Distilled water
- ❑ Measuring tape
- ❑ Large Ziploc bags
- ❑ Other supplies may be needed depending on the direction that individual investigations take.
- ❑ *Investigation Write-up* handout

2. Separate the components of the diaper. One of the best ways to separate the crystal is to pull all the filler out of the diaper, put it in a Ziploc bag, seal it, and shake it. The crystals will separate from the filler and gather in the corner of the bag.
4. Discover the white crystals in the filler. What are these crystals? What is their function in the diaper? (absorb liquid)
5. Start to form questions to be used for class, group, or individual investigations. Questions may include, but are not limited to:
   - How much water will one diaper absorb without leaking?
   - What is the ratio of weight of water absorbed to the weight of the crystals? (good math connection)
   - Does the temperature of the water affect how quickly the water will be absorbed?
   - Do more expensive diapers contain more crystal? Will more expensive diapers absorb more water?
   - Do different sizes of diapers contain different amounts of crystal?
   - How much more water will a regular diaper hold than a swim diaper?
   - How long does it take for the waterlogged crystals to dry out?
6. Design an investigation as a class, group, pairs, or individuals.
7. Write question, hypothesis, materials, and method before beginning.
8. Distribute materials to each group according to what they've listed on the *Investigation Write-up* handout (p. 4-7).
9. Investigate!

Possible Extensions/Adaptations/Integration

Show students a baking soda and vinegar reaction. One of the most common ways this is done is with a bottle or test tube containing a small amount of vinegar and a balloon containing baking soda stretched over the bottle opening. When the balloon is tipped up and the baking soda mixes with the vinegar, a gas is formed that plumps up the balloon. Students design investigations based on this idea. Questions may include:

- How does the temperature of the vinegar affect the amount of gas produced?
- Does the amount of vinegar used affect the amount of gas produced?
- How does the type of vinegar affect the amount of gas produced?
- How does the test tube size affect the size of the blown-up balloon?
- How does the number of times the balloon is stretched affect how big it gets?

Possible Extensions/Adaptations/Integration

- Use the wet crystals as a medium for growing a plant. No dirt is needed. Water it every couple of days and include a small amount of fertilizer.
- Place students of different abilities in each group. Each student should have a meaningful role.

Assessment Suggestions

- Assess the completed *Investigation Write-up*.
- Ask students to write about what they learned.
- Have students design an investigation on another topic.
- Ask students to list evidence that the crystals change was a physical change.
- Give each group the opportunity to present their findings to the class.

Additional Resources

Books

Kitchen Chemistry: Science Experiments to Do at Home, by Robert Gardner and Jane Steltenpohl; ISBN 0671677764

Sciencesaurus: A student handbook, (Great Source Education Group); ISBN 0669481920

States of Matter Files: Transform!, (Discovery Communications, copyright 2000, http://school.discovery.com/); Student Resource Guide Item #739581, Teacher Resource Guide Item #742452

Teacher Resource Book 3, State Science Core Teacher Text Grade Five, "What's the Matter?" Student Literacy section 8.1.1 to 8.1.4, available from Jordan School District

Family Connections

- Science Fair Experiments follow this basic idea. A question is formed and investigated, and then data is gathered and analyzed.
- Investigate dishwashing liquid. How long will the bubbles last? Do they last longer if you start with cold water or hot water?

Name _____

Investigation Write-up

Question: _____

Hypothesis: _____

_____

Materials: _____

_____

Procedure: _____

_____

_____

_____

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_____

Observations: _____

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_____

Measurable Results: _____

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Conclusion: _____

_____

_____

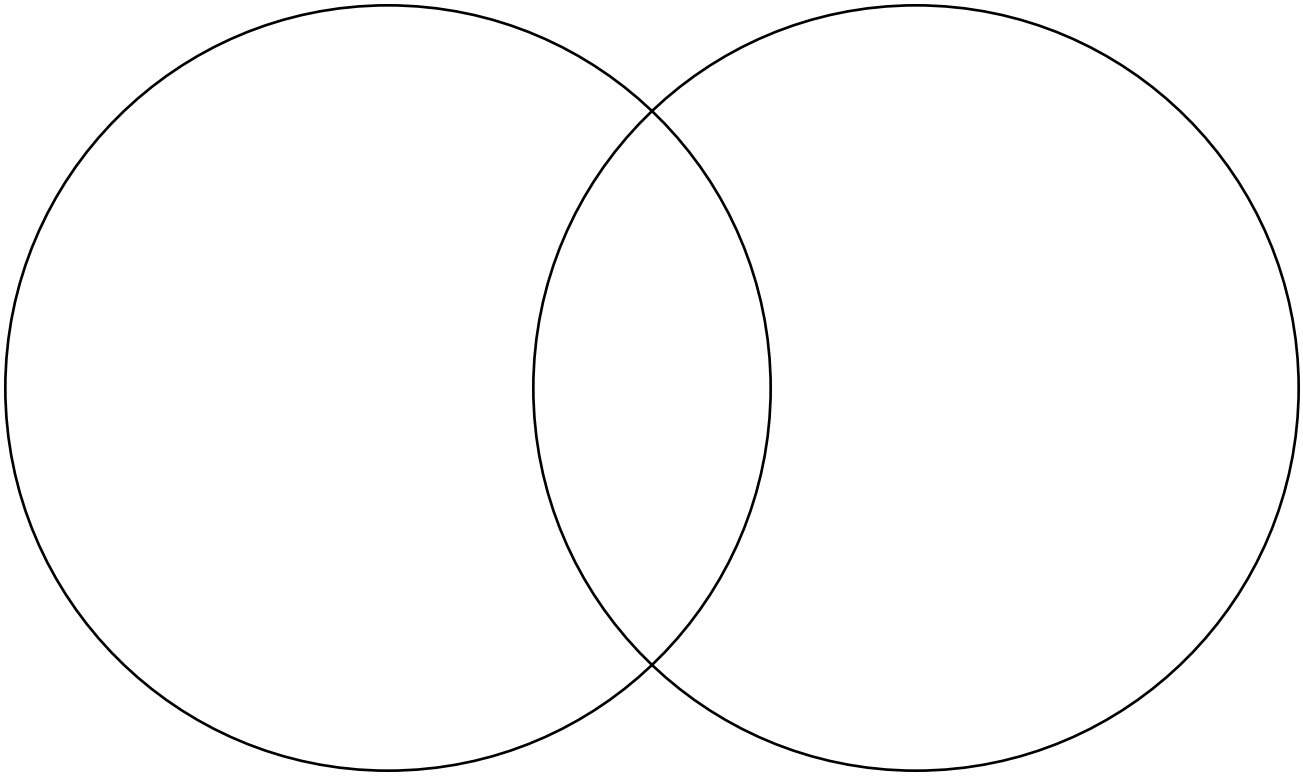
Application: _____

_____

_____

Name _____

What's the Matter?



Physical Change ***Both*** ***Chemical Change***

Cut out the words and place them on the diagram where they belong.

Changes size only	**Products**	**Heat absorbed**	**Burn a piece of paper**
Changes state only	**Change physical properties**	**Rocket fuel combined with oxygen**	**Produces a gas**
Matter stays the same	**Reactants**	**Baking cake batter**	**Surprise color change**
Changes texture only	**Heat given off**	**Tear a paper**	**Produces a new solid**

The Heat is On!

Science Standard I:
Students will understand that chemical and physical changes occur in matter.

Objective 3:
Investigate evidence for changes in matter that occur during a chemical reaction.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts VIII-1, 6

Science Standard I

Objective 3

Connections

Background Information

This activity gives students experience with *chemical change*. The evidence of chemical change they will see is production of a gas, color change, and production of heat.

Note: pH is a measure of the acidity or basic nature of a solution.
pH = 7 is neutral; pH < 7 is acid; pH > 7 is base.
The scale is **not** linear—an acid of pH 4 is ten times more acidic than a pH of 5.

This activity makes use of pH indicator solution. Indicators show a change from a base to an acid or an acid to a base. The mixed calcium chloride, baking soda, and water make an acid solution. Phenol red is the indicator used in the instructions, but other indicators may be used. Bromythymol blue works well, changing from a blue to a yellow. Red cabbage juice (made by boiling the leaves of red cabbage) may be used. Cabbage juice starts off blue or violet and changes to bright pink. There are no special safety considerations for any of these indicators.

Calcium chloride is commonly used as a sidewalk ice-melter and comes in pellets. It is available in the automotive department under the brand name "Heat" and many others. It is also available through science supply companies, but is more expensive. When purchased through science supply companies, it generally comes in small flakes. The powder from the calcium chloride is harmful if inhaled. The pellet form is less likely to have powder that can be inhaled. *The pellet form is strongly recommended for safety.*

Any time things are mixed or heated in the classroom, safety goggles must be worn. The amounts of chemicals listed in these instructions are designed to keep the bags from popping open. Larger amounts of chemicals produce more gas that may cause bags to pop open and create an additional splash danger.

Invitation to Learn

Review the mixing of colors. What does red plus yellow make? How about blue and yellow? What if you mix red and white? Students may be surprised when we conduct today's experiement!

Instructional Procedures

Materials

- ❑ Baking soda
- ❑ Calcium Chloride
- ❑ Water
- ❑ Phenol red or other indicator
- ❑ Film canisters or small bottle
- ❑ Ziploc bags
- ❑ *The Heat is On!* data sheet
- ❑ Safety goggles

Advance Preparation

1. Prepare a Ziploc bag containing two teaspoons baking soda and one teaspoon calcium chloride for each pair of students. *These amounts should not be increased, or the bag may burst open.*
2. Prepare small bottles or film canisters (without lids) with approximately three tablespoons of water. Add two or three drops of phenol red. Use only enough phenol red to make the color show.

Activity

3. Distribute *The Heat is On!* data sheets (p. 4-13) and safety goggles. Read instructions and remind students that goggles must be worn until the chemicals are disposed of and desks are clean.
4. Discuss what makes a good scientific observation. Measurements are great! Objective observations are great! Statements like "it stinks" or "it turned an ugly color" are opinions and could be rephrased to be more objective. Saying, "It has a strong odor," or saying, "It changed to a bright yellow-orange color," is more objective.
5. Goggles should be worn at this point. Distribute bags and bottles.
6. Make initial observations about contents of the bag and bottle. Students record observations on the data sheet. Remember to measure temperature.
7. Zip the bottle inside the bag.
8. Tip bottle over and observe. Remember to measure temperature.
9. Record observations on data sheet.
10. Clean up by placing closed bags into garbage. Wash hands and put away goggles.
11. Discuss the evidence of chemical change. Students may write a one paragraph summary of the activity.

Possible Extensions/Adaptations/Integration

Writing

- Students write a paragraph telling what they know about chemical change, giving examples from this activity and daily life.

Adaptations

- Allow students to illustrate what they observed in the activity without writing the sentences OR just label the things that are evidence of chemical change like "heat," "color change," "new gas." Students may record some observations in drawing form only.
- Pair ELL students with a partner with the same primary language to do the writing work.
- Review key vocabulary words before beginning writing.

Assessment Suggestions

- Assess student learning using the "filmstrip" at the bottom of the data sheet. Did s/he identify evidence of chemical change?
- Students write a paragraph explaining how they know something has undergone a chemical change.

Additional Resources

Books

Science Experiments You Can Eat, by Vicki Cobb;
ISBN 0064460029

The Science Chef: 100 Fun Food Experiments and Recipes for Kids, by Joan D'Amico and Karen Eich Drummond;
ISBN 047131045X

Web site

How Stuff Works, http://www.howstuffworks.com
Some articles would be good for non-fiction reading for our study of matter, especially if shortened, including *How does bread work?* and *How do light sticks work?*

Family Connections

- Most students know what happens when they mix baking soda and vinegar together—it bubbles indicating that a gas has formed. With adult supervision, try other cooking liquids (e.g., milk, buttermilk, lemon juice, orange juice, etc.) to find which form a gas when combined with baking soda.
- Students make a T-chart listing the physical and chemical changes involved in preparing a favorite food.

Name _____

The Heat is On!

1. Put on goggles. They must stay on until all chemicals are cleaned up.

2. Write your observations of the substances in the bag and bottle.

_____

_____

_____

Temperature of liquid _____

Temperature of solids _____

3. When your teacher tells you, zip the bottle of liquid inside the bag. When it is zipped tightly, tip the bottle of liquid over into the powder. Watch for changes.

4. What changes did you observe? Write them below. Be sure to measure temperature.

_____

_____

_____

5. Was this a physical change or a chemical change? Provide evidence below.

   a. _____

   b. _____

   c. _____

6. Filmstrip: Using the four to five filmstrip cells below, illustrate what happened during this experiement. Under each cell, write a one-sentence caption telling about the picture. Use words like: chemical change, produces heat, produces a gas, changes color, product, reactant, solid, liquid, and temperature.

1.	2.	3.	4.	5.

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Clean Pennies

Science Standard I

Objectives 2 & 3

Connections

Science Standard I:
Students will understand that chemical and physical changes occur in matter.

Objective 2:
Evaluate evidence that indicates a physical change has occurred.

Objective 3:
Investigate evidence for changes in matter that occur during a chemical reaction.

Intended Learning Outcome:
1. Use Science Process and Thinking Skills

Content Connections:
Language Arts VIII-1, 6

Background Information

Each student needs a penny that is no longer shiny. If the pennies you have are too clean, oxidize the surface in the following manner. Place all the pennies into a cup and pour vinegar over the top. After coating them with vinegar, spread the pennies out on a paper towel to dry overnight. By the time they are dry you will see a green-colored substance called malachite.

When the salt and vinegar are combined, they form a very small amount of hydrochloric acid. This acid removes oxidation from pennies. Removing the copper oxide is a chemical change. The copper molecules in the vinegar and salt solution settle on paper clips after a period of time, but wipe off easily. This is not a chemical change. If the cleaned pennies are allowed to sit without rinsing them off, more malachite forms.

Invitation to Learn

Today we are going to do an activity with money and chemicals. The chemicals are sodium chloride and acetic acid (or salt and vinegar).

Instructional Procedures

Materials

- ❑ Dirty pennies
- ❑ *Clean Pennies* data sheet
- ❑ Safety goggles
- ❑ Cups
- ❑ Salt
- ❑ Vinegar
- ❑ Paper towel
- ❑ Paper clips

1. Give each student a dirty penny. Observe pennies. Stress the importance of using all the senses, except for taste. Students record observations on the *Clean Pennies* data sheet (p. 4-17).
2. Pass out goggles. Students should keep the goggles on until the cups are put away in step six. Give each pair of students a cup with a small amount of salt in the bottom. Students place the pennies in the cup. Allow students to rotate cups. Ask what changes to the penny they see. (none)
3. Add a small amount of vinegar to each of the cups. Allow students to rotate cups and observe changes.
4. Pennies will become bright pink and copper colored. All the discoloration may not be removed, but most pennies will show a dramatic difference.
5. Remove pennies and place them on a paper towel to dry. Continue observations.
6. Place a paper clip in each cup of vinegar and salt solution. Leave the paper clip in the solution overnight. After cups are put away, remove goggles.
7. Observe paper clips next day. Wear safety goggles to avoid splash danger. Allow students to remove the paper clip from solution and handle it. The copper coating will rub off easily. Ask students if the paper clip's change to copper-colored was a chemical or physical change. (It was a physical change. No new substance was formed. The copper was there all the time—dissolved in the solution.)

Possible Extensions/Adaptations/Integration

- Allow students with special needs to list or draw examples of chemical change instead of writing a paragraph.
- Make a list of *Important Science Words* to use in the assigned paragraph.
- Allow students with special needs to dictate their paragraph to another student, an aide, or the teacher.
- To introduce the idea of physical properties, have each student bring an object from home. Each student describes a number of physical properties, such as color, shape, texture, etc. Other students take turns guessing the identity of the item.

Assessment Suggestions

- Create a rubric to score the paragraph including attributes such as, science content, organization, presentation, conventions, and use of science language.
- Make a T-chart with *Physical Changes* on one side and *Chemical Changes* on the other side. Give students a list of changes to categorize. Include examples of change from daily life.

Additional Resources

Books

Writer's Express: A handbook for young writers, thinkers, and learners, by David Kemper, et.al.; ISBN 0669471658

Kitchen Science with over 50 Fantastic Experiments, by Chris Maynard (DK Publishing); ISBN 0-7894-6972-3

Web site

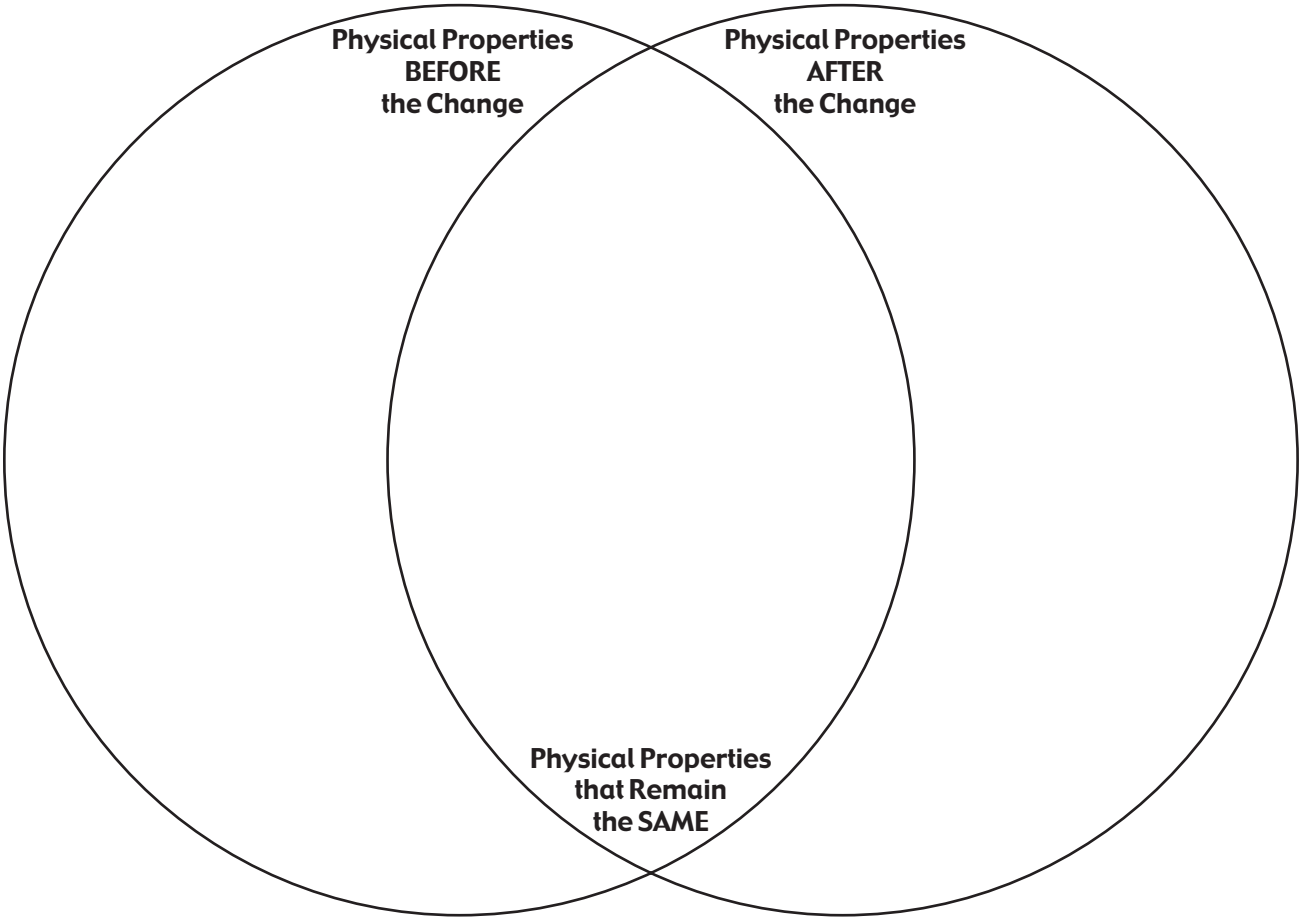
Some good ideas on the USOE science site for ELL students http://www.usoe.k12.ut.us/curr/science/core/5th/lep/matter/default.htm

Family Connections

- Have a mold race! Moisten a slice of bread with a few drops of water and place it into a Ziploc sandwich bag. Place it in a warm, dark place. Keep the bag zipped shut after the mold grows—many people are allergic to mold. Observe the bread once a day and keep a log of the changes that occur. Many of the changes are chemical changes. Design an experiment to investigate questions like: Does white bread or whole wheat bread mold faster? Does homemade bread or store-bought bread mold faster? Does bread get moldy faster in a warm environment or cold environment? Does bread mold faster in sunlight or dark?
- Have students repeat the *Clean Pennies* activity at home with one variation—after removing the pennies from the solution, place a steel screw in the solution instead of a paper clip. They should see bubbles rising from the thread of the screw, which is another indicator of chemical change.

Name _____

Clean Pennies



Write a paragraph using the information from the Venn Diagram above. Discuss the physical properties of the penny before and after the change. Provide evidence that a chemical change took place.

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Science Standard II Activities

Weathering Landforms

Science Standard II:
Students will understand that volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.

Objective 1:
Describe how weathering and erosion change Earth's surface.

Objective 3:
Relate the building up and breaking down of Earth's surface over time to the various physical land features.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles

Content Connections:
Math IV-2

Science Standard II

Objectives 1 & 3

Connections

Background Information

There is a process called *weathering* that is constantly changing Earth's surface. *Chemical weathering*, such as acid rain, eats away at certain types of rocks, creating cracks and holes. *Physical weathering* is usually caused by extreme hot and cold temperatures. Water seeps into cracks in rocks, freezes, and expands, causing further breakdown of rocks. *Biological weathering* is caused by plants and animals and also contributes to the breaking down of rocks and landforms. These weathering processes cause rocks and landforms to fragment, crack, and breakdown. *Erosion* carries away debris and soil.

Science language students should use:
earthquakes, erode, erosion, faults, uplift, volcanoes, weathering, buttes, arches, glaciers, geological, deposition

Invitation to Learn

Brainstorm all the ways the surface of Earth can change. Discuss weathering, erosion, wind, and the effect that frozen water has on Earth's surface.

Materials

- ❑ Plaster of paris
- ❑ Water balloons
- ❑ Paper cups
- ❑ Colored markers or watercolor paints

Instructional Procedures

1. Fill water balloons. (about 11/2" in diameter)
2. Mix plaster of paris. (runny)
3. Pour into cups. (small milk cartons work well)
4. Quickly push balloon into plaster.
5. Set aside to dry.
6. When completely dry, peel off cup.
7. Color plaster landforms with permanent markers, or paint with watercolors.
8. See *Family Connections*.

Possible Extensions/Adaptations/Integration

- Take students outside and look for evidence of weathering. Pay special attention to evidence of weathering in the sidewalks, blacktop, and in the form of a frost heave.
- Record discoveries in science journals.
- Pay special attention to students who need help smoothing the plaster during activity.
- Fill a plate with plaster of paris. Germinate seeds on the plaster to demonstrate biological weathering.

Assessment Suggestions

- Read science journals. Use *Science Writing Rubric* (p. 3-34) to evaluate student progress.
- Have classroom discussion of results. Students journal how they felt when they discovered their landforms were broken.

Additional Resources

Books

Eyewitness Earth, by Susanna Van Rose; ISBN 0-7894-5575-7

Icebergs and Glaciers, by Seymour Simon; ISBN 0-688-16705-5

Web site

Fifth Grade USOE SciberText:
http://www.usoe.k12.ut.us/curr/science/core/5th/sciber5/index.htm

Family Connections

- Have students make predictions with families about what will happen to the plaster landform when placed overnight in freezer. Place in freezer and record the results the following day.
- Look for evidence of weathering around homes.

Landform Concentration

Science Standard II

Objectives 1 & 2

Connections

Science Standard II:
Students will understand that volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.

Objective 1:
Describe how weathering and erosion change Earth's surface.

Objective 2:
Explain how volcanoes, earthquakes and uplift affect Earth's surface..

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts I-1, 2, VI-1, 2

Background Information

Earth seems quiet and still, but silently, powerfully, Earth is alive and in constant motion. The shape of the land, over time, is constantly being changed by the forces of weathering and erosion. Weathering causes rocks to fragment, crack, crumble, or break down chemically, biologically, and physically. Erosion loosens and carries away rock debris and soil. Volcanoes erupt. A mountain emerges where once there was none. In mere minutes, an earthquake redesigns parts of Earth's surface. Nature contrives a new scene for her works of art.

Science language students should use:
earthquakes, erode, erosion, faults, uplift, volcanoes, weathering, buttes, arches, glaciers, geological, deposition

Invitation to Learn

List familiar landforms and generate definitions. Pair definitions with pictures. Record the definitions.

Instructional Procedures

Materials

- ❑ *Landform Picture Cards* (provided on disk)
- ❑ *Definition Cards*
- ❑ Drawing paper (journals)

1. Divide students into groups of five or six.
2. Play *Concentration* with *Landform Picture Cards* and *Definition Cards*.
3. Draw landforms.

Possible Extensions/Adaptations/Integration

- Connect to water and rock cycles learned in fourth grade.
- Partner special needs students.

Family Connections

- *Concentration* may be played at home with family members.
- Locate landforms during family travels. Draw or photograph.

Assessment Suggestions

- Observe student participation in the game.
- Evaluate drawings, making sure all landforms are included.

Additional Resources

Books

Mountain Dance, by Thomas Locker; ISBN 0-15-202622-3

Eyewitness Earth, by Susanna Van Rose; ISBN 0-7894-5575-7

The Usborne Encyclopedia of Planet Earth, by Anna Claybourne; ISBN 1580862608

Earthquakes and Volcanoes (Understanding Geography Series), by F. Watt; ISBN 0-88110-592-9

Earthdance, by Cynthia Pratt Nicolson; ISBN 1-55074-155-1

Icebergs and Glaciers, by Seymour Simon; ISBN 0-688-16705-5

Mountains, by Seymour Simon; ISBN 0-688-15477-8

Web sites

Fifth Grade USOE SciberText:
http://www.usoe.k12.ut.us/curr/science/core/5th/sciber5/index.htm

SLCSD Elementary Science Web site
http://www.slc.k12.ut.us/staff/larmad/science/index.html

Landforms in a Tub

Science Standard II

Objectives 1, 2 & 3

Connections

Science Standard II:
Students will understand that volcanoes, earthquakes, uplift, weathering, and erosion reshape Earth's surface.

Objective 1:
Describe how weathering and erosion change Earth's surface.

Objective 2:
Explain how volcanoes, earthquakes, and uplift affect Earth's surface.

Objective 3:
Relate the building up and breaking down of Earth's surface over time to the various physical land features.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests
3. Understand Science Concepts and Principles

Content Connections:
Language Arts VII-1, 2, 5, 6; Visual Arts I-3

Background Information

Earth is alive and in constant motion. The shape of the land is constantly being changed by weathering and erosion. Weathering causes rocks to fragment, crack, crumble, or break down chemically, biologically, and physically. Erosion loosens and carries away rock, debris, and soil.

Invitation to Learn

Read *Mountain Dance* by Thomas Locker.

Instructional Procedures

Materials

- ❑ Small plastic wading pool
- ❑ Two 5-gallon buckets of sand
- ❑ Bicycle pump/needle/ deflated playground ball
- ❑ Garden water can
- ❑ Five gallons of water and a tray of ice cubes
- ❑ Hair dryer

1. Divide into groups. Explain to students that they need to build an Earth model in the sand with landforms from high mountains all the way to sea level, including a river, a lake, and a valley. Use pictures drawn in *Landform Concentration* (p. 5-6) and build landforms.
2. Use ice cubes to form a glacier on the side of the mountain. It may be beneficial to have students build at least two mountains for comparisons.
3. Add "rain" with a garden water can.
4. Record observations in a science journal.

5. Inflate a playground ball and place beneath the pool. Observe and record account of uplift in a science journal.
6. Use a hair dryer to simulate wind.
7. Create a book using terms and drawings learned in activities. Stress use of science language.

Possible Extensions/Adaptations/Integration

- Find pictures in magazines and books of similar landforms.
- Forms may be built in the school's playground sandbox.

Assessment Suggestions

- Grade books using *Science Writing Rubric* (p. 3-34).
- Orally quiz students on landforms.

Additional Resources

Books

Mountain Dance, by Thomas Locker; ISBN 0-15-202622-3

The Usborne Encyclopedia of Planet Earth, by Anna Claybourne; ISBN 1580862608

Earthquakes and Volcanoes (Understanding Geography Series), by F. Watt; ISBN 0-88110-592-9

Earthdance, by Cynthia Pratt Nicolson; ISBN 1-55074-155-1

Icebergs and Glaciers, by Seymour Simon; ISBN 0-688-16705-5

Mountains, by Seymour Simon; ISBN 0-688-15477-8

Videos

Eyewitness Volcano, (DK Publishing, available from Amazon.com); ASIN: 6304165323

Earth's Crust, by Bill Nye (Disney Educational Productions, 1-800-295-5010, http://dep.disney.go.com/educational/index); VHS Product ID: 68A51VL00, DVD Product ID: 77A09VL00

Web sites

Fifth Grade USOE SciberText:
http://www.usoe.k12.ut.us/curr/science/core/5th/sciber5/index.htm

SLCSD Elementary Science Web site
http://www.slc.k12.ut.us/staff/larmad/science/index.html

Family Connections

- Share books.
- Read books to a younger child.
- Quiz parents.

Science
Standard III
Activities

Magnets in a Bag

Science Standard III:
Students will understand that magnetism can be observed when there is an interaction between the magnetic fields of magnets or between a magnet and materials made of iron.

Objective 1:
Investigate and compare the behavior of magnetism using magnets.

Objective 2:
Describe how the magnetic field of Earth and a magnet are similar.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests

Content Connections:
Language Arts VII, VIII

Science Standard III

Objectives 1 & 2

Connections

Background Information

We know that magnets have forces that draw iron and steel objects toward them. We also know that magnets have poles usually referred to as *North* and *South*. Opposite poles attract each other and like poles repel. North ends attract South ends, South ends attract North ends. North ends repel North ends and South ends repel South ends. If they are close enough, depending upon the strength of the magnet, they will come together with great force and must be treated with care.

There are unseen magnetic fields around magnets. North and South polarized ends of magnets are where the strong pulling and repelling occurs. Bar, ring, disc, and horseshoe magnets each have different, distinctly-shaped magnetic fields. Lines within these fields and the patterns they create are referred to as *magnetic field lines*. These lines seem to flow away from the North end of a magnetic field and return again to the South end.

Earth has a magnetic field very similar to a bar magnet, with magnetic field lines flowing away from the North and returning in an oval pattern to the South Pole. The magnetic North and South Poles are not the same as the true North and South poles as depicted on globes and maps. The North Magnetic Pole is slowly drifting across the Canadian Arctic. The Geological Survey of Canada keeps track of this motion by periodically conducting magnetic surveys to determine the Pole's location. The most recent survey, completed in May 2001, determined an updated position for the Pole and established that it is moving northwest at approximately 40 km per year.

Invitation to Learn

Duct tape a strong magnet under a table or sheet of cardboard or poster board. Ask the students what the forces are around a magnet. Slide paper clips along the table/cardboard until they are attracted to the magnet. Explore the patterns.

Instructional Procedures

Materials

For each group:

- ❑ Bar magnet
- ❑ Horseshoe magnet
- ❑ Disc or ring magnet
- ❑ 8 oz bottle of vegetable oil
- ❑ Two clear Ziploc baggies
- ❑ 1 tbs. Iron filings
- ❑ Box of large paperclips

1. Have students pour vegetable oil into one Ziploc bag.
2. Mix in iron filings.
3. Zip the first bag closed and place it inside the second bag; zip the second bag closed. *(Clear bags are best. The kind with white labels on the side work, too, however the labels make the magnetic lines of a force field difficult to see.)*
4. Gently shake the bags up until the iron filings are equally distributed in the vegetable oil.
5. Place a bar magnet as flat as possible on a smooth, hard surface.
6. Place the shaken plastic bag on top of the bar magnet.
7. Observe the lines that occur. *(You may want to gently tap the top of the bag and loosen some of the iron particles to move in the liquid.)*
8. Label and draw the pattern that occurs.
9. Repeat this procedure for horseshoe, disc, and ring magnets.
10. Compare and contrast the patterns.
11. Students record the results in a science journal.
12. *Clean-up:* Have students pour their oil from the Ziploc bags through a funnel back into the original bottles and label them. *(Make sure they label them, CONTAMINATED, and only good for detecting magnetic fields.)*

Note: **Ziploc bags are great for freezers and short term storage, but oil left in Ziploc bags overnight makes a mess.**

Possible Extensions/Adaptations/Integration

- Have students write down and describe what happened and how they think these patterns were formed.
- Allow students to hypothesize if the position of the magnet effects the appearance of the magnetic field?
- Partner special needs students responsibly to assure success during this activity.

Assessment Suggestions

- Assess writing using the *Science Writing Rubric* (p. 3-34).
- Students create compare and contrast drawings to assess accuracy.
- Have students compare and draw the patterns created by a bar, horseshoe, ring, and disc magnet.

Additional Resources

Books

Usborn Science Activities—Vol. 1, by Joan and Maurice Martin (Usborn Publishing Ltd, Usborn House, 83-85 Saffron Hill, London, EC1N 8RT, England. Copyright 1992, www.edcpub.com or www.ubah.com); ISBN 0-7460-0698-5

Usborn Science Activities—Science With Magnets, by Joan and Maurice Martin (Usborn Publishing Ltd, Usborn House, 83-85 Saffron Hill, London, EC1N 8RT, England. Copyright 1992, www.edcpub.com or www.ubah.com); ISBN 0-7460-1259-4

World Book, Young Scientist—Light & Electricity–Magnetic Power, by Hemesh Alles (World Book Inc., 525 West Monroe Street, Chicago, Illinois 60661. Copyright 1992); ISBN 0-7166-2791-4

The World Book Student Discovery Encyclopedia—Vol. M, (World Book Inc., 233 N. Michigan Ave., Chicago, Illinois 60601. http://www.worldbook.com, 1-800-975-3250. Copyright 2000); ISBN 0-7166-7400-9

Web site

Fifth Grade USOE SciberText:
http://www.usoe.k12.ut.us/curr/science/core/5th/sciber5/index.htm

Video

The Magic of Magnetism, (100% Educational Videos; 4921 Robert J. Matthews Pkwy, El Dorado Hills, California 95762, http://www.schoolvideos.com/index.cfm); VHS Product #1010S, DVD Product #S1401

Family Connections

- Have students teach their parents about magnetic fields.
- Allow students to check out magnets and bottles of CONTAMINATED oil to test the hypothesis mentioned in the *Curriculum Extensions*.

Magnetic Hangman

Science Standard III:
Students will understand that magnetism can be observed when there is an interaction between the magnetic fields of magnets or between a magnet and materials made of iron.

Objective 1:
Investigate and compare the behavior of magnetism using magnets.

Objective 2:
Describe how the magnetic field of Earth and a magnet are similar.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests

Content Connections:
Language Arts VII, VIII

Science Standard III

Objectives 1 & 2

Connections

Background Information

Earth has a magnetic field very similar to a bar magnet, with magnetic field lines flowing away from the North and returning in an oval pattern to the South Pole. The magnetic North and South Poles are not the same as the true North and South poles as depicted on globes and maps. The North Magnetic Pole is slowly drifting across the Arctic. The Geological Survey of Canada keeps track of this motion by periodically carrying out magnetic surveys to determine the Pole's location.

Handling and Storing Magnets

- Always use caution when handling magnets. Strong magnets can snap together and injure students and teachers, or be damaged.
- Keep magnets away from magnetic media, such as floppy discs, credit cards, and computer monitors.
- Store magnets in closed containers so they don't attract metal debris.
- If several magnets are being stored together, they should be stored in attracting positions.
- Alnico magnets should be stored with "keepers" (iron or magnetic steel plates that connect the poles of the magnet) as they can easily become demagnetized otherwise.
- Magnets should be kept away from pacemakers!

Invitation to Learn

Allow students to hang magnets from the ceiling or another safe place. You may hang magnets ahead of time. Safety first!

Instructional Procedures

Materials

- ❑ One horseshoe magnet per student group
- ❑ One bar magnet per student group
- ❑ Fishing line/3 ft. per magnet

1. Hang horseshoe magnets with a string.
2. Determine north, south, east, and west directions in your classroom.
3. Brainstorm magnetism vocabulary words.
4. Look at magnets and see if there are similarities in their alignment.
5. Have students predict what will happen when the north end of their bar magnets are placed near the north end of the hanging magnets.
6. Chart and draw results in journals.
7. Discuss results with class.

Possible Extensions/Adaptations/Integration

- Measure the distance that hanging magnets are attracted by other magnets. Measure in centimeters and inches.
- Chart, graph, and journal results.
- Pair special needs students with partners.
- Hang bar and ring magnets in a similar fashion and hypothesize their alignment.

Assessment Suggestions

- Grade student journals according to *Science Writing Rubric* (p. 3-34).

Additional Resources

Books

Usborn Science Activities—Vol. 1, by Joan and Maurice Martin (Usborn Publishing Ltd, Usborn House, 83-85 Saffron Hill, London, EC1N 8RT, England. Copyright 1992, www.edcpub.com or www.ubah.com); ISBN 0-7460-0698-5

Usborn Science Activities—Science With Magnets, by Joan and Maurice Martin (Usborn Publishing Ltd, Usborn House, 83-85 Saffron Hill, London, EC1N 8RT, England. Copyright 1992, www.edcpub.com or www.ubah.com); ISBN 0-7460-1259-4

World Book, Young Scientist—Light & Electricity–Magnetic Power, by Hemesh Alles (World Book Inc., 525 West Monroe Street, Chicago, Illinois 60661. Copyright 1992); ISBN 0-7166-2791-4

The World Book Student Discovery Encyclopedia—Vol. M, (World Book Inc., 233 N. Michigan Ave., Chicago, Illinois 60601. http://www.worldbook.com, 1-800-975-3250. Copyright 2000); ISBN 0-7166-7400-9

Web site

Fifth Grade USOE SciberText: http://www.usoe.k12.ut.us/curr/science/core/5th/sciber5/index.htm

Video

The Magic of Magnetism, (100% Educational Videos; 4921 Robert J. Matthews Pkwy, El Dorado Hills, California 95762, http://www.schoolvideos.com/index.cfm); VHS Product #1010S, DVD Product #S1401

Family Connections

- Allow students to check out magnets and teach parents laws of magnets learned in class.
- Have students and parents make a list of magnets in their homes and their uses.

Where's Up?

Science Standard III

Objectives 1 & 2

Connections

Science Standard III:
Students will understand that magnetism can be observed when there is an interaction between the magnetic fields of magnets or between a magnet and materials made of iron.

Objective 1:
Investigate and compare the behavior of magnetism using magnets.

Objective 2:
Describe how the magnetic field of Earth and a magnet are similar.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests

Content Connections:
Language Arts VII, VIII; Math IV

Background Information

- You can make a compass by creating a magnet.
- Earth is a magnet.
- By rubbing a magnet in the same direction over a needle, a magnet is created.

Invitation to Learn

Ask "Why does a compass point north?"

Instructional Procedures

Materials

- ❑ Needles
- ❑ Magnets: bars, rings horseshoes, etc.
- ❑ Styrofoam plates
- ❑ Water pitcher
- ❑ Water

1. Pass out needles and magnets.
2. Have half of the class stroke needles on the north end of the magnet and the other half stroke needles on the south end.
3. Place needles on floating Styrofoam disks in water-filled plates.
4. Have students journal results.
5. Rearrange students in different groups and compare results.

Possible Extensions/Adaptations/Integration

- Measure the distance, in centimeters or inches, that a compass is affected by different magnets.
- Allow students with special needs to think and respond to journaling activities as a homework assignment with parents. Also allow them to share their results with class members as part of the Language Arts Core Curriculum.

Assessment Suggestions

- Have students design an experiment to test compared results.

Additional Resources

Books

Usborn Science Activities—Vol. 1, by Joan and Maurice Martin (Usborn Publishing Ltd, Usborn House, 83-85 Saffron Hill, London, EC1N 8RT, England. Copyright 1992, www.edcpub.com or www.ubah.com); ISBN 0-7460-0698-5

Usborn Science Activities—Science With Magnets, by Joan and Maurice Martin (Usborn Publishing Ltd, Usborn House, 83-85 Saffron Hill, London, EC1N 8RT, England. Copyright 1992, www.edcpub.com or www.ubah.com); ISBN 0-7460-1259-4

World Book, Young Scientist—Light & Electricity–Magnetic Power, by Hemesh Alles (World Book Inc., 525 West Monroe Street, Chicago, Illinois 60661. Copyright 1992); ISBN 0-7166-2791-4

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Web site

Fifth Grade USOE SciberText: http://www.usoe.k12.ut.us/curr/science/core/5th/sciber5/index.htm

Video

The Magic of Magnetism, (100% Educational Videos; 4921 Robert J. Matthews Pkwy, El Dorado Hills, California 95762, http://www.schoolvideos.com/index.cfm); VHS Product #1010S, DVD Product #S1401

Family Connections

- Students check out five marked and magnetized needles and classify according to polarity.
- Create a compass course for students and parents to complete after school.
- Have teams create a compass course to be exchanged with another team.
- Share journal results with parents.
- Allow students with special needs to think and respond to journaling activities as a homework assignment with parents.

Science
Standard V
Activities

I Will Survive!

Science Standard V:
Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

Objective 2:
Describe how some characteristics could give a species a survival advantage in a particular environment.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles

Content Connections:
Language Arts I-2, VIII-6; Math II-5

Science Standard V

Objective 2

Connections

Background Information

This lesson helps students understand *specialized structure* and *variation*. These terms are very similar in that specialized structures often vary across a species to accommodate different environments. This can be confusing to students. Use this lesson to solidify these two terms and their differences.

Discuss how specialized structures and variations help species survive in their environments. Point out the obvious creatures such as lions, cheetahs, giraffes, bears, and others that have obvious specialized structures. Write the names of two similar species on the board and have groups analyze them using Venn Diagrams for specialized structures. Then analyze the specialized structures based on variations from environment to environment.

To follow up, discuss humans and how we have many specialized structures that aren't so glamorous or exciting, but help us survive just the same. Using cooperative learning groups, students investigate specialized structures that humans have and tell how they help us survive in our environment. Each group presents what they think is the most important specialized structure on their list.

As a conclusion, discuss each of the *specialized structures* and decide if they might have *variations* in different species of animals.

Invitation to Learn

Ask for two volunteers to come up for an experiment. Wrap their hands with a few rounds of masking tape so that their thumb is immobile. Have them play a game of *Tic-Tac-Toe* on the board. The trick is to write without the use of their hands. After expected laughter and giggles, calm students down, take the tape off, and ask them to go ahead and play. When they are finished, ask how it felt not have use of their thumb. They probably didn't realize how important their thumb really was until then. Introduce the lesson with discussion about specialized structures. You may also incorporate a survival item such as opening a peanut for food.

Instructional Procedures

Materials

- ❑ PowerPoint presentation (optional)
- ❑ *Venn Diagram* worksheets
- ❑ Large Venn Diagram prepared with comparison of Chihuahua and Alaskan Husky
- ❑ *Human Body Outline* worksheets
- ❑ Four foot blank body outline on butcher paper (trace a student)

1. Write the terms *specialized structure* and *variations* on the board and have the students tell you what they mean. Instigate a discussion about how specialized structures help species survive in their environments. Point out the obvious creatures such as lions, cheetahs, giraffes, bears, and others that have obvious specialized structures. Talk about their specialized structures and what they allow them to do.

   Note: ADD POWERPOINT HERE IF POSSIBLE, or create transparencies from pictures found on the PowerPoint provided at the CORE Academy session.

2. Now narrow it down to a few different species. Write five different species pairs on the board such as Polar Bear/Grizzly Bear, Zebra/Mustang, Snowshoe Hare/Jackrabbit, Crocodile/Alligator, and Pelican/Woodpecker. Draw a Venn Diagram underneath each pair. Divide the class into five groups and assign each group one set of animals on the board. They have two minutes to think of the *specialized structures* the pair has in common. One representative from each group comes to the front to complete the center of the Venn Diagram with common specialized structures. While they are doing this, hang up a poster-sized Venn Diagram comparing a Chihuahua and an Alaskan Husky. Have five specialized structures written down the middle as an example for them. When their two minutes are up, have another representative present their findings to the class. Once each group has presented the specialized structures, have them move on to discussing variations.

3. Show the class your example of Chihuahuas and Alaskan Huskies. They have many specialized structures that are the same, but even

more interesting are the variations in those structures that help them survive in their environments. Talk about the different environments these members of the dog family live in. Would this affect their specialized structures? They both have fur, but does a Chihuahua need as much as the Husky to survive in Mexico? They both have claws, but an Alaskan Husky probably needs longer, stronger ones to actually kill his food (which is probably the size of the Chihuahua!). Complete each side of the Venn Diagram addressing the variations in the specialized structures; in the middle address what they have in common.

4. Have students think of how their specialized structures might vary for each animal. They may find that some of them don't vary much at all (zebra's hooves and mustang's hooves might not be different enough for a fifth grader to point out). Have a representative write their findings on either side of the Venn Diagram.

   Note: Either continue with the remainder of the lesson the next day or shorten the first section to fit it into one day.

5. It is good to have the students relate what they have learned back to their own species. Discuss humans and how we have many specialized structures that aren't so glamorous or exciting, but help us survive just the same. Put the students into different cooperative groups and give them a *Human Body Outline* (p. 7-10). Have them come up with at least five different specialized structures that we have and tell how they help us survive in our environment. Each group presents what they think is the most important specialized structure on their list. Hang a four-foot outline of a fifth grader on butcher paper on the board. Each group sends a representative up to draw the specialized structure with quick explanations on the body. Once all groups are done, review and talk about each of the specialized structures and decide if we even have variations. Propose the situation of one student whose family has lived in the northwestern part of the world for generations and generations—hundreds of years. Compare to a student from Africa or Alaska whose family has lived there for generations and generations. Would they have variations? YES!

6. Go through each of the specialized structures listed on the class body and discuss what variations might be there—skin color, skin thickness, eye color, hair color, hair texture, facial shape, body structure differences, feet, toes, body hair, etc.

Possible Extensions/Adaptations/Integration

Language Arts

- Students complete a creative writing assignment on two to three specialized structures or variations they wish they had. You could give them a story line with the main character, villain, and problem, then let them come up with specialized structures and variations that would help them solve the problem. Involved in the plot could be a different environment that might spark their imaginations as to what kind of specialized structures and variations to give themselves!

Math

- Create a worksheet that introduces students to a new type of species with three very specific specialized structures. Introduce three possible variations for each specialized structure. Have the students calculate how many different combinations can be made to see how many truly different subspecies there could be of this new organism.

Writing Extensions

- After completing the discussion on human specialized structures and their variations, have students write a summary of what a specialized structure is and why it is important to survival. Include why specialized structures vary and give an example of a variation.
- To turn this into a more in-depth expository or research writing assignment, provide one to three paragraph summaries on different animals for the students to use in their assignment. (First or second-grade level animal books work great for this because the information is simple and easy to read. The students won't get overwhelmed with the material they need to read and summarize.)
- They can do a mini-research report on a particular animal focusing on its specialized structures and its variations for its particular subspecies. These reports act as an assessment tool where students give examples of the specialized structures and variations and explain how they are related to survival in the animal's environment.

ESL and Special Needs Learners

- The PowerPoint presentation comes in handy for students with special needs and ELL learners. Visual images help them follow the presentation and be more involved in the comparing process. If a PowerPoint presentation is not available, having pictures of the animals you are comparing is crucial to helping the new ELL student glean substance from the lesson. All learners are more stimulated with pictures of the animals to refer to.
- Group your low achieving and ELL students with others who will work with them and not do the brainstorming for them.
- In some cases it might help for you to have special needs students work with you on your dog Venn Diagram. If you do not have pictures for all the animals, try to have them for this pair.

Gifted and Talented

- Encourage students to do further research on their animal pairs. Pairs of students study one of the animal pairs and provide the class with a mini-report on their findings.
- If students have been trained in PowerPoint, they can create a presentation with additional pictures and photos from CD encyclopedias of their animal pairs.
- Provide modeling clay and embellishments for pairs of students to create pairs of animals in the same species. They must show five variations on five specialized structures.

Assessment Suggestions

- Give the students paper with pictures of a pair of similar animals in the same species. Have them construct a Venn Diagram showing their specialized structures and fill in the variations that go along with each. Give at least five answers in each part of the Venn Diagram. On the bottom of the sheet, explain why there are variations in specialized structures. They should be able to tell you that it is due to the different environmental needs for survival.

Additional Resources

Web sites

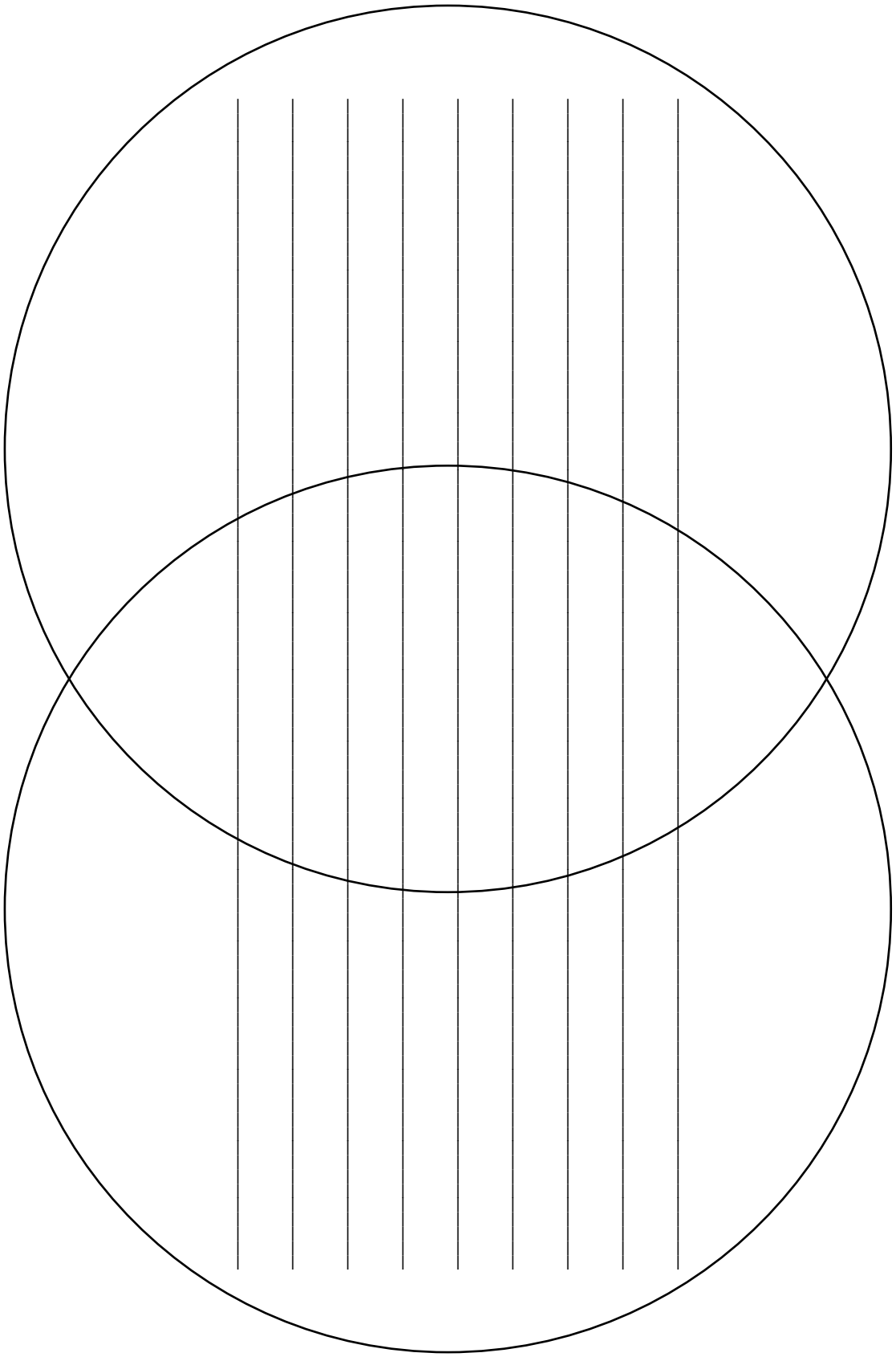
A fun smiley face lesson on traits and variations.
http://sciencespot.net/

How to extract DNA from wheat germ—fun demonstration
http://gslc.genetics.utah.edu/units/activities/wheatgerm/

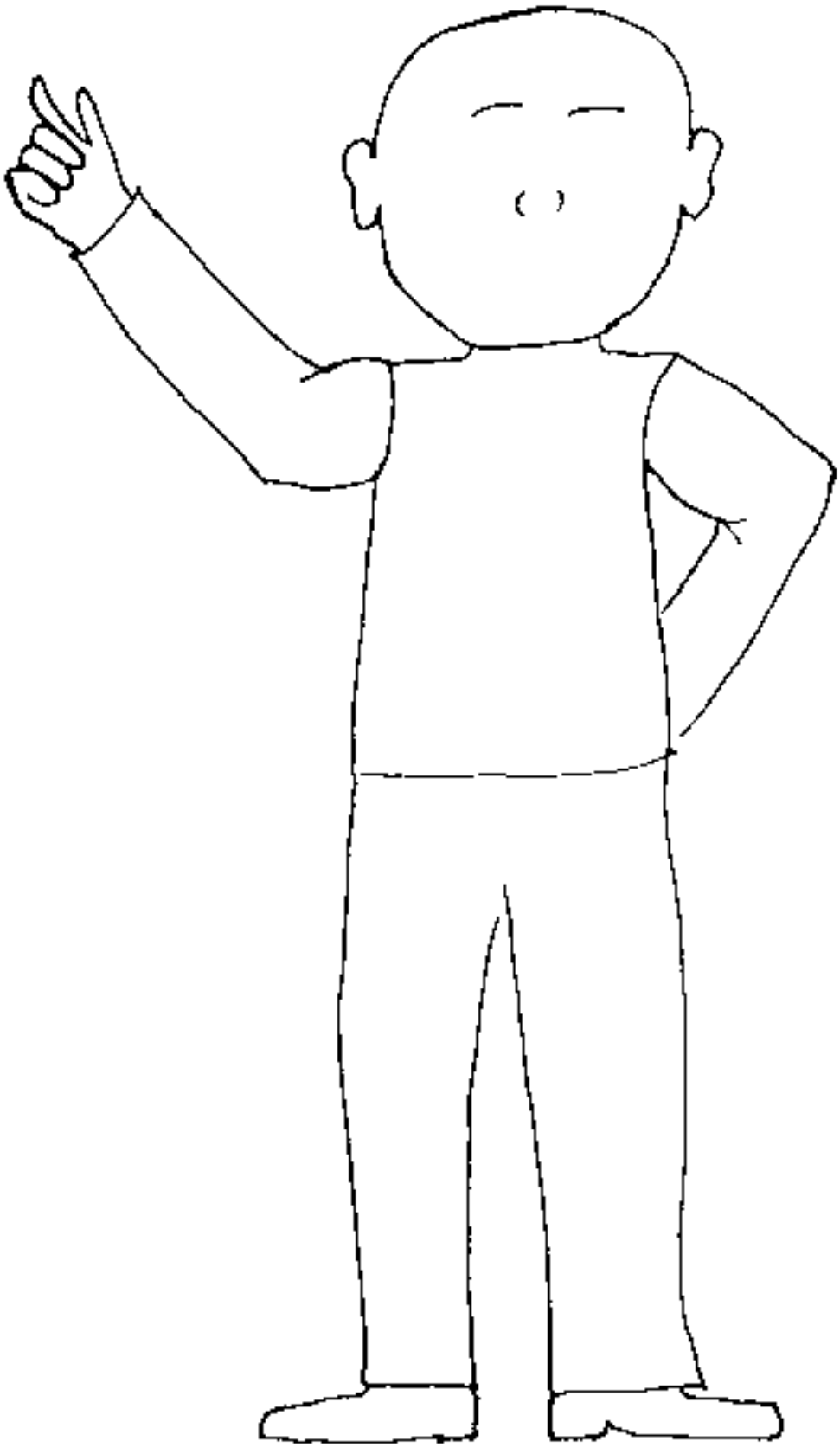
Family Connection

- Have students create and take home a matching game of two similar species and the specialized structure that they share. It could be played like *Go Fish*. Twenty sets of animals is sufficient. Students tell the variation in the specialized structure for each animal when they get a correct match in order to keep their cards.

Venn Diagram and _____



Human Body Outline



The Planet Wakyabi

Science Standard V:
Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

Objective 2:
Describe how some characteristics could give a species a survival advantage in a particular environment.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts I-2, VIII-1, 6; Science II-1, 2; Social Studies VI-3

Science Standard V

Objective 2

Connections

Background Information

This lesson focuses on students understanding how organisms' *specialized structures* and *variations* work with the environment to help them survive. Previous discussion of each of these terms separately is advised, but not necessary. If you have not taught each of these, take it a little slower in the beginning and give more examples of the vocabulary terms in the discussion. This is a good lesson to help students see how they all work in tandem.

Discuss planet Earth and how it has many different types of habitats. Describe how different locations on Earth have different weather conditions that change throughout the year. Introduce students to the Planet Wakyabi—a large planet drawn on a poster board. It shows mountains, marshes, volcanoes, jungles, deserts, and more, identified in a key. Students will describe the different landmasses by the key symbols and name them. Students come up with the different habitats in the world while you write the information on the poster. It is the students' job to inhabit the planet with animal, humanoid, and insect life forms. Each student is assigned a different landmass and a different type of species to create. Discuss the need to pay attention to the environment assigned and give their species particular specialized structures and variations to ensure its survival. When finished, share with the class.

Invitation to Learn

Ask, "If tomorrow a strange chemical filled the air and we all suddenly grew massive coats of fur that couldn't be shaved off, how might that change the way we live?" Have the students consider the

question for a moment silently and then call on students for answers. Listen for students moving to colder climates because it is too hot with their new fur coats. See if they pick up on how that variation might change what type of environment we choose to live in. Transition into the lesson. Refer to the opening question at the end of the lesson to determine student understanding of this concept. An optional *Quick Introduction for Planet Wakyabi* is provided on p. 7-15.

Instructional Procedures

Materials

- ❑ *Quick Introduction for Planet Wakyabi* (optional)
- ❑ Large Poster of *The Planet Wakyabi*
- ❑ *Organism Description* handout
- ❑ *Humanoid of* ___ handout
- ❑ *Animal of* ___ handout
- ❑ *Insect of* ___ handout
- ❑ *The Planet Wakyabi Mix and Match for Survival Test*
- ❑ Colored pencils, crayons, markers

1. Brainstorm the Earth's many different types of habitats. List them on the board as students brainstorm (e.g., hot, cold, wet, humid, dry, rocky, flat, marsh areas, etc.). Discuss how different locations on the planet have different weather conditions and how it changes throughout the year as we rotate around the sun. Some areas are always consistent—which ones? (The poles and the equator—always freezing and always hot.)
2. Now introduce them to the *Planet Wakyabi* (p. 7-16)—a large planet drawn on a poster board. Show mountains, marshes, volcanoes, jungles, deserts, and more, using a key and symbols. Don't describe the different areas beforehand. Instead, have the students describe what the different symbols probably stand for. As they decide, write what they are on the key. Guide the discussion so you end up with different landmasses with various habitats. Discuss the weather of each area and what it would be like according to where it is (close to the poles/equator, etc.). Write the description on the map. Choose students to name the landmasses like countries.
3. Discuss the probability of Planet Wakyabi having many different types of organisms living there. The organisms have interesting variations and specialized structures that allow them to survive on the different parts of the world. Imagine that this is a world like ours was millions of years ago—no cars, planes, refrigerators, roads. What kinds of specialized structures would humans, animals, and insects need to survive?
4. It is the students' job to populate Planet Wakyabi. They will be creating a *Humanoid* (p. 7-18), *Animal* (p. 7-19), or *Insect* (p. 7-20), *Animal* (p. 7-19), life form to populate one of the landforms on the planet Wakyabi. Each student is assigned a different type of species to create (for variety). You can decide if you want to assign landmasses or allow students to decide where the new life form is going to live. Pay attention to the environment and give their species particular specialized structures and variations to ensure its survival.

5. Students must add at least three specialized structures to their animal in order to help it survive. When they are finished creating and coloring their animal, insect, or humanoid, write a descriptive summary using the *Organizm Description* handout (p. 7-17) about their organism (one to two paragraphs), describing the three main variations. Remind them to use vocabulary terms in their summary.
6. Share the new species with the group. Use the discussion time to point out how the environment, specialized structures, and variations all work together to help the species organism survive. Display pictures and descriptions in the hall with Planet Wakyabi.

Possible Extensions/Adaptations/Integration

Language Arts

- Students write fictional stories about the organism they created for Planet Wakyabi and an adventure on the planet. As a class, brainstorm a dangerous plot that threatens the survival of all organisms on the planet. Students write individual stories about what happens to them and how their organism survives using its variations and specialized structures. Read stories aloud and compare. Have students vote on their favorite ending.

Science

- This lesson is a good opening/connecting lesson into a science unit on landforms. Students enjoy revisiting this planet and talking about how the environments and their inhabitants change with earthquakes, volcanic eruptions, erosion, etc.

Social Studies

- Study the great waves of immigration the United States felt at the beginning of the 1800's and the 1900's and discuss how the "melting pot" of America mixed variations in humans that were separate for hundreds of years.

Writing Extension

- Create a graphic organizer with three triangles around a center triangle. Have each outer triangle say the words *specialized structures*, *variations*, *environment* and the inside one say *survival*. The students describe and give an example of what each of these words are and explain how they work with each other.

Triangle Graphic Organizer

ESL/Special Needs Students

- It is easier for some students to take an animal that already exists and make changes to it instead of coming up with an entirely new species. Some students need a brainstorming session to help them think of neat specialized structures—get their ideas flowing with questions such as, "If you could be any animal, what would it be? Why? What can it do that you like? Maybe you should put that on your animal? What other animals do you like?" Their new species may end up a hodge-podge of many other existing animals!

Gifted and Talented

- Allow students that are caught up in the project or finish early to create plant species or oceanic organisms for Planet Wakyabi. Be sure to include a written description of the new organism.

Assessment Suggestions

- Students complete *The Planet Wakyabi Mix and Match for Survival Test* (p. 7-21).
- Provide the definitions of *specialized structure, variations, environment,* and *survival*. Have the students write a short story about a fictional pair of animals. They must correctly use the four terms in context to demonstrate understanding of meaning and how they work together.

Additional Resources

Discoveryshool.com—There is a great lesson plan called *Reptile Adaptations* that would be a valuable precursor to this lesson or a useful follow-up.

Family Connections

- Students take their species home and share it with their family. A sibling or parent can help add more variations to share with the class.
- Students take a blank organism form home and invite their family members to create a new species that lives in the Wakyabi oceans.
- Have students research the wildest specialized structure they can find on the Internet of an animal, plant, or insect. Share with the class.

Quick Introduction for Planet Wakynabi

There once was a town in England that had a large population of moths in the woods. The moths were the same species, but had a variation. There were a group of moths that had light colored wings and another group that had dark colored wings. The light colored population was much bigger than the dark group because they blended into the light birch trees much better. Because they were more hidden, they hid easily from predators such as birds and spiders. Soon a factory came to the countryside. An interesting phenomenon happened to the environment. As the years passed and the smoke stacks from the factory poured out grimy pollution, the trees' bark became darker. When the population of moths was measured once again (about 20 years after the first time) they found an interesting change. The population of dark colored moths had gone up and the population of light colored moths was virtually extinct.

Why is that? Because the ENVIRONMENT changed. When the ENVIRONMENT changes, we find that sometimes VARIATIONS in a species SPECIALIZED STRUCTURES don't work as well. If the VARIATIONS aren't helping the POPULATION to blend in and protect themselves, then they probably won't SURVIVE.

In this case, the dark colored moths now had a great environmental situation for their variations and their specialized structures worked really well!

Intro to Terms for this Lesson

Write on Board and Describe/Give Examples:

Population—the number and kind of organisms in an area

Environment—the surroundings in which an organism lives

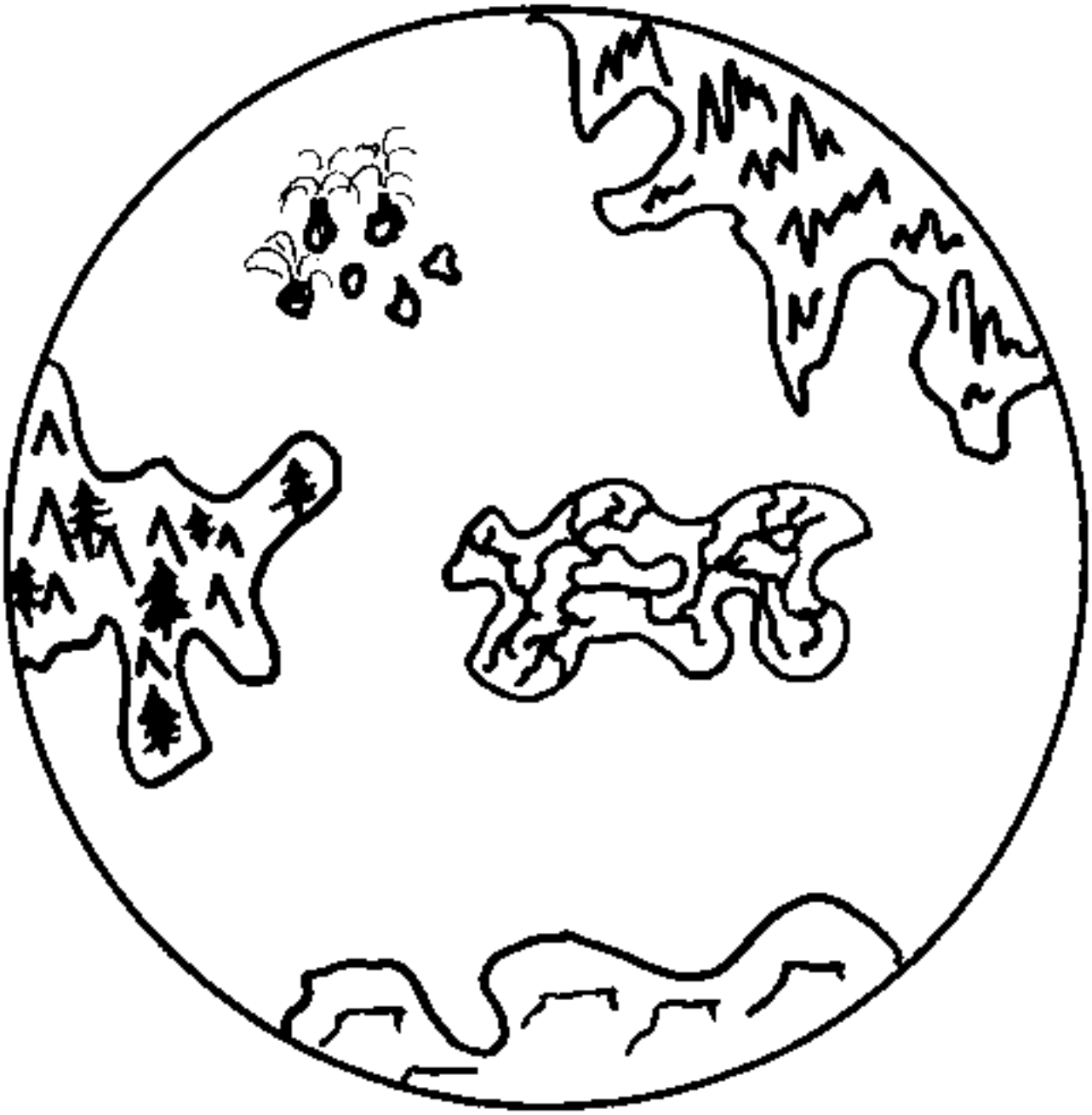
Survival—the continuation of life

Specialized Structures—body parts which help an organism survive

Variations—differences in the appearances of specialized structures or traits (that can help us survive in our environments)

Name _____

The Planet Wakyabi



Organism Description

_____
Name of Organism

Specialized Structure: _____
_____
_____

Specialized Structure: _____
_____
_____

Specialized Structure: _____
_____
_____

Location on Wakyabi: _____
Creator: _____

_____
Name of Organism

Specialized Structure: _____
_____
_____

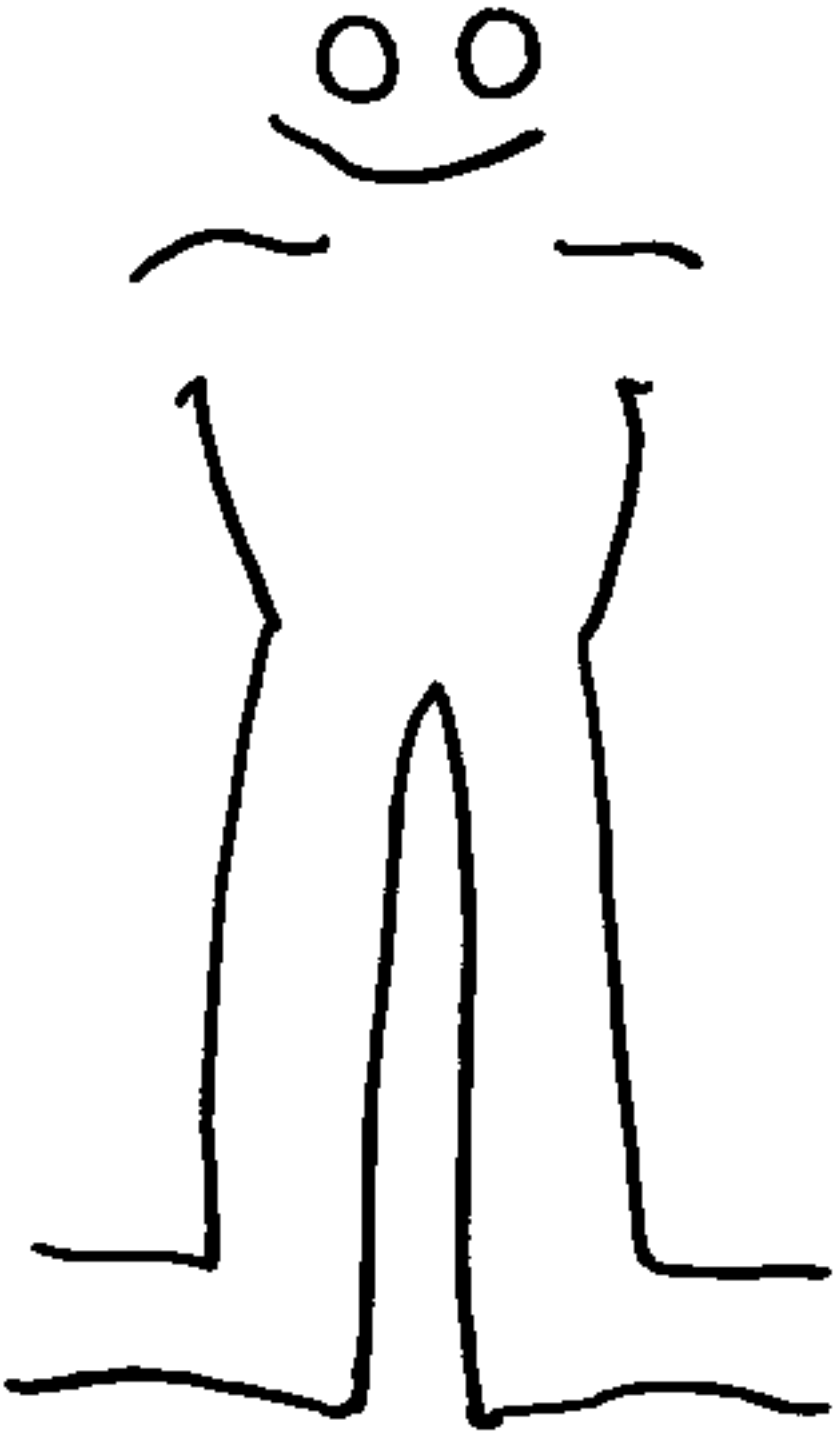
Specialized Structure: _____
_____
_____

Specialized Structure: _____
_____
_____

Location on Wakyabi: _____
Creator: _____

Name _____

Humaniod of _____

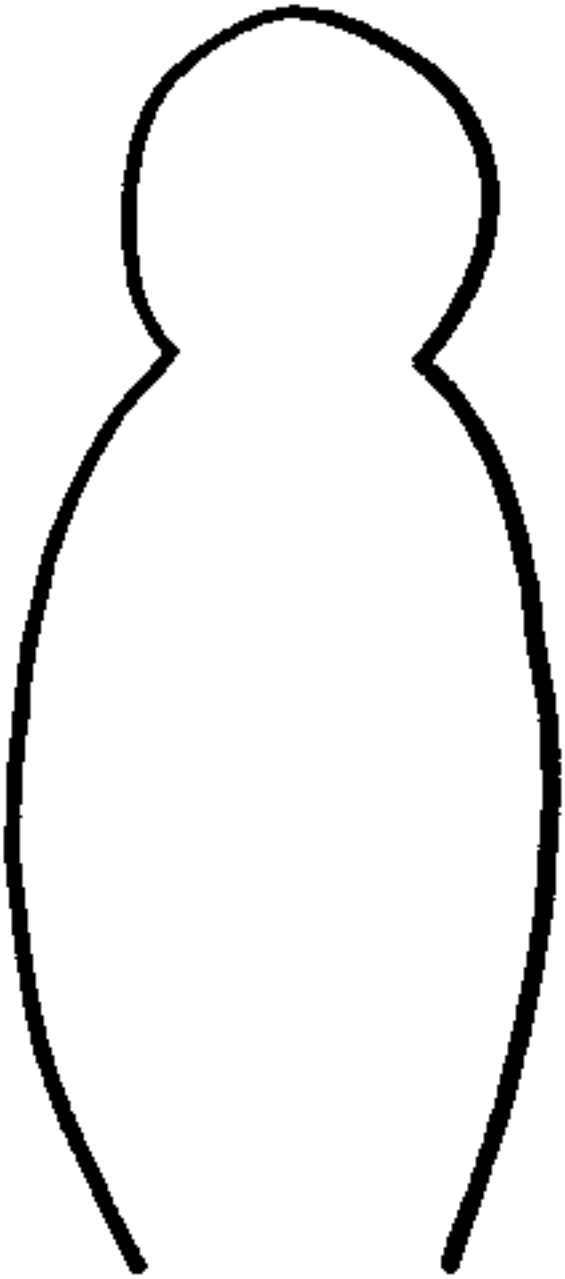


Name _____

Animal of _____

Name _____

Insect of _____



Name _____

The Planet Wakyabi
Mix and Match for Survival Test

Match the different species up with their specialized structure and environment for their survival.

Species	Specialized Structure	Environment
Polar Bear ____ ____	A. Long beak with a pouch.	1. Dark Corners
Bumble Bee ____ ____	B. Huge ears to disperse heat.	2. Africa Near Tall Trees
Recluse Spider ____ ____	C. Long, wide tail for swimming.	3. Arctic Tundra
Pelican ____ ____	D. Stripes blend with tall grass.	4. Forest Bottoms
Giraffe ____ ____	E. Ability to change color.	5. Desert
Crocodile ____ ____	F. White Fur	6. Desert
Jackrabbit ____ ____	G. Water repelling feathers.	7. Arctic Icebergs
Squirrel ____ ____	H. Long beak for insects.	8. Lilypads
Frog ____ ____	I. Hard outer shell.	9. In the Ocean Sand
Chameleon ____ ____	J. Large cheeks for nut gathering.	10. By the Seashore
Tiger ____ ____	K. Legs with tiny hairs for pollen.	11. Flowers
Penguin ____ ____	L. Powerful back legs for jumping.	12. Forest Trees
Crab ____ ____	M. Ability to spin webs.	13. Swamps
Woodpecker ____ ____	N. Five foot long neck.	14. Africa in the Grasslands

TEACHER KEY

The Planet Wakyabi
Mix and Match for Survival Test

Match the different species up with their specialized structure and environment for their survival.

Species	Specialized Structure	Environment
Polar Bear F 3	**A. Long beak with a pouch.**	**1. Dark Corners**
Bumble Bee K 11	**B. Huge ears to disperse heat.**	**2. Africa Near Tall Trees**
Recluse Spider M 1	**C. Long, wide tail for swimming.**	**3. Arctic Tundra**
Pelican A 10	**D. Stripes blend with tall grass.**	**4. Forest Bottoms**
Giraffe N 2	**E. Ability to change color.**	**5. Desert**
Crocodile C 13	**F. White Fur**	**6. Desert**
Jackrabbit B 5 or 6	**G. Water repelling feathers.**	**7. Arctic Icebergs**
Squirrel J 4	**H. Long beak for insects.**	**8. Lilypads**
Frog L 8	**I. Hard outer shell.**	**9. In the Ocean Sand**
Chameleon E 5 or 6	**J. Large cheeks for nut gathering.**	**10. By the Seashore**
Tiger D 14	**K. Legs with tiny hairs for pollen.**	**11. Flowers**
Penguin G 7	**L. Powerful back legs for jumping.**	**12. Forest Trees**
Crab I 9	**M. Ability to spin webs.**	**13. Swamps**
Woodpecker H 12	**N. Five foot long neck.**	**14. Africa in the Grasslands**

Twins–Comparing Behaviors: Instinct vs. Learned Behavior

Science Standard V:
Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

Objective 1:
Using supporting evidence, show that traits are transferred from a parent organism to its offspring.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts VII-3; Math V-1; Health Education V-3

Science Standard V

Objective 1

Connections

Background Information

The idea that some behaviors are actually inherited is a hard concept for students to grasp. It's easy when discussing barking dogs or purring cats, but when you try to tell them that some of their actions are instincts, they have a hard time discerning those from learned behaviors. Make a list of behaviors on the board with the help of the students. Then go back through the list with two symbols, one for instinctive and one for learned. See if the students can decide which behaviors are which. Most of the behaviors will probably have both symbols, because it is hard to tell which human behaviors are learned and which are instinct.

Once students are sufficiently perplexed, watch a video to demonstrate that some behaviors are truly genetically determined. Refer back to the class list of behaviors and see if students have a different opinion on some of the behaviors after watching the video. Have them make a list of their own behaviors for further investigation. For homework, students interview their parents to determine which behaviors that they, their parents, grandparents, aunts, uncles, cousins, etc. share by genes.

Invitation to Learn

Ask students to raise their hand if they have a pet. If they do, have them describe some funny things they do. As they tell their behaviors, ask them to decide if it is something their pet has learned (playing dead, rolling over, coming to their food dish at the sound of a rustling bag) or if it is something instinctive to their species (barking at cats, playing with their tails, pouncing). Tell them that these are obvious behaviors. You can tell if they are learned from their surroundings or if they would act that way no matter where they were. Sometimes it's not so easy to tell.

Instructional Procedures

Materials

- ❑ *The Mystery of Twins* video
- ❑ *Behavior Investigation Chart*
- ❑ *My Conclusions* worksheet

1. Ask students to describe a behavior that they notice, or somebody else has noticed, that they do (they giggle a lot, they are very serious, quiet, surly, jolly, excitable, etc.). If they can't come up with one, give them an example from your own plethora of behaviors (I am loud and like lots of people around me.). Ask them why they think they act that way. Why do you act the way you do? Let them think about this a little.
2. Begin a list of behaviors on the board. Tell students that you want at least one type of behavior from each of them. It doesn't have to be one of their own behaviors, but some kind of act/behavior they have seen, do themselves, or know of. Call on students one at a time, writing their suggestions on the board.
3. Tell the students that there are two ways that they get their actions and behaviors. First, and sometimes most obviously, their behaviors come from their environment. Their surroundings are the easiest place for them to attribute their actions. They will be the first ones to say, "Well, I'm pretty hyper, but my house is a fun and crazy place. We're all pretty quiet at my house because my dad likes the silence. I mess around with art supplies because there's nothing else to do at my house." They understand that there is something in their environment that has influenced them to be the way they are. If you ask them if they think they would act differently if they were raised in a different home, they will almost always say yes.
4. Give them a twist—ask if they might consider the idea that perhaps they play with art supplies because they are genetically (instinctively) inclined to do so. With a little investigation they might find a great grandfather who loved to paint. Their enjoyment of art might be instinctive, not just a matter of finding something to do in the family room. Have them stop and think

about their personalities. Is one of their parents like them in more ways than one? A quiet, passive personality can be learned and passed on through inherited traits.

5. Revisit the behavior list, using two distinct symbols to make instinctive and learned behaviors. See if the students can decide which behaviors are which. *Most of the behaviors will probably have both symbols,* because it is hard to tell which human behaviors are learned and which are instinctive.
6. Once they are sufficiently perplexed, watch parts of *The Mystery of Twins* video to demonstrate that some behaviors are truly genetically determined. The video has great examples of twins who were separated at birth, raised in different environments, yet share instinctive behaviors.
7. Refer back to the class list of behaviors and see if students have a different opinion about some of the behaviors after watching the video. Help them see that it is difficult to determine which behaviors are instinctive or learned, but that we definitely get our behaviors from both.
8. Have students complete the *Behavior Investigation* chart (p. 7-29). Complete the portion of the chart in the ME section during class. If they already know some behaviors they share with their parents, siblings or cousins, etc., they can fill those in, also. Students interview their parents and determine behaviors that they, their parents, grandparents, aunts, uncles, cousins, etc., share by genes. Parents are very helpful with this because they often recognize behaviors in their children that they know they have, and vice versa. They are able to help in finding similarities with aunts, uncles, and grandparents who the children might not know as well. Students complete the chart and share at least one discovered inherited behavior with the class.

Possible Extensions/Adaptations/Integration

Math

- Students create a new word as a class. Make it a weird funny word and give it a meaning. For a month, tell the students to use the word everyday at school, at home, at recess, etc. around all of their friends and family. Have them tell you when they hear someone outside the class use the word in natural speech. Keep a line graph in the class through the month of how often the students hear other people use their word. This is a great example of people subconsciously learning new words from the

environment around them. Analyze the graph at the end of the month. Use of the word should rise dramatically (as long as the students are using the word regularly).

Character Education

- Use the activity to talk about how our actions and the words we use can subconsciously be learned by those around us. With that, it shows how we can be changed by who we associate with. The words we use (foul language included) are often peppered with the words we hear regularly. Our actions reflect the actions of those we hang around. Therefore, we should surround ourselves with people we like and admire, so that we will reflect their likeable behaviors.

Writing Connections

- Following the discussion on the discoveries from the home assignment, have students complete the *My Conclusions* worksheet (p. 7-30). They should write at least two paragraphs. One paragraph should explain what an instinct is, and include at least one example from their research of a personal instinct they discovered in their family. The second paragraph should explain what a learned behavior is, and include at least one example of a behavior they do that they think came from their environment. conclude with a third paragraph of their opinion of the nature vs. nurture theory. Do they think we get our behaviors mostly from our genes, or are they mostly learned? Responses should be interesting and very telling as to how much students understood of the overall concept.

ESL/Special Needs Students

- ELL students who are fairly new to the language have an easier time drawing pictures of things they like to do and of their behaviors. Students with special needs, depending on their abilities, benefit from drawing their behaviors as well. Other options would be to give them a simpler chart to complete with only a ME and a PARENTS side. They would only be comparing their behaviors with their parents, instead of multiple people.

Gifted Students

- Challenge students to look into their ancestry, interview grandparents about great or great-great grandparents and their behaviors. See if they can find an inherited behavior that has been passed on through more than two generations. Students who enjoy this can research more information on twins separated at birth and the studies that have been done about them.

- Students may enjoy conducting their own Learned Behavior Study by observing their family at home. Have them watch their siblings for actions that are similar to their parents. They should keep a log for a month and share their observations with their family for a good laugh, and the class as a fun reminder of the lesson.

Assessment Suggestions

- Give students a list of ten example behavior situations and have them tell if it is instinct or learned and WHY (in their opinion). You are not really looking for a "right" answer. Rather, can they support their answer with correct logic? Some behaviors should be obviously learned (The phone rings and I walk over and pick it up), some obviously instinctive (I jump when I am startled), and some that are a bit in between (I sing in the shower just like my mom).
- Give students example behaviors and reasons why those behaviors are in place and see if they can give them the correct label, INSTINCT or LEARNED BEHAVIOR (e.g., I am scared of spiders. When I was little my brother would throw big fake black ones on me. They should write LEARNED as their answer.).

Additional Resources

Web sites

A fun nature vs. nurture lesson called *Genetics,* http://www.Discoveryschool.com

A great lesson on *Animal Instincts*, http://www.Discoveryshool.com

Genetics Education Center, http://www.kumc.edu/gec/

Games for kids to learn about genetics, http://www.genetics.gsk.com/kids/index_kids/htm

Information on cloning, http://www.bbc.co.uk/genes./index.shtml

Video

The Mystery of Twins, (Unapix, available through Amazon.com); ASIN: 1575238535

Family Connections

- Send a sealed letter home to the parents challenging them to try to change a simple behavior of their child subconsciously in one month. Without telling the students, have the parents choose a certain way they are going to answer the phone such as "Hello, Williamson Residence" or "Williamson's" or "Hello this is _____." Have them choose something distinctive and different than just "Hello." See if over a month of just listening to their parents answer the phone this way, the students will switch over to it subconsciously. At the end of the month, send a paper home for parents to complete about their participation and the results. Share in class.

Name _____

Behavior Investigation Chart

Me	Parents	Siblings	Grandparents	Relatives

My Conclusions

_____'s Conclusions About Instincts vs. Learned Behaviors

What do you think about how you got your behaviors?
What was the most interesting thing you learned?

_____'s Conclusions About Instincts vs. Learned Behaviors

What do you think about how you got your behaviors?
What was the most interesting thing you learned?

Science
Standard IV
Activities

Zapped!

Science Standard IV:
Students will understand the features of static and current electricity.

Objective 1:
Describe the behavior of static electricity as observed in nature and everyday occurrences.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts VII-5, 6

Science Standard IV

Objective 1

Connections

Background Information

When you shuffle across a carpet and touch a metal doorknob you may get zapped! You may feel a tiny electric shock as a spark jumps from you to the metal. This sort of electricity is called *static electricity*. It can make your hair stand on end, attract dust to the television set, or stick a balloon to the wall. It can cause your clothes to stick together as they come out of the dryer. Static electricity builds up charges in one place. It is stationary. When it discharges, it becomes *current electricity*.

Invitation to Learn

"Romeo, Romeo, where art thou, Romeo?" (Juliet flings left arm out and bends right arm with hand on chest and exclaims. . .

"I'm Juliet Electron and I'm looking for Romeo Proton. Will you (point to students) help me find him?"

When you walked across the carpet on a dry winter day and touched someone . . . Zap!. . . a small electrical shock happened. This is called static electricity, or the story of Romeo Proton and Juliet Electron. Static electricity is a buildup of charges on non-metallic materials. When objects are rubbed, their electrons move from one atom, or material, to another causing an unbalance in charges and creating an electric current. Electrons have a negative charge and the materials that lost the electrons become positively charged by the same amount. Electrons aren't really lost, they just move.

When you walked across carpet you picked up extra Juliet Electrons. When you extended your finger to touch Romeo Proton, the extra electrons on you caused the electrons on neutrally balanced Romeo to move away from your finger. This caused a positive charge on Romeo.

"A-ha!" exclaims Juliet.

Romeo now has a positive charge and all the extra electrons on Juliet are attracted to positively charged Romeo. (opposite charges attract)

Your lovebird, Juliet Electron, is not going to stay stationary any longer. An electric current has developed. When she sees Romeo Proton getting closer, she runs to him and gives him a shock! (Juliet, spying Romeo, runs toward him, extends her finger, touches his ear and he pretends to receive a shock.) It's static electricity! (End of play. Thunderous applause!)

Instructional Procedures

Materials

- ❑ *Station Directions*

Students are given the same opportunity to experiment with static electricity. The room is setup into six stations—two of each as outlined below. Place materials for each station on a table, including a station sign and *Station Directions* (p. 8-7). Students rotate from one station to the next approximately every seven minutes until they have participated in each station. They write what they observe at each station and include drawings in a science journal.

Station 1—Snake Charmer

Materials

- ❑ Ten strings 15 inches long (five cotton and five yarn)
- ❑ Five balloons, blown up and tied
- ❑ Wool cloth

1. Charge the end of the balloon with the wool cloth by rubbing it for 60 seconds.
2. With the end of the balloon, pick up the string without touching it.
3. What did you observe? See how high you can raise the string. Try picking up the yarn with the end of the charged balloon without touching it. Record your observations in a science journal.

Explanation: The charged end of the balloon gains electrons from the wool cloth, thus building up a negative charge. The string is neutral until attracted by induction to the balloon. (OPPOSITES ATTRACT.)

Station 2—Romeo and Juliet

Materials

- ❏ *Romeo Proton* and *Juliet Electron* necklaces
- ❏ Wool socks or nylons (optional)

1. Pick one Romeo and Juliet from your group. Don the appropriate necklaces. Juliet Electron shuffles his/her feet on the carpet and heads for Romeo Proton with an extended finger. Try building up a charge and touching other metallic items in the room.
2. Write a paragraph about what you observed. Include opposite charges attract, static electricity is stationary, it is a build up of charges until it discharges, then it becomes current electricity. Record your observations in a science journal.

Explanation: Juliet builds up a negative charge from the electrons gained from the carpet. Romeo becomes positively charged by induction. (OPPOSITES ATTRACT)

Station 3—Balloon Games

Materials

- ❏ Ten balloons blown up and tied
- ❏ Wool cloth
- ❏ Ten pieces of string cut 24 inches long, one tied to each balloon

1. Hang both balloons by their strings from a student's desk about two inches apart. Tape the string to the desktops. How do they react to each other? Record your observation in a science journal.

Explanation: The balloons are neutral and should not react to each other.

2. Charge the side of one balloon that faces the other balloon by rubbing it with a wool cloth for one minute. Make a drawing showing how the balloons react to each other. Label the drawing, telling what you did and how they reacted.

Explanation: The charged balloon will attract the other balloon because the wool cloth will have left extra electrons on the balloon, giving it a negative charge. When the negatively charged balloon is brought near the neutral balloon, it induces a positive charge near the surface of the balloon. The negative charges on the neutral balloon will separate and run away, and the positive charges will be attracted to the charged balloon. (OPPOSITE CHARGES ATTRACT.)

3. Rub both balloons for one minute with a wool cloth on the sides FACING each other. Draw how they reacted to each other and record what you did to the balloon to cause that reaction.

Explanation: Rubbing creates a gain of electrons on both balloons, causing them to repel. (LIKE CHARGES REPEL.)

Possible Extensions/Adaptations/Integration

Floating Halo

Materials

- ❑ One Christmas tree icicle tied into a small circle (the thin hanging kind)
- ❑ One 9-inch square of 1/2-inch Styrofoam building insulation
- ❑ One 8-inch aluminum pie plate with a plastic drinking cup taped to the center (see diagram).

Since Juliet was practicing devilish pranks on Romeo, let's end by seeing how "near to the angels" some of you may become with a halo activity.

1. Rub the Styrofoam for 60 seconds with the wool cloth.
2. Holding the pie plate by the plastic cup, set it on the Styrofoam.
3. Place your finger close enough to the pie plate to receive a shock. Don't touch the pie plate.
4. Pick up the pie plate by the cup handle, turn it over and hold it away from you.
5. With the other hand, hold the circular icicle six inches above the pie plate.
6. Let go of the icicle. It will float after it hits the pie plate. Move the plate around to keep the halo floating.
7. Explain what you observed.

Additional Resources

Book

Hands-on Physical Science Activities, by Marvin N. Tolman; ISBN 0-13-230178-4

Web site

www.usoe.k12.ut.us/science/core/5th/sciber/5/romeo/default.htm

Family Connections

- Build an electroscope using the *Making Electroscope* handout (p. 8-9). Students design an electroscope with their family and conduct the experiment at the bottom of the page. Complete the *Electroscopes* handout (p. 8-10) and share with the class. Encourage students to design additional electroscope experiments.

Station Directions

Station 1—Snake Charmer

1. Charge the end of the balloon with the wool cloth by rubbing it for 60 seconds.
2. With the end of the balloon, pick up the string without touching it.
3. What did you observe? See how high you can raise the string. Try picking up the yarn with the end of the charged balloon without touching it. Record your observations in a science journal.

Station 2—Romeo and Juliet

1. Pick one Romeo and Juliet from your group. Don the appropriate necklaces. Juliet (electron) shuffles his/her feet on the carpet and heads for Romeo (proton) with an extended finger. Try building up a charge and touching other metallic items in the room.
2. Write a paragraph about what you observed. Include opposite charges attract, static electricity is stationary, it is a build up of charges until it discharges, then it becomes current electricity. Record your observations in a science journal.

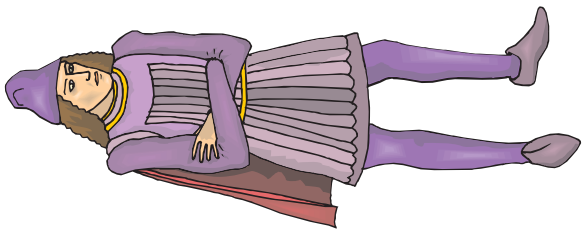
Station 3—Balloon Games

1. Hang both balloons by their strings from a student's desk about two inches apart. Tape the string to the desktops. How do they react to each other? Record your observation in a science journal.
2. Charge the side of one balloon that faces the other balloon by rubbing it with a wool cloth for one minute. Make a drawing showing how the balloons react to each other. Label the drawing, telling what you did and how they reacted.
3. Rub both balloons for one minute with a wool cloth on the sides FACING each other. Draw how they reacted to each other and record what you did to the balloon to cause that reaction.

Romeo and Juliet Necklaces

Romeo

Proton

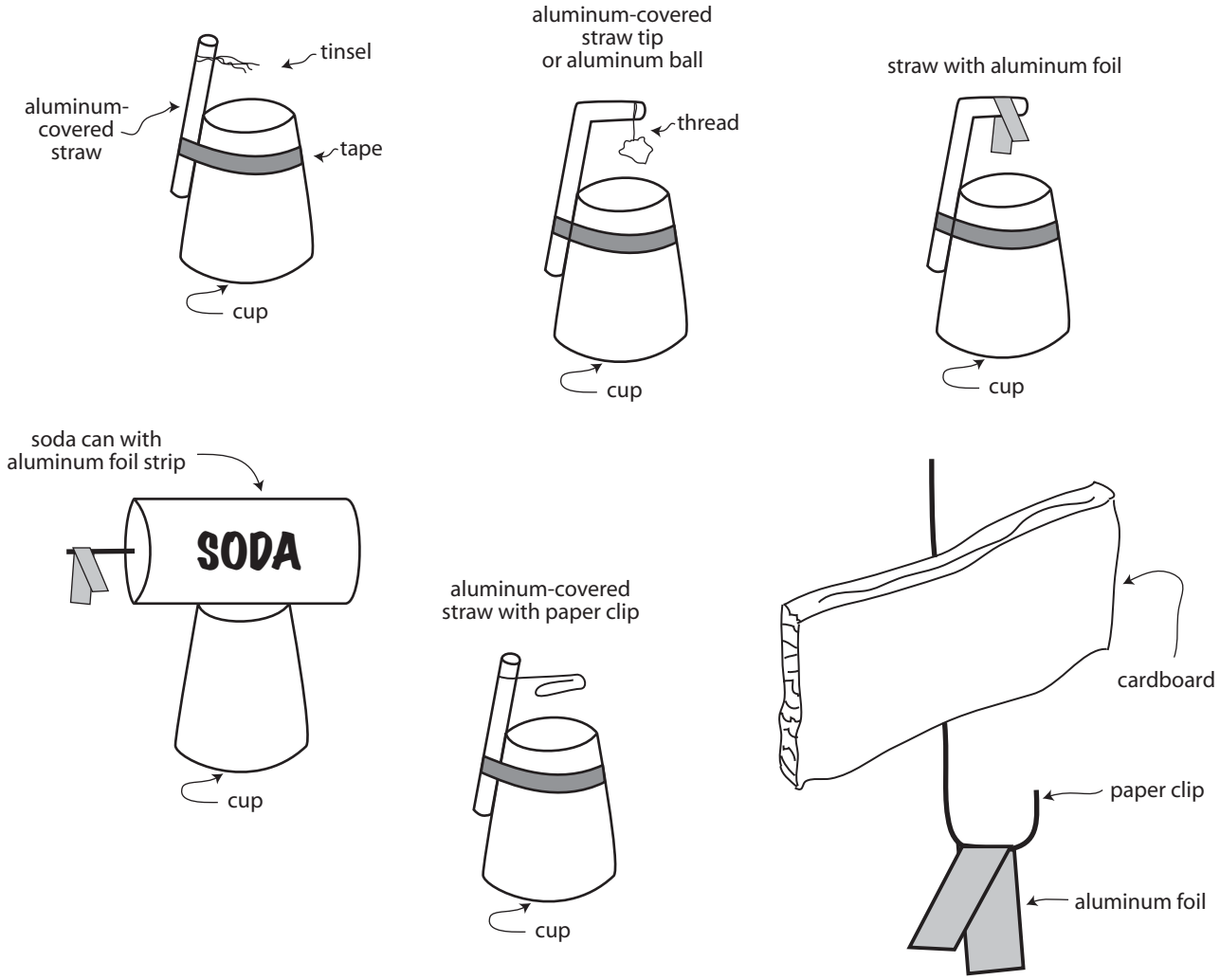


Juliet

Electron

Making Electroscopes

An electroscope detects the presence of static electricity. Use the following illustrations to create electroscopes for use in the following experiment. Or be creative and design your own electroscope.



Time to experiment! Conduct this experiment on a dry day. Moisture in the air acts like a conductor, carrying electricity away as fast as it is produced.

Procedures

1. Rub each object on the wool cloth for 60 seconds. This produces a static charge on each object.
2. Hold the electroscope by the cardboard.
3. Use various objects in testing for static electricity.

Name _____

Electroscopes

We made an electroscope at home. Today we all brought them to class. This is what the electroscopes in my group look like:

We used _____ to charge them.

The following illustrations show some of the experiements we tried:

Stuck on You

Science Standard IV:
Students will understand features of static and current electricity.

Objective 1:
Describe the behavior of static electricity as observed in nature and everyday occurrences.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts VIII-2, 3

Science Standard IV

Objective 1

Connections

Invitation to Learn

Begin with a riddle.

Clues

1. I like to move from place to place.
2. When the toaster and TV are on, I am there.
3. When the doorbell buzzes, I am there.
4. I amaze, delight, and help people every hour, day after day.
5. I have a home in various places.
6. You can't see or hear me.
7. I light up things.
8. I am present in thunderstorms.
9. Can you guess who I am? If you're right it could be downright shocking to you! (electricity)

We will be studying electricity for the next few weeks. First, let's assess what you already know by creating a foldable called a K-W-L-H chart. It stands for:

What you already **K**now.

What you want to find out.

What you **L**earned.

How you can learn more.

We will add new information to our chart throughout the unit.

K-W-L-H Chart

What We Know	What We Want to Find Out	What We Learned	How We Can Learn More

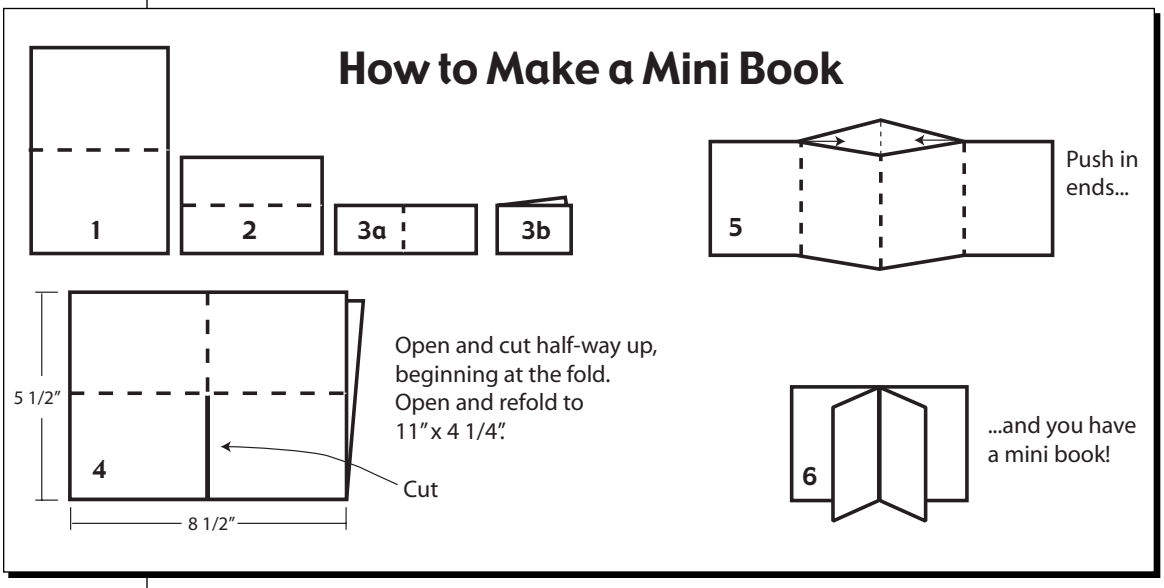
Instructional Procedures

Materials

- ❑ Two sheets of colored bond paper for each student
- ❑ Elmers glue
- ❑ Scissors

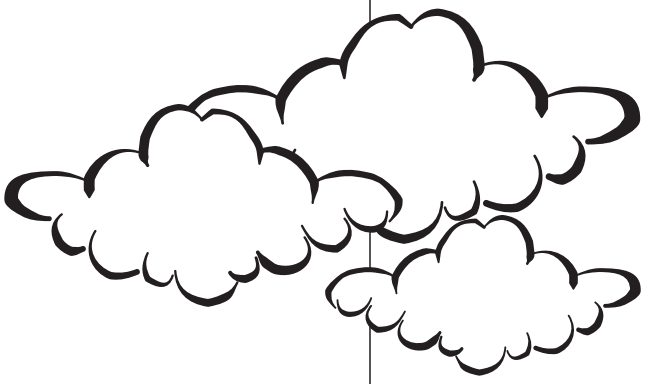
How to Make A Mini Book

1. To make a mini book, fold a sheet of paper in a horizontal fold (hamburger fold).
2. With the paper horizontal, and the fold of the paper up, fold the bottom edge to the top (hotdog fold).
3. With the fold of the paper up, fold in half again (hamburger fold).
4. Open the mini book to the first fold, with the folded edge at the bottom. Cut the along the fold half-way to the top of the paper.
5. Open and refold as shown, making a book!



6. Write **K** on the first tab, **W** on the second, **L** on the third, and **H** on the fourth. Have students list what they *know* about electricity under the **K** tab. Then list what they *would like to know* under the **W** tab. This book should be used throughout the unit to assess what students have learned and what they would still like to know.
7. Teacher may appear dressed as Ben Franklin, complete with wig, spectacles, jacket, and a kite in one hand. Read pp. 3-10 in *Who Was Ben Franklin?* Share pictures that show life with and without electricity.

8. *Lightening* is a giant spark of static electricity that forms in the clouds. *Clouds* can be made up of ice crystals (light) and water droplets (heavy). *Ice crystals* have a positive charge; each water droplet has a negative charge. During a thunderstorm, negative charges move from the cloud to the ground and positive charges move from the ground to the cloud. These moving charges are called lightening. Lightening can also move within a cloud, or from one cloud to another.



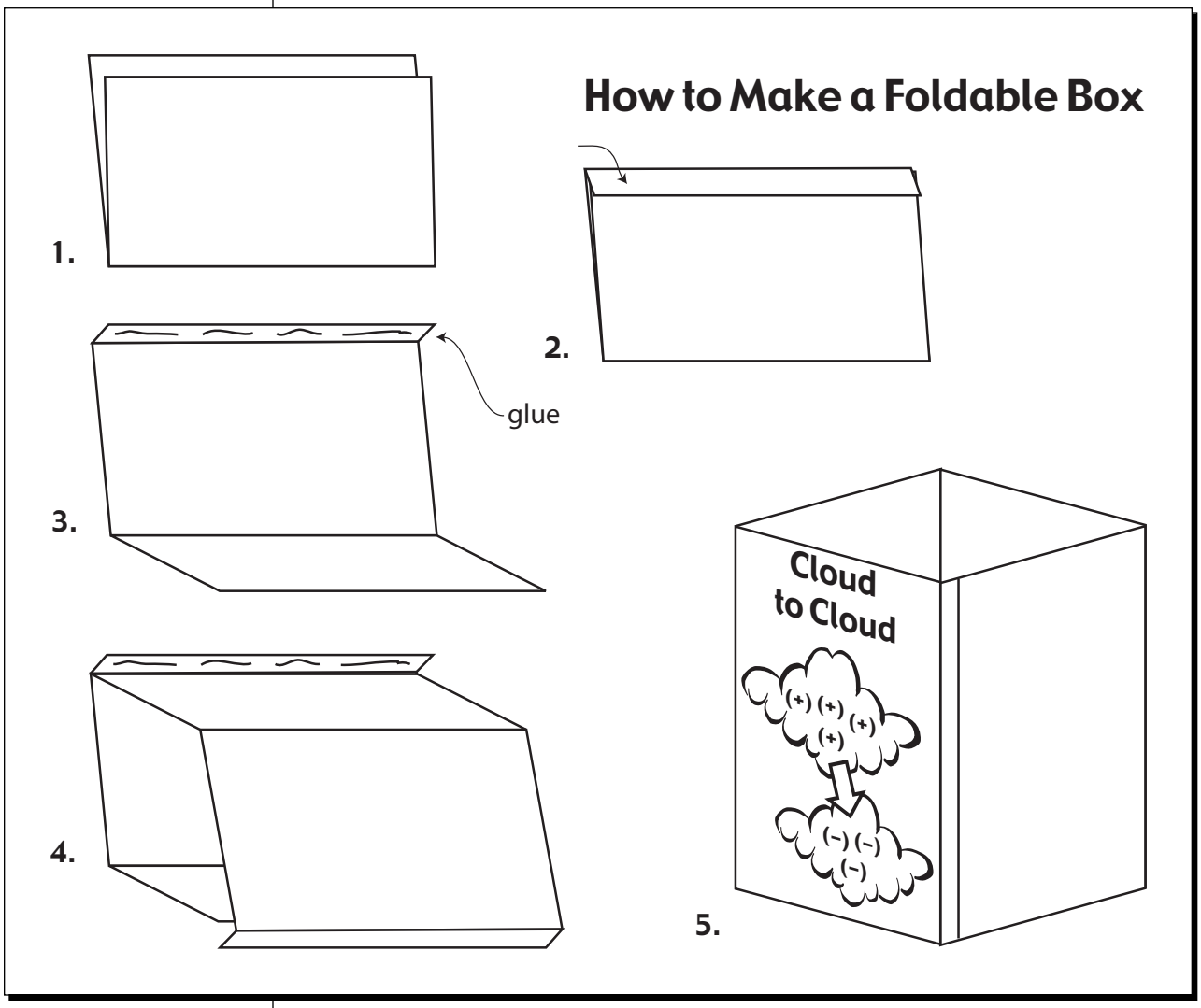
Cloud to Ground

Ground to Cloud

Within the Cloud

Cloud to Cloud

9. Draw and label the four ways lightening can move. Make a foldable box (see below) to illustrate this principle. Include the charges. Use the titles as headings for each of the four sides of the box. Draw and label the clouds under each heading, include the charges.



Possible Extensions/Adaptations/Integration

- Construct a timeline of electrical discoveries.
- Assign a biographical report on Thomas Edison, Ben Franklin, Guglielmo Marconi, Andre-Marie Amphere, Nikola Tesla, Alessandro Volta, James Watt, Michael Faraday, or Georg Simon Ohm. Write about the individual's life and experiments with electricity.
- Host a biography party where students dress as their inventor and make a mini replica or bring a picture of their invention.

- Create trading cards of their inventor.
- List the three ways to know that static electricity is present:
  1. A crackling sound may be heard.
  2. A spark can be seen and can shock you.
  3. Items cling together with static cling
- Brainstorm a list of everyday occurrences in which static electricity is present.
- Students may write a newspaper article on the lightening storm that hit your town last night using the *News Article Frame* (p. 8-17) as a graphic organizer.
- Create a class newspaper using the inventor biographies or newspaper articles.

Assessment Suggestions

- Make a *Discovery Box* to extend inquiry on questions about electricity. Include items that would make exploration of electricity possible. Include a list of *Inventor—Testable Questions* (p. 8-18) for investigation.
- Using the *Problem/Solution Outline* (p. 8-19) or *Discovery Log* (p. 8-20), have each group write a testable question to research. Go through the steps of the scientific method and come up with a conclusion. Record the investigation in a science journal.

Additional Resources

Books

Hands-on Physical Science Activities, by Marvin N. Tolman; ISBN 0-13-230178-4

Teaching Science with Foldables, by Dinah Zike (Glencoe McGraw-Hill); Student Edition ISBN 0-07-828238-1, Teacher Classroom Resources ISBN 0-07-828642-5

Lightening, by Seymour Simon; ISBN 0-590-12122-7

Thundercake, by Patricia Polacco; ISBN 0-698-11581-3

Who Was Ben Franklin?, by Dennis Brindell Fradin; ISBN 0-448-42495-9

Nurturing Inquiry: Real Science for the Elementary Classroom, by Charles R, Pearce (Heinemann); ISBN 0-325-00135-9

Web sites

www.dinah.com

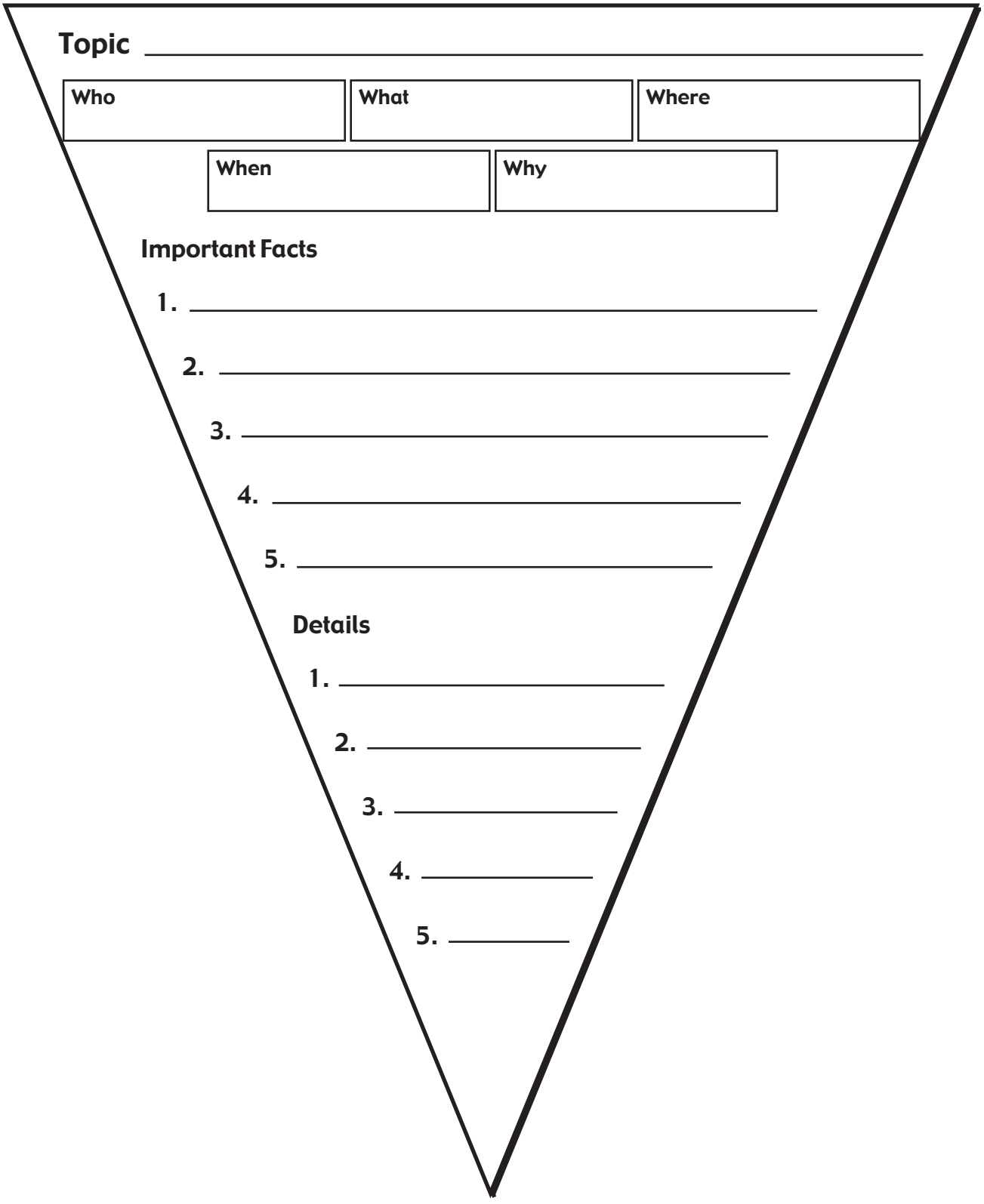
http//www.uen.org.5thgradescience (lesson plans Greenwood Biographies)

Family Connections

- Read *Thundercake* as a family on a day that thunder and lightening storms could happen. Make the cake and serve. While eating, count between the thunder and lightening bursts to see how close the lightening is.

Name _____

News Article Frame



Name _____

Inventor–Testable Questions

We have been writing testable questions. These are questions that you can answer by experimenting or doing something.

"Is It Possible?" Questions

- Is it possible to make a buzzer ring?
- Is it possible to light up a model community?

Comparing Questions

- When comparing C batteries with D batteries, which will light a bulb the longest and the brightest?
- When comparing conductors and insulators which materials will allow electricity to flow through them the easiest?

"What If?" Questions

- What if I added one more battery to a series circuit?
- What if I added more lights to a series circuit and kept the same amount of batteries?
- What if I made a circuit using a lemon, potato, or used liquids? Will electricity pass through salt water, Gatorade, orange juice, or colored water?

"How Can We?" Questions

- How can we create a newspaper using the results from all our discoveries in electricity?
- How can we discover which batteries last the longest?
- How can we use a telegraph to communicate with the other classroom?

"What Is?" Questions

- What is a series circuit?
- What is an AC/DC current?
- What is lightening?

Name _____

Problem/Solution Outline

Inventor _____

Problem

Who

What

Where

When

Why

How

Solution

Attempted Solutions	**Results**
1.	1.
2.	2.

End Results

Name _____

Discovery Log

Inventor _____

Question you are researching (Testable Question) _____

_____

_____

Materials _____

_____

_____

Procedure _____

_____

_____

_____

_____

Conclusion _____

_____

_____

_____

Discovery _____

_____

_____

_____

Make a sketch of your experiment:

Flowing Electrons

Science Standard IV:
Students will understand features of static and current electricity.

Objective 2:
Analyze the behavior of current electricity.

Intended Learning Outcomes:
1. Use Science Process and Thinking Skills
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts VII-6

Science Standard IV

Objective 2

Connections

Background Information

In order to create a current, electrons jump continuously from one atom to another. Show a model of an atom and locate the position of the electrons.

Invitation to Learn

Hold a D-cell battery up for the students to see. We are going to discover how electricity flows by playing a game called *Flowing Electrons*. Students become an electron moving in a circuit.

Instructional Procedures

1. Students sit in a large circle. Each person is given a Styrofoam ball representing an electron. Their hands are atoms, and the circle represents a pathway, or wire, that the electron must travel on.
2. The teacher positions herself between two students, with the box holding the extra electrons to the teacher's left. On the box (battery) is a + sign at one end and a – sign at the other end, representing the two ends of a real battery.
3. With the command of "pass," students pass the electron to their right with their right hand. At the same time, students receive an electron with their left hand. The teacher takes electrons from the box. The student to the teacher's left passes electrons into the box. Interject the word "and" between the word "pass" as students move the ball from the left hand to the right, thus being ready to hand the ball to the person on the right with the next command of "pass." Don't drop the balls. Students can't pass unless they receive at the same time. A person may never have more than one ball in each hand at a time.

Materials

One per student

- ❑ Two-inch Styrofoam balls
- ❑ *Battery Book Cover* handout
- ❑ Four sheets of bond paper

4. Balls can't be passed unless the receiving student is directly to the right of the passing student.
5. To play, students pass an electron with the command "pass." They are acting out current electricity. The teacher's command turns the flow of electricity on and off.
6. To add a bulb, one person is chosen to represent a light bulb in the line. When he receives an electron, he runs around the desk before passing to the next person in line. The student must then run back around the desk to receive the next electron. After a few times of the student running, ask him how he feels. He should be getting warm. Tell the students that the light bulb offers a resistance to the flow of electrons, and is called a *load*. Anything that uses electricity is a load. It slows the flow down, so the bulb heats up and lights up.
7. Introduce a *switch* by having three students sitting by each other. At the command "off," move forward so they can't receive or pass electrons. This is called an *open switch* because the wire has been interrupted. Switch it on again or close the switch so the electrons can flow in a circuit.
8. Repeat the activity; this time students explain. Students return to their seats.
9. Give each student a wire, bulb, bulb holder, battery and a switch. They are to make:
   - a complete circuit.
   - an incomplete circuit.
   - a closed circuit with a bulb.
   - an open circuit with a bulb.
10. After creating the different types of circuits, students design a *Battery Book Cover* (p. 8-24) and label it *Energy Sources*. Cut it out and trace around it on four sheets of paper so students may have a battery-shaped book. Staple the pages together at the top. On page one, draw a *complete circuit*. Label the parts. Include the vocabulary words *pathway, load,* and *power source*. On page two, draw an *incomplete circuit*. Explain why it doesn't work. Label the drawing. Draw a *closed circuit with a bulb* on page three, and an *open circuit with a bulb* on page four. Label the parts on both pages using the vocabulary words. Include the word *switch* on the last two drawings. Explain the difference between an open circuit and an incomplete circuit. Add any reflections on the last page page about any new discoveries about circuits.

Possible Extensions/Adaptations/Integration

- Give each student a Kit Kat that has a foil component to the wrapper, a light bulb, and a battery. Have him/her make the bulb light four different ways.
- Students write testable questions about other areas they want to experiment with and present their list to their teacher for approval and a supply of materials. Proceed with further experimentation.

Assessment Suggestions

- Students learn *How to Make An Electric Puzzle* (p. 8-25) and are quizzed on what they learned in the electricity unit. Have students write ten questions with answers and cut them into two strips or use the *Electricity Puzzle Pieces* (p. 8-26). Place the questions in one pile and the answers in another. Using a piece of cardstock, center the circuit board worksheet and glue down. Punch ten holes on each side by each question and each answer. Place a paper clip over each hole (to hold their questions and answers) and insert a brad. Flip the cardstock over and attach wires to the brads from the back of the matching questions and answers. Wire ends should be stripped of insulation covering about 1 inch on each end before wire is wrapped around brads.
- To test the puzzle, unbend a paper clip. Secure it to the positive end of the battery using a wide rubber band. Place a wire with the copper ends exposed to the negative end of the battery and tape it down with masking tape. Wrap the other end of the wire around the metal connection on the bulb. Touch the end of the bulb to the question side and the paper clip to the answer side. When the bulb lights, you have a match.

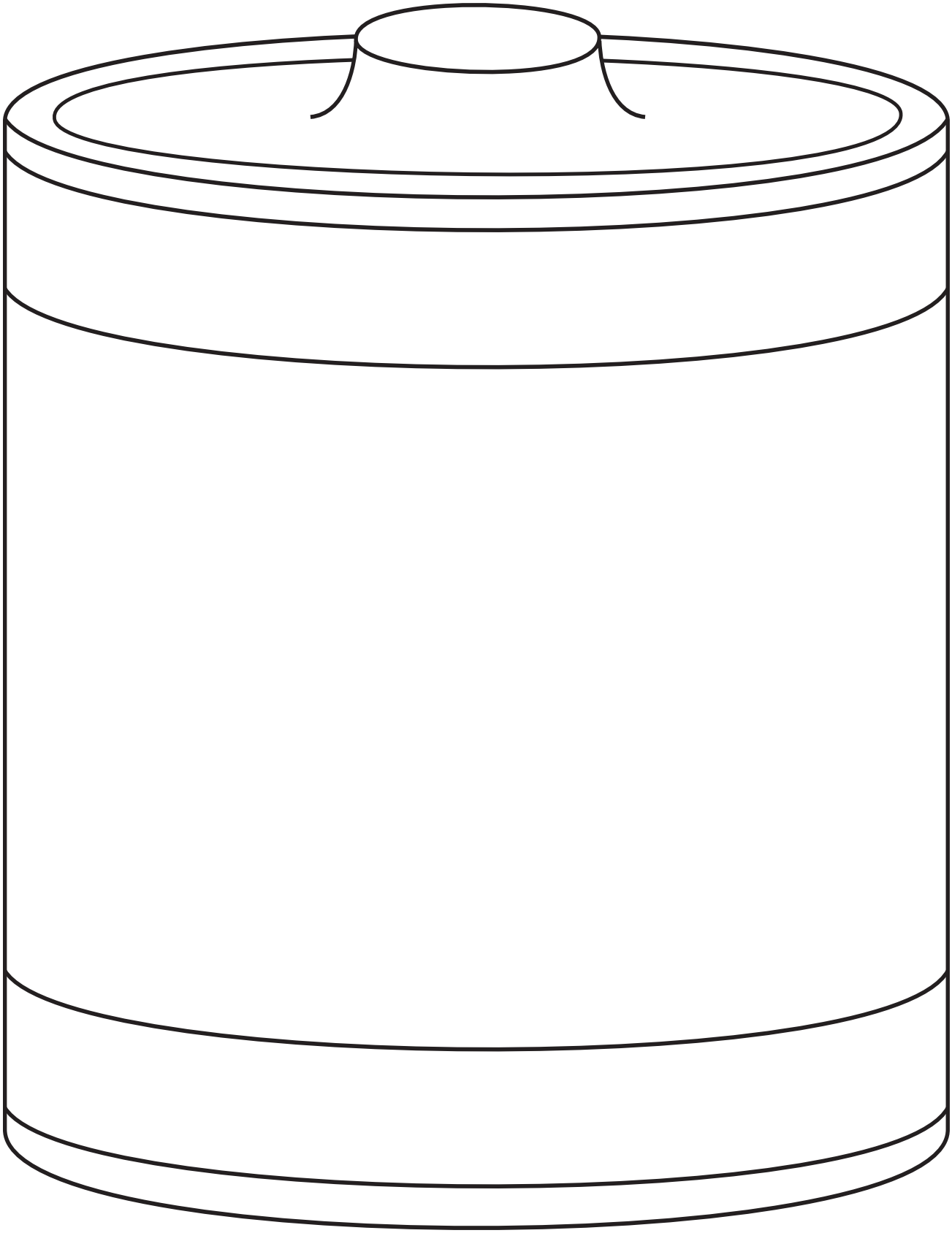
Additional Resources

Electricity, by Ron Marson (Tops Learning Systems, http://www.topscience.org/order.html); ISBN 0-941008-32-0

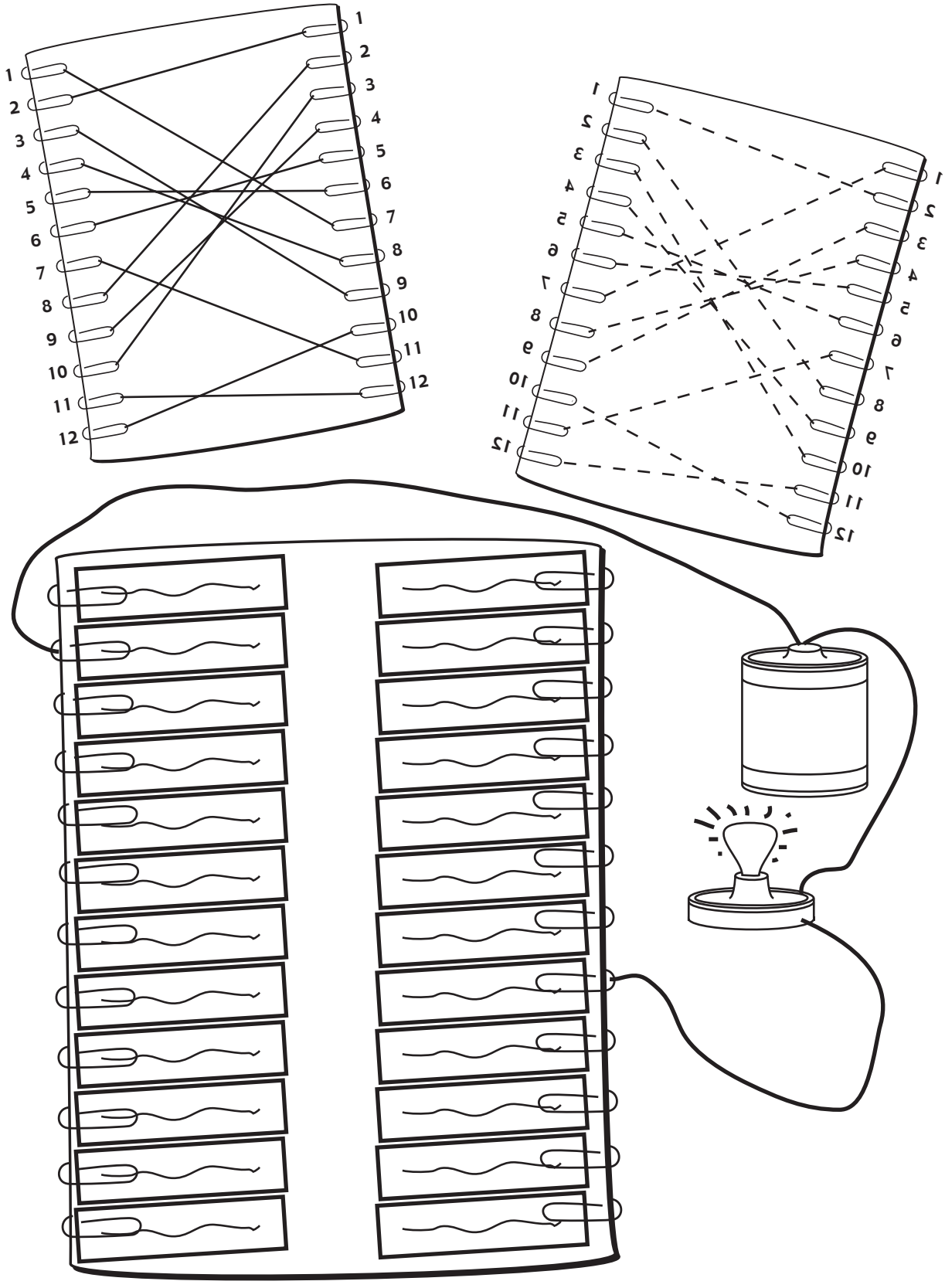
Family Connections

- Students teach their families the *Flowing Electrons* activity.
- Make a list of the items that use electricity in their home during a 24-hour period.

Battery Book Cover



How to Make An Electric Puzzle



Electric Puzzle Pieces

1. The word "electricity" comes from the Greek word _____.	A. Like charges repel and unlike charges attract.
2. Static electricity is _____.	B. Amber
3. When the Greeks saw lightning, they thought it was _____.	C. A continuous flow of electrons.
4. Benjamin Franklin was responsible for the first practical use of static electricity by inventing the _____.	D. A yellowish translucent solid made from fossilized tree sap.
5. Law of Electrical Charges.	E. Charged particles that are on the surface and stay in one place.
6. Current electricity is _____.	F. Zeus hurling thunderbolts.
7. Amber is _____.	G. Lightning Rod
8. Conductors are _____.	H. Materials, like rubber or plastics, that do not let charges flow through them. They hold the electric charge on the surface.
9. Insulators are _____.	I. Small parts of the atom which moves around the outside shell. It has a negative charge.
10. A circuit is _____.	J. Object that allow electric charges to move through like many of the metals.
11. An electron _____.	K. A pathway which allows electricity to flow continuously.

Name _____

Conductors

Object	Conductor/Insulator	What did you observe?
1. Penny		
2. Yarn		
3. Aluminum Foil		
4. Paper Clip		
5. Straw		
6. Rubber Band		
7. Popsicle Stick		
8.		
9.		
10.		
11.		

Analyze your data. Draw a conclusion about the type of material that makes a good conductor and the type of material that would make a good insulator.

_____

_____

List items that are found at home that make good conductors. What are their uses?

_____

_____

Clustering

Science Standard IV

Objective 2

Connections

Science Standard IV:
Students will understand features of static and current electricity.

Objective 2:
Analyze the behavior of current electricity.

Intended Learning Outcomes:
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Content Connections:
Language Arts VII-1, 2

Background Information

Vocabulary is an essential tool in understanding the concepts of electricity. As students attempt to organize unknown words into related groups, they are faced with a dilemma—they lack the knowledge to complete the task accurately. A purpose for reading non-fiction text is created—specific information is needed.

Invitation to Learn

Each group is given the opportunity to cut apart the vocabulary cards for the electricity unit and arrange them in a web or cluster design. Provide tape and markers to aid groups in developing an organizational pattern of how these words fit together. Each table shares their design when finished.

Instructional Procedures

Materials

For each group

- ❑ *Vocabulary Cards*
- ❑ Markers
- ❑ Poster
- ❑ Masking tape (about 15 inches)

For each student

- ❑ *ABC Electricity* handout

1. Arrange students in cooperative groups of no more than five people. Pass out a set of *Vocabulary Cards* (p. 8-30), markers, and a poster to each team. As a group, organize the *Vocabulary Cards* into a web design and create a *Cluster Poster* (allow five to seven minutes for this task). Groups share their *Cluster Posters* and display them on the wall.
2. After sharing, the class is assigned to read in a non-fiction text about electricity. During reading, fill out the *ABC Electricity Words* worksheet (p. 8-31) with vocabulary words embedded in the text. Include in each box a short definition of a word inferred from context clues in the text.
3. With new knowledge gained from the reading selection, groups may revisit their *Cluster Posters* and make adjustments.

Possible Extensions/Adaptations/Integration

- *ABC Words* worksheets work well when taking notes during a video, filmstrip, or discussion.

Assessment Suggestions

- Adjustments made to *Cluster Posters* upon completion of reading are a visual representation of knowledge gained.

Additional Resources

Electricity and Magnetism, by Mary Atwater (MacMillan/McGraw-Hill); ISBN 0-02-276128-4

Family Connections

- The *Cluster Posters* and the *ABC Words* worksheets are two useful tools to organize informational reading at home.

Vocabulary Cards

Electricity	**Current Electricity**	**Load**
Pathway	**Lightening**	**Conductor**
Insulator	**Power Source**	**Attract**
Repel	**Incomplete Circuit**	**Battery**
Static Electricity	**Complete Circuit**	**Switch**

Name _____

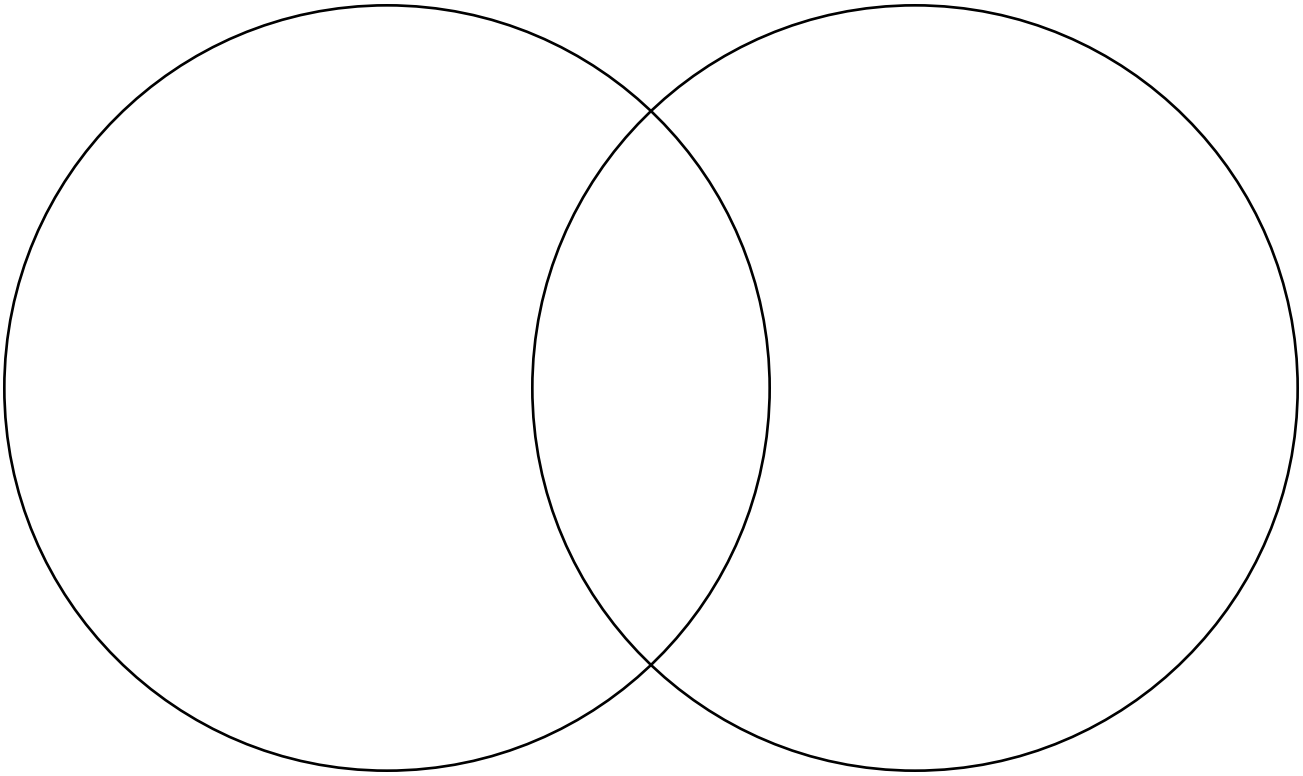
ABC Electricity Words

A	**B**	**C**	**D**
E	**F**	**G**	**H**
I	**J**	**K**	**L**
M	**N**	**O**	**P**
Q	**R**	**S**	**T**
U	**V**	**W**	**X Y Z**

Appendix

Name _____

What's the Matter?



Physical Change ***Both*** ***Chemical Change***

Cut out the words and place them on the diagram where they belong.

Changes size only	**Products**	**Heat absorbed**	**Burn a piece of paper**
Changes state only	**Change physical properties**	**Rocket fuel combined with oxygen**	**Produces a gas**
Matter stays the same	**Reactants**	**Baking cake batter**	**Surprise color change**
Changes texture only	**Heat given off**	**Tear a paper**	**Produces a new solid**

Name _____

Investigation Write-up

Question: _____

Hypothesis: _____

_____

Materials: _____

_____

Procedure: _____

_____

_____

_____

_____

_____

_____

_____

Observations: _____

_____

_____

Measurable Results: _____

_____

_____

Conclusion: _____

_____

_____

Application: _____

_____

_____

Name _____

The Heat is On!

1. Put on goggles. They must stay on until all chemicals are cleaned up.

2. Write your observations of the substances in the bag and bottle.

_____

_____

_____

Temperature of liquid _____

Temperature of solids _____

3. When your teacher tells you, zip the bottle of liquid inside the bag. When you are sure that it is zipped, tip the bottle of liquid over into the powder. Watch for changes.

4. What changes did you see? Write your observations below. Be sure to measure temperature.

_____

_____

_____

5. Was this a physical change or a chemical change? Give your evidence below.

a. _____

b. _____

c. _____

6. Filmstrip: Using the four to five filmstrip cells below, illustrate the things that happened in this activity. Under each cell write a one-sentence caption telling about the picture. Be sure to use words like: chemical change, produces heat, produces a gas, changes color, product, reactant, solid, liquid, and temperature.

1.	2.	3.	4.	5.

_____ _____ _____ _____ _____

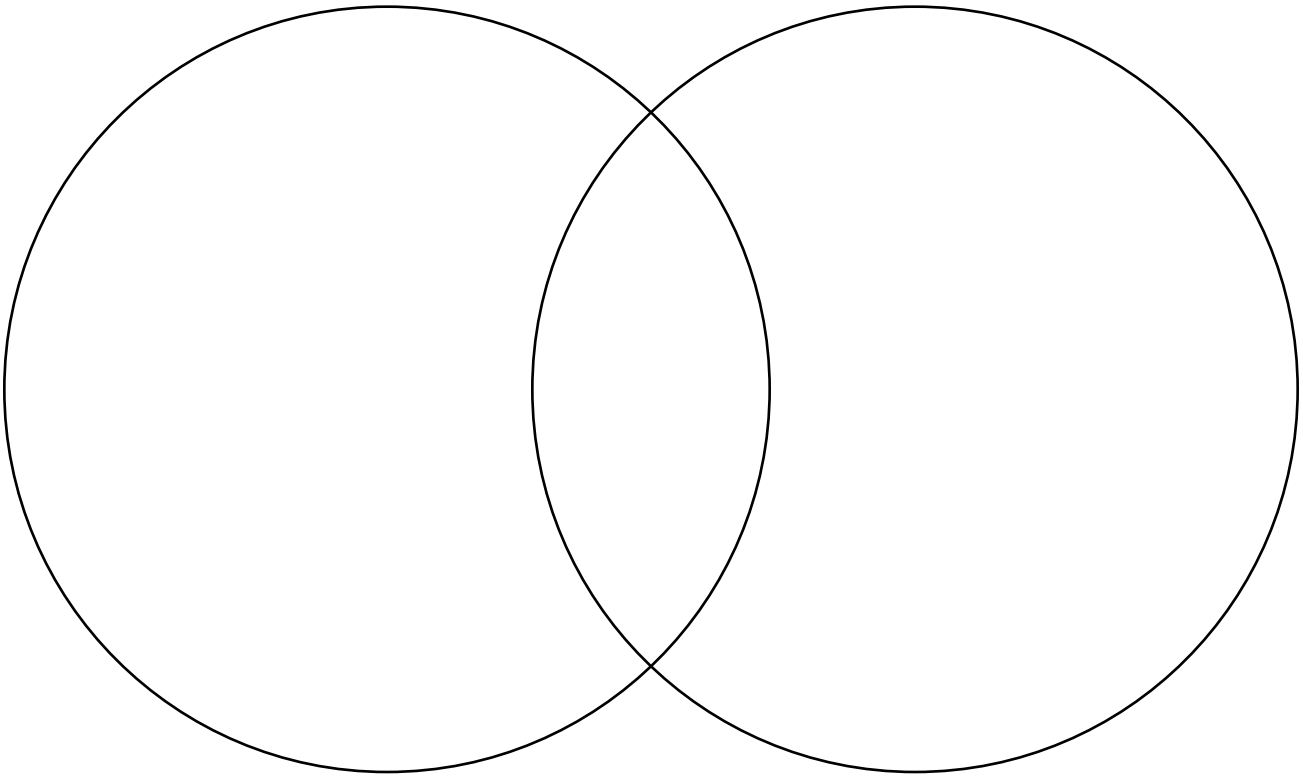
_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Name _____

Clean Pennies

In the first circle give physical properties that are specific to the penny before the change. In the last circle give properties of the penny after. In the middle circle give the physical properties that stayed the same.



Write a paragraph using the information from the Venn Diagram. Tell about the physical properties of the penny before and after the change. Give evidence that a chemical change took place.

_____

_____

_____

_____

_____

_____

_____

_____

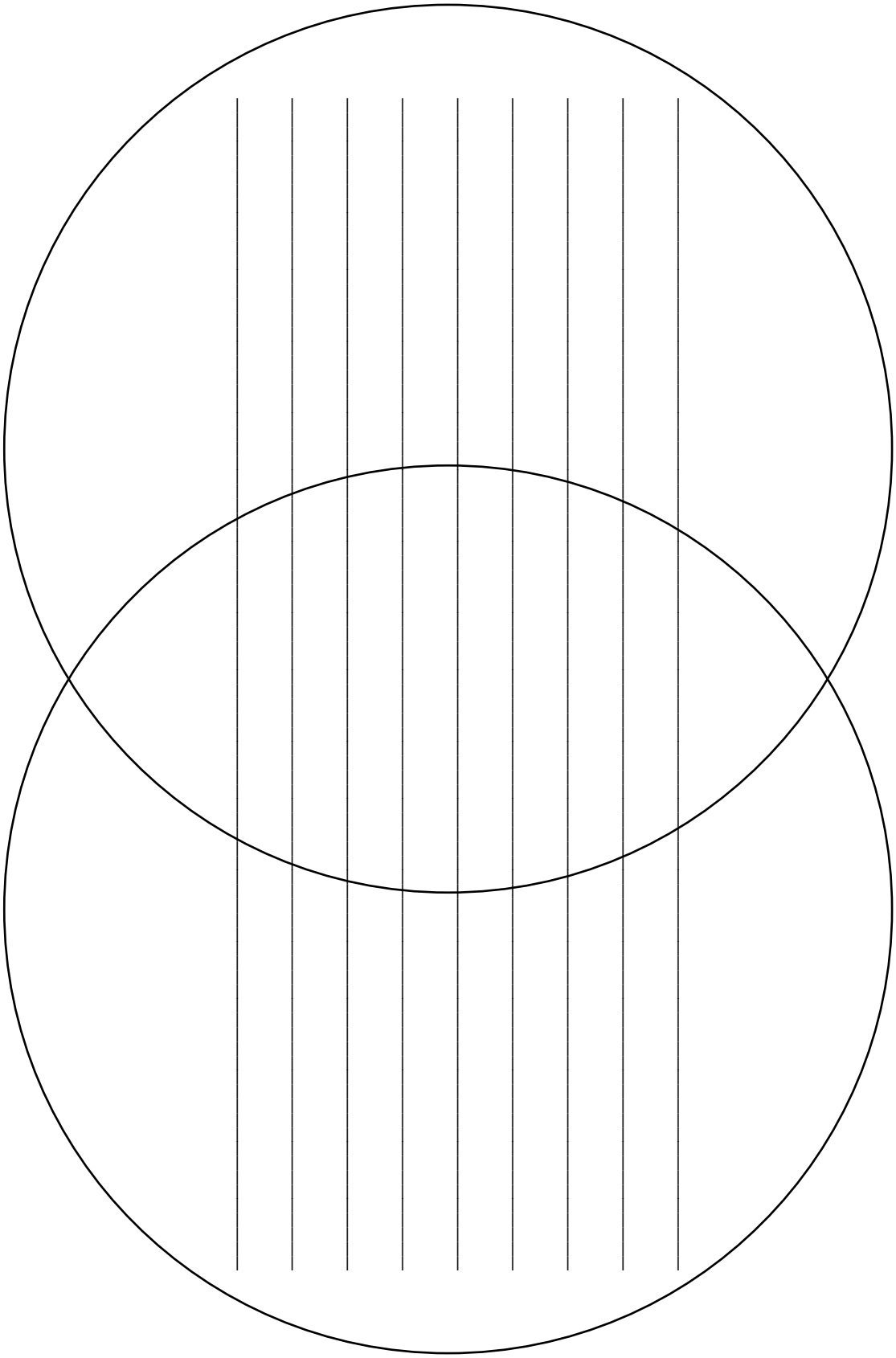
_____

Venn Diagram

_____

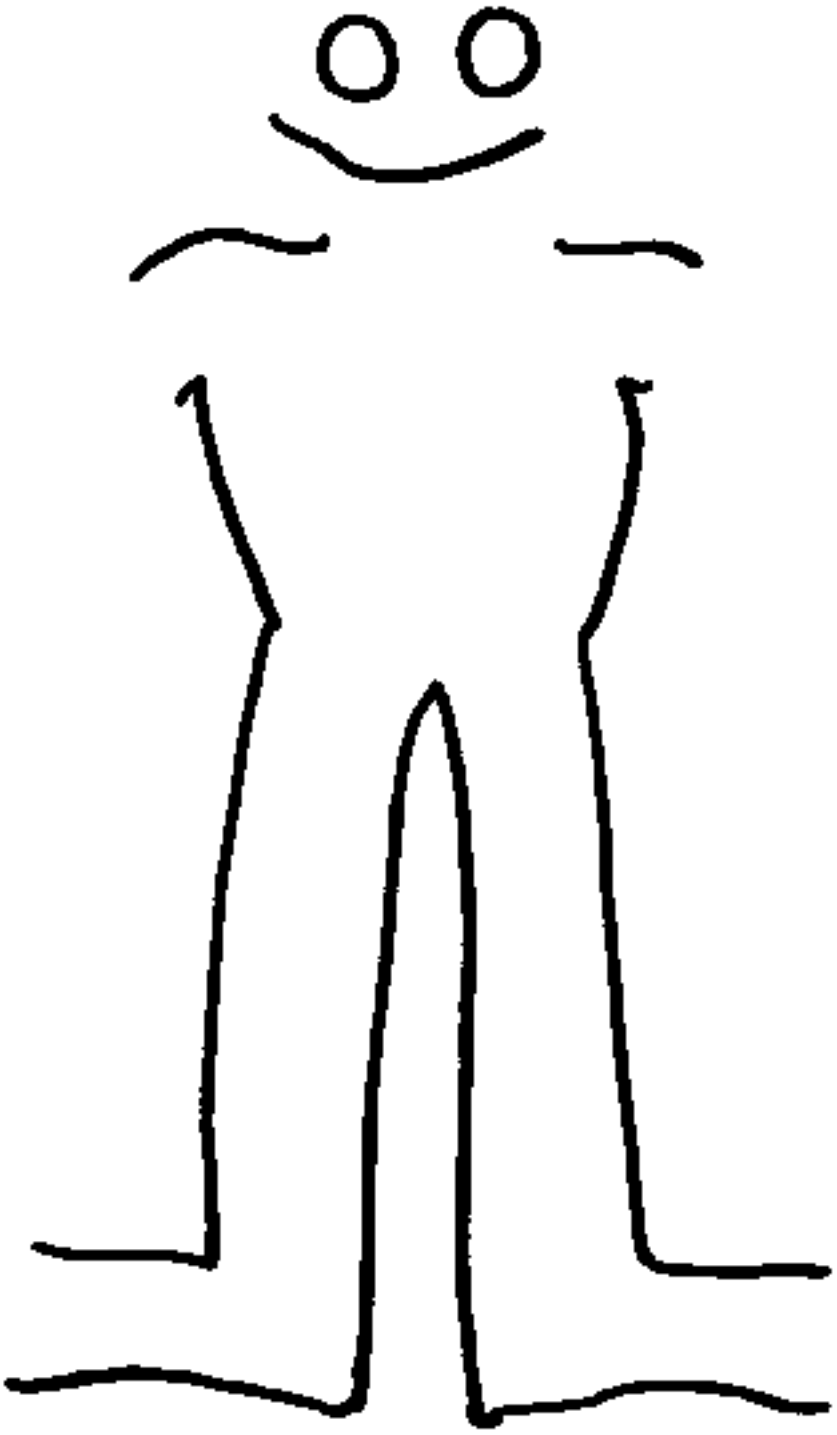
and

_____



Name _____

Humaniod of _____

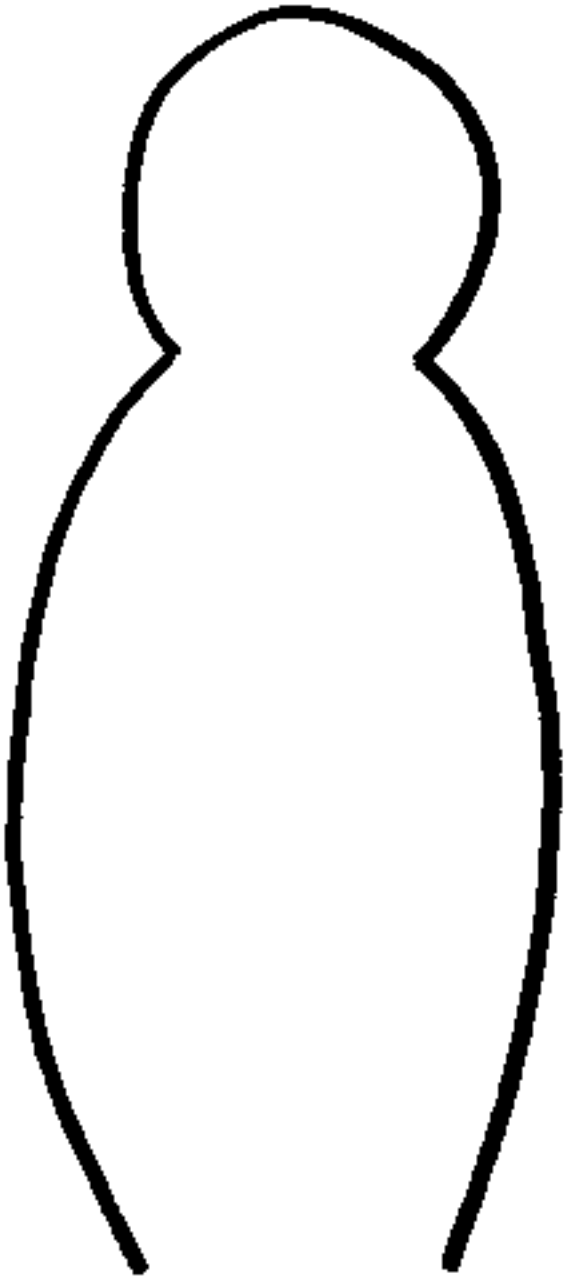


Name _____

Animal of _____

Name _____

Insect of _____



Name _____

The Planet Wakyabi
Mix and Match for Survival Test

Match the different species up with their specialized structure and environment for their survival.

Species	Specialized Structure	Environment
Polar Bear ____ ____	A. Long beak with a pouch.	1. Dark Corners
Bumble Bee ____ ____	B. Huge ears to disperse heat.	2. Africa Near Tall Trees
Recluse Spider ____ ____	C. Long, wide tail for swimming.	3. Arctic Tundra
Pelican ____ ____	D. Stripes blend with tall grass.	4. Forest Bottoms
Giraffe ____ ____	E. Ability to change color.	5. Desert
Crocodile ____ ____	F. White Fur	6. Desert
Jackrabbit ____ ____	G. Water repelling feathers.	7. Arctic Icebergs
Squirrel ____ ____	H. Long beak for insects.	8. Lilypads
Frog ____ ____	I. Hard outer shell.	9. In the Ocean Sand
Chameleon ____ ____	J. Large cheeks for nut gathering.	10. By the Seashore
Tiger ____ ____	K. Legs with tiny hairs for pollen.	11. Flowers
Penguin ____ ____	L. Powerful back legs for jumping.	12. Forest Trees
Crab ____ ____	M. Ability to spin webs.	13. Swamps
Woodpecker ____ ____	N. Five foot long neck.	14. Africa in the Grasslands

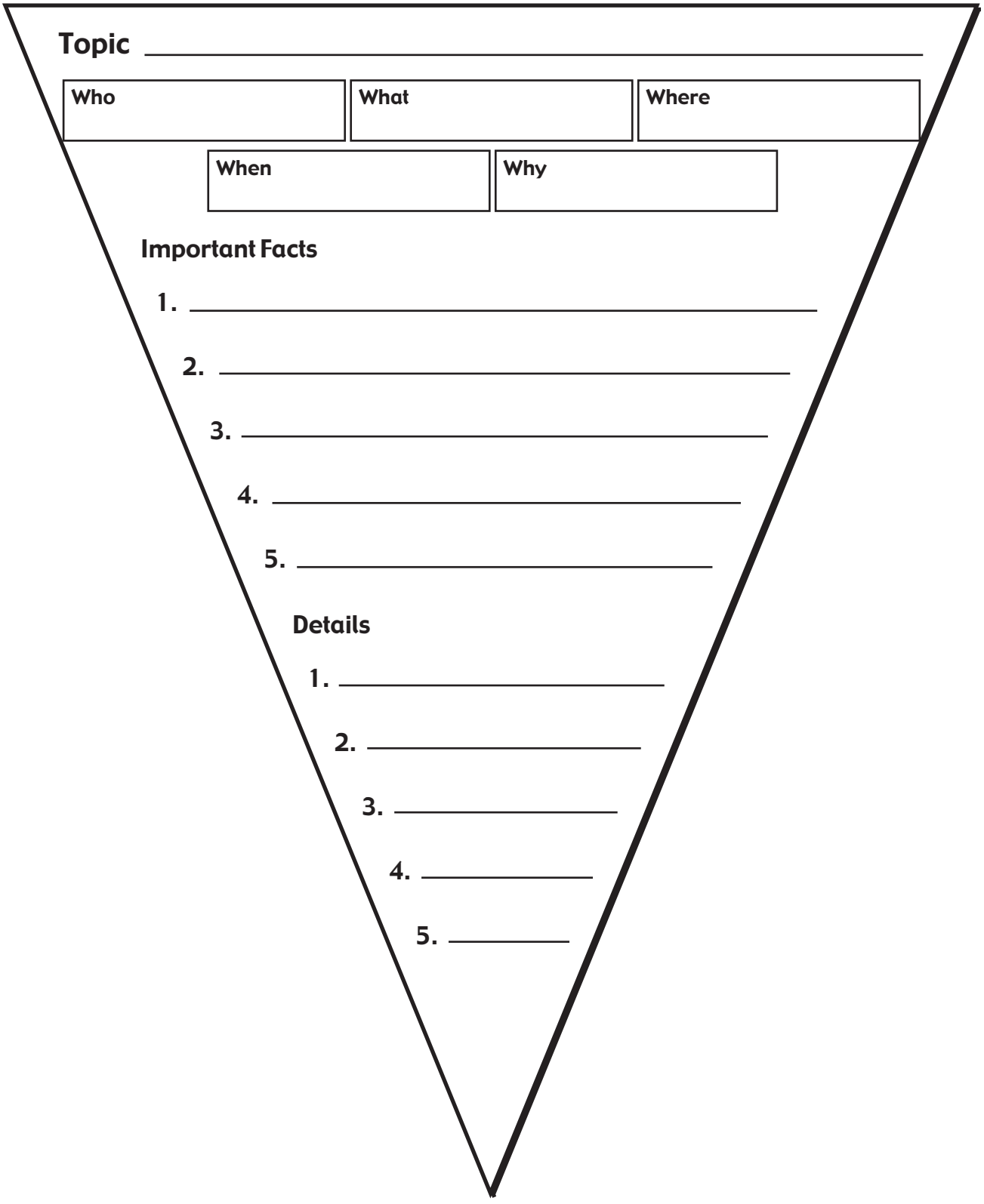
Name _____

Behavior Investigation Chart

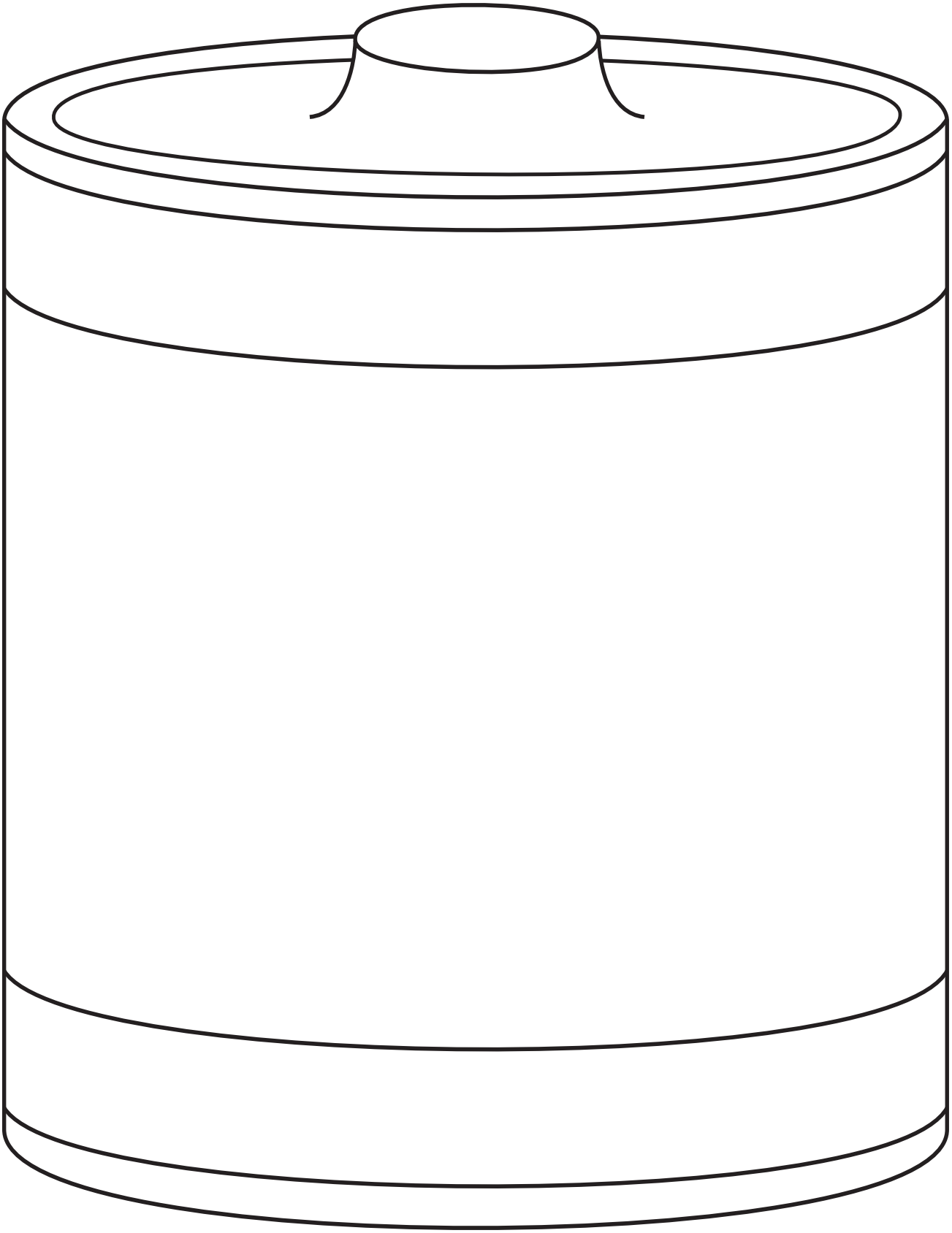
Me	Parents	Siblings	Grandparents	Relatives

Name _____

News Article Frame



Battery Book Cover



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