

**STANDARD 1: SCIENCE AS INQUIRY**

**Grades 3-4**

**SCIENCE AS INQUIRY – The student will experience science as *full inquiry*. In the elementary grades, students begin to develop the physical and intellectual abilities of scientific inquiry.**

**Benchmark 1: The student will develop the skills necessary to do full inquiry. *Full inquiry* involves asking a simple question, completing an *investigation*, answering the question, and sharing the results with others.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. ▲ asks questions that he/she can answer by investigating.</li> <li>2. ▲ plans and conducts a simple investigation.</li> <li>3. ▲ employs appropriate equipment, <i>tools</i>, and safety procedures to gather data.</li> <li>4. ▲ begins developing the abilities to communicate, critique, analyze his/her own <i>investigations</i>, and interprets the work of other students.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1. asks questions like: will the size of the opening of a container change the rate of evaporation of liquids? How much water will a sponge hold?</li> <li>2. designs a test of the wet strength of paper towels; experiments with plant growth; experiments to find ways to prevent soil erosion.</li> <li>3.               <ol style="list-style-type: none"> <li>a. uses a balance to find the <i>mass</i> of the wet paper towel in grams; uses meter tape to measure the diameter of a rock; uses the same size containers to compare evaporation rates of different liquids.</li> <li>b. uses appropriate precautions, procedures, and safety equipment when conducting <i>investigations</i>.</li> </ol> </li> <li>4. describes <i>investigations</i> with pictures, graphs, written language, and oral presentations.</li> </ol>
<p>Teacher Notes:</p> <p>Not every activity will involve all of these stages nor must any particular sequences of these stages be followed.</p> <p><i>Full inquiry</i> – involves asking a simple question, completing an investigation, answering the question, and presenting the results to others. In elementary grades, students begin to develop the physical and intellectual abilities of scientific inquiry. They can design investigations to try things to see what happens – they tend to focus on concrete results of tests and will entertain the idea of a “fair” test (see page 122 in the National Science Education Standards, 1996). It is developmentally appropriate for elementary level student to test for only one independent variable</p> <p><i>Investigation</i> – finding the answer to a question.</p>	

*Tools* – object(s) used to achieve a goal, to make an observation, and extend the senses (see page 122 in the National Science Education Standards, 1996).

*Mass* - measure of the amount of material something contains.

▲ = Grade 4 Assessed Indicator

**STANDARD 2: PHYSICAL SCIENCE**

**Grades 3-4**

**PHYSICAL SCIENCE - The student will increase their understanding of the *properties* of objects and materials that they encounter on a daily basis. The student will compare, describe, and sort and *classify* these materials by observable properties.**

**Benchmark 1: The student will develop skills to describe objects.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. ▲ observes <i>properties</i> of objects and measures those <i>properties</i> using appropriate <i>tools</i>.</li> <li>2. ▲ describes and <i>classifies</i> objects by more than one property.</li> <li>3. ▲ observes and records how one object <i>interacts</i> with another object.</li> <li>4. ▲ recognizes and describes the differences between solids, liquids, and gases.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1. observes and records the size, <i>mass</i>, shape, volume, color, and temperature of objects using balances, thermometers, and other <i>metric measurement tools</i>.</li> <li>2. observes that an object could be hard, round, and rough; <i>classifies</i> objects by two or more <i>properties</i>.</li> <li>3. mixes baking soda and vinegar, or tea bag/food coloring and water, and records observations.</li> <li>4. observes differences between a stick of butter and melted butter, a chocolate bar and melted chocolate, frozen water (ice), water, and water vapor; observes that a solid has a shape of its own and a liquid takes the shape of its container; observes differences between an inflated and a deflated balloon.</li> </ol>
<p>Teacher Notes:</p> <p>Through observation, manipulation, and classification of common objects, children reflect on the similarities and differences of the objects.</p> <p><i>Properties</i> – word that describes an object based on direct observations using touch, sight, hearing, taste, smell, and measurements.</p> <p><i>Classify</i> – a method for establishing order on collections of objects or events. Students use classification systems to identify objects or events, to show similarities, differences, and interrelationships. It is important to realize that all classification systems are subjective and may change as criteria change; the test for a good classification system is whether others can use it.</p> <p><i>Tools</i> – object(s) used to achieve a goal, to make an observation, and extend the senses (see page 122 in the National Science Education Standards, 1996).</p>	

*Mass* - measure of the amount of material something contains.

*Metric measurements* – meter, centimeter, millimeter, liter, milliliter, gram, kilogram, Celsius

*Interact*- when two or more things do something to each other.

▲ = Grade 4 Assessed Indicator

**STANDARD 2: PHYSICAL SCIENCE**

**Grades 3-4**

**PHYSICAL SCIENCE – The student will increase their understanding of the properties of objects and materials that they encounter on a daily basis. The student will compare, describe, and sort and classify these materials by observable properties.**

**Benchmark 2: The student will describe the motion of objects.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"><li>1. ▲ moves objects by pushing, pulling, throwing, spinning, dropping, and rolling; and describes the motion.</li><li>2. describes the change in position of objects when moved.</li></ol>	<p>The student...</p> <ol style="list-style-type: none"><li>1. spins or rolls a variety of objects on various surfaces and explains how forces (a push or pull) caused the objects to move or stop moving.</li><li>2. describes the objects new position as being above, below, to the right or left, or in front or behind its original position.</li></ol>
<p>Teacher Notes:</p> <p>Students begin to observe the position and movement of objects when they manipulate objects by pushing, pulling, throwing, dropping, and rolling them.</p> <p>▲ = Grade 4 Assessed Indicator</p>	

**STANDARD 2: PHYSICAL SCIENCE****Grades 3-4**

**PHYSICAL SCIENCE – The student will increase their understanding of the properties of objects and materials that they encounter on a daily basis. The student will compare, describe, and sort and classify these materials by observable properties.**

**Benchmark 3: The student will recognize and demonstrate what makes sounds.**

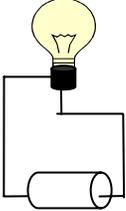
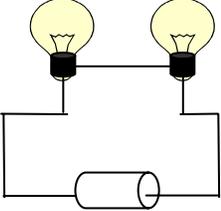
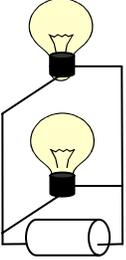
Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. ▲ identifies that the source of sound is vibrations.</li> <li>2. discriminates between sounds made by different objects.</li> <li>3. discriminates between various pitches.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1. explores various vibrating objects (tuning forks, rulers, tongue depressors, musical instruments, etc.) that produce sound.</li> <li>2. listens and compares the sounds made by musical instruments and other objects, such as cans, gourds, plastic spoons, pennies, and plastic disks; sorts and classifies a group of objects according to the sounds they make when they are dropped.</li> <li>3. identifies high and low pitches.</li> </ol>
<p>Teacher Notes:</p> <p>The concept of sound is very abstract. To make the connection between vibrations and sounds more concrete, have students listen to, touch, and watch the object (tuning fork, audio speaker, ruler on the edge of the table, etc.) being used to produce the sound/vibration. Then attempt to connect the controlled experimental sounds with other observed sounds such as jets rattling windows, intercom speakers, class bells, and that all sounds are ultimately the result of vibrations. However, by investigating a variety of sounds made by common objects, students can form a connection between sounds the objects make and the materials from which the objects are made. Plastic objects make a different sound than do wooden objects, etc.</p> <p>The relationship between high and low pitches can be explored by causing a tightly and loosely stretched rubber band to vibrate.</p> <p>▲ = Grade 4 Assessed Indicator</p>	

**STANDARD 2: PHYSICAL SCIENCE**

**Grades 3-4**

**PHYSICAL SCIENCE – The student will increase their understanding of the properties of objects and materials that they encounter on a daily basis. The student will compare, describe, and sort and classify these materials by observable properties.**

**Benchmark 4: The student will experiment with electricity and magnetism-**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. ▲ demonstrates that magnets attract and repel.</li> <li>2. designs a simple experiment to determine whether various objects will be attracted to magnets.</li> <li>3. ▲ constructs a <i>simple circuit</i>.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1               <ol style="list-style-type: none"> <li>a. explores the <i>interactions</i> between two magnets.</li> <li>b. designs a simple experiment with two magnets to show that they attract or repel.</li> </ol> </li> <li>2. designs an experiment involving a group of objects to determine which are attracted to or repelled by the magnet.</li> <li>3. uses a battery, bulb(s), and wire(s) to make complete circuits i.e. <i>simple parallel circuit or simple series circuit</i>.</li> </ol>
<p>Teacher Notes:            Magnets attract and repel each other and certain kinds of other materials.            Students will develop the concept that electrical circuits require a complete loop of conductors through which an electric current can pass.            Example circuits:</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p><i>Simple circuit</i></p>  <p>- Battery +</p> </div> <div style="text-align: center;"> <p><i>Series circuit</i></p>  <p>- Battery +</p> </div> <div style="text-align: center;"> <p><i>Parallel circuit</i></p>  <p>- Battery +</p> </div> </div> <p>Developmentally, elementary students should be able to build circuit but should not be tested on the difference between types of circuits.  <i>Interact</i> – when two or more things do something to each other,            ▲ = Grade 4 Assessed Indicator</p>	

**STANDARD 3: LIFE SCIENCE****Grades 3-4**

**LIFE SCIENCE – The student will develop an understanding of biological concepts through direct experience with living things, their life cycles, and their habitats.**

**Benchmark 1: The student will develop knowledge of organisms in their environment.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. ▲ observes different organisms and compares and contrasts how similar functions are served by different structural characteristics.</li> <li>2. ▲ compares basic needs of different organisms in their environment.</li> <li>3. discusses ways organisms use their senses to survive in their environments.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1. compares the structures for movement of an insect to the structures for movement of a guppy; compares the leaf structures of a sprouted bean seed to the leaf structures of a corn seed.</li> <li>2. compares the basic needs of an animal to the basic needs of a plant.</li> <li>3. compare how organisms find food, seek shelter (bird nests, beaver dams, etc.), and defend themselves.</li> </ol>
<p>Teacher Notes:</p> <p>The study of organisms should include observations and interactions within the natural world of the child.</p> <p>Each plant or animal has different structures that serve different functions in growth, survival, and reproduction. For example, humans have distinct body structures for walking, holding, seeing, and talking (see page 129 in the National Science Education Standards, 1996).</p> <p>▲ = Grade 4 Assessed Indicator</p>	

**STANDARD 3: LIFE SCIENCE**

**Grades 3-4**

**LIFE SCIENCE – The student will develop an understanding of biological concepts through direct experience with living things, their life cycles, and their habitats.**

**Benchmark 2: The student will observe and illustrate the life cycles of various organisms.**

Grades 3-4 Indicators	Instructional Examples
The student...  1. ▲ compares, contrasts, and asks questions about life cycles of various organisms.	The student...  1. plants a seed and cares for a plant through its life cycle, observing and recording its growth; observes and records the changes of an insect as it develops from birth to adult.
<p>Teacher Notes:</p> <p>Plants and animals have life cycles that include being born, developing into adults, reproducing, and eventually dying. Organisms develop into adults that are similar to their parents.</p> <p>▲ = Grade 4 Assessed Indicator</p>	

**STANDARD 4: EARTH AND SPACE SCIENCE**

**Grades 3-4**

**EARTH AND SPACE SCIENCE – The student will observe objects, materials, and changes in their environment, note their properties, distinguish one from another, and develop their own explanations making sense of their observations.**

**Benchmark 1: The student will develop an understanding of the properties of *earth materials*.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. ▲ collects, observes <i>properties</i>, and <i>classifies</i> a variety of <i>earth materials</i> in his/her <i>environment</i>.</li> <li>2. experiments with a variety of soil types (clay, silt, sand, and loam).</li> <li>3. ▲ describes <i>properties</i> of water and process of the water cycle.</li> <li>4. observes and records the properties of <i>fossils</i> and discusses what <i>fossils</i> are.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1.               <ol style="list-style-type: none"> <li>a. brings in samples of earth materials (rocks, sand, soil, water) from his/her surroundings to observe and classify the samples' by their colors, textures, and other physical properties.</li> <li>b. describes properties of many different kinds of rocks.</li> <li>c. brings rocks from the playground, and observes their colors, and textures when dry as well as when immersed in water; as well as, the reaction when placed in dilute acids (vinegar).</li> </ol> </li> <li>2. plants seeds in a variety of soils to compare and collect data on the effect of different soils on plant growth; experiments with soil samples and observes how they react to water, wind, compaction, etc...</li> <li>3.               <ol style="list-style-type: none"> <li>a. Observes a water drop using a hand lens to notice shape of the drop (surface tension) and that water is a transparent, odorless, colorless liquid.</li> <li>b. Makes a diagram of the water cycle to show processes of evaporation, condensation, and precipitation.</li> <li>c. Relates the water cycle to observations of weather. Example: forms of precipitation.</li> </ol> </li> </ol>
<p>Teacher Notes:</p> <p>Earth materials may include rocks, soil, air, and water. Playgrounds or parks are convenient study sites to observe.</p> <p><i>Environment</i> - all external conditions and factors, living and non-living that affects an organism during its life time.</p> <p><i>Properties</i> – word that describes an object based on direct observations using touch, sight, hearing, taste, smell, and measurements.</p> <p><i>Fossil</i> - part of a once-living organism or a trace of an organism preserved in rock.</p>	

*Earth materials* - rocks, soil, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties which make them useful in different ways.

*Classify* – a method for establishing order on collections of objects or events. Students use classification systems to identify objects or events, to show similarities, differences, and interrelationships. It is important to realize that all classification systems are subjective and may change as criteria change; the test for a good classification system is whether others can use it.

▲ = Grade 4 Assessed Indicator

**STANDARD 4: EARTH AND SPACE SCIENCE**

**Grades 3-4**

**EARTH AND SPACE SCIENCE – The student will observe objects, materials, and changes in their environment, note their properties, distinguish one from another, and develop their own explanations making sense of their observations.**

**Benchmark 2: The student will observe and describe objects in the sky.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. observes the moon and stars.</li> <li>2. observes and compares the length of shadows.</li> <li>3. ▲ discusses that the sun provides light and heat (electromagnetic radiation) to maintain the temperature of the earth.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1. sketches the position of the moon in relation to a tree, rooftop, or building at two or three hourly increments on the same evening.</li> <li>2. observes the movement of an object's shadow during the course of a day; constructs a simple sundial.</li> <li>3. discusses why it seems cooler when the sun goes behind a cloud, and then investigates why it is cooler in the shade versus direct sunlight.</li> </ol>
<p><b>Teacher Notes:</b></p> <p>The sun, moon, stars, clouds, birds, and other objects such as airplanes have <i>properties</i> that can be observed and compared.</p> <p><i>Properties</i> – word that describes an object based on direct observations using touch, sight, hearing, taste, smell, and measurements.</p> <p>▲ = Grade 4 Assessed Indicator</p>	

**STANDARD 4: EARTH AND SPACE SCIENCE**

**Grades 3-4**

**EARTH AND SPACE SCIENCE – The student will observe objects, materials, and changes in their environment, note their properties, distinguish one from another, and develop their own explanations making sense of their observations.**

**Benchmark 3: The student will develop skills necessary to describe changes in the earth and weather.**

Grades 3-4 Indicators	Instructional Examples
The student...  1. ▲ describes changes in the surface of the earth.  2. ▲ observes, describes, and records daily and seasonal weather changes.	The student...  1. observes <i>erosion</i> at a study site.  2. records weather observations using simple instruments (metric rain gauge, Celsius thermometer, etc.).
Teacher Notes:  If the students revisit a study site regularly, they will develop an understanding that the earth's surface and weather are constantly changing.  <i>Erosion</i> – movement of earth materials from one place to another.  ▲ = Grade 4 Assessed Indicator	

**STANDARD 5: SCIENCE AND TECHNOLOGY**

**Grades 3-4**

**SCIENCE AND TECHNOLOGY – The student will have a variety of educational experiences which involve science and technology. The student will begin to understand the design process.**

**Benchmark 1: The student will work with a technology design.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <p>1. ▲ identifies a simple <i>design problem</i> (designs a plan, implements the plan, evaluates the results, makes changes to improve the product, and communicates the results).</p>	<p>The student...</p> <p>1. a. tries different kinds of tools for making the biggest bubbles or the longest lasting bubbles.</p> <p>b. designs and flies a paper airplane that makes one loop before landing.</p>
<p>Teacher notes:</p> <p>As with the Science as Inquiry Standard, not every activity will involve all stages. Students will develop the ability to solve simple design problems that are appropriate for their developmental level.</p> <p>Teachers should guide students to make only one change at a time to the product as the product is being developed.</p> <p><i>Design problem</i> – developing or inventing a product that accomplishes a task or challenge.</p> <p>▲ = Grade 4 Assessed Indicator</p>	

**STANDARD 5: SCIENCE AND TECHNOLOGY**

**Grades 3-4**

**SCIENCE AND TECHNOLOGY – The student will have a variety of educational experiences which involve science and technology. They will begin to understand the design process.**

**Benchmark 2: The student will apply their understanding about science and technology.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. will understand that the design process produces knowledge that can be used to solve a problem and improve our world.</li> <li>2. invents a product to solve problems.</li> <li>3. works with others to solve problems.</li> <li>4. develops an awareness that women and men of all ages, backgrounds, and ethnic groups engage in a variety of scientific and technological work.</li> <li>5. investigates how scientists use <i>tools</i> to observe.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1. understands why a zipper was designed; what problem the zipper has solved; how the zipper has improved our lives; how Velcro is like a zipper; what problem Velcro solves; how Velcro has improved our lives.</li> <li>2. invents a new use for old products: potato masher, strainer, carrot peeler, or 2 liter pop bottle; uses a juice can, 2 liter pop bottle or one-half gallon milk jug to invent something useful; invents something to solve a problem.</li> <li>3. solves a problem by working with others, sharing ideas, and testing the solutions.</li> <li>4. interviews parents and other community and school workers to determine how they use science and technology in their work.</li> <li>5. engages in Internet or library research; interviews or visits a school nurse's, veterinarian's, dentist's, or weatherman's office/laboratory to learn about the <i>tools</i> they use.</li> </ol>
<p>Teacher notes:</p> <p>As with the Science as Inquiry Standard, not every activity will involve all stages. Students will develop the ability to solve simple design problems that are appropriate for their developmental level.</p> <p>Children's abilities in technological problem-solving can be developed by firsthand experiences in tackling tasks with a technological purpose. They can study technological products and systems in their world: zippers, coat hooks, can openers, bridges, paper clips, etc.</p>	

*Tools* – object(s) used to achieve a goal, to make an observation, and extend the senses (see page 122 in the National Science Education Standards, 1996).

▲ = Grade 4 Assessed Indicator

**STANDARD 6: SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES****Grades 3-4****SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES – The student will demonstrate personal health and environmental practices.****Benchmark 1: The student will develop an understanding of personal health.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. ▲ discusses the nutritional value of various foods and their contribution to health.</li> <li>2. discusses that safety involves preventing injury by avoiding inappropriate risks and dangers.</li> <li>3. assumes some responsibility for his/her own health, and the health and well being of others.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1. reads and compares nutrition information found on labels; discusses healthy foods; identifies or makes a healthy snack.</li> <li>2. takes part in classroom discussions which could include bike safety, water safety, weather safety, sun protection, etc...</li> <li>3. practices good personal hygiene and cleanliness (including dental); discusses healthy exercise and sleep habits, and practices self-control by abstaining from actions that harm one's self as well as others.</li> </ol>
<p>Teacher notes:</p> <p>A variety of experiences will be provided to understand various science-related personal and environmental challenges. This standard should be integrated with physical science, life science, and earth &amp; space science standards, and physical education.</p> <p>Personal health involves physical and mental well being, including hygienic practices, and self-respect.</p> <p>▲ = Grade 4 Assessed Indicator</p>	

**STANDARD 6: SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES**

**Grades 3-4**

**SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES – The student will demonstrate personal health and environmental practices.**

**Benchmark 2: The student will demonstrate an awareness of changes in the environment.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. defines pollution.</li> <li>2. develops personal actions to solve pollution problems in and around the neighborhood.</li> <li>3. practices reducing, reusing, and recycling.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1. takes a pollution walk, gathering examples of litter and trash.</li> <li>2. after the pollution walk, works with other children to solve pollution problems observed.</li> <li>3. presents the problem that paper is being wasted in the classroom; meets with other students and forms a plan to resolve this problem by considering how the plan is beneficial to others, and consequently, to one's self. The student should recognize that some benefits occur immediately, but many are only gained through longer periods of time.</li> </ol>
<p>Teacher notes:</p> <p>A variety of experiences will be provided to understand various science-related personal and environmental challenges. This standard should be integrated with physical science, life science, and earth &amp; space science standards.</p> <p>Through classroom discussions, students can begin to recognize pollution as an environmental issue, scarcity as a resource issue, and crowded classrooms or schools as a population issue.</p> <p>▲ = Grade 4 Assessed Indicator</p>	

**STANDARD 7: HISTORY AND NATURE OF SCIENCE**

**Grades 3-4**

**HISTORY AND NATURE OF SCIENCE – The student will experience some things about scientific inquiry and learn about people from history.**

**Benchmark 1: The student will develop awareness that people practice science.**

Grades 3-4 Indicators	Instructional Examples
<p>The student...</p> <ol style="list-style-type: none"> <li>1. recognizes that students participate in science inquiry by asking questions.</li> <li>2. studies the lives of people who made scientific contributions.</li> </ol>	<p>The student...</p> <ol style="list-style-type: none"> <li>1. asks questions such as: How are plants affected by various amounts of light? Which is the “best” paper towel (define best)? Which liquid causes substances such as a jawbreaker, chocolate candy, and Jell-O to dissolve more quickly?</li> <li>2. reads short stories; views films or videos; discusses contributions made by people in science.</li> </ol>
<p>Teacher notes:</p> <p>Experiences of investigating and thinking about explanations provide fundamental ideas about the history and nature of science. Students will observe and compare, pose questions, gather data and report findings. Posing questions and reporting findings are human activities that all students are able to understand. Science is not just memorizing information. This standard should be integrated with physical science, life science, and earth and space science standards.</p> <p>Science and technology have been practiced by people for a long time. Children and adults can derive great pleasure from doing science. They can investigate and experience science. Individuals, as well as groups of students, can conduct investigations.</p> <p>Teachers need to help students understand that asking questions is the beginning of doing science.</p> <p>▲ = Grade 4 Assessed Indicator</p>	