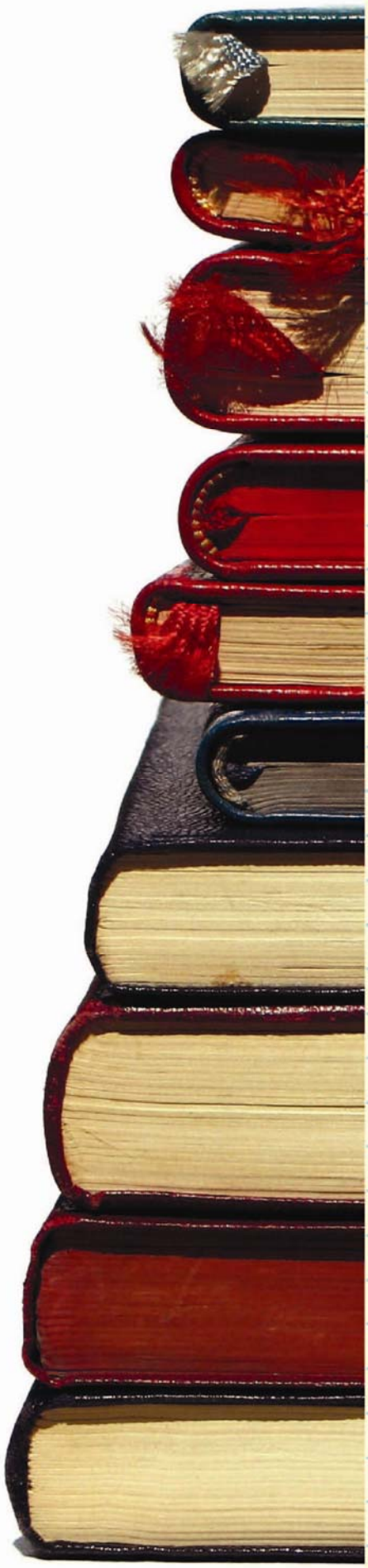

Comprehensive Curriculum

Revised 2008

Grade 1
Science

Louisiana Department of
EDUCATION

Paul G. Pastorek, State Superintendent of Education

Grade 1
Science

Table of Contents

***Louisiana Comprehensive Curriculum*, Revised 2008**
Course Introduction

The Louisiana Department of Education issued the *Comprehensive Curriculum* in 2005. The curriculum has been revised based on teacher feedback, an external review by a team of content experts from outside the state, and input from course writers. As in the first edition, the *Louisiana Comprehensive Curriculum*, revised 2008 is aligned with state content standards, as defined by Grade-Level Expectations (GLEs), and organized into coherent, time-bound units with sample activities and classroom assessments to guide teaching and learning. The order of the units ensures that all GLEs to be tested are addressed prior to the administration of *i*LEAP assessments.

District Implementation Guidelines
Local districts are responsible for implementation and monitoring of the *Louisiana Comprehensive Curriculum* and have been delegated the responsibility to decide if

- units are to be taught in the order presented
- substitutions of equivalent activities are allowed
- GLES can be adequately addressed using fewer activities than presented
- permitted changes are to be made at the district, school, or teacher level

Districts have been requested to inform teachers of decisions made.

Implementation of Activities in the Classroom
Incorporation of activities into lesson plans is critical to the successful implementation of the Louisiana Comprehensive Curriculum. Lesson plans should be designed to introduce students to one or more of the activities, to provide background information and follow-up, and to prepare students for success in mastering the Grade-Level Expectations associated with the activities. Lesson plans should address individual needs of students and should include processes for re-teaching concepts or skills for students who need additional instruction. Appropriate accommodations must be made for students with disabilities.

New Features
Content Area Literacy Strategies are an integral part of approximately one-third of the activities. Strategy names are italicized. The link (view literacy strategy descriptions) opens a document containing detailed descriptions and examples of the literacy strategies. This document can also be accessed directly at http://www.louisianaschools.net/lde/uploads/11056.doc.

A *Materials List* is provided for each activity and *Blackline Masters (BLMs)* are provided to assist in the delivery of activities or to assess student learning. A separate Blackline Master document is provided for each course.

The *Access Guide to the Comprehensive Curriculum* is an online database of suggested strategies, accommodations, assistive technology, and assessment options that may provide greater access to the curriculum activities**.** The *Access Guide* will be piloted during the 2008-2009 school year in Grades 4 and 8, with other grades to be added over time. Click on the *Access Guide* icon found on the first page of each unit or by going directly to the url http://mconn.doe.state.la.us/accessguide/default.aspx.

Grade 1
Science
Unit 1: The Changing Weather and Local Effects

Time Frame: Approximately 12 instructional periods at 45 minutes per period.

Unit Description

This unit creates awareness of the changes in the weather that occur daily and seasonally. These changes can be observed, measured, and recorded. The unit focuses on how water changes from one form to another, the amount of water on Earth, and the seasonal changes in weather.

Student Understandings

Students experience the water cycle and compare seasonal temperature changes and other weather phenomena, including how changing weather affects life and activities in their immediate surroundings. The students will develop an understanding that there is more water than land on the surface of the Earth and that this affects weather patterns.

Guiding Questions

1. Can students identify continents and oceans on a map or globe?
2. Can students identify where salty water and fresh water are found?
3. Can students describe the water cycle?
4. Can students describe weather events such as hurricanes and thunderstorms and the effects of these weather changes on plant and animal life?

Unit 1 Grade-Level Expectations (GLEs)

GLE #	GLE Text and Benchmarks
Science as Inquiry	
1.	Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)
2.	Pose questions that can be answered by using students' own observations and scientific knowledge (SI-E-A1)
3.	Predict and anticipate possible outcomes (SI-E-A2)
5.	Use the five senses to describe observations (SI-E-A3)
6.	Measure and record length and temperature in both metric system and U.S. system units (SI-E-A4)

GLE #	GLE Text and Benchmarks
7.	Select and use developmentally appropriate equipment and tools and units of measurement to observe and collect data (SI-E-A4)
8.	Express data in a variety of ways by constructing illustrations, graphs, charts, tables, concept maps, and oral and written explanations as appropriate (SI-E-A5) (SI-E-B4)
9.	Use a variety of appropriate formats to describe procedures and to express ideas about demonstrations or experiments (e.g., drawings, journals, reports, presentations, exhibitions, portfolios) (SI-E-A6)
10.	Identify and use appropriate safety procedures and equipment when conducting investigations (e.g., gloves, goggles, hair ties) (SI-E-A7)
Earth and Space Science	
36.	Locate and compare the relative proportions of land and water found on Earth (ESS-E-A2)
37.	Illustrate how water changes from one form to another (e.g., freezing, melting, evaporating) (ESS-E-A3)
38.	Compare weather patterns as they relate to seasonal changes in students' immediate environment (ESS-E-A4)

Sample Activities

Activity 1: Safety Contract: (GLEs: 8, 10)

Materials List: chart paper

Using a modified *SQPL* (Student Questions for Purposeful Learning (view literacy strategy descriptions) strategy, the students will generate a list of safety procedures for science labs. This strategy uses a teacher-generated statement to cause students to wonder, challenge, or question. The statement does not have to be factually true, as long as it causes students to think about safety procedures. The following statement (or similar statement) should be written on the board or chart paper for student discussion:

The teacher makes the classroom safe for science.

Have students turn to a partner and think of one good question or comment they have about the given statement. Repeat the statement as needed to individual pairs. As students respond, record the questions and/or comments on the board or chart paper. Facilitate a discussion about each of the questions or comments. Reinforce accurate comments, clarify inaccurate comments, and answer questions. Following the discussion, explain to the students that the class will create a safety contract. Using the previous discussion, develop a chart about how to practice safe science. Refer to this chart throughout the year.

Here are some examples of safety statements you may develop together:

- Listen to the directions before beginning an experiment.
- Keep hands away from face when working.
- Demonstrate responsibility when using materials.

Explain to the students that different rules apply to different situations. Before every investigation, or experiment, science safety requirements should be discussed. Add rules to the chart as necessary. Students can then sign their name on the chart.

Activity 2: Groovy Globe (GLEs: 1, 2, 3, 5, 8, 36)

Materials List: inflatable globe, globe, paper plates, crayons

Display a globe and ask students why it is different colors. Guide them to the fact that water is blue on globes and land may be different colors to show different countries. Toss an inflatable globe back and forth, from teacher to student, with each student taking a turn. Have one student tally the location of the right thumb of the child who caught the ball. The location should be called out or described as on land or water.

Spin a globe and have each child stop it with the index finger, and tally the same way. Explain that probability means what is most likely to happen. Since there is more water than land on Earth, more students will probably land on water.

Questions for inquiry:

- Which do you think will have more tally marks, land or water? Why?
- Do you think scientists do an experiment over and over? Why?
- If we have more tally marks for land in our investigation, does that mean that it changes the amount of land on Earth? Is there really more land? Why?
- If you color a map of Earth to show land and water, what colors would you use? Why? (All maps use blue to represent water; guiding questions can help students get to the fact that land can be green or brown like the grass or dirt on the land.)
- Do you think that people decide where to live by finding out how much land and water is in the location? Why?

Have students create a visual model of the proportions of land and water on Earth by folding a paper plate into fourths and coloring 3 parts blue and 1 part green.

Questioning procedure for GLE 1: Place a large question mark visual on the board, signaling question time. Allow time for students to ask questions about the concept at hand and call on other students to answer them. A fun way to lead students to ask questions on topic is to have a puppet, stuffed animal, or seashell that the student holds near his/her ear to "listen to the science question" and then he/she asks the class (the student is actually formulating the question in his/her mind). The teacher should model the use of the prop first before having students try it. Use of a prop can be a confidence

builder for reluctant participants as well as a way to keep the students on track with the correct line of questions. The teacher will facilitate the discussion.

Activity 3: Surf–n–Turf (GLEs: 1, 2, 5, 36)

Materials List: globe or wall map, The Ocean Song BLM, The Continent Song BLM, copy of world map to color (To obtain a blank copy of the world map, visit www.enchantedlearning.com), crayons/colored pencils

Begin by singing *The Ocean Song* to review that Earth is covered with more water than land. Have students locate the oceans on a globe or wall map. Sing the song many times so that students can learn the words and join in. Ask students about the difference between salt water and fresh water. They may be able to describe tasting salt water on a trip to the beach.

Sing *The Continent Song* to introduce the names of the continents. Ask students what represents land on the globe/map. Explain that the continents are the very large pieces of land that contain the countries. Have the students find the United States and show that it is in North America. Follow a similar procedure to show all seven continents. Sing the song a few times for students to learn the words and join in.

Give each student a copy of a world map to color and allow them to work with a partner. Have them try to color that map using only two or three colors. As the teacher monitors the activity, students should be able to explain that land areas should be green or brown while water areas should be blue, based on their discussion from Activity 1.

Use Questioning Procedure for GLE 1 (see Activity 1).

For additional practice, allow students who are able to read the words to the two songs work in small groups to sing and point to each ocean or continent on individual maps. Place students who need a review or cannot read the words in the teacher's group.

Activity 4: The Weather Calendar (GLEs: 1, 2, 3, 5, 6, 7, 8, 9, 38)

Materials List: large calendar or chart paper, simple outdoor thermometer, windsock

This will be an ongoing activity with periodic discussion of changes and patterns in the weather. Building on previous grade-level experience, post a yearly calendar on the wall. (Locate the students' birth dates on the calendar and mark them.) Assign students to be the weather keepers for the week. Students must create a common set of weather symbols (draw pictures) of (sunny, cloudy, partly cloudy, rainy, thunderstorm) to mark the weather on the calendar. They will need to be sure to record weekend weather on Monday mornings. Using a windsock, the students can take turns going out morning and afternoon and record if there was no wind, little wind, or strong wind by drawing the

position of the windsock, assigning numbers 0=no wind, 1=little wind, and 2=strong wind.

Review or introduce the use of a thermometer. Hang a thermometer outside near the classroom for students to take turns checking and recording the temperature in the morning and the afternoon. Students should record temperature in Celsius and Fahrenheit. Allow students to predict the next day's weather.

Periodically, summarize the weather trends—sunny, windy, cloudy, rainy, as well as daily temperature—using data to develop a graph. Relate the weather patterns to seasonal changes by making a chart of the months, divided into groups of three to represent the four seasons, and having the children tally rainy and sunny days.

Activity 5: Wicked Weather (GLEs: 1, 3, 8, 38)

Materials List: map or globe, chart paper for word grid, teacher-selected literature with a focus on weather events (see following examples)

Jake and Friends Encounter Hurricane Katrina (Aucoin, 2007)
Lightening (Simon, 2006) *Oh Say, Can You Say What the Weather is Today?* (Rabe, 2004)

Using appropriate teacher-selected reading material, the students will create a graphic organizer of preparations necessary for hurricane safety (brainstorming, concept map). Using a map or globe, include discussions about hurricanes in Louisiana. Have students locate Louisiana, the Gulf of Mexico, and the Atlantic Ocean during these discussions. Include indicators of hurricane season on the classroom weather calendar.

Co-construct a *word grid* (view literacy strategy descriptions) to reinforce the ways that weather affects our daily lives. This strategy involves building a grid to emphasize types of weather and the effects. The weather events brainstormed by the students are listed on the vertical axis and the activity/items brainstormed by the students are listed on the horizontal axis. The students discuss each type of weather and determine whether or not the activity/item will be affected and indicate the effect with a plus (+) or minus (-) on the grid.

The teacher should make sure that various types of weather are represented and a variety of activities are listed (e.g., sporting events, plants, food sources, and other ways in which we live). The word grid provides the students with a concrete model of cause and effect and develops vocabulary of weather events.

Students can create a *word grid* such as the sample below:

	recess	plants	outdoor sports
drought	-	+	-
rain	+	+	+
sunshine	+	+	+
lightening	+	-	+

Use Questioning Procedure for GLE 1 (see activity 1).

Activity 6: The Water Goes 'Round (GLEs: 1, 2, 8, 37)

Materials List: teacher-selected video or trade book, chart paper, The Water Cycle Song BLM, leather cording or string for bracelet per student, beads for bracelets in the following colors (one each per student): Kelly green, light blue, dark blue, yellow, clear, white (pony beads, available at craft stores, work well)

Using appropriate teacher-selected reading material or media (see resources below), the students will generate questions about the topic based on an *SQPL* (*Student Questions for Purposeful Learning*) (view literacy strategy descriptions) prompt. The teacher should make this (or a similar) statement and write it on the board or on chart paper: *The Earth uses the same water again and again.* Repeat it as necessary. Have students turn to a partner and think of one good question they have about the upcoming video or book based on the given statement. *The Earth uses the same water again and again.* As students respond, record the questions on the board or on chart paper.

Tell students to listen carefully for the answers to their questions as you read the book aloud or as they actively watch a video. If reading, the teacher should stop at key points for discussion and to record answers to the students' questions. If using a video, the teacher should stop the video at key points for discussion and to record answers to the students' questions.

The students should draw and label a diagram of the water cycle to include water vapor, clouds, and rain. The Water Cycle Song BLM can be printed on chart paper or presented on the overhead projector. Students may have a copy of the song to take home and sing to their families. The terms *evaporation*, *condensation*, and *precipitation* are only introduced. Some students may learn and use these words, but mastery of these terms is not necessary at this level.

Finally, the students can create a Water Cycle Bracelet to wear and describe the events of the water cycle to family and friends. The beads represent the components of the water cycle.

Students should string each bead on the bracelet as he/she describes the water cycle.
Kelly green = land
Dark blue = bodies of water
Yellow = sun
Clear = water vapor
White = clouds
Light blue = rain, hail, sleet, snow

The two books listed below might be good resources for read alouds:
The Drop Goes Plop: A First Look at the Water Cycle (Goodwin, 2004)
The Snowflake: A Water Cycle Story (Waldman, 2003)

This video is an age-appropriate explanation of the water cycle.
www.unitedstreaming.com - Water: A First Look (17:00)

Activity 7: Dear Mr. Sunshine (GLEs: 5, 8, 37)

Materials List: chart paper, Reader's Theater script for students (ex. http://teachers.net/lessons/posts/400.html), or other related age-appropriate stories such as those listed below:
Follow a Raindrop. (Ward, 2000)
What Makes it Rain? (Brandt, 1996)

Have small groups of students practice reading the script, make story props, and present the play to the rest of the class or use literature as read-alouds. The teacher can model writing an acrostic poem (the letters in a topic word begin each line; all lines of the poem relate to or describe the topic word) using the students' ideas/suggestions for the text. Possible words might be *rain*, *clouds*, *sun*, *weather*, *water*, etc.

Example using the word *rain*:

Ripples in ponds

All over the ground

I can't go out to play

Nice and refreshing for plants

The students can then use the descriptions from the literature and the ideas generated in the acrostics for a modified *RAFT* writing (view literacy strategy descriptions) (***R**ole of writer, **A**udience, **F**orm, **T**opic*) to demonstrate their understanding of the changing states of water. The role refers to the viewpoint of the writer, the audience refers to whom or what the RAFT is being written, the form refers to the form the writing will take, and the topic refers to the subject focus of the writing.

RAFT writing is a form of writing that gives students the freedom to project themselves into unique roles and look at content from unique perspectives. The teacher can use this as a whole class activity. The parts of a friendly letter can be introduced and the letter can be written with student input. The letter should be written to the Sun to illustrate how the students would feel if they were raindrops. The students' role will be raindrops, the audience will be the Sun, the form will be a letter, and the topic will be phases of the water cycle. The product will be one that can serve as a model of something both creative and informative and can also serve as a model of a friendly letter for later instruction.

Sample Assessments

General Guidelines

Documentation of student understanding is recommended to be in the form of portfolio assessment. Teacher observations and records as well as student-generated products may be included in the portfolio. All items should be dated and clearly labeled to show student growth effectively over time.

Activity-Specific Assessments

- Activity 2: Teacher can evaluate the maps students colored to indicate land and water; teacher can have students label continents or oceans or point to land and water, based on ability levels.

- Activity 5: Assess the accuracy of the word grid.

- Activity 6: Students can explain the ways water changes by pointing to each bead on his/her bracelet, stating what the color represents, and correctly identifying the forms of water.

Grade 1
Science
Unit 2: All Sorts of Solids

Time Frame: Approximately 10 instructional periods of 45 minutes per period

Unit Description

This unit introduces measurement skills, sorting, and classifying as ways to investigate the properties of matter. Standard and non-standard units are compared and used in science experiments and real-life situations. Materials are sorted as magnetic and non-magnetic.

Student Understandings

Students will develop an understanding that solid objects have varying physical characteristics. Students will explore the process of experimentation to sort and classify solid objects.

Guiding Questions

1. Can students measure the length of an object in nonstandard units?
2. Can students use physical properties to sort things?
3. Can students predict and determine, through experimentation, if objects are magnetic or non-magnetic?
4. Can students predict and determine, through experimentation, if objects sink or float?

Unit 2 Grade-Level Expectations (GLEs)

GLE #	GLE Text and Benchmarks
Science as Inquiry	
1.	Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)
2.	Pose questions that can be answered by using students' own observations and scientific knowledge (SI-E-A1)
3.	Predict and anticipate possible outcomes (SI-E-A2)
4.	Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2)
5.	Use the five senses to describe observations (SI-E-A3)

GLE #	GLE Text and Benchmarks
6.	Measure and record length and temperature in both metric system and U.S. system units (SI-E-A4)
7.	Select and use developmentally appropriate equipment and tools and units of measurement to observe and collect data (SI-E-A4)
8.	Express data in a variety of ways by constructing illustrations, graphs, charts, tables, concept maps, and oral and written explanations as appropriate (SI-E-A5) (SI-E-B4)
9.	Use a variety of appropriate formats to describe procedures and to express ideas about demonstrations or experiments (e.g., drawings, journals, reports, presentations, exhibitions, portfolios) (SI-E-A6)
10.	Identify and use appropriate safety procedures and equipment when conducting investigations (e.g., gloves, goggles, hair ties) (SI-E-A7)
Physical Science	
13.	Sort a group of objects by using multiple characteristics (PS-E-A1)
14.	Order objects by weight/mass (PS-E-A1)
15.	Measure length and width of a variety of objects and materials by using nonstandard tools, such as a paper clip, cube, shoe, and hands (PS-E-A2)
23.	Identify materials attracted by magnets (PS-E-C5)
24.	Determine, through experimentation, which poles of magnets are attracted to each other and which poles repel each other (PS-E-C5)

Teacher note: This unit requires many materials, which are easy to obtain, but may take time to gather. Consider assigning a list of materials to each teacher in the grade level and then share the sets.

Sample Activities

Activity 1: Sorting Things (GLEs: 1, 2, 4, 5, 8, 9, 13)

Materials List: chart paper, markers, bags, trays, items to sort (but not limited to [paper clips (silver and colored, large and small), scissors [all metal, plastic and metal, pointed and rounded], rocks [large and small, rough and smooth, one color, multi-colored], pencils [sharp, dull, long, short], keys [with and without holes], buttons]with and without holes], cotton balls, foam shapes, screws [flat and rounded)], and any other small items that are safe for students to handle); chart paper, markers, bags, trays, (optional: graduation cap, lab coat, clipboard)

Prepare a bag of solid materials and a tray for each group of 3 or 4 students. The bag should include small objects that can be sorted by shape, color, texture, and size.

Discuss safety procedures for sorting items that may be sharp. Have students describe ways to pass scissors safely and ways to handle other pointed objects.

Have each group sort the objects in the bag into categories. They will decide which things go together. Give them no further directions. Tell the groups that they will have two minutes. Time their work.

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Use a modified *professor know-it-all* strategy (view literacy strategy descriptions) to have students question each other about the ways to sort the items. In this activity, the groups of 3-4 students will serve as experts on the topic. Groups of students should be called upon randomly to present a group of objects and have the class guess why they put these objects into a single category. The students should then explain why those objects belong together. The teacher should list the categories on chart paper, to produce a list of vocabulary words: *hard*, *soft*, *sharp*, *metal*, *plastic*, *smooth*, *rough*, *color*, etc.

To add a level of novelty to the strategy, the teacher can supply graduation caps and gowns, lab coats, clipboards, or other symbols of professional expertise for students to don when it's their turn to be the *professor know-it-alls*.

Once all students have had a turn to present and the vocabulary list has been formed, *professor know-it-all* groups can choose two categories for the rest of the class to sort again. (e.g., hard and soft) Students will work together to create these groups. Then, choose two different categories for the students to sort again. (e.g., one color and more than one color) Students will work together to create these groups.

Finally, have each student in the group take a turn to sort the items as the others watch. The others will try to name the categories that the student used in sorting.

Each student can write a sentence and/or draw a picture that shows objects sorted into categories. (see assessment section).

Activity 2: Measuring Things (GLEs: 4, 6, 7, 15)

Materials List: rulers with both metric and U.S. units, measuring tape, paper clips, toothpicks, crayons, items to measure (4 items per pair of students), pencils, scissors, bottles of glue, paper bags, How Long? BLM, Scavenger Hunt BLM, Scavenger Hunt Rubric BLM

*Teacher note: Allow two days for this activity because there is a home assignment for students to bring to class and use the next day.

Show students a ruler and a measuring tape, asking for what these tools might be used. Work towards a list of vocabulary words (*length*, *height*, *tall*, *long*). Discuss other things that might be used to measure if these tools are not available (paper clips, cubes, toothpicks, hands, feet). Add the terms *standard* and *nonstandard* to the list of vocabulary words and identify which units are standard and which are nonstandard.

Model using hands as units of measure and have students measure how many hands would describe the length of the desktop. Model using crayons as units of measure and have students use crayons to describe the length of the desktop.

Questions for inquiry:

- Why are all of our measures not the same?
- Is there a way to make sure all of our desks are measured by the same amount of crayons? Hands? Other objects?

Provide each pair of students with ten toothpicks and twenty paper clips to use as measurement tools, along with four classroom items and How Long? BLM Have partners join the paper clips to make a chain. Students should take turns measuring each item with their measurement tools, drawing a picture of the item, and recording the number of clips or toothpicks in the appropriate column on the top half of the How Long? BLM..

Questions for inquiry:

- What if you had some water to measure, could you use the toothpicks or the clips? Why?
- Why can the toothpicks and clips be used to measure some things, but not water?
- What can we use to measure an amount of water?
- What if we had something round to measure, which would be best to measure it? Why?

Introduce or review the units of measure for U.S. system and metric system: *inches* and *centimeters*. Add the terms to the list of vocabulary words. Allow students time to observe rulers to discover that an inch is longer than a centimeter. Introduce or review the abbreviations for inches (in.) and centimeters (cm.).

Show students how to estimate an inch: bend your index finger at the knuckle. The knuckle to the first joint is about one inch. Model the use of a ruler by showing students how to align the edge of the ruler with the edge of the object. Have students work with a partner to measure their pencils, scissors, and bottles of glue in inches and in centimeters.

Using the second half of the How Long? BLM, have students practice their measurement skills independently or in pairs.

Send the Scavenger Hunt BLM home with a paper bag for students to gather and record items for each length indicated.

The next day, have students work in pairs to practice measuring each other's items, with one student acting as the *professor-know-it-all* (view literacy strategy descriptions) to ask his/her partner to estimate the length and measure it. Students should compare this measurement to the measurement recorded on the home assignment. Students can use the back of the BLM to record each of his/her partner's items by drawing a picture of the

item and writing the length with the correct abbreviation (in. or cm.). Finally, have students put the items in order from shortest to longest by physically arranging the items on the desk. A Scavenger Hunt Rubric BLM is provided to assess this part of the activity.

Activity 3: Estimating Weight (GLEs: 3, 4, 7, 9, 14)

Materials List: balance, box of crayons, scissors, pencil, crumpled paper, Unifix© cubes, items to weigh (3 per group), How Heavy? BLM

Ask students to observe a pan balance at rest. Have students predict the outcome of comparing the weights of a box of crayons and a pair of scissors, a box of crayons and a pencil, and a box of crayons and a piece of crumpled paper. Call on student volunteers to measure these items.

Questions for inquiry:

- How do you know when an object is heavier than the box of crayons?
- How can you tell when an object is lighter than the box of crayons?

Using the How Heavy? BLM, have students explore ordering items from lightest to heaviest. Have them select three items found in the classroom and weigh them on the balance against Unifix© cubes, recording the number of cubes to balance each. Then have students place the items in order from lightest to heaviest.

Activity 4: Sorting Sinkers and Floaters (GLEs: 1, 2, 8, 13)

Materials List: clear containers to hold water; items to test (per group): pennies, paper clips, leaves, foil squares, drinking straws, small buttons, marbles, marshmallows; safety goggles for each child; paper towels; Sink or Float? BLM; Safety Contract created in Unit 1

Following a modified *SQPL* (view literacy strategy descriptions), the students will predict and test the outcome of placing solid objects in water.

The following statement (or similar statement) should be written on the board or chart paper for student discussion:

Only things that are heavy can sink.

Have students turn to a partner and think of one good question or comment they have about the given statement. Repeat the statement as needed to individual pairs. As students respond, record the questions and/or comments on the board or chart paper.

Facilitate a discussion about each of the questions or comments. Reinforce accurate comments, clarify inaccurate comments, and answer questions. Refer to the Science

Safety Contract created in Unit 1 and have students identify safety procedures for scientific investigations. Following the discussion, explain to the students that they will be experimenting with items to sort into sinkers and floaters.

Using the Sink or Float BLM, have small groups of students predict whether the objects will sink or float and test items in water. Set containers of water on the table for each group and provide the items listed. Students should make their predictions individually on his/her own record sheet by drawing an arrow up (will float) or down (will sink). Then, students should take turns dropping the item into the water, recording the outcome by writing the word sink or float, and removing that item from the water. Items can be set on paper towels to dry.

Teacher note: Students should be instructed to leave the material as it is and drop it into the water. Following the investigation, ask the students if they might get different results with any of the items. Students may want to try changing the shape of the foil square and drinking straw.

Questioning procedure for GLE 1: Place a large question mark visual on the board, signaling question time. Allow time for students to ask questions about the concept at hand and call on other students to answer them. A fun way to lead students to ask questions on topic is to have a puppet, stuffed animal, or seashell that the student holds near his/her ear to "listen to the science question" and then he/she will ask the class (the student is actually formulating the question in his/her mind). The teacher should model the use of the prop first before having students try it. Use of a prop can be a confidence builder for reluctant participants as well as a way to keep the students on track with the correct line of questions. The teacher will facilitate the discussion.

Activity 5: Discovering Magnets (GLEs: 2, 3, 4, 8, 23, 24)

Materials List: Pick Me Up! BLM, disc magnets, magnet wands for each student or each group, age-appropriate book or video (see resources below), disc magnet inside a small, sealed envelope (library pocket size) for each pair of students, colored sticky dots; one unsharpened pencil and two donut magnets per pair of students, one set of materials per group of students (tacks, paper clips, screws, nightlight light bulbs, metal spoons, clothespins, pennies, pens, safety pins, pencil sharpeners)

Safety note: Have students discuss the proper handling of pointed objects, such as the tacks and safety pins used in this investigation.

Magnets: A First Look (17:00) www.lpb.org/cyberchannel
This fee-based resource is provided by Louisiana Public Broadcasting (LPB). Check with the school district for availability.
Magnetic and Non-Magnetic, Royston.
The Mystery of Magnets, Berger

Distribute copies of the Pick Me Up! BLM to students. In small groups, the students will predict whether each item will be attracted to the magnet or not by drawing a happy or sad face. Students should take turns testing one item at a time and writing "yes" or "no" in the proper column on his/her BLM .

Next, students will experiment with magnets to discover that one side (pole) is attracted to the opposite side (pole) of another. Provide pairs of students with a small, sealed envelope with a disc magnet inside. One side of the envelope should be marked with a colored dot, the other with nothing.

*Note: The teacher must test each envelope and mark the side that is attracted to the magnet prior to the activity.

Students should use another disc magnet to test the envelope and determine that one side is attracted and the other is not.

Read a story or use a video to further illustrate that opposite poles attract and like poles repel.

Finally, use a pencil and donut magnets to make magnets "float." One student should hold the pencil vertically with thumb and index finger. The partner should place a donut magnet on the pencil and have it rest on the student's thumb and finger. The partner should then drop the other donut magnet onto the pencil.

Ask students:
If the magnets stick together, what can we say about the poles? (opposite poles attract)
If the magnet on top is "floating," what can we say about the poles? (like poles repel)

Give the students extra time to repeat this experiment, allowing each partner to have a turn to drop the magnets.

Activity 6: The Main Attraction (GLEs: 1, 3, 4, 10, 23)

Materials List: stuffed animal; one set of materials per group of students: sheet of paper, wooden block, piece of waxed paper, book, piece of aluminum foil, chalkboard eraser, small disc magnet per child or group, magnet wands for each child or group; Will a Magnet Work Through…BLM; safety goggles for each student; bowl of clean sand per group; bowl of water per group; one set of materials per group: dime, pull-tab from soda can, insulated wire, paper clip, screw, twist tie

Discuss safety considerations before beginning this experiment. Ask students why they should not taste the water that they will use in the experiment. Students should wear goggles for this experiment and discuss why scientists would wear such protective gear. *Re-visit the Safety Contract generated in Unit 1.

Allow students time to explore the poles of magnets by turning the wand magnets back to back and feeling the attraction and the repulsion. Explain that when like poles are near each other, the magnets repel; when opposite poles are near each other, the magnets attract.

Ask students to think about what might happen if an object was between two magnets. Would the magnets still attract? Model the way that magnets will be tested to determine if magnets still attract through certain objects: place a stuffed animal on a desk. Hold a disc magnet to its back. Hold a wand magnet to its chest. Let go of the disc magnet. Students should observe that magnets do not attract through the thick stuffing of the animal. Try again with the animal's ear. If it's thin enough, it may attract the other magnet. Now have a student hold a piece of paper. Hold a disc magnet on one side. Hold a wand magnet on the other. Let go of the disc magnet. Students should observe that magnets do attract through the paper. They may use words such as *thick* and *thin* to describe these events. Have the students generate a list of items that might be used to test this idea.

Questioning procedure for GLE 1: Place a large question mark visual on the board, signaling question time. Allow time for students to ask questions about the concept at hand and call on other students to answer them. A fun way to lead students to ask questions on topic is to have a puppet, stuffed animal, or seashell that the student holds near his/her ear to "listen to the science question" and then have him/her ask the class (the student is actually formulating the question in his/her mind). The teacher should model the use of the prop first before having students try it. Use of a prop can be a confidence builder for reluctant participants as well as a way to keep the students on track with the correct line of questions. The teacher will facilitate the discussion.

Using the Will a Magnet Work Through…BLM, have students work in small groups or pairs to test each material. Allow time for students to search the classroom for other items to test the magnets and record the results on the chart. Observe the students in their conversations and be aware of misconceptions. Students should be able to verbalize that the magnets attract through certain materials, but not to the material itself.

Questions for inquiry: (Students should make inferences based on their experiments.)

- Do you think magnets work in salt? How do you know?
- Do you think magnets work in dirt? How do you know?
- What kinds of work could big machines that held magnets do in dirt or sand?

Have students drop objects (dime, pull-tab from soda can, insulated wire, paper clip, screw, twist tie) into the cup or jar of clean sand and press the objects into it so they are buried at different depths. Students will take turns dipping the wand into the sand and attempting to pick up the buried objects. Students will discuss which items are attracted to the magnet.

Have students tie one end of the string to the magnet wand. Have them drop the same objects into the cup or jar and take turns dipping the wand into the water to try and pick up the objects.

Discuss the results of this investigation. Students should conclude that magnets do work through sand and water, as long as the material they are trying to pick up is one that is attracted to a magnet.

Questions for inquiry:

- If you dropped a paper clip in your bathtub, how could you get it out without getting your hands wet?
- If a car rolled into a lake, could a giant machine with a magnet on it pick it up? Why?
- If you dropped a penny in your bathtub, could a pole with a magnet on the end pick it up? Why?
- Why might people use metal detectors in their yards or at the beach?

Sample Assessments

General Guidelines

Documentation of student understanding is recommended to be in the form of portfolio assessment. Teacher observations and records as well as student-generated products may be included in the portfolio. All items should be dated and clearly labeled to show student growth effectively over time.

General Assessments

- Teacher observation of students' object-sorting activity
- Anecdotal notes about students' understanding of measuring in non-standard and standard units, based on discussions
- Work samples for portfolio may include completed blackline masters and photos of students working in groups

Activity-Specific Assessments

- Activity 1: Students can work at a science station or learning center to complete a sorting chart individually. Provide the same items used in the activity and have students sort them into categories, drawing a picture of the objects in each group and labeling the groups to show similar characteristics.

- Activity 2: Observe students as they work to record each student's performance in measuring with standard units, using scientific tools, and cooperative learning. Scavenger Hunt Rubric BLM should be completed by the teacher after/during observations of students. The rubric should not be used for prompts to question students, but to record how well the student accomplishes each task.

- Activity 5: Check the BLM for accuracy in recording the outcome of the investigation. After reading a book or using a video for discussion, have students write a sentence or make a list on the back of the BLM to record the kinds of materials attracted to magnets (iron, nickel, steel) and check for accuracy.

Grade 1
Science
Unit 3: States of Matter

Time Frame: Approximately 10 instructional periods of 45 minutes per period

Unit Description

This unit focuses on the exploration of the three states of matter (solids, liquids, and gases) and some of the observable characteristics of each state.

Student Understandings

Students differentiate among the properties of solids, liquids, and gases. Students understand some of the factors that cause a particular state of matter to exist. Students understand that changes in the state of matter are easily observed in the world around them and in their everyday lives.

Guiding Questions

1. Can students differentiate among the properties of solids, liquids, and gases?
2. Can students describe common properties of solids, liquids, and gases?
3. Can students describe how hot and cold temperatures affect the state of matter?

Unit 3 Grade-Level Expectations (GLEs)

GLE #	GLE Text and Benchmarks
Science as Inquiry	
1.	Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)
2.	Pose questions that can be answered by using students' own observations and scientific knowledge (SI-E-A1)
3.	Predict and anticipate possible outcomes (SI-E-A2)
4.	Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2)
5.	Use the five senses to describe observations (SI-E-A3)
6.	Measure and record length and temperature in both metric system and U.S. system units (SI-E-A4)
8.	Express data in a variety of ways by constructing illustrations, graphs, charts, tables, concept maps, and oral and written explanations as appropriate (SI-E-A5) (SI-E-B4)

GLE #	GLE Text and Benchmarks
10.	Identify and use appropriate safety procedures and equipment when conducting investigations (e.g., gloves, goggles, hair ties) (SI-E-A7)
Physical Science	
13.	Sort a group of objects by using multiple characteristics (PS-E-A1)
16.	Observe and describe common properties of solids, liquids, and gases (PS-E-A4)
17.	Sort and classify objects by their state of matter (PS-E-A4)
Earth and Space Science	
37.	Illustrate how water changes from one form to another (e.g., freezing, melting, evaporating) (ESS-E-A3)

Teacher note: This unit requires many materials, which are easy to obtain, but may take time to gather. Consider assigning a list of materials to each teacher in the grade level and then share the sets.

Sample Activities

Activity 1: A Matter of Meaning (GLEs: 2, 4, 5, 8, 16)

Materials List: chart paper, wooden blocks, various shaped clear plastic containers, water with food coloring added, clear plastic bag, clear helium balloon, Vocabulary Chart BLM, What Do You Think? BLM

Students can maintain a *vocabulary self-awareness chart* (view literacy strategy descriptions) throughout the unit. The teacher should present the target vocabulary words: *solid*, *liquid*, *gas* (Vocabulary Chart BLM). Do not give students definitions or examples at this stage, but allow them to rate their own understanding of each word by indicating a happy face (I think I know what that word means) or a question mark (I don't think I know what that word means), example, and definition.

Over the course of the activities and exposure to other sources of information, the students should return often to the chart and add new information to it. The goal is to replace all question marks with happy faces. Because students continually revisit their vocabulary charts to revise their entries, they have multiple opportunities to practice and extend their growing understanding of key terms related to matter.

New terms can also be added to the chart prior to the investigations described in this unit. An additional, blank copy of the BLM is provided. Allow students time to talk with partners or small groups about their charts to add other examples. Allow time for whole class discussion to create working definitions of each term to be written on chart paper and displayed in the classroom throughout the unit.

Place wooden blocks in various shaped containers (short, tall, round, square). Through guided questioning, elicit student understanding that solids are visible and do not change shape. Repeat the process with colored water to elicit student understanding that liquids are visible and become shaped like their containers. Next use a clear plastic bag filled with air or a clear balloon filled with helium. Squeeze the bag/balloon to show that there is something in there. Undo the seal and let the gas escape, allowing the students to feel the air/gas as it escapes; squeeze bag/balloon to show that something is gone that was in there before. Elicit student understanding that most gases are not visible and that gases change shape easily. depending upon the shape of their container.

Using the What Do You Think? BLM, have students respond to each statement by writing "yes" or "no." The statements on the BLM are a modified *anticipation guide* (view literacy strategy descriptions). The statements are designed to assess students' prior knowledge, provide topics for discussion, and serve as an assessment tool at the end of the unit. The students should have the same paper returned at the end of the unit. They can write "yes" or "no" with a crayon to the left of the statement, with an opportunity for them to re-evaluate their responses based on what was discovered through the activities.

Activity 2: Sorting Solids (GLEs: 1, 2, 13)

Materials List: yarn or paper plate, chart paper, Science Learning Log BLM, Science Learning Log Rubric BLM, one set for each group of students: a square of flexible plastic (cut from a pocket folder), a square of cardboard, a square piece of cloth, a square of transparency, a four-inch piece of flexible wire, a screw, a craft stick, a wooden block, a four-inch piece of flexible tubing, a wooden cylinder, a small sponge, a small rubber ball, a marble

As the set of materials is shown to the class, discuss safety issues. Have students explain the proper handling of materials with sharp points. Review the safety contract generated in Unit 1.

Place a paper plate or piece of yarn tied to a circle in the center of the table. Model the use of a sorting circle by putting in two or more objects in the circle and telling why they are similar (e.g., the plastic square, the cardboard square, and the cloth square all have four sides and four corners).

Allow students one minute to sort the items in the set, telling their group members why certain items belong together. Call on students to share describing words for the solids. Develop vocabulary for the solids on chart paper, which might include *flexible, bendable, pointed, soft, hard, sharp, squishy, square, round, keeps it shape*, etc.

Allow students one additional minute to sort the items again, determining if they would make any changes based on the list of words.

Questioning procedure for GLE 1: Place a large question mark visual on the board, signaling question time. Allow time for students to ask questions about the concept at hand and call on other students to answer them. A fun way to lead students to ask questions on topic is to have a puppet, stuffed animal, or seashell that the student holds near his/her ear to "listen to the science question" and then he/she asks the class (the student is actually formulating the question in his/her mind). The teacher should model the use of the prop first before having students try it. Use of a prop can be a confidence builder for reluctant participants as well as a way to keep the students on track with the correct line of questions. The teacher will facilitate the discussion.

Suggested questions for inquiry:

- What do the plastic tube and the wooden cylinder have in common?
- What do the plastic square, cloth, wire, and plastic tube have in common?

Using a modified science *learning log* (view literacy strategy descriptions) to record information about the investigation of sorting solids, the students will write and draw to demonstrate what was done and what was learned. The goal of the *learning log* is to allow students to record their observations and ideas, to write descriptions in detail, to build and complete charts, and to draw clear, understandable diagrams and illustrations.

Following the experience of sorting, discussing, and posing questions about solids, have the students use the Science Learning Log BLM to record the following key pieces of information:
What did I do?, symbolized by a question mark on the page; *What did I learn?*, symbolized by a light bulb; an illustration or diagram to share with others, symbolized by a camera. The student can label the drawing or sentences can be written below the picture to verbalize the illustration.

Allow time for students to share their science *learning log* entries with partners. Send the completed page as a homework assignment in which the students read their responses with family members to spark discussion about science concepts.

*Teacher note: This science *learning log* format is used in the Comprehensive Curriculum for Grade 2. Using a consistent format will allow students to refine their skill in writing about science content**.*** The Learning Log Rubric BLM can be used to assess student responses (see Activity-Specific Assessments at the end of this unit).

Activity 3: Sorting Liquids (GLEs: 1, 2, 4, 5, 10, 16)

Materials List: one set per group of three or four students - liquids in small, clear bottles (water, corn syrup, cooking oil, blue fabric softener, shampoo, green liquid dish soap, water with blue or green food coloring, chocolate syrup, orange juice, milk); paper plates

Teacher safety note: Make sure the bottles do not leak and that the tops are tightened. Review safety rules for using substances in experiments, especially those that might be unknown. (Do not tell the students what is in each bottle.) Tell students they can shake, spin, turn, or roll the bottles to find out what they can about each liquid. They may not open the bottles.

Have each group of students examine the liquids without opening the bottles. Review the use of a sorting circle (paper plate) by putting in two or more bottles with liquids inside and telling why they are similar (e.g., the shampoo and colored water are both green).

Allow students one minute to sort the liquids in the set, telling their group members why certain liquids belong together. Call on students to share describing words for the liquids. Develop vocabulary for the solids on chart paper, which might include *bubbly, foamy*, *slow-moving*, *clear*.

Introduce additional descriptive vocabulary words, discuss their meanings, and possibly demonstrate each by having students hold up the bottle that has the property:

Foamy – bubbles form on top of the liquid
Bubbly – bubbles form inside the liquid
Colored – liquid is colored (but can be clear or opaque)
Viscous – liquid is slow-moving
Transparent – clear visibility through the liquid
Translucent – some light can be seen through the liquid

Some first graders will enjoy learning and using these important science words. Others will enjoy the introduction of names for these concepts.

Allow students one additional minute to sort the items again, determining if they would make any changes based on the list of words.

Questions for inquiry:

- Would it be a good idea to take the caps off the bottles and touch these liquids to find out more about them? Why or why not?
- Would it be a good idea to taste these liquids? Why or why not?
- What liquids have you touched or tasted that might be described with the words on our list?

Questioning procedure for GLE 1: Place a large question mark visual on the board, signaling question time. Allow time for students to ask questions about the concept at hand and call on other students to answer them. A fun way to lead students to ask questions on topic is to have a puppet, stuffed animal, or seashell that the student holds near his/her ear to "listen to the science question" and then he/she asks the class (the student is actually formulating the question in his/her mind). The teacher should model the use of the prop first before having students try it. Use of a prop can be a confidence builder for reluctant participants as well as a way to keep the students on track with the correct line of questions. The teacher will facilitate the discussion.

Activity 4: Flat Solids (GLEs: 2, 5, 10, 13, 16)

Materials List: flashlights for each group of three to four students and a re-sealable plastic bag filled with flat, solid materials, cut into 4x4-inch squares such as cardboard, aluminum foil, black construction paper, bubble wrap, black garbage bag, cloth, foam, tissue, wax paper, newspaper, overhead transparency, dark felt; index cards; liquids in small, clear bottles (same as Activity 3)

Model the use of the flashlight. Discuss the importance of not shining it into the eyes of others or own eyes. Discuss proper handling of materials used in the experiment, as some may have sharp edges.

Build vocabulary for liquids by investigating flat, solid objects and then comparing them to the liquids in bottles. Each group should also have index cards, one for each word:

- *transparent* – all light is visible
- *translucent* – some light is visible
- *opaque* – no light is visible

Students should take turns holding a flat, solid material and shining the light behind it. The group will decide if the item is transparent, translucent, or opaque and place it on the correct card.

Some will not clearly be transparent or translucent, so discussion should follow. To clarify, tell the students that transparent solids allow you to clearly see the light as well as the light source.

Finally, allow students to examine the liquids used in Activity 3, again using the flashlights, sorting them into one of the three categories.

Activity 5: Liquids—Sink, Float or Mix (GLEs: 4, 5, 10)

Materials List: safety goggles for each student, Science Learning Log BLM, Science Learning Log Rubric (Activity 2); towels and/or sponges for clean-up, clear glass or plastic jar, colored paper clips, toothpicks, beans, marbles, materials for each group of three or four students: four cups of water (5 oz. cups half full), four popsicle sticks, four portion cups – each with one liquid (colored water, glue, vegetable oil, green shampoo, four plastic spoons)

Review the Safety Contract generated in Unit 1. Students should discuss the reasons for not tasting anything in a science lab. Both teacher and students should always use safety goggles when pouring liquids.

Review the meaning of the words *solid* and *liquid*. Demonstrate mixing solids in a jar. Show the students a clear glass or plastic jar and some colored paper clips (red, blue,

yellow, and green). Have a student volunteer come up and put the clips in the jar and shake it to make a *mixture*.

Questions for inquiry:

- Can you separate this mixture back to the way it was? Try it.
- If you make a mixture of different solids, can you separate the solids back to the way they were? Try it. (Call on another volunteer to make a mixture in the jar of toothpicks, beans, and marbles.)
- If you make a mixture of two liquids, can you separate the liquids back to the way they were before? Explore this concept with the following activity:

At one central location, prepare the group materials listed above in the Materials List for students to gather and take to their desks or workstations. Each student should have a blank sheet of paper to record results, divided into four areas for them to draw pictures of each mixture.

Have students place a spoonful of the liquid into a cup of water very slowly. Ask them to carefully observe what happens to the liquid as it enters the water. Ask students to draw pictures of how the liquids looked as they entered the water. Next, have the students stir the liquids. Encourage them to notice what happens to both the liquid and the water. After a few minutes, have students draw pictures that illustrate their observation of how the liquids looked after they were stirred. Invite students to share their observations with the class.

Questions for inquiry:

- What happened when you poured the glue into the water?
- What happened when you poured the vegetable oil into the water?
- What happened when you poured the shampoo into the water?
- What happened when you mixed the glue with the water?
- What happened when you mixed the vegetable oil with the water?
- What happened when you mixed the shampoo with the water?
- How are liquids different? Why don't they act the same way as solids?

Allow time for students to clean the work surface before proceeding with written responses to the activity.

Using a modified science *learning log* (view literacy strategy descriptions) to record information about the investigation of sorting solids, the students will write and draw to demonstrate what was done and what was learned.

Following the experience of sorting, discussing, and posing questions about solids, have the students use another copy of the Science Learning Log BLM to record the following key pieces of information:

What did I do?, symbolized by a question mark on the page.
What did I learn?, symbolized by a light bulb, an illustration or diagram to share with others, symbolized by a camera.

The student can label the drawing or sentences can be written below the picture to verbalize the illustration.

Allow time for students to share their science *learning log* entries with partners and with family members to spark discussion about science concepts.

Activity 6: What's the Matter? (GLEs: 1, 8, 17)

Materials List: items previously used during this unit for students to classify (e.g., helium balloons, air-inflated balloons, bottles of water, a variety of solids – two of each type of matter per group), student's Vocabulary Chart BLM (created in Activity 1), chart paper.

Have the students sort the items into categories: solid, liquid, gas. Revisit the *vocabulary self awareness* activity (view literacy strategy descriptions) (Vocabulary Chart BLM) with the students, refining definitions as necessary. In groups of three, the students will discuss the given items and create one or two clues about an item based on the meaning of each word. For example, if a group has a bottle of water, they might say that water takes the shape of its container.

The teacher will record the responses (clues) from each group to assist the class in forming a *word grid* (view literacy strategy descriptions) on chart paper. The words "solid," "liquid," and "gas" are listed on the vertical axis of the grid and the characteristics (clues), such as "holds its shape," "can be poured," "takes up space," etc., are listed on the horizontal axis of the grid.

Once the grid is co-constructed with the students, the students participate in adding a + or – to the grid for each clue. The grid below is an example of what might be created with the students. The teacher should add any key terminology (clues) that the students leave out to ensure that the concepts are covered completely.

	Holds its shape	takes shape of container	*takes up space*	*changes state*	*can be poured*
solid	+	-	+	+	+
liquid	-	+	+	+	+
gas	-	+	+	+	-

Activity 7: Temperature Talk (GLEs: 5, 6, 8)

Materials List: set of materials for each set of partners: cup of room temperature water, cup of water with ice, cup of water heated (not boiling), non-mercury thermometer, How Hot? How Cold? BLM, a collection of pictures from magazines to illustrate different temperatures, safety goggles

Have students discuss what happens to water when it is placed in the freezer, when it is heated, and when it is left outdoors in the backyard or the schoolyard (perhaps in a cup). Record this background knowledge and observe their responses for misconceptions.

Explore the use of a thermometer. Introduce the term *degrees* and explain that the temperature can be recorded in Fahrenheit and Celsius. Have partners compare the temperature of room temperature water, a cup of ice water, and a cup of heated water (not boiling) by placing a thermometer in each cup and recording the temperature.

Explore the use of an outdoor thermometer to record the temperature in the morning and afternoon over a period of a few days. Have students work in pairs to answer questions on How Hot? How Cold? BLM and discuss their responses. Students might use the space at the bottom of the blackline master to cite another situation that shows an example of temperature.

Questions for inquiry:

- Can a liquid be changed into a solid? How?
- Can a solid be changed into a liquid? How?
- Is Jell-O a solid or a liquid? Why do you think so?
- If you leave juice in a container, will it evaporate?
- If you leave a pencil in a container, will it evaporate?

Have the students recall weather events discussed in Unit 1 and explain the relevance of observing outdoor temperature. Guide students to write sentences that illustrate their understanding through a modified *GISTing* (view literacy strategy descriptions) activity. *GISTing* will help students summarize essential information while using a limited number of words in the sentence. Show the students a magazine picture that represents extremely cold weather and temperature. Model *GISTing* by writing a sentence on the board to describe that picture in less than 15 words, but more than 3 words. For example, the students should develop a more interesting sentence than "It is cold." The sentence might read, "The girl is wearing her coat to protect her body from the cold." By limiting the total number of words students can use, this approach to summarizing forces them to think about only the most important information, which is the essence of comprehension.

The students can work in small groups or pairs with different pictures and then share their *GISTS* with the class. Each *GIST* can be written on sentence strips to allow the class to count the words as each is shared.

Activity 8: What's Happening? (GLEs: 3, 5, 8, 37)

Materials List: measuring cup for each group of three to four students, clear pitcher of hot water, plate, ice cubes, safety goggles for teacher, chart paper, Water Cycle Song BLM (in Unit 1)

Review the Safety Contract generated in Unit 1. Discuss the reason for the teacher conducting this investigation (hot water) and the use of safety goggles.

Have students recall the water cycle discussed in Unit 1. Call upon students to draw the water cycle on chart paper and label it. Ask the students to identify each type of matter that is represented (liquid, gas). The teacher will place the plate on top of the pitcher of hot water and then set the ice cubes on top. The students will observe the wispy "cloud" that forms in the pitcher. When the plate is lifted, "raindrops" will have formed on the bottom. The students may sing the Water Cycle Song while they watch and wait.

Have students discuss things that they have observed that have changed from a solid to a liquid. Responses might include ice cubes, popsicles, chocolate candies, etc. Ask the students what might have made these solids melt. To move into a deeper discussion, ask the students if these solids that have turned to liquids will remain a liquid forever. Try to move students to the idea that some liquids can evaporate and can freeze again under the right temperature conditions.

In groups of three or four, have students place a measuring cup with 4 oz. of water in a sunny, undisturbed outdoor area. In some cases, the water may have to be placed in an undisturbed location in the building if no outdoor area is available. Have the students draw a T-chart to record data each day until the water has evaporated. See example below:

Day	Water (oz.)

Encourage students to brainstorm other investigations to try. They might put ice cubes in a cup and observe for several days. They might put a popsicle in a cup to observe. Allowing the students ownership of investigations will increase motivation.

The following website might be used for a whole-class lesson or for independent exploration. The site provides and interactive format for 'testing' objects in hot and cold temperatures.
www.aolatschool.com/junior/science/matter Click on *solids and liquids* after entering this website.

Sample Assessments

General Guidelines

Documentation of student understanding is recommended to be in the form of portfolio assessment. Teacher observations and records as well as student-generated products may be included in the portfolio. All items should be dated and clearly labeled to show student growth effectively over time.

General Assessments

- Teacher observation of students' object-sorting activity
- Anecdotal notes about students' understanding solids, liquids, and gasses, based on discussions
- Work samples for portfolio may include journal entry and photos of students working in groups while sorting objects

Activity-Specific Assessments

- Activity 1**:** Discuss the Vocabulary Chart BLM with each student at the end of the unit to ensure that they have grown in their understanding of the meaning of the words *solid*, *liquid*, and *gas*.

- Activity 1**:** Check the What Do You Think? BLM used in Activity 1 after students respond again at the end of the unit to ensure that they have mastered an understanding of the common properties of matter.

- Activity 2**:** Use the Science Learning Log Rubric to assess student responses.

- Activity 5**:** Use the Science Learning Log Rubric to assess student responses.

Grade 1
Science
Unit 4: Functions of the Human Body

Time Frame: Approximately 12 instructional periods of 45 minutes per period

Unit Description

This unit introduces the structure and basic functions of the systems of the human body: skeletal system, digestive system, circulatory system, respiratory system, nervous system, and the muscular system.

Student Understandings

Students will become familiar with the structure and basic functions of the systems of the human body. Students will be able to identify major parts and systems of the human body.

Guiding Questions

1. Can students explain that the human body is made up of different systems?
2. Can students identify six body systems and the major organ associated with each?
3. Can students relate everyday items to the six body systems explored in this unit and describe how each one works?

Unit 4 Grade-Level Expectations (GLEs)

GLE #	GLE Text and Benchmarks
Science as Inquiry	
1.	Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)
2.	Pose questions that can be answered by using students' own observations and scientific knowledge (SI-E-A1)
4.	Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2)
5.	Use the five senses to describe observations (SI-E-A3)
8.	Express data in a variety of ways by constructing illustrations, graphs, charts, tables, concept maps, and oral and written explanations as appropriate (SI-E-A5) (SI-E-B4)

GLE #	GLE Text and Benchmarks
9.	Use a variety of appropriate formats to describe procedures and to express ideas about demonstrations or experiments (e.g., drawings, journals, reports, presentations, exhibitions, portfolios) (SI-E-A6)
Life Science	
29.	Describe basic functions of parts of the body (e.g., lungs, heart, bones, muscles) (LS-E-A3)

Sample Activities

Activity 1: What is a System? (GLEs: 8, 29)

Allow two days to complete this activity.

Materials List: chart paper, marker, video or book, pocket chart, sentence strips (copy each body system name and descriptions as they appear on the Body Systems BLM), one of each object (bone, jump rope, apple, computer hard drive, stethoscope, inflated balloon), Match the Systems BLM, Name that Organ BLM, Body Systems BLM

Begin with a *graphic organizer* (view literacy strategy descriptions) for the words "human body." First, activate students' prior knowledge by asking them to brainstorm words that tell about the body. The words "human body" can be written at the top of the chart paper and the teacher should accept every response and list them on the chart. This list will be used throughout the unit to serve as a springboard for discussion on each body system. As each system is introduced, circle all of the words related to that system in a single color. The *graphic organizer* should be revisited throughout the unit to provide an opportunity to add new words as they are introduced.

Begin with a short video or read a book to the students to introduce the topic of body systems. Possible resources include the following:
Body Machine, School House Rock Video
What's Inside My Body, Scholastic
Stage One Science: Busy Bodies, www.lpb.org/cyberchannel

Ask students to share their ideas on the meaning of the word *system*. Write the following meaning on the board or on sentence strips: A system is a group of smaller parts that work together. The human body is made up of many systems.

Using a modified version of *split-page notetaking* (view literacy strategy descriptions), have students use the Body Systems BLM to organize data and aid in explaining the function of each system. To demonstrate the value of using the *split-page notetaking* with science material the teacher can create an example of disorganized notes and then model the way to organize facts into the two-column format. The teacher discusses the advantage of studying information in this way, as one column can be covered to prompt

recall. On the board or on a pocket chart, put the sentence strips with the words and functions in a disorganized, haphazard way. Ask the students if they would like to read a chart that looks like this one. The students may realize that it is difficult to tell what goes together. With students' help, organize the systems and functions on the pocket chart. Then, allow students to complete the BLM.

Skeletal system – gives the body its shape and protects the organs
Muscular system – helps the body move
Digestive system – helps the body break down food
Circulatory system – moves blood around the body
Nervous system – controls the body and helps us think, speak, and remember
Respiratory system – brings oxygen into the body and removes carbon dioxide

Have students write the name of each system next to the corresponding function on the Match the Systems BLM. Demonstrate for students how the split-page format can help them remember the information. Cover the information in the right column. Using the system names, have students try to recall the information that's covered. Next, cover the system names in the left column and have the students use the information in the right column to remember the systems.

Gather the students on the floor with the objects for making mental connections to the functions of each system (bone, jump rope, apple, computer hard drive, stethoscope, inflated balloon). Use the names of each system written on sentence strips to place on the floor with the objects. Ask the students which object might relate to each system as you read the function of the system. Discuss the connection of the object with the meaning of the job each system performs.

Skeletal – bone
Muscular – jump rope
Digestive – apple
Circulatory – stethoscope
Nervous – computer
Respiratory – balloon

Connect the name of each system with the major organs. The pocket chart can be used again to organize sentence strips with the following systems and organs.

Skeletal – bones
Muscular – muscles
Digestive – mouth, esophagus, stomach, intestines
Circulatory – heart
Nervous – brain and spinal cord
Respiratory – lungs

Have students complete the Name That Organ BLM to save for future reference.

Activity 2: The Nervous System (GLEs: 5, 8, 9, 29)

Materials List: graphic organizer developed in Activity 1, colored marker, book or video, Touch and Smell BLM, Science Learning Log BLM, Science Learning Log Rubric BLM (see Unit 3 Activity 2), one brown paper bag containing the following items for each group of 3-4 students: elbow macaroni, sand, plastic fork, cotton balls; baby food jars or film canisters containing: cotton ball with vanilla extract, cotton ball with cinnamon, cotton ball with peppermint oil, garlic clove

*Safety note: This activity involves smelling substances. The term *wafting* should be introduced and explained prior to asking the students to complete the activity. Wafting is a way of "smelling" a chemical in a laboratory. Since the substances are unknown, it is important not to put the nose directly over the jar and inhale. Doing so could result in chemical burns. Reassure the students that there are not going to be dangerous chemicals in the classroom for this investigation, but that it is important to learn the correct way to waft. Have students practice by pretending to hold a jar in one hand and sweeping the scent towards the nose with the other.

Choose a colored marker and circle all of the words that relate to the nervous system on the *graphic organizer* developed in Activity 1. Students may have supplied words such as *brain*, *spinal cord*, and *nerves*. The teacher should add these key vocabulary words if necessary.

Use a book or video to introduce the nervous system. Possible resources might include
Telegraph Line, School House Rock Video
What's Inside My Body, Scholastic
The Five Senses, www.lpb.org/cyberchannel
Magic School Bus Goes Cellular, www.lpb.org/cyberchannel
Why I Sneeze, Shiver, Hiccup, and Yawn (Let's-Read-and-Find-Out-Science 2), Berger

In small groups, have students investigate their senses of touch and smell. Students should work together to complete the Touch and Smell BLM, discuss results as a whole class, and complete the Science Learning Log BLM independently. In small groups, each student should take a turn to feel the bag, state a prediction to the group, and record his/her prediction on the BLM. The same procedure can be used for the jars.

Using a modified science *learning log* (view literacy strategy descriptions) to record information about the investigation, the students will write and draw to demonstrate what was done and what was learned. The purpose of the learning log is to allow students to record their observations and ideas, to write descriptions in detail, to build and complete charts, and to draw clear, understandable diagrams and illustrations.

Following the experience of using the senses, have the students use the Science Learning Log BLM to record the following key pieces of information:
What did I do?, symbolized by a question mark on the page; *What did I learn?*, symbolized by a light bulb; an illustration or diagram to share with others, symbolized by

a camera. The student can label the drawing or sentences can be written below the picture to verbalize the illustration.

Allow time for students to share their science *learning log* entries with partners. Send the completed page as a homework assignment in which the students read their responses with family members to spark discussion about science concepts.

A fun follow-up might be to have groups develop clues for other items to place in touch bags. The teacher can use the clues to create additional touch bags for an independent / partner learning center activity. An additional copy of the top half of the Touch and Smell BLM can be provided for recording.

Activity 3: The Skeletal System (GLEs: 8, 9, 29)

Materials List: graphic organizer developed in Activity 1; colored marker, picture of wooden chair; picture of upholstered chair; picture of a cage for a small pet; a poster, model, or online diagram of the human skeleton; Science Learning Log BLM; Science Learning Log Rubric BLM (see Unit 3 Activity 2)

Choose a colored marker and circle all of the words that relate to the skeletal system on the *graphic organizer* developed in Activity 1. Students may have supplied words such as *elbow*, *knee*, *skull*, etc. that can be identified as bones or joints in the body.

Show the students a picture of a bare wooden chair and explain that it is like a skeleton. Compare it to a picture of an upholstered chair and have students discuss the differences. Relate it to the muscles and skin that cover the skeleton. Show the students a picture of a rodent cage or birdcage. Ask why it is used in keeping pets. Ask students if there are any bones in our bodies that protect us the same way. Have each child feel his/her own ribcage. Ask what the ribcage might protect (heart and lungs).

Show students a poster, model, or on-line diagram of the human skeleton. (http://www.enchantedlearning.com/subjects/anatomy/skeleton/Skelprintout.shtml) Explain that the human body has 206 bones.

Give each student a copy of a diagram of the human skeleton, with a number written next to each bone to be identified, and 10 sticky dots.

Teacher Note: Appropriate bones for first graders would be the *skull*, *mandible*, *clavicle*, *vertebrae*, *ribs*, *humerus*, *elbow*, *femur*, *patella*, and *phalanges*. The students will enjoy learning these big words and can remember them after practicing this activity. It would be best to white out the names of other bones to help students follow along and even identify words by beginning sounds. Keep in mind that mastery of these terms may be for advanced students, but exposing first graders to proper terminology is still beneficial. Keep the focus on the function of bones.

Students will number the dots 1-10. As the teacher reads the name of each bone and points to it on a larger diagram, poster, etc., the students will look at the number of that bone and place the corresponding sticky dot on their body. The teacher will continue with each bone until students have had practice identifying the location of each of the bones.

Questions for inquiry:

- Why do we have bones in our bodies?
- Describe what our bodies would feel like without bones.
- Do animals, such as pets, have bones too?
- Do animals have the same kinds of bones as people? (Look on-line at a diagram of dog or cat skeleton to compare.)

Using a modified science *learning log* (view literacy strategy descriptions) to record information, the students will write and draw to demonstrate what was done and what was learned. Following the experience of identifying bones on their partner's body, have the students use the Science Learning Log BLM to record the following key pieces of information: *What did I do?*, symbolized by a question mark on the page; *What did I learn?*, symbolized by a light bulb; an illustration or diagram to share with others, symbolized by a camera. The student can label the drawing or sentences can be written below the picture to verbalize the illustration. The science *learning log* entry can be used as an assessment tool.

Allow time for students to share their science *learning log* entries with partners. Send the completed page as a homework assignment in which the students read their responses with family members to spark discussion about science concepts.

To involve families and provide additional practice, send the diagram of the human skeleton home with another set of sticky dots. Have the students identify bones on their parents or siblings.

A good learning center activity is to have students make a model of a skeleton with dry pasta. An excellent resource can be found at

http://www.enchantedlearning.com/themes/skeleton.shtml

Activity 4: The Digestive System (GLEs: 1, 4, 9, 29)

Materials List: graphic organizer developed in Activity1, colored markers, book or video that focuses on the digestive system, diagram of digestive system, question mark visual, word cards, mirrors, clear plastic cups, clear carbonated beverage, cheese crackers, grapes, small strainers or pieces of window screen, foam-type bowls, old magazines, paper plates, glue, Science Learning Log BLM, Science Learning Log Rubric BLM (see Unit 3 Activity 2)

Choose a colored marker and circle all of the words that relate to the digestive system on the *graphic organizer* developed in Activity 1. Students may have supplied words such as *mouth, esophagus, stomach, small intestine, large intestine*. The teacher should add these key vocabulary words if necessary.

Use a book or video to introduce the digestive system. Possible resources might include
Magic School Bus for Lunch, www.lpb.org/cyberchannel
What Happens to a Hamburger?, Showers

Questioning procedure for GLE 1: Place a large question mark visual on the board, signaling question time. Allow time for students to ask questions about the concept at hand and call on other students to answer them. A fun way to lead students to ask questions on topic is to have a puppet, stuffed animal, or seashell that the student holds near his/her ear to "listen to the science question" and then he/she asks the class (the student is actually formulating the question in his/her mind). The teacher should model the use of the prop first before having students try it. Use of a prop can be a confidence builder for reluctant participants as well as a way to keep the students on track with the correct line of questions. The teacher will facilitate the discussion.

Show the students a poster, diagram, or on-line picture of the digestive system (http://www.enchantedlearning.com/subjects/anatomy/digestive/labeleasy/labelanswers.shtml). Grade-appropriate words to focus on are *mouth, esophagus, stomach, small intestine, large intestine*. Display these words on cards and have a student come up to the front of the room. Tape the cards to his/her clothing to show the digestive tract.

Have students use their fingers to trace the route that food follows as it enters the mouth and passes to the stomach. Direct attention to a diagram of the mouth and make sure students understand that the teeth and tongue are parts of the digestive system. Have students look at their teeth in a mirror to note that the front teeth are sharp edged and the back teeth are wide and dull. These shapes correspond to the functions of the teeth.

Pair the students and provide each pair with two, clear cups (each with a small amount of a clear, carbonated beverage), a cracker, and a grape. One student will crumble the cracker, placing the crumbs into his/her fisted hand (turned sideways) squeezing and releasing the grip to let the crumbs drop into a cup. The other student will squash the grape, squeeze it through the fist, and drop it into the other cup. Ask students to describe what these actions resemble in the digestion process (chewing food, traveling down esophagus, mixing with stomach acids). Students can swirl the mixture in the cup to imitate action in the stomach.

Students should pour each mixture through a strainer or piece of screen over a bowl. The liquid that passes into the bowl represents the nutrients that the small intestine will keep for the body to use. The leftovers that did not pass through the screen represent the waste material that will pass out of the small intestine into the large intestine.

Have students label a diagram of the main organs of the digestive system, or have them draw a diagram. A good resource may be found at http://www.enchantedlearning.com/subjects/anatomy/digestive/labeleasy/labelanswers.shtml The diagram may be less cluttered if the teacher whites out unnecessary lines before copying. The focus is on the mouth, esophagus, stomach, small intestine, and large intestine.

Using a modified science *learning log* (view literacy strategy descriptions) to record information, the students will write and draw to demonstrate what was done and what was learned.

Following the experience of modeling the digestion process, have the students use the Science Learning Log BLM to record the following key pieces of information: *What did I do?*, symbolized by a question mark on the page; *What did I learn?*, symbolized by a light bulb; an illustration or diagram to share with others, symbolized by a camera. The student can label the drawing or sentences can be written below the picture to verbalize the illustration.

Allow time for students to share their science *learning log* entries with partners. Send the completed page as a homework assignment in which the students read their responses with family members to spark discussion about science concepts.

In a learning center, have students cut pictures of healthy foods from magazines and glue them onto paper plates. The plates may serve as the brainstorming for a writing activity about favorite healthy foods.

Activity 5: The Circulatory System (GLEs: 4, 29)

Materials List: graphic organizer developed in Activity 1, colored markers, poster or diagram of circulatory system, Heart and Blood BLM, paper towel tubes cut in half

Choose a colored marker and circle all of the words that relate to the circulatory system on the *graphic organizer* developed in Activity 1. Students may have supplied words such as *heart* and *blood*. The teacher should add these key vocabulary words if necessary.

Show the students a poster or on-line diagram of the circulatory system such as the one found at http://infozone.imcpl.org/kids_circ.htm. Explain that the red and blue lines are used to trace the path of blood pumped around and around inside our bodies.

Teacher note: Make sure that the students understand that human blood is not blue. The blue lines only show the direction blood is moving (towards the heart). Discuss any misconceptions.

Questions for inquiry:

- What happens when you cut your skin?
- How does the heart move blood in our bodies?
- Why do we need blood in our bodies?

Display the words to the song, *Heart and Blood*. Sing it with the students several times, having them read and sing along.

Have students feel the beat of their heart by sitting very still and placing their hands over their hearts. Have them give descriptive words for the sounds the heart makes (e.g., lub-dub). Have the students stand and jog in place for one minute, then feel the heartbeat again.

Have students make a T-chart on a piece of paper to compare resting and active heart rates. Example:

at rest	after exercise

Pair the students and have one lie on the floor and rest for one minute. The partner should use the half-sized paper towel tube to listen to his/her partner's heartbeat and count the beats for one minute. The student on the floor will jog in place for one minute and lie down again. The partner will listen again and count the beats per minute. The partners should switch roles and repeat the activity.

Questions for inquiry:

- Does your heartbeat feel different after jogging? How?
- Why does the heartbeat change?
- Do you think your heart ever stops beating? How do you know?
- Do animals have hearts, too? Why do you think so?

The teacher can go to each student and locate his/her pulse on the thumb side of the wrist. Mark that place with a highlighter pen. Have the students place the first two fingers of the opposite hand on that location to feel the pulse to prove that the heart pumps blood throughout the body. Have them repeat jogging in place for one minute and feeling the location again. Each student can make another T-chart and count his/her own beats in one minute. Discuss changes in the number of beats before and after exercise.

Activity 6: The Respiratory System (GLEs: 4, 29)

Materials List: graphic organizer developed in Activity 1, colored markers, poster or diagram of the respiratory system, balloons, paper

Choose a colored marker and circle all of the words that relate to the respiratory system on the *graphic organizer* developed in Activity 1. Students may have supplied words such as *nose*, *lungs*, *oxygen*, *carbon dioxide*, *inhale*, and *exhale*. The teacher should add these key vocabulary words if necessary.

Ask students what breathing means. Have students cover their mouths and breathe in and out through their noses only. Then have them cover their noses and breathe only through their mouths. Finally, have students breathe in and out through their noses and mouths at the same time. Through probing questions, elicit student understanding that the mouth, nose, and lungs are parts of the respiratory system.

Show students a poster/diagram or view an on-line source of the respiratory system such as http://www.enchantedlearning.com/subjects/anatomy/lungs/label/labelanswers.shtml. Appropriate vocabulary words are *nostrils*, *mouth*, *lungs*, *oxygen*, and *carbon dioxide*. Add these words to the vocabulary from previous systems. The students should be able to explain that the lungs bring in oxygen from the air and push carbon dioxide out of the body.

Give each student a balloon. Have him/her stretch the balloon several times and blow air into it, two or three times, pinching the end to keep it inside.

Questions for inquiry:

- What might happen if another person inhaled the air you blew into that balloon? (*germs/illness*)
- Can your body live without oxygen?
- Does oxygen just stay in the lungs? What can make it travel all over inside your body? (*blood*)
- How does blood travel through your body? (*the heart works with the lungs – the heart pumps the blood that the lungs fill with oxygen*)

Have students let the air out of the balloon slowly. Ask if carbon dioxide can be seen when it is exhaled into the air. Ask students where the carbon dioxide might go since we are indoors and there are no plants and trees around. Guide students to understand that air is everywhere and oxygen is always in the air for us to breathe.

Activity 7: The Muscular System (GLEs: 2, 29)

Materials List: graphic organizer developed in Activity 1, colored markers, index cards, poster or diagram of the muscular system, book or video, chart paper

Choose a colored marker and circle all of the words that relate to the muscular system on the *graphic organizer* developed in Activity 1. Students may have supplied words such as *strong*, *exercise*, *contract*, and *relax*. The teacher should add these key vocabulary words if necessary.

Use a book or video to introduce the muscular system. Possible resources might include
Magic School Bus Flexes Its Muscles, www.lpb.org/cyberchannel
What's Inside My Body, Scholastic

Have each child lay his/her forearm flat on a table or desk, palm up (DOMINANT hand = the hand you use to write). Watch the clock and time 30 seconds while students make a fist and let it go as many times as possible. Model first, so that the students see the hand must completely open and close to count. Have each child record his/her number of fists and the hand, right or left, on an index card.

Questions for inquiry:

- Do your hand and arm feel differently after the experiment? How?
- Did you make a fist as many times as you thought you could? Why?
- What makes your hand move that way?
- Do you think your other hand will have the same results in this experiment? How can you find out? (repeat experiment, record results, compare)

Explain that muscles work by *contracting* and *relaxing*. When muscles contract, they pull two bones toward each other; when they relax, they return to their longer length and the bones move away from each other. Add those words to the set of vocabulary words.

Have your students feel their muscles work. Tell each student to place one hand on the bicep of his other arm and to feel the muscle contract as he bends his arm at the elbow. Ask: Which two bones are being brought together by this action? To get bones to move two ways, two muscles are needed. Tell the students to sit on the floor with their legs out in front of them. Be sure they note the natural, relaxed position of their feet. Then tell them to flex their feet, pulling the toes toward the shins. Next, have them relax their legs and then point their toes. Have them repeat the movements, this time using their hands to feel the different muscles in their calves contract and relax.

Show students a poster or on-line diagram of the muscular system such as http://www.innerbody.com/image/musfov.html. Explain that some muscles move voluntarily. We can use our brains to "tell" some muscles to move. Some muscles move involuntarily. Those muscles just work all the time without people even having to think about it. Ask students to think about the following muscles and tell if they move voluntarily or involuntarily: the arm muscles, the heart muscle, the leg muscles, and the face muscles. Discuss differences in these muscles.

Using a modified version of *SPAWN writing*, (view literacy strategy descriptions) model a "what if" prompt for students to reflect upon and write about. *SPAWN* is an acronym

that stands for five categories of writing prompts. The teacher can create various prompts for students to respond to based on each of the letters of SPAWN. The W of *SPAWN* represents the "What If?" category. What If? prompts can stimulate writing that allows students to think critically about what they have just learned. Pose the following question: "What would happen if the heart did not work on its own?" Construct a response while talking it through and writing it for the students to see. Then have students choose a prompt. Allow students 10-15 minutes to write a response to a selected prompt. When finished, students can share their SPAWN writing with a partner or the class. Students should listen for accuracy and logic in their classmates' writing in response to this What If? prompt about the heart.
Possible prompts might include the following::
What would happen if the muscles of the face did not move?
What would happen if you never exercise your muscles?
What would happen if muscles were as hard as bones?

In a learning center, have students generate a list of activities that would be good for exercising the muscles. They can illustrate each activity to create a class book.

Activity 8: My Body at School (GLEs: 5, 8)

Materials List: poster or diagram of the five senses, items used in Activity 1 to connect body systems to real objects (bone, balloon, computer hard drive, jump rope, apple, stethoscope), body system word cards, scissors, old magazines, Which System? BLM, Pay Attention to Your Body BLM

Activate prior knowledge by having the students name the five senses. Show the students a poster or on-line diagram of the eye, ear, nose, tongue, and skin on a website such as www.enchantedlearning.com
(Type *five senses* to search, then go to *label five senses*.)

Have students recall the body systems discussed in this unit by using the word cards and real objects that describe each system.

Teacher note: If using this particular site, show only the larger view of each organ; the text is too high level.

Using a *word grid* (view literacy strategy descriptions), the students will observe use of each of the body systems in this unit throughout the day at school. Students add classes or events of the school day on the vertical axis, such as "reading," "writing," "lunch," "recess," "art," etc. The body systems are listed on the horizontal axis of the grid.

Using the Which System? BLM, the students participate in adding a check on the grid for each time a system is used. The students may add other events of the school day that they wish to think about in relation to the body systems. The teacher should add any key

terminology that the students leave out to ensure that the concepts are covered completely.
Follow the same procedure using a *word grid* for observing the use of the five senses during the school day, using the Pay Attention to Your Body BLM. The use of the grid will lead to an interactive discussion of how the body functions.

The blackline masters might be reproduced again for a take-home activity. Students can generate a list of activities that are done at home and place a check on the grid to show use of the body systems and senses. A good learning center activity would be to have students cut pictures from magazines depicting use of the five senses and make their own charts.

Sample Assessments

General Guidelines

Documentation of student understanding is recommended to be in the form of portfolio assessment. Teacher observations and records as well as student-generated products may be included in the portfolio. All items should be dated and clearly labeled to show student growth effectively over time.

General Assessments

- Teacher observation of students during partner /group activities
- Anecdotal notes about students' understanding of body systems, based on discussions
- Work samples for portfolio may include journal entry and photos of students working in groups

Activity-Specific Assessments

- Activity 3: Use the Science Learning Log Rubric to assess student responses.

- Activity 4: Use the Science Learning Log Rubric to assess student responses.

- Activity 6: Have students share the SPAWN writing activity and save the writing for portfolio.

Grade 1
Science
Unit 5: Variations, Changes, and Adaptations in the Environment

Time Frame: Approximately 12 instructional periods of 45 minutes per period

Unit Description

This unit introduces selected environmental science and biological concepts. Activities encourage exploration, observation, and description of naturally occurring changes.

Student Understandings

Students make observations and describe differences between living and nonliving things. Students understand that predictable change can be shown in plant life cycles created in the laboratory classroom and others can be observed in the schoolyard. Through observation of classroom and family pets, students will develop an understanding of what the needs of a pet are and how the needs are met. Students will compare features of animals that help them to survive and characteristics of soils that support plant growth.

Guiding Questions

1. Can students describe differences between living things and nonliving things?
2. Can students describe the basic stages in the growing cycle of plants and what plants need to grow?
3. Can students describe the survival needs and habitats of different types of animals/pets?
4. Can students describe some soil characteristics?

Unit 5 Grade-Level Expectations (GLEs)

GLE #	GLE Text and Benchmarks
Science as Inquiry	
1.	Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)
2.	Pose questions that can be answered by using students' own observations and scientific knowledge (SI-E-A1)
4.	Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2)

GLE #	GLE Text and Benchmarks
5.	Use the five senses to describe observations (SI-E-A3)
7.	Select and use developmentally appropriate equipment and tools and units of measurement to observe and collect data (SI-E-A4)
8.	Express data in a variety of ways by constructing illustrations, graphs, charts, tables, concept maps, and oral and written explanations as appropriate (SI-E-A5) (SI-E-B4)
10.	Identify and use appropriate safety procedures and equipment when conducting investigations (e.g., gloves, goggles, hair ties) (SI-E-A7)
11.	Recognize that a variety of tools can be used to examine objects at different degrees of magnification (e.g., hand lens, microscope) (SI-E-B3)
Life Science	
26.	Describe the differences between plants and animals (LS-E-A1)
27.	Identify what animals and plants need to grow and develop (LS-E-A1)
28.	Describe the characteristics of *living (biotic)* and *nonliving (abiotic)* things (LS-E-A2)
30.	Record and share observations of changes in developing plants (LS-E-B1)
31.	Describe how animals and their offspring are similar and how they are different (LS-E-B3)
32.	Describe features of some animals that benefit them in their environments (LS-E-C1)
33.	Explain how pets' needs are met in their habitats (LS-E-C1)
34.	Record evidence of plants and animals in the schoolyard or other environments (LS-E-C2)
35.	Examine soils to determine that they are often found in layers (ESS-E-A1)
39.	Identify the characteristics of soil, according to color, texture, and components, including *living (biotic)* and *nonliving (abiotic)* substances (ESS-E-A6)

Sample Activities

Activity 1: Biology Detectives (GLEs: 5, 8, 10, 28, 34)

Materials List: book or video (see resources below), chart paper, marker, safety contract generated in Unit 1, crayons, Collecting and Sorting BLM, Science Learning Log BLM Science Learning Log Rubric BLM (Unit 3, Activity 2), set of the following for each pair of students: re-sealable plastic bags, disposable gloves, magnifying glass, and small tongs or tweezers for collecting items, clipboard, paper, and pencils

Allow three days for this activity.

Review the safety contract generated in Unit 1 to allow student discussion about handling science tools and samples that will be collected.

Possible resources might include
Living or Nonliving Video, 12:00, www.lpb.org/cyberchannel
Is It Alive?, Berger

Day One:
Using a modified *DR-TA* strategy (*Directed Reading-Thinking Activity*), (view literacy strategy descriptions), have students discuss the differences of living and nonliving things. Use a video or read a book aloud to help students comprehend text or information that describes and exemplifies inductive and deductive reasoning.

Begin by asking students what they already know about living and non-living things. Record students' responses on chart paper to be referred to later on in the activity. After telling students the titles of either the book or video, they should make predictions about what information the author will include in the book or what might be seen in the video. Read a section of text, or show a section of the video, stopping at predetermined places to allow students to check and revise predictions. Reread background knowledge statements and predictions and have students change their predictions if necessary, citing new evidence for doing so. Repeat this cycle several times as you and your students read the text or view the video.

After the book or video is complete, ask the students to look back at their original predictions and tell why some might have changed. Emphasize to students that this process is one that good readers use when they read non-fiction books. Finally, help the students compose a working definition of *living things* and *non-living things*. Record the definitions on chart paper to be referred to throughout the unit.

Day Two:
Review the safety contract generated in Unit 1 and have students discuss safety rules for this activity (don't run with pencils, use caution when viewing a living thing – look but don't touch).

Students will work in pairs to observe and classify living and non-living things in the schoolyard. Distribute clipboards, paper, and pencils to pairs of students as they go into the yard. Students can draw a T-chart on a blank piece of paper and label one column "living" and the other "non-living." Students can record their observations with words and pictures. After students return to class, invite them to share their observations and classifications. Refer to the working definition of living and non-living created in the *DR-TA*. Students discuss and share their observations and classifications. Discuss to ensure that students correctly label living and nonliving things.

Next, have students take a closer look at what they classified as living things. Ask them to sort the list into two groups. Ask what criteria they used. If students have not grouped them as plants and animals, use guiding questions to achieve this division. Students can circle plant matter with a green crayon and animals with a red crayon.

Day Three:
Have students recall the way living things could be sorted into plants and animals. Now have the students focus on non-living things and present these categories for students to discuss and generate examples of each:

- Something that once lived
- Something that never lived
- Something from a tree or plant
- Something that can be eaten by any living thing
- Something that is man-made

Students should collect items on the playground or possibly during a field trip to sort as non-living things. Students should recall their discussions on what makes an object living or non-living. Students should be provided with the tools and equipment described in the materials list: re-sealable plastic bags, disposable gloves, magnifying glass, small tongs or tweezers for collecting items, clipboard, Collecting and Sorting BLM, and pencils.

Again, review the safety contract generated in Unit 1. Before going outside, ask students to discuss things they should not pick up (living things, sharp items) and have them identify safety reasons for their responses. Be sure that they know to ask the teacher if they are not sure if it is safe to pick up a certain item. Students can place tally marks next to each heading on the paper so that they find no more than the number that the teacher specifies (perhaps two or three of each type). This will help students focus on quality, and not on who collects the most. Students can draw an example of each type on the BLM.

When students return to the classroom, the teacher will assist the class in forming a *word grid* (view literacy strategy descriptions) on chart paper. This activity will help student learn important concepts about non-living things and expand their reading vocabularies. The categories are listed on the vertical axis of the grid and the items collected, are listed on the horizontal axis of the grid.

Once the grid is co-constructed with the students, the students participate in adding a + or – to the grid for each clue. The grid below is an example of what might be created with the students. The teacher should add any key terminology (clues) that the students leave out to ensure that the concepts are covered completely.

	rock	leaf	*twig*	*paper clip*	*dead bug*	
Something that once lived	-	+	+	-	+	
Something that never lived	+	-	-	+	-	
Something from a tree or plant	-	+	+	-	-	
Something that can be eaten by any living thing	-	+	+	-	+	
Something that is man-made	-	-	-	+	-	

The teacher facilitates discussion on each item, asking students to support reasons for placing the items and identifying other categories for the same item (e.g., a leaf once lived, comes from a tree, and can be eaten by animals; a paper clip never lived and is

man-made). Guide students to understand that man-made objects can never be alive. Be sure to discuss the overlapping categories so that students are not left with the idea that only non-living things are eaten by living things.

Using a modified science *learning log* (view literacy strategy descriptions) to record information about the investigation of living and non-living things, the students will write and draw to demonstrate what was done and what was learned. The goal of the *learning log* is to allow students to record their observations and ideas, to write descriptions in detail, to build and complete charts, and to draw clear, understandable diagrams and illustrations.

Following the experience of collecting, sorting, and discussing, the students use the Science Learning Log BLM to record the following key pieces of information: *What did I do?*, symbolized by a question mark on the page; *What did I learn?*, symbolized by a light bulb; an illustration or diagram to share with others, symbolized by a camera. The student can label the drawing or sentences can be written below the picture to verbalize the illustration.

Allow time for students to share their science *learning log* entries with partners. Send the completed page as a homework assignment in which the students read their responses with family members to spark discussion about science concepts.

Activity 2: Seed Needs (GLEs: 2, 4, 27, 30)

Materials List: chart paper, marker, cardboard egg cartons, seedlings, seeds, plastic cups, safety goggles, hand trowels, potting soil, index cards, transparent tape, How Does Your Garden Grow? BLM, Science Learning Log BLM, Science Learning Log Rubric BLM (Unit 3, Activity 2)

Teacher Note: A few days prior to this activity, the teacher should plant seeds in order to have at least two dozen seedlings (tiny sprouts) to use in the experiment. Cardboard egg cartons (non-foam) would work well so that students can transplant the seedlings to their cups. Radish seeds would be good for this activity. Ask students to make a list of what all plants need and record responses on chart paper.

Explain to students that they will investigate the importance of two things seeds need to grow—water and sunlight—and conduct two experiments. In groups of four, students should plant a seedling in each of four cups. Each student should label the cup by writing the conditions for the plant on an index card and taping it to the cup. The information for labeling can be written on the board or on chart paper for students to copy:

LIGHT – cup 1 – with sunlight and with water
LIGHT – cup 2 – without sunlight and with water
WATER – cup 1 – with water and with sunlight
WATER – cup 2 – without water and with sunlight

The cups should be placed in appropriate locations in the classroom (table accessible for students to water seedlings, table for plants not to be watered, and table with access to sunlight, closet, or cabinet).

Teacher note: It is imperative that the cup without sunlight receives water and the cup without water is in the light so that the focus in only on one variable. Cup 1 is the control in both experiments.

The students should record their observations on the How Does Your Garden Grow? BLM. Each student should have a blackline master on which to record observations for his/her group's cups. The experiments may last past the duration of the unit, depending on plants and conditions. Students should conclude with a discussion about the growing conditions of the seedlings. They should be able to verbalize that plants need sunlight and water to grow. They should be able to state what was removed from each plant that caused it not to grow.

Using a modified science *learning log* (view literacy strategy descriptions) to record information about the needs of growing plants, the students will write and draw to demonstrate what was done and what was learned. The goal of the *learning log* is to allow students to record their observations and ideas, to write descriptions in detail, to build and complete charts, and to draw clear, understandable diagrams and illustrations.

Following the experience of planting, observing, and discussing seeds, have the students use the Science Learning Log BLM to record the following key pieces of information: *What did I do?*, symbolized by a question mark on the page; *What did I learn?*, symbolized by a light bulb; an illustration or diagram to share with others, symbolized by a camera. The students can label the drawing or sentences can be written below the picture to verbalize the illustration.

Allow time for students to share their science *learning log* entries with partners. Send the completed page as a homework assignment in which the students read their responses with family members to spark discussion about science concepts.

Activity 3: Ready, Set, Grow (GLEs: 1, 4, 27, 30)

Materials List: safety contract generated in Unit 1, a house plant, potted flowering plant, a flower(s) in a vase of water, a leaf, a twig, seeds, a plant with roots exposed, a carrot, a stalk of celery, a lettuce leaf, a cauliflower, chart paper, seeds, plastic cups, permanent markers, potting soil, hand trowels, watering can, safety goggles for each student, variety of books of the plant/seed topic, rulers, blank paper (stapled together to be used as a seed observation journal), books that focus on the growth cycle of plants (see resources below)

Teacher Note: Select seeds that germinate quickly: lima beans, radishes, and alfalfa are some to consider. Read package indications for germination times when selecting seeds.

Review the safety contract generated in Unit 1. Students should discuss the safe handling of living things (plants) and science tools. Students should be able to discuss why any food in a science lesson should not be eaten without permission. They should discuss safe use of hand trowels, soil, and seeds in terms of handling tools carefully and not putting their hands near the mouth until they have washed them.

Day One:
Display the various plants and plant parts described in the materials list. Allow the students to observe the collection for a minute or two and then allow them to ask questions based on their observation.

Questioning procedure for GLE 1: Place a large question mark visual on the board, signaling question time. Allow time for students to ask questions about the concept at hand and call on other students to answer them. A fun way to lead students to ask questions on topic is to have a puppet, stuffed animal, or seashell that the student holds near his/her ear to "listen to the science question" and then he/she asks the class (the student is actually formulating the question in his/her mind). The teacher should model the use of the prop first before having students try it. Use of a prop can be a confidence builder for reluctant participants as well as a way to keep the students on track with the correct line of questions. The teacher will facilitate the discussion.

Possible questions to be answered might be the following:
Which of these are alive? Which of these were once living? Do all of these things come from plants or trees? Do all vegetables grow from plants?

The collection of plants and parts may be grouped into categories to show edible parts of plants, food sources, once living, etc.

The teacher should guide students to the concept that most plants grow from seeds. In this activity, students will plant seeds and seedlings and observe changes over time. The teacher can read a book about seeds and plants to have further discussion. Possible resources include the following:
Seeds Get Around, Berger
The Carrot Seed, Krauss

The students will participate in a modified *story chain* strategy (view literacy strategy descriptions) to record the steps in planting seeds in a cup. Writing out the steps in a story provides students an opportunity to reflect on their understanding, while reinforcing reading, writing, speaking, and listening. In groups of four, the first student writes the opening sentence of the story. The student passes the paper to the student on the right, and that student writes the next sentence of the story. The paper is passed again to the right to the next student who writes the third sentence of the story. The fourth student adds the last sentence and reads the story to the group so they can cooperatively decide if the steps are correct. The teacher should read each group's story upon completion to determine if they are ready to plant their seeds. The story should be revisited throughout

the process to reinforce comprehension. A sample story chain that might be created by the students is as follows:

Student 1: One day, a gardener put soil in a pot.
Student 2: Next, he pushed some seeds down into the soil.
Student 3: After that, he poured some water on the soil and put it in a sunny window.
Student 4: He watched and waited for a seed to grow.

This activity is most effective for groups of four students, and when possible, conducted outdoors. Working in groups allows students to observe others, compare, share, and cooperate. Assigning a student to get materials from a central location and establishing the order for students to use materials makes the process flow. Each student will plant his or her own seeds (two seeds in a cup of potting soil).

After the students have completed the planting, lead a discussion on what happens at the end of the story chain. Elicit the concept of a growing cycle. Students should be able to explain that the plant makes more seeds to be planted which will grow into another plant. Ask students to compare the growing cycle of plants to the growing cycle of animals and people.

Students may illustrate the concept of the growing cycle of plants by drawing the stages around a circle. The seed, seedling, plant with new seeds can be joined by arrows around the circle.

Day Two:
Using the *RAFT Writing* strategy, (view literacy strategy descriptions), guide students to write a letter (**R**ole of writer, **A**udience, **F**orm, **T**opic) to a gardener from the point of view of a plant. The role refers to the viewpoint of the writer, the audience refers to whom or what the *RAFT* is being written, the form refers to the form the writing will take, and the topic refers to the subject focus of the writing.

This form of writing gives students the freedom to project themselves into unique roles and to look at content from unique perspectives. The writing should be creative and informative.

Present the following RAFT:

R – Role of the writer (plant)
A – Audience (gardener)
F-- Form the writing will take (letter)
T – Topic/subject of the writing (what plants need to grow)

Be sure that the form of a friendly letter has been introduced, or introduce it at this time. Have the students brainstorm ideas for the body of the letter by recalling the needs of plants. Once the letters are complete, have the students work in pairs to read the letters aloud. One student can be the gardener and the 'plant' can express its needs. Then, the students can switch roles and the other partner can read the letter. Other students should

listen and watch for accuracy and logic in the *RAFT*s. The product will be one that can serve as a model of something both creative and informative and can also serve as a model of a friendly letter for later instruction.

Students continue to observe, discuss, and record the progress of their seeds as they sprout and grow. Have students record in their seed observation journals drawings, photographs, observations, or interesting (e.g., a new leaf, flower buds, seedpods) discoveries. Students can measure the plant as it grows. The use of rulers may need to be reviewed. At the end of the observation period, discuss the changes that have occurred. Have students recall planting the seeds and what they needed in order to grow. Discuss what changes the students have observed. Look at all the plants; are there any differences? Why?

Activity 4: Comparing Soil (GLEs: 5, 7, 11, 35, 39)

Materials List: safety contract generated in Unit 1; three small paper bags: one with rice, one with sand, one with top soil; chart paper; large roll of paper/plastic; Touch and Describe BLM; hand lens, plastic spoons, paper cups for each group of three to four students; safety goggles and disposable gloves for each child

Teacher Note: Prior to this activity, the teacher should obtain soil samples from the schoolyard, from his/her own yard, or other various areas. The areas in which the soil is collected should be free of ants and poison ivy. The types of soil that might be used are topsoil (dug as a shallow slab with grass, leaves, and twigs on top), topsoil dug more deeply then the layer of soil that we most commonly water (the soil beneath the surface having the roots of the plants), and sandy soil. (This may need to be a mix of sand and topsoil purchased from the store if there is not access to such soil.) If evidence of biotic (living) substances is not visible, the teacher may choose to add twigs or dead insects to either the top soil or sandy soil for students to discover.

Safety Note: Have students discuss reasons for not putting their hands near their eyes or mouth during this experiment. Ask them to identify other safety considerations for this lesson.

Invite the students to discuss words that will be used in observing the soil samples. Write the words *color*, *texture*, and *particles* on chart paper and have it visible throughout the lesson. Invite the students take turns reaching into a paper bag of rice, a paper bag of sand, and a paper bag of top soil and describe how each one feels (texture). The students may offer words for texture such as *soft, bumpy, smooth,* and *slimy*. List the words that are generated on chart paper. Explain that texture is partly determined by the size of the particles. Explain that they will be observing some types of soil found on Earth's surface.

Prepare an area for each group of three or four students to observe and examine the soil samples. Laying out butcher paper or waxed paper for each group might be helpful, so that each type of soil can be separated and labeled as "topsoil" and "sandy soil." (If the

school cafeteria has old plastic trays to donate, these work well, too.) Provide each group with a hand lens, plastic spoons, paper cups, gloves, safety goggles, Touch and Describe BLM for recording observations, and a pencil.

Model the use of a hand lens as a scientific tool. Make sure students understand how to move the lens closer or further away to get a sharp image.

Divide students into groups of three or four. Provide each with the samples of topsoil and sandy soil. Students will explore the texture and observe characteristics of each soil and record their observations. They may choose to use the plastic spoons to put samples in cups for observation or the hand lens for viewing. Students may conclude that sandy soil is rough and contains sand and topsoil is dark and not as rough as sandy soil. The chart paper with the list of describing words should be on display for students to use as a spelling aid.

Have students observe a soil sample from the schoolyard; determine what type of soil this sample is most like; identify leaves, grass, and twigs that occur in the top layer of topsoil. Guide students to an understanding that the best soil (topsoil with organic materials) is at the surface and under that come other layers with more sand or formed from clay that are not as fertile (healthy) for growing things.

Questions for inquiry:

- How does soil feel?
- How does soil smell?
- How can we describe the layers of soil?
- What can soil be used for?
- Can you separate the soil into different substances?
- Where are these kinds of soil found? (beaches, deserts, farms, gardens, yard at home)
- Does soil contain anything that is living? Does soil contain anything that is not living?

A fun, culminating activity would be to make and eat a great Soil Cake. Be sure to check any dietary limitations or food allergies for all students. The recipe is available at http://ltpwww.gsfc.nasa.gov/globe/soilcake/soilcake.htm. Have students recall the layers in the samples that were shown (decaying material on top with the soil beneath that having the roots of the plants) in relation to this cake.

Activity 5: Pick a Pet, Any Pet (GLEs: 1, 31, 33)

Materials List: chart paper, colored markers, a pet for students to observe, book or guest speaker about pet care, book/video of adult animals with their offspring
Teacher note: Be sure to check the school policy regarding pets in the classroom before engaging in this activity. Also, check health records for allergies specific to animals.

Generate a list of types of animals that can be kept as pets. (Hopefully, there will be a wide variety, such as fish, cats, dogs, horses, hamsters, birds, etc.) Divide the pets into categories. Through guided questioning, have students arrive at categories of pets that move in water, pets that move in air, and pets that move over land. Ask students to describe what special features are needed for each category of pet to live in its environment (e.g., wings for birds, legs for animals, fins for fish).

Prior to this activity, the teacher may want to establish a classroom pet such as a fish or hamster, in the event that every student does not have a family pet or have access to one. Another option would be to borrow one from another classroom. Ask students if they have a family pet. If they do not, ask if they know someone (i.e., neighbors, relatives, close friend) who has a pet and whether they live close enough to observe that pet. Students should observe a pet and share with the class the things required for that pet to be kept safe and comfortable. Students might infer that pets living with them in their homes may be handled differently from classroom pets.

Resources for pet care:
Berenstain Bears Trouble With Pets, Berenstain
Invited parents willing to bring class friendly pets to share and discuss proper care.

Ask students if their pet has ever had babies. Ask what the babies looked like and if the babies were different from the mother. Read a picture book, show pictures, or show a video of adult animals with their offspring. Ask students to identify ways in which the adults and babies are alike and how they are different.

Possible resources might include the following:
See How They Grow video series
Is Your Mama a Llama?, Guarino & Kellog
Whose Baby?, Yabuuchi

The students might ask questions based on the care of pets and/or the similarities and differences of adult animals and their offspring. They might also ask questions about the differences and similarities of plants and their offspring, comparing them to animals.

Questioning procedure for GLE 1: Place a large question mark visual on the board, signaling question time. Allow time for students to ask questions about the concept at hand and call on other students to answer them. A fun way to lead students to ask questions on topic is to have a puppet, stuffed animal, or seashell that the student holds near his/her ear to "listen to the science question" and then he/she asks the class (the student is actually formulating the question in his/her mind). The teacher should model the use of the prop first before having students try it. Use of a prop can be a confidence builder for reluctant participants as well as a way to keep the students on track with the correct line of questions. The teacher will facilitate the discussion.

Activity 6: Get a Clue! (GLEs: 2, 8, 26, 32)

Materials List: chart paper, markers, Venn Diagram BLM, Clues BLM

Using the information provided by students and the clues on the blackline master, students will create a *graphic organizer* (view literacy strategy descriptions) to compare plants and animals. Use of a *graphic organizer* provides students with a visual illustration of verbal statements. In this instance, the Venn Diagram shows at a glance the key parts of the whole and their relations, helping the learner to comprehend and solve problems.

One side of the Venn Diagram is used to list features of plants and the other side is used to list features of animals. The center section of the diagram is used to list features common to both. After having completed the lessons in which plants and animals are investigated and compared, the students can synthesize the knowledge through the use of this organizational structure. Using the Clues BLM, students will cut and paste the sentence strips on the Venn Diagram BLM to compare plants and animals. To make the activity more open-ended, students can list other features of plants and animals, write them in their own words on the blank sentence strips, and add them to the Venn Diagram. Time should be allowed for students to share the ideas added. The completed diagram should be sent home for students to discuss with their families after the teacher assesses accurate comparisons.

Sample Assessments

General Guidelines

Documentation of student understanding is recommended to be in the form of portfolio assessment. Teacher observations and records as well as student-generated products may be included in the portfolio. All items should be dated and clearly labeled to show student growth effectively over time.

General Assessments

- Anecdotal notes about students' understanding during discussion and/or group work
- Work samples for portfolio may include journal entries
- Individual student conferences about written descriptions of soil

Activity-Specific Assessments

- Activity 1: Use Science Learning Log Rubric assessment to determine the accuracy of student responses in categorizing living and non-living things. (see Unit 3, Activity 2 for BLM)

- Activity 2: Use Science Learning Log Rubric assessment to determine the relevancy of student responses in observing what happens to a seedling with and without sunlight; with and without water. (see Unit 3, Activity 2 for BLM)

- Activity 6: Assess Venn Diagram for accurate comparisons of plants and animals on both given statements and open-ended, student-generated statements.

Grade 1
Science
Unit 6: Heat, Sound, and Light

Time Frame: Approximately 10 instructional periods of 45 minutes per period

Unit Description

This unit introduces three forms of energy: heat, sound, and light. Simple forms of energy are demonstrated through the use of making sounds, reflecting light, and generating heat.

Student Understandings

Students identify forms of energy, including sound, light, and heat.

Guiding Questions

1. Can students recognize various types of energy?
2. Can students describe how sounds are made?
3. Can students describe things that give off heat? light?
4. Can students describe what type of energy makes certain objects move?

Unit 6 Grade-Level Expectations (GLEs)

GLE #	GLE Text and Benchmarks
Science as Inquiry	
1.	Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)
2.	Pose questions that can be answered by using students' own observations and scientific knowledge (SI-E-A1)
3.	Predict and anticipate possible outcomes (SI-E-A2)
4.	Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2)
5.	Use the five senses to describe observations (SI-E-A3)
7.	Select and use developmentally appropriate equipment and tools and units of measurement to observe and collect data (SI-E-A4)
8.	Express data in a variety of ways by constructing illustrations, graphs, charts, tables, concept maps, and oral and written explanations as appropriate (SI-E-

GLE #	GLE Text and Benchmarks
	A5) (SI-E-B4)
9.	Use a variety of appropriate formats to describe procedures and to express ideas about demonstrations or experiments (e.g., drawings, journals, reports, presentations, exhibitions, portfolios) (SI-E-A6)
10.	Identify and use appropriate safety procedures and equipment when conducting investigations (e.g., gloves, goggles, hair ties) (SI-E-A7)
12.	Explain and give examples of how scientific discoveries have affected society (SI-E-B6)
Physical Science	
18.	Demonstrate how sound is made in a variety of ways (e.g., singing, whispering, striking an object) (PS-E-C1)
19.	Describe and demonstrate the volume of sound (e.g., soft, loud) (PS-E-C1)
20.	Use a flashlight and various objects and materials to determine if light is transmitted or reflected (PS-E-C2)
21.	Demonstrate that light can be reflected onto another object by using a mirror (PS-E-C2)
22.	Identify some examples where heat is released (e.g., burning candles, rubbing hands, running) (PS-E-C3)
25.	Discuss what type of energy makes objects work (e.g., car/gasoline, waterwheel/water, lamp/electricity) (PS-E-C6) (PS-E-C7)

Sample Activities

Activity 1: Guessing Sounds (GLEs: 2, 5, 7, 18, 19)

Materials List: chart paper, book or video, items for making sounds (e.g., paper, keys, book, bell, zipper), contributions of students' home assignment

Allow two days to complete this activity.

Using a modified *SQPL* (*student questions for purposeful learning*) (view literacy strategy descriptions) strategy, the students discuss the concept of sound. This strategy uses a teacher-generated statement to cause students to wonder, challenge, or question. The statement does not have to be factually true, as long as it causes students to think about the given topic. The following statement (or similar statement) should be written on the board or chart paper for student discussion:

All sounds are loud.

Have students turn to a partner and think of one good question or comment they have about the given statement. Repeat the statement as needed to individual pairs. As students respond, record the questions and/or comments on the board or chart paper. Facilitate a discussion about each of the questions or comments. Reinforce accurate comments, clarify inaccurate comments, and answer questions.

Following the discussion, read a book about sound or use a video to generate additional discussion about sound. Possible resources might include the following:
The Wonder of Sound (13:00) www.lpb.org/cyberchannel
Sounds All Around (Pfeffer)

Have students sing a song in unison in a soft voice to demonstrate a low volume. Have them sing again in a loud voice. Ask how the volume of the song might sound if they are close to the singers and how it might sound different if further away from the singers. Play some music while the students stand close to the source. Without changing the volume, have students move across the room to compare the sound when far from the source.

Position students so they are unable to view the items that will be used to make the sounds. Ask them to close their eyes to listen very carefully. Emphasize the need for absolute quiet. Make several sounds, and then ask students to identify how each sound is made. Here are suggestions of sounds to create: wad a piece of paper, pour some water, open and close a zipper, ring a bell, stomp feet, click tongue, rattle some keys, drop a book. Students should describe that the paper is pushed together with the hands, water is poured, the zipper is pulled up and down, the bell is shaken with the hand, etc.

The teacher will assist the class in forming a *word grid* (view literacy strategy descriptions) on chart paper. The students will learn important concepts about sound and expand their reading vocabularies. The sounds are listed on the vertical axis of the grid and the adjectives are listed on the horizontal axis of the grid. After each sound is made, allow students to identify the sound and add it to the chart. Collaborate with the students on adjectives to describe the sounds and write those.

Once the grid is co-constructed with the students, the students participate in adding a + or – to the grid for each clue. The grid below is an example of what might be created with the students. The teacher should add any key adjectives that the students leave out to ensure that the concepts are covered completely. Afterward, students can be encouraged to suggest other sounds, which can be added to the grid. Students should be asked to link their sound with the adjectives that describe it.

Sound	loud	soft	sharp	rumbling	metallic	
wadding paper	+	-	+	-	-	
rattling keys	+	-	-	-	+	
dropping a book	+	-	-	-	-	
ringing a bell	+	-	+	-	+	
closing a zipper	-	+	-	-	-	
stomping feet	+	-	-	+	-	
clicking tongue	-	+	-	-	-	

To encourage family participation, invite students to bring in one or two objects that make noise. Set up an area in the classroom for students to stand behind and make mystery sounds. The class can guess how the sounds are made and create a list of sounds that are loud, soft, high, low, etc. Quiz students by asking questions that require them to use the vocabulary words to compare and contrast sounds.

Activity 2: Music to My Ears (GLEs: 4, 8, 9, 18, 19)

Materials List: book or video, materials for creating musical instruments (see website link below), real musical instruments brought in by guest speakers and/or parents, Do You Hear That? BLM

Allow two days to complete this activity.

Use a book or video to encourage a discussion about the volume of sound. Possible resources might include the following::
*Sound: A First Look (*17:00) www.lpb.org/cyberchannel
The Magic School Bus in the Haunted House (video)

This would be a great opportunity to involve the music teacher, guest musicians from the community, and even the students' parents. Begin by asking parents if they have any musical expertise to share. This would provide students with relevant examples of high and low sounds if they experience demonstrations of high and low pitches in the classroom.

After demonstrations, live or by video, allow students time in a learning center, in small groups, or as a take-home assignment to create a musical instrument to investigate and compare sounds that the instrument makes. A good resource for teachers is www.enchantedlearning.com/crafts/music

Allow time for students to share their instruments with the class, demonstrating the sounds it makes and asking classmates to identify them as high or low sounds.

Use the Do You Hear That? BLM *word grid* (view literacy strategy descriptions). The format is the same as the one created whole-group in the previous activity, but this is one that students can personalize.

Prior to the outdoor part of the activity, the students should create adjectives to describe sounds to be written across the horizontal axis of the grid by asking them to think of sounds they might hear outdoors and use a word to describe it. Possible responses might include *high*, *low*, *soft*, *loud*, *rumbling*, *banging*, *dripping*, *gurgling*, *squeaking*, *crunching*, *crackling*, *crashing*, *buzzing*, etc.

Students should find a few safe places to sit outdoors to listen for a short time. As a sound is heard, it should be recorded on the vertical axis of the grid as the students' best guess of what made the sound (example: dog, bulldozer, water, horn, wind chimes, etc).

A + or – should be added to the grid for the type of sound observed. Allow time to share the observations and discuss new vocabulary generated from the *word grid*.

Activity 3: Light the Way (GLEs: 3, 10 , 20, 21)

Materials List: safety contract generated in Unit 1, sentence strips, markers, Science Learning Log BLM, Science Learning Log Rubric BLM (see Unit 3 Activity 2), set of materials for each group of three students: flashlight with batteries, two index cards with a hole (use standard-sized punch) in the center of each, and small mirror

Discuss safety considerations for using flashlights and mirrors. Revisit the safety contract generated in Unit 1.

Have students recall the vocabulary learned in Unit 2: *transparent*, *translucent*, and *opaque*. They should recall that they used a flashlight to test materials to determine the categories: transparent (all light is visible), translucent (some light is visible), or opaque (no light is visible). Present two vocabulary words on sentence strips: *transmitted* and *reflected*. Explain that flashlights will be used to show examples of these new words:

Transmitted – light passes through
Reflected – light bounces back from a surface

Turn off classroom lights. In groups of three, a student shines a flashlight at a wall while another holds an index card in front of the beam. The students observe the light shining through the hole to the wall. The third student holds another card about a foot away from the first, lining up the holes. Students can move the cards to observe changes. Students can switch roles so that each has a turn to hold the flashlight.

The students can discuss the outcome to determine that light travels in a straight path to the wall unless something blocks it.

Next, have a student hold a mirror in front of the beam of light. The mirror can be turned up or down to reflect the light from the floor to the ceiling. Students can predict where the light will go if the mirror is turned to the right or left and then test predictions.

Using a modified science *learning log* (view literacy strategy descriptions) to record information about the investigation, the students will write and draw to demonstrate what was done and what was learned. The purpose of the learning log is to allow students to record their observations and ideas, to write descriptions in detail, to build and complete charts, and to draw clear, understandable diagrams and illustrations.

Following the experience of investigating light, have the students use the Science Learning Log BLM to record the following key pieces of information:
What did I do?, symbolized by a question mark on the page; *What did I learn?*, symbolized by a light bulb; and an illustration or diagram to share with others,

symbolized by a camera. The students can label the drawing or sentences can be written below the picture to verbalize the illustration.

Allow time for students to share their science *learning log* entries with partners. Send the completed page as a homework assignment in which the students read their responses with family members to spark discussion about science concepts.

Activity 4: We're Energetic! (GLEs: 1, 12, 22, 25)

Materials List: old magazines (especially home improvement advertisements), scissors, How Does It Go? BLM

Begin the activity by instructing students to rub their hands together. Have students describe what they feel (warm). (*Friction* is not a term to be mastered at this level, but it can be mentioned). Next, have students run in place for 2 minutes. Have students describe what they feel (warm). Brainstorm other things that give off heat energy such as fire, the Sun, a stove.

Using a variety of old magazines, put students in groups of three and have them cut out pictures of items that use different types of energy. Present the How Does It Go? BLM and have students sort the pictures into categories that describe the type of energy that makes each object work.

Allow students to take turns giving clues about an item for the class to identify and to name the type of energy it uses. The teacher should model this procedure. For example, a student might say people can move across water with this and it is powered by air to describe a sailboat.

The following list may be helpful to the teacher in stocking the magazine selection so that students find a variety of relevant items. Possible items to be categorized include the following:

Mechanical – gumball machine, hand can opener, hammer, wind-up toy
Gasoline- car, tractor, lawn mower, go-cart
Air – balloon, windmill, kite, sailboat
Electricity – lamp, stove, fan, hair dryer, television, computer
Battery – toys, flashlight, metal detector, remote control

Questioning procedure for GLE 1: Place a large question mark visual on the board, signaling question time. Allow time for students to ask questions about the concept at hand and call on other students to answer them. A fun way to lead students to ask questions on topic is to have a puppet, stuffed animal, or seashell that the student holds near his/her ear to "listen to the science question" and then he/she asks the class (the student is actually formulating the question in his/her mind). The teacher should model the use of the prop first before having students try it. Use of a prop can be a confidence

builder for reluctant participants as well as a way to keep the students on track with the correct line of questions. The teacher will facilitate the discussion.

Questions for inquiry:

- What type of energy is needed to make a gumball machine and a wind-up toy work? (mechanical energy)
- What kind of energy is needed to make a vacuum cleaner work? (electrical energy)

Lead a discussion about how scientific discoveries have affected society. For example, what did people do before lawn mowers were invented? Use the How Does It Go? BLM to guide the discussion. The students can identify what they think might have been used prior to these inventions to get things done. The teacher can guide students to reasonable responses, if necessary. This discussion might lead to opportunities to look for information about inventions on the Internet or other sources.

Sample Assessments

General Guidelines

Documentation of student understanding is recommended to be in the form of portfolio assessment. Teacher observations and records as well as student-generated products may be included in the portfolio. All items should be dated and clearly labeled to show student growth effectively over time.

General Assessments

- Work samples for portfolio may include charts, illustrations, and journal entries.

Activity-Specific Assessments

- Activity 2: Assess the relevance of the adjectives used to describe sounds observed by the student to make sure they are applicable.

- Activity 3: Use the Science Learning Log Rubric BLM to assess student responses.

- Activity 4: Assess the accuracy of the items cut from magazines and placed on the How Does It Go? BLM in categories of energy.