

Question,  
Investigate,  
Discover!

A CLOSER LOOK:

# Energy and Me

SCIENCE 2 and SCIENCE 3

A CURRICULUM RESOURCE



conserve  
NOVA SCOTIA

NOVA SCOTIA  
Education



**A CLOSER LOOK:**

# **Energy and Me**

**SCIENCE 2 and SCIENCE 3**

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**A CURRICULUM RESOURCE**

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# Introduction

## About Energy and Me

Activities in this booklet are designed to educate students about energy. The activities will help students discover the value of energy as an essential resource in their lives and may inspire them to think about energy efficiency and conservation. The goal is to help them make better personal energy choices and empower them to change their attitudes to renewable and non-renewable energy.

The activities in this booklet fit into the Life Science Units for grades 2 and 3 (Life Science: Animal Growth and Changes, Science 2, and Plant Growth and Changes, Science 3). Each activity in this booklet has the same basic structure:

- **Outcomes** from various subject areas (in addition to science) have been identified for each activity.
- **Assessment** describes demonstration of what students will be able to do when they have completed the activity.
- **Procedure** outlines the steps involved in completing an activity.
- **Analysis** should be completed by students and their teacher at the conclusion of an activity. Teachers can use students' observations and inferences to assess their understanding of an activity.

Activities should lead students towards asking questions such as

- How is energy vital to an animal's life?
- How can I monitor how much energy I use?
- How do other animals use energy?
- How can I save energy?
- Where might energy be scarce?
- How can it be managed?
- What are some of the reasons I should save energy?
- What do I do now?

This booklet presents a number of age- and grade-appropriate activities that allow students to explore their role in responsible stewardship of finite resources.

Science time should be spent on hands-on, minds-on activities with students making connections to other curriculum areas in order to reflect on and consolidate the concepts that they are learning. For example, there are a number of activities that involve constructing and interpreting graphs; these activities provide teachers and students with strong connections to curriculum areas in addition to science.



## Aim of Science Education

The aim of science education in the Atlantic provinces is to develop scientific literacy.

Scientific literacy is an evolving combination of the science-related attitudes, skills, and knowledge that students need to develop inquiry, problem-solving, and decision-making abilities; to become lifelong learners; and to maintain a sense of wonder about the world around them. To develop scientific literacy, students require diverse learning experiences that provide opportunities to explore, analyse, evaluate, synthesize, appreciate, and understand the interrelationships among science, technology, society, and the environment.

## Three Processes of Scientific Literacy

An individual can be considered scientifically literate when he or she is familiar with, and able to engage in, three processes: inquiry, problem solving, and decision making.

### INQUIRY

Scientific inquiry involves posing questions and developing explanations for phenomena. While there is general agreement that there is no such thing as the scientific method, students require certain skills to participate in the activities of science. Skills such as questioning, observing, inferring, predicting, measuring, hypothesizing, classifying, designing experiments, collecting data, analysing data, and interpreting data are fundamental to engaging in science. These activities provide students with opportunities to understand and practise the process of theory development in science and the nature of science.

### PROBLEM SOLVING

The process of problem solving involves seeking solutions to human problems. It consists of proposing, creating, and testing prototypes, products, and techniques to determine the best solution to a given problem.

### DECISION MAKING

The process of decision making involves determining what we, as citizens, should do in a particular context or in response to a given situation. Decision-making situations are important in their own right, and they also provide a relevant context for engaging in scientific inquiry and/or problem solving.



## Elementary Science Skills

Science at elementary grades is hands on, minds on. Students advance to the next grade with knowledge, skills, and attitudes gained through their experiences. These experiences give our students a solid background in scientific inquiry. From grades primary to 6, students require a minimum of 60 percent of their science time engaged in hands-on, minds-on learning. Students need to explore, examine, explain, elaborate on, and evaluate science in their world. A classroom offers exciting opportunities for students to become scientifically literate and to behave as young scientists.

Science provides opportunities for connections to reading, writing, mathematics, and other curriculum areas in context. In a hands-on, minds-on science classroom, students are engaged in questioning, observing, and discovering science for themselves by making connections to their worlds.

### OBSERVING

The skill of observing is important because almost all other science skills are based upon it. Scientists make observations and construct several inferences about each. In many cases, it is possible to make more than one inference to explain an observation or set of observations.

*An observation is an experience that is obtained through one of the senses.*

*An inference is an explanation of an observation.*

Observing items closely provides opportunities to describe objects with greater detail. Tools such as hand-held magnifiers, box magnifiers, microscopes, and optical microscopes allow a variety of extensions of the sense of sight. These instruments allow observations that extend the senses—in this case, the naked eye. Activities in this booklet provide opportunities for students to use these tools and to develop and hone their skills in observing.

Qualitative observations are descriptions of the object based on the five senses. Quantitative observations are important in science; these tell how much or how many by giving an amount with the description. Observations involving changes are useful and should be included in reporting whenever possible.

Planning for and accurately recording observations increases their reliability. Recording in one or more of the following representations is an important part of each student's science reporting. Representations can include symbolic, contextual, concrete, pictorial, and verbal (any written and/or oral language).

### INFERRING

Inferring means explaining an observation. Distinguishing between observations and inferences needs to be done continually. The thought process used in constructing an inference may take place quickly. This process is often conditioned by past experiences.

In many cases, it is possible to make more than one inference to explain an observation or set of observations. Scientists make observations and construct several inferences about each. Then, they can make new observations to see if the inferences are acceptable explanations of the old and new observations.



## QUESTIONING

Questioning is an important science skill for children to develop. Teachers should use operational questions that allow students to continue to explain and support their observations and inferences. Questions also help students to develop ideas for further study. Some questions might be

1. What questions do you have?
2. What do you see?
3. What is happening?
4. What happened?
5. What did you know about the problem before you began your study?
6. What sense did you use to make that observation?
7. That is an interesting inference. What observation(s) did you use to support your inference?
8. What observation(s) did you make that allow you to say that?
9. What evidence do you have for saying \_\_\_\_\_?
10. What evidence do you have to support your inference?
11. Have you considered all the evidence?
12. What further information do you need?
13. What discoveries did you make?

## COMMUNICATING

Following activities and experiences in which students make observations and develop inferences, they must be invited to communicate their findings and ideas.

Students may use a variety of methods for communicating their findings. Using the computer, students might create word-processing documents that include images of what they saw, create slide shows, or make PowerPoint types of presentations. Different groups might report their findings in ways appropriate to their understandings and learning styles.

## Journals

Journals are a part of many occupations and as such are highly reflective of the world of work. Many highly successful people keep a daily journal as a habit that helps them develop insights into their work. A journal can include sketches, diagrams, notes, quotes, questions, excerpts, and drafts. Scientists recording this way are keeping track of all their observations. This is their “private science.”

The journal may be used to develop a final product, such as a report, design, profile, fictional text, or dramatization, or it may be a way of tracking progress and developing ideas and insights. The final product is the young scientist’s “public science.”



Students need to see the value of their science journal writing, not only through frequent responses from the teacher, including assessments that “count,” but also through assignments and experiences that provide linkages to previous and subsequent learning or that meet specific learning and/or personal needs for the student.

Since the journal can contain very personal thoughts and ideas stimulated by thought-provoking questions, the teacher must make provisions to honour the confidentiality of students’ work, except where legally required to do otherwise.

## School Planning

Teachers at schools with combined classes need to plan science learning over a two-year period. All four science units need to be accomplished at each grade. The spiral curriculum allows for the accomplishment, with careful planning, of each unit at each grade over a two-year period. For instance, Science 2 has the unit Animal Growth and Development; Science 3 has Plant Growth and Development. A combined class of Science 2 and Science 3 can easily adapt outcomes in these units to examine Growth and Development. Students in combined classes will be able to achieve all outcomes each year that they are in the combined classroom, but they will explore and learn using a different focus each year. Students at this level are developing their skills, knowledge, and attitudes about the world around them. Using classroom experiences of science, the students will have information they can read about, write about, and wonder about.

A hands-on, minds-on approach to science will reinforce student learning and exploration of concepts.





# GRADE 2 ACTIVITIES



# Activity 1: My Animal and Energy

**Outcomes:** *Students will be expected to*

Science

- 202-7 propose suggestions for meeting the needs of the organism being investigated and draw conclusions about its growth patterns or stages based on observations
- 202-9 identify new questions about the needs and growth patterns of other organisms
- 200-1 ask questions about an organism's needs and changes in growth patterns that lead to exploration and investigation
- 200-4 select and use materials to carry out their own explorations for observing the life cycles of an organism

English Language Arts

- 1.1 describe, share, and discuss thoughts, feelings, and experiences and consider others' ideas
- 1.2 ask and respond to questions to clarify information and to explore possibilities or solutions to problems
- 5.1 answer, with assistance, their own questions and those of others by seeking information from a variety of texts
- identify their own personal and learning needs for information
  - generate their own questions as a guide for research
  - use a range of print and non-print materials to meet their needs
  - use basic reference materials and a database or electronic search
  - reflect on their own research process
- 8.1 use writing and other forms of representation to
- formulate questions
  - generate and organize language and ideas
  - discover and express personal attitudes and opinions
  - express feelings and imaginative ideas
  - record experiences
  - explore how and what they learn

**Purpose:**

to discover through observation how animals need energy and how they are adapted to use energy; to pose questions that might not necessarily have answers

**Assessment:**

Students will be able to write or draw observations of energy needs and animal adaptations. Students will be able to pose questions that may or may not be operational.

**Materials:**

Activity 1: My Animal and Energy, bug boxes, magnifiers, science log book, see-through habitat



**Procedure:**

- Choose an animal/insect to observe (ant, mealworm, household pet).
- Observe how it is moving. What is it doing? Is it carrying anything? How is it carrying its load?
- Identify four stages of your animal's life cycle. List the stages in your science log book, or draw pictures of the different stages.
- In your log book, draw diagrams of your animal. Write down questions that you wonder about your animal. For example, how do ants carry things that are many times larger than they are? Why do ants all follow each other in long lines. How can cats jump so high?
- Complete the graphic organizer. Students can use their science journals to complete the organizer. The graphic organizer can be completed as a class on chart paper or on an LCD projector using Inspiration or Kidspiration software.

**Analysis:**

Students will be able to complete the graphic organizer.



Student Name: \_\_\_\_\_

## Activity 1: My Animal and Energy

Draw a picture of your animal.

**A Day in the Life of** \_\_\_\_\_  
(Describe what your animal does during a day.)





# Activity 1: My Animal and Energy (continued)

Here are some things I wonder about my animal:

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How does your animal use energy?

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Does the animal use electricity for any part of its life cycle?  
If so, which parts?

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Who uses more energy, you or your animal?

---

What evidence is there to support your answer?

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## Activity 2: Human Life Cycle and Energy

<b>Outcomes:</b>	<i>Students will be expected to</i>
Science	<p>102-7 describe features of natural and human-made environments that support the health and growth of some familiar animals</p> <p>202-7 propose suggestions for meeting the needs of the organism being investigated and draw conclusions about its growth patterns or stages based on observations</p> <p>203-3 communicate procedures and results of the investigation into the life cycle of an organism, using drawings, demonstrations, and/or written and oral descriptions</p> <p>202-9 identify new questions about the needs and growth patterns of other organisms</p>
<b>Purpose:</b>	to match the life cycle of a human with the energy requirements to meet its basic needs (food, shelter, water, and light)
<b>Assessment:</b>	Students will be able to explain the human life cycle and its energy requirements for meeting basic needs (food, shelter, water, and light).
<b>Materials:</b>	Activity 2: Human life Cycle and Energy, chart paper, human life cycle cards
<b>Procedure:</b>	<ul style="list-style-type: none"> <li>• Divide students into groups and give each group one card representing one of the stages of a human life cycle (egg, child, adult, elder).</li> <li>• Each group will discuss the following questions as they pertain to the particular life-cycle stage.             <ul style="list-style-type: none"> <li>– At this stage, how do I use energy?</li> <li>– What do I use that needs energy?</li> <li>– What do I do that uses energy?</li> </ul> </li> <li>• Each group will complete a data chart based on the stage they are exploring (see next page).</li> <li>• Make a class list of energy use and activity based on the discussions from each group.</li> </ul>
<b>Analysis:</b>	Students will complete a data chart. They can use their science journals, Kidspiration software, and/or chart paper. What conclusions can the class make about how people use energy as they grow?



Student Name: \_\_\_\_\_

## Activity 2: Human life Cycle and Energy

Stage of Life Cycle <input type="checkbox"/> egg <input type="checkbox"/> child <input type="checkbox"/> adult <input type="checkbox"/> elder	
Diagram	Tell me about your diagram
<b>Energy Used</b>	
<b>Day examples:</b> _____ _____ How do I use energy? _____ _____	<b>Night examples:</b> _____ _____ How do I use energy? _____ _____
What materials do I use that need energy? _____ _____	
What do I do that uses energy? _____ _____	
When do I use the most energy? _____ _____	
What evidence do you have to support your answer? _____ _____	



## Activity 3: Energy Then and Now

**Outcomes:** *Students will be expected to*

Science

102-7 describe features of natural and human-made environments that support the health and growth of some familiar animals

100-16 describe changes in humans as they grow and contrast human growth with that of other organisms

203-3 communicate procedures and results of the investigation into the life cycle of an organism, using drawings, demonstrations, and/or written and oral descriptions

Social Studies

2.1.2 demonstrate an understanding of how individuals and groups have contributed to change

2.1.4 predict ways their community might change in the future and how they can contribute to that future

2.2.2 demonstrate an understanding that people have changed technology over time to meet their needs, wants, and interests

Mathematics

A1 order numbers and use ordinal language

A2 count in a variety of ways

F1 conduct simple surveys and record data

F2 create and interpret pictographs and symbolic bar graphs

F3 develop and modify predictions with respect to data collected or presented to them

English Language Arts

8.1 use writing and other forms of representation to

- formulate questions
- generate and organize language and ideas
- discover and express personal attitudes and opinions
- express feelings and imaginative ideas
- record experiences
- explore how and what they learn

**Purpose:** to discover, through interviews and time lines, how energy use has changed over time

**Assessment:** Students be able to conduct an interview and construct a time line based on the interview that reflects changes in energy use over the subject's lifetime.

**Materials:** interview questions, time line



**Procedure:**

- Design a class questionnaire that will explore developments or inventions that have happened over time that may have affected how people use energy.
- Have students conduct an interview with a parent, grandparent, or other adult, or invite a speaker to come to the class. The point of the interview is to show change over a person's lifetime, not to be exact about dates. Students should be able to construct a time line that shows the sequence of events of a person's life without focussing specifically on dates.
- Sample questions might be: How did you get to school when you were young? How did you store food or cook food when you were young? When you were younger, did you have a television? a car? a computer? What do you do now that uses electricity that you used to be able to do without electricity (writing letters vs. typing vs. e-mail)?
- From their notes of the interview, students can plot their information on the time line template so that changes in the energy use during the life of their interview subject are shown.



**Analysis:**

Students will make inferences about energy use based on the information they have collected. As a class, talk about how they made their inferences. What patterns can students see in their data?



EXAMPLE

### Activity 3: Energy Then and Now (Time Line of Energy Use)

I interviewed: <u>My Grandmother</u> <span style="float: right;">Age: <u>64</u></span>	
Year	Energy Use
1950	walked to school, walked home at lunch, played outside
1960	first television set
1965	washing machine and dryer—we used to do laundry by hand and hang it out to dry 
1985	first computer to replace manual typewriter 
2000	talk to family using webcam and e-mail over the Internet

Student Name: \_\_\_\_\_

### Activity 3: Energy Then and Now (Time Line of Energy Use)

**I interviewed:** \_\_\_\_\_ **Age:** \_\_\_\_\_

Year	Energy Use



## Activity 4: When It's Light / When It's Dark

**Outcomes:** *Students will be expected to*

Science

- 102-7 describe features of natural and human-made environments that support the health and growth of some familiar animals
- 202-7 propose suggestions for meeting the needs of the organism being investigated and draw conclusions about its growth patterns or stages based on observations
- 203-3 communicate procedures and results of the investigation into the life cycle of an organism, using drawings, demonstrations, and/or written and oral descriptions
- 202-9 identify new questions about the needs and growth patterns of other organisms

Mathematics

- F2 create and interpret pictographs and symbolic bar graphs

English Language Arts

- 1.1 describe, share, and discuss thoughts, feelings, and experiences and consider others' ideas
- 8.1 use writing and other forms of representation to
- formulate questions
  - generate and organize language and ideas
  - discover and express personal attitudes and opinions
  - express feelings and imaginative ideas
  - record experiences
  - explore how and what they learn
- 8.2 explore, with assistance, ways for making their own notes
- 8.3 experiment with language choices in imaginative writing and other ways of representing

**Purpose:**

to match the life cycle of a human with the energy requirements to meet its basic needs (food, shelter, water, and light).

**Assessment:**

Students will be able to complete a graph and read information from it.

**Materials:**

Activity 4: When It's Light / When It's Dark, cards from kit, chart paper, student data table

**Procedure:**

- Select one of the stages of the human life cycle.
- Discuss the amount of energy that is used to support a human during this stage of its life. Basic descriptions might be small (e.g., watching television), medium (e.g., heating water for macaroni), large (e.g., driving the car to do the grocery shopping), and extra large (e.g., heating water for a bath).
- As a class, decide on four choices of activities to look at (e.g., making food, washing, using lights, and watching television).
- Have each student draw the graph for energy used during the day.





- As a class, fill in a data chart (see example on page 20) for each life cycle stage: egg, child, adult, elderly.
- For each life stage, draw a bar graph like the one that follows comparing activity to amount of energy used during the day.
- Have each student repeat the above activity for the energy used during the night.
- Draw a bar graph for the life stage that lists an activity and the amount of energy it uses.
- Compare your graphs.
- As a class, discuss the following questions: Does this seem like lots of energy for this activity? Is it a good use of energy? Could it use less energy? Could it use more energy?
- Post the graphs for the whole class to see.
- Write an expository paragraph that describes an energy day—how do you use energy during the day?
- As a class, make a large graph of information for each stage.

**Analysis:**

Students will complete the graphs for each life stage.

Students will identify patterns in energy use as a person grows and develops.

Students will complete expository paragraphs that describe how they might use energy during the life-cycle stage that they have chosen.

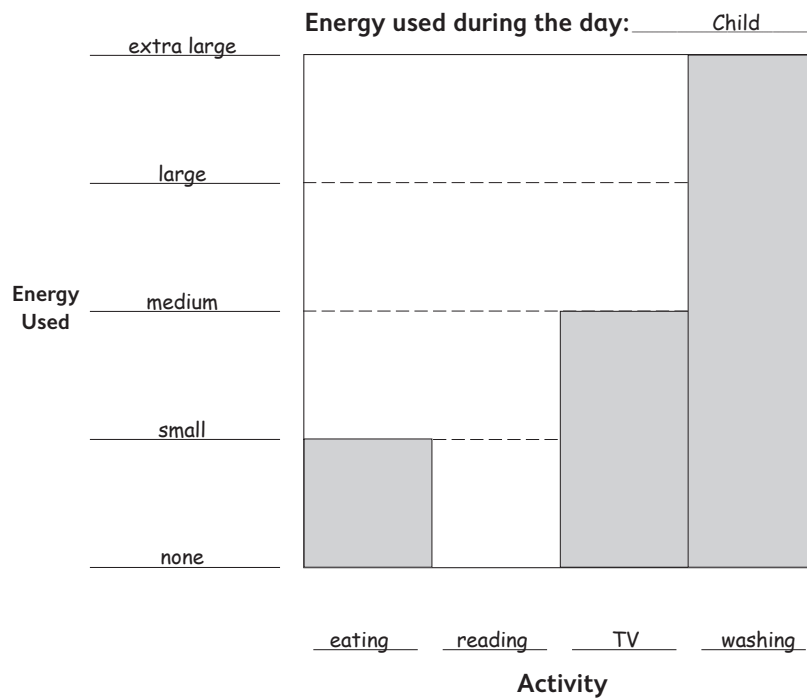


EXAMPLE

### Activity 4: When It's Light / When It's Dark

Energy use during the day: <u>Child</u>		
Activity	Amount of energy used during the day	Amount of energy used at night
watching TV	medium	small (before bed)
reading	none	small (at bedtime)
washing myself / brushing my teeth	lots (hot bath after school) brushing teeth 3 times	none
eating breakfast eating lunch eating dinner	none stove used to heat up soup oven for 60 minutes for casserole	none

EXAMPLE



Student Name: \_\_\_\_\_

## Activity 4: When It's Light / When It's Dark

Energy use during the day: _____		
Activity	Amount of energy used during the day	Amount of energy used at night

Energy used during the day: \_\_\_\_\_

Energy Used	_____	
	_____	
	_____	
	_____	
	_____	
	_____	Activity



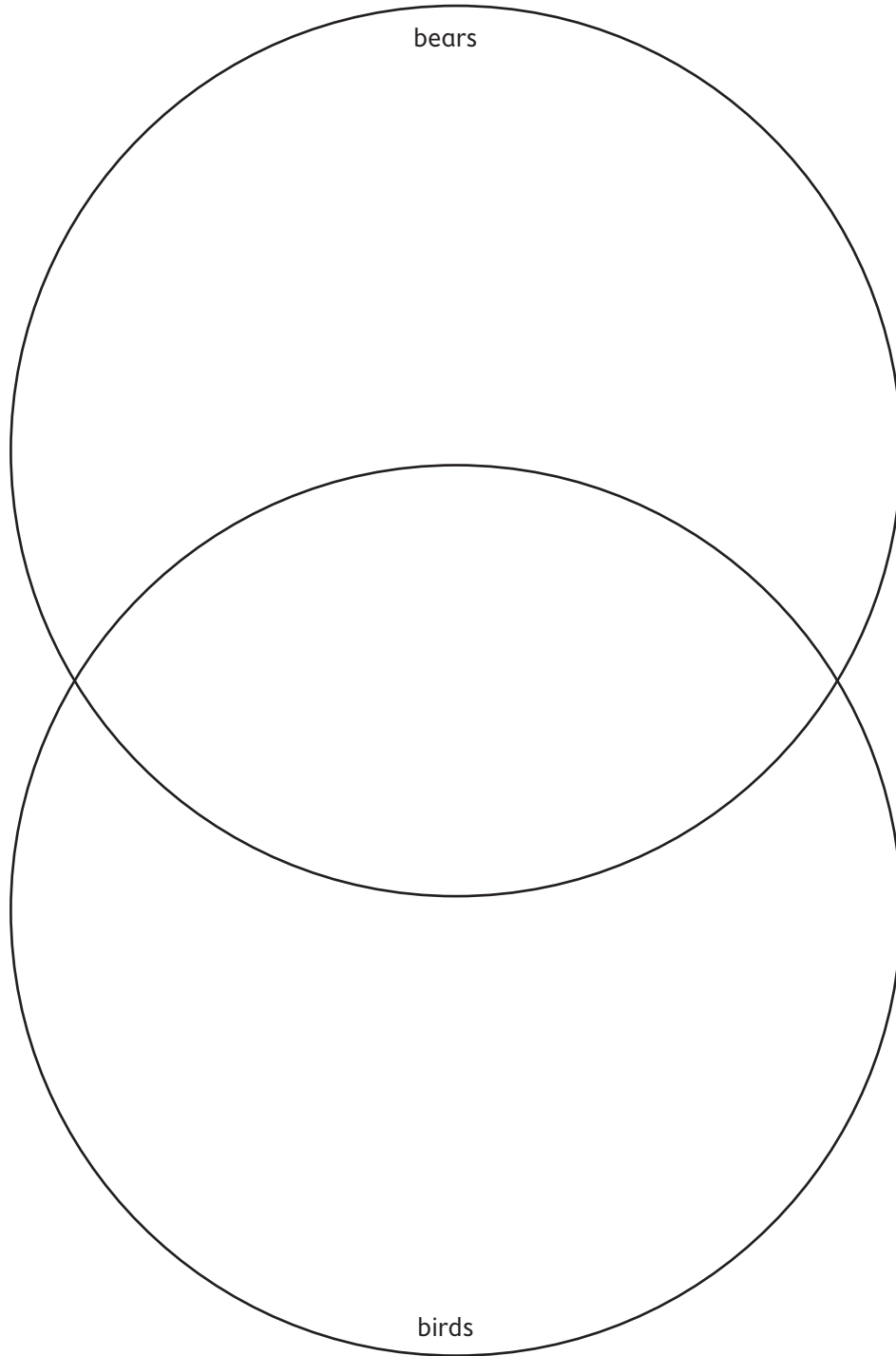
## Activity 5: Bears and Birds

<b>Outcomes:</b>	<i>Students will be expected to</i>
Science	<p>202-7 propose suggestions for meeting the needs of the organism being investigated and draw conclusions about its growth patterns or stages based on observations</p> <p>202-9 identify new questions about the needs and growth patterns of other organisms</p>
English Language Arts	<p>5.1 answer, with assistance, their own questions and those of others by seeking information from a variety of texts</p> <ul style="list-style-type: none"> <li>– identify their own personal and learning needs for information</li> <li>– generate their own questions as a guide for research</li> <li>– use a range of print and non-print materials</li> <li>– use basic reference materials and/or a database or electronic search</li> <li>– reflect on their own research process</li> </ul> <p>9.1 create written and media texts using a variety of forms</p> <ul style="list-style-type: none"> <li>– experiment with a combination of writing with other media to increase the impact of their presentations</li> </ul>
<b>Purpose:</b>	to compare the energy use of bears and birds
<b>Assessment:</b>	Students will be able to make a chart and graphic organizer that compares birds and bears. They will be able to identify similarities and differences between these two organisms.
<b>Materials:</b>	Use EBSCO to find pictures of birds and bears, videos available from the Education Media Library, and science log books.
<b>Procedure:</b>	<ul style="list-style-type: none"> <li>• This may be done as a whole-class activity or in groups. Use a number of pictures of bears and birds that are native to Canada or Nova Scotia. Show videos from the Education Media Library and make a chart that shows what these animals do that is the same and what they do that is different. (Search the online catalogue at <a href="http://lrt.ednet.ns.ca">http://lrt.ednet.ns.ca</a> and use keywords like “bears” or “birds.”) Students can answer the following questions to help them come up with ideas.           <ul style="list-style-type: none"> <li>– How do these animals get energy? How do these animals move in the summer?</li> <li>– How do they move in the winter? What do bears need energy to do? What do birds need energy for?</li> <li>– What is the same about bears and birds and their energy needs?</li> <li>– Do bears use the same amount of energy in winter as in summer?</li> <li>– Do birds need more energy to migrate than they do to stay put?</li> </ul> </li> <li>• Make a Venn diagram to compare the energy needs of these two types of animals.</li> </ul>
<b>Analysis:</b>	Students will complete a Venn diagram that compares the energy needs of bears and birds.



Student Name: \_\_\_\_\_

# Activity 5: Bears and Birds





## GRADE 2–3 ACTIVITIES



## Activity 6: My Energy Game

**Outcomes:** *Students will be expected to*

Science

**Grade 2**

100-15/200-3 compare and make predictions about the life cycles of familiar animals

**Grade 3**

100-30/201-5 observe and describe changes, using written language, pictures, and charts, that occur through the life cycle of a flowering plant

Mathematics

**Grade 2**

A1 order numbers and use ordinal language

A2 count in a variety of ways

**Grade 3**

B4 solve and create problems involving addition and/or subtraction

F1 select appropriate strategies for collecting, recording, organizing, and describing relevant data

English Language Arts

**Grade 3**

10.3 demonstrate engagement with the creation of pieces of writing and other representation

- engage in writing/representing activities for sustained periods of time
- work willingly on revising and editing for an audience
- demonstrate pride and sense of ownership in writing/representing efforts

**Purpose:** to create a game that looks at animals or plant life cycles and energy use

**Assessment:** Students will be able to play the game that they have created.

**Materials:** blank playing cards, bristol board, bug counters, dice, life-cycle cards, magazines (to cut pictures from), spinner (Note: blank playing cards can be purchased from suppliers or may be made from Bristol board, old playing cards may also be used by covering them with blank labels.)

**Procedure:** Students will create a game that explores energy use in animal or plant life cycles using the life-cycle cards and other materials. Set up a tournament and have students play one another's games.

**Analysis:** Students can play the card games that they have created. What do they know about life cycles having designed and played their games? They can discuss the energy used in a life cycle.





## Activity 7: Time Clock

**Outcomes:** *Students will be expected to*

Science

**Grade 2**

102-7 describe features of natural and human-made environments that support the health and growth of some familiar animals

**Grade 3**

100-29 identify, investigate, and suggest explanations for life needs of plants and describe how plants are affected by conditions in which they grow

Mathematics

**Grade 2**

D10 read hours and half-hours on a clock

**Grade 3**

D7 read digital and analog clocks to the nearest 5 minutes

**Purpose:** to collect data about energy use during specific times of the day and night and compare it

**Assessment:** Students will be able to discuss and compare their energy use at specific times of the day or night.

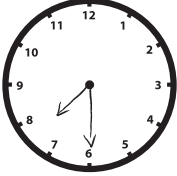
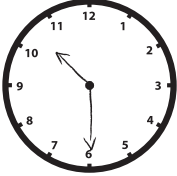
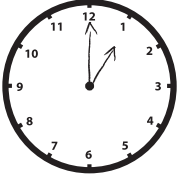
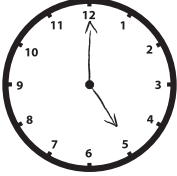
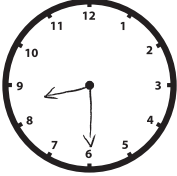
**Materials:** Activity 7: Time Clock, five clocks or clock faces

**Procedure:** After discussion with the class, students will each select five different times of day. Set each clock for a different time of day. Using the sheet entitled “Time Clock,” students will record what energy they are using to perform their various tasks. Energy can be their own (e.g., running or walking), electricity from an appliance (e.g., running a bath, watching TV), or other types of energy use (e.g., solar, food).



EXAMPLE

## Activity 7: Time Clock

Time Clock		
Time	What am I doing?	What kind of energy?
	eating breakfast / waking up	microwave, lights
	recess	outside keeping warm using body energy
	in school	lights/furnace
	dinner, watching TV	electricity for oven, stove
	bath, reading	hot water, lights

Teachers can also use the time clock on page 30 to demonstrate this activity.

**Analysis:**

As a class, discuss the following questions:

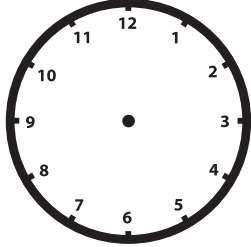
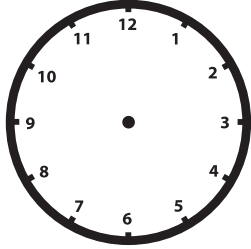
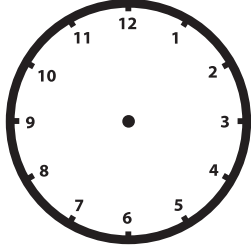
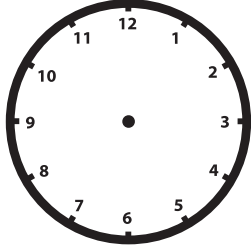
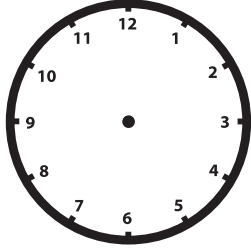
- When do I use energy?
- What kinds of activities do I do that use energy?
- When are most of us using energy?
- When are most of us not using energy?
- When do we use the most energy?

As an extension, make a checklist of the activities that students might do. Have them indicate which activities they did, whether the activity used energy, and what time they performed the activity.



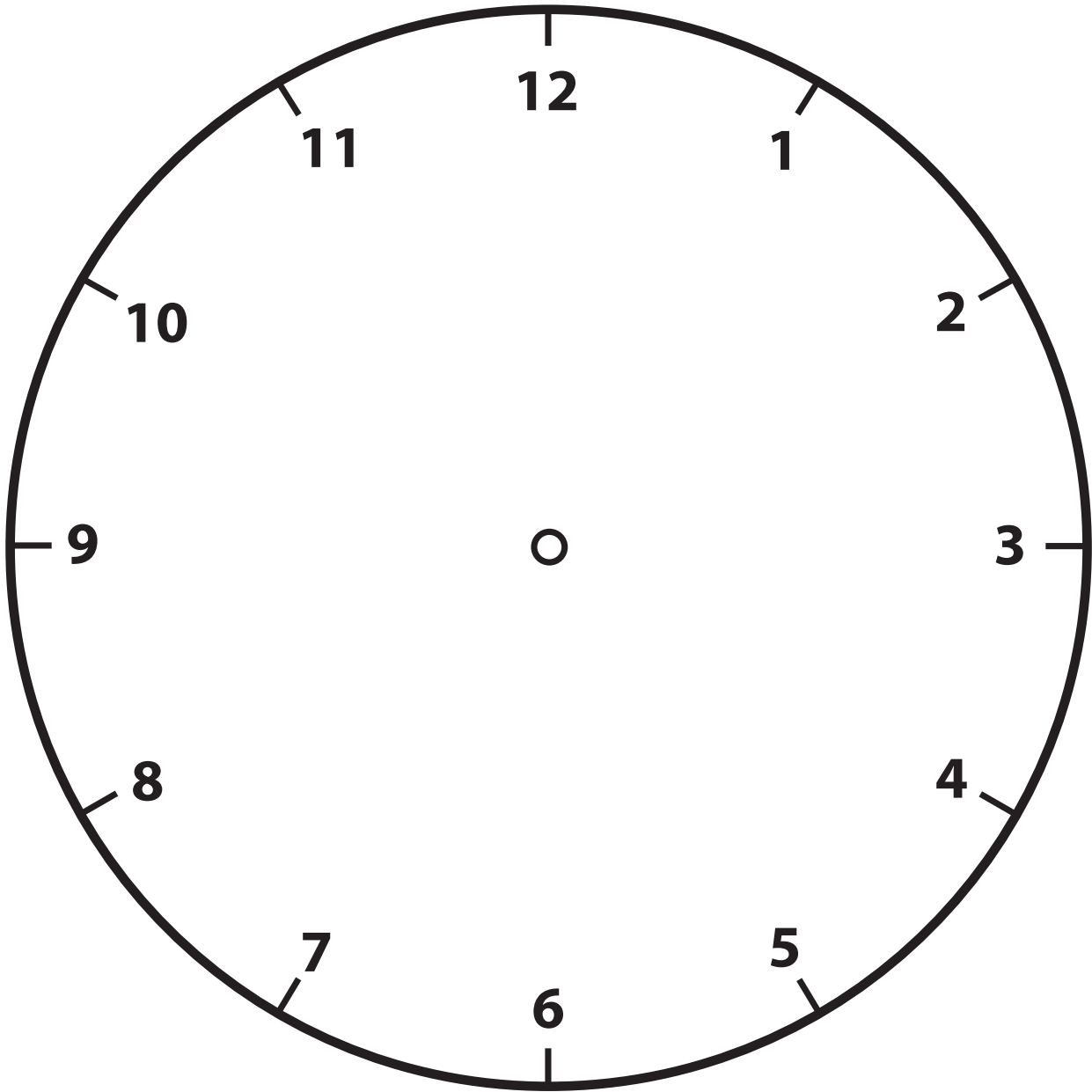
Student Name: \_\_\_\_\_

# Activity 7: Time Clock

Time Clock		
Time	What am I doing?	What kind of energy?
		
		
		
		
		



# Time Clock



# Activity 8: The Energy Survey

**Outcomes:** *Students will be expected to*

Science

**Grade 2**

102-7 describe features of natural and human-made environments that support the health and growth of some familiar animals

**Grade 3**

100-29 identify, investigate, and suggest explanations for life needs of plants and describe how plants are affected by conditions in which they grow

Social Studies

2.4.1 explain how and why physical environments change over time

2.1.4 predict ways their community might change in the future and how they can contribute to that future

2.2.1 describe and evaluate the role of technology in their lives

2.2.2 demonstrate an understanding that people have changed technology over time to meet their needs, wants, and interests

3.3.3 take age-appropriate action to practise responsible citizenship

**Purpose:** to explore how energy is used by various appliances/facilities within your school

**Assessment:** Students will be able to describe the role of technology in their school lives and to observe and describe how energy is used in their school environment.

**Materials:** Activity 8: The Energy Survey

**Procedure:** Find objects in your classroom and school that use electricity. Make a list of these. Record whether these appliances are using electricity all the time or just sometimes and when they are using it.

**EXAMPLE**

Objects That Use Electricity			
Object	Location	Use	Times checked
lights in washroom	washroom	all day	10 am and 2 pm
clock	classroom	all day	10 am
computer	library	off and on	10 am and 2 pm
loudspeaker	office	only for announcements	9 am and 1 pm

**Analysis:** In small groups or as a class, discuss the results of the survey. Some sample questions for discussion might be

- What do you think is using the most electricity?
- Which objects could be turned off?
- How could we save energy with these appliances?



Student Name: \_\_\_\_\_

## Activity 8: The Energy Survey

Objects That Use Electricity			
Object	Location	Use	Times checked



## Activity 9: Exploring Energy Information

**Outcomes:** *Students will be expected to*

Science

**Grade 2**

102-7 describe features of natural and human-made environments that support the health and growth of some familiar animals

Mathematics

**Grade 3**

F1 select appropriate strategies for collecting, recording, organizing, and describing relevant data

F2 interpret and create pictographs in which each symbol represents more than one item

F3 create bar graphs using simple scales

English Language Arts

1.1 describe, share, and discuss thoughts, feelings, and experiences and consider others' ideas

1.2 ask and respond to questions to clarify information and to explore possibilities or solutions to problems

**Purpose:**

- to interpret graphs and data about energy used in various homes
- to make inferences about data presented in a graph

**Assessment:**

Students will be able to interpret a graph and give likely explanations for the data and patterns in the graph. Students will make inferences based on patterns that they see in the electricity used graph.

**Materials:**

Activity 9: Energy Used Graph, electricity bill, chart paper to record answers

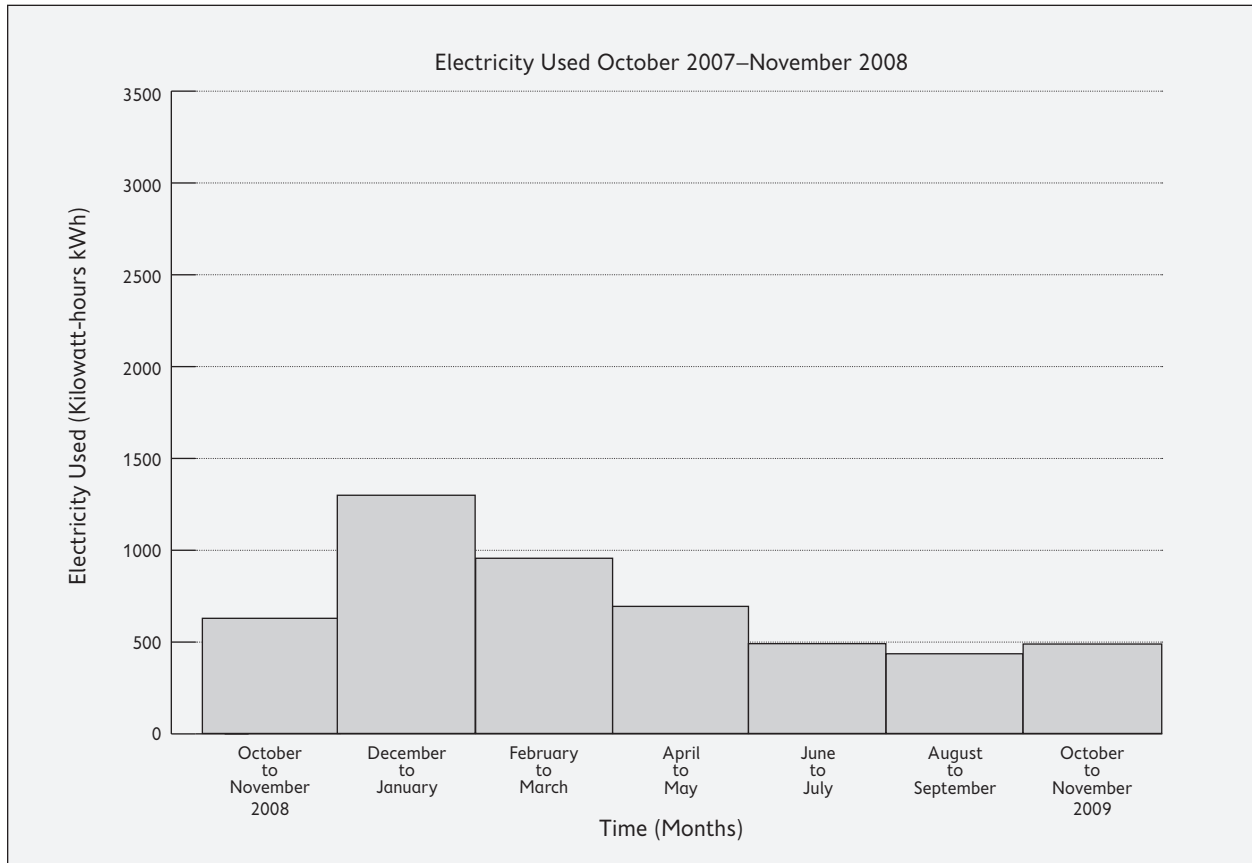
**Procedure:**

This activity can be done as a whole class. Using an electricity bill, explain that the bill shows electricity use for a two-month period. Talk about patterns that can be identified within a year-long period. Use the graph on the next page to answer the following questions:

1. Read the graph as a class. What is being measured? What is the scale?
2. In February–March, how many kilowatt hours did the family use?
3. In which months did the family use 1000 kWh?
4. In which months does the family use the most energy? What do you think is the reason?
5. In which months does the family use the least energy?
6. What might explain why the energy used in October–November 2008 is lower than the previous year at the same time?
7. What do you think will happen when the energy bill for December–January 2009 comes?
8. How will the amount of energy compare with December–January 2008?



# Activity 9: Energy Used Graph



The graph shows how much energy a family of four uses during a year. The family lives in a two-storey house that is 70 years old. In December it was very cold. In August, the family went away on vacation for three weeks. In September, the family installed a new, energy-efficient furnace.

## Inferences

Inferences are explanations of observations.

Ask the following questions based on the information above.

- What inferences can you make about the graph?
- Look at October–November 2008. What inferences can you make about the family’s electricity use based on what you can see from the graph and the story? What evidence is there to support your inference?
- Make some inferences about October–November 2007. What evidence is there to support your inference?





# Activity 10: An Energy Story

**Outcomes:** *Students will be expected to*

Science

**Grade 2**

102-7 describe features of natural and human-made environments that support the health and growth of some familiar animals

**Grade 3**

100-29 identify, investigate, and suggest explanations for life needs of plants and describe how plants are affected by conditions in which they grow

200-1 question and record relevant observations and measurements while investigating various growing conditions for plants

Social Studies

**Grade 2**

2.1.4 predict ways their community might change in the future and how they can contribute to that future

2.2.1 describe and evaluate the role of technology in their lives

2.2.2 demonstrate an understanding that people have changed technology over time to meet their needs, wants, and interests

2.4.1 explain how and why physical environments change over time

3.3.1 recognize that in their province people organize themselves into governments to meet needs and wants

3.3.3 take age-appropriate action to practise responsible citizenship

English Language Arts

7.1 question information presented in print and visual texts; use a personal knowledge base as a frame of reference

8.1 use writing and other forms of representation to

- formulate questions
- generate and organize language and ideas
- discover and express personal attitudes and opinions
- express feelings and imaginative ideas
- record experiences
- explore how and what they learn



Mathematics

**Grade 2**

- F2 create and interpret pictographs and symbolic bar graphs
- F3 develop and modify predictions with respect to data collected or presented to them

**Grade 3**

- F1 select appropriate strategies for collecting, recording, organizing, and describing relevant data
- F2 interpret and create pictographs in which each symbol represents more than one item

**Purpose:**

- to interpret data and graphs about energy used from various homes
- to explain patterns in the graph
- to relate the patterns in graphs to the patterns in a life cycle

**Materials:**

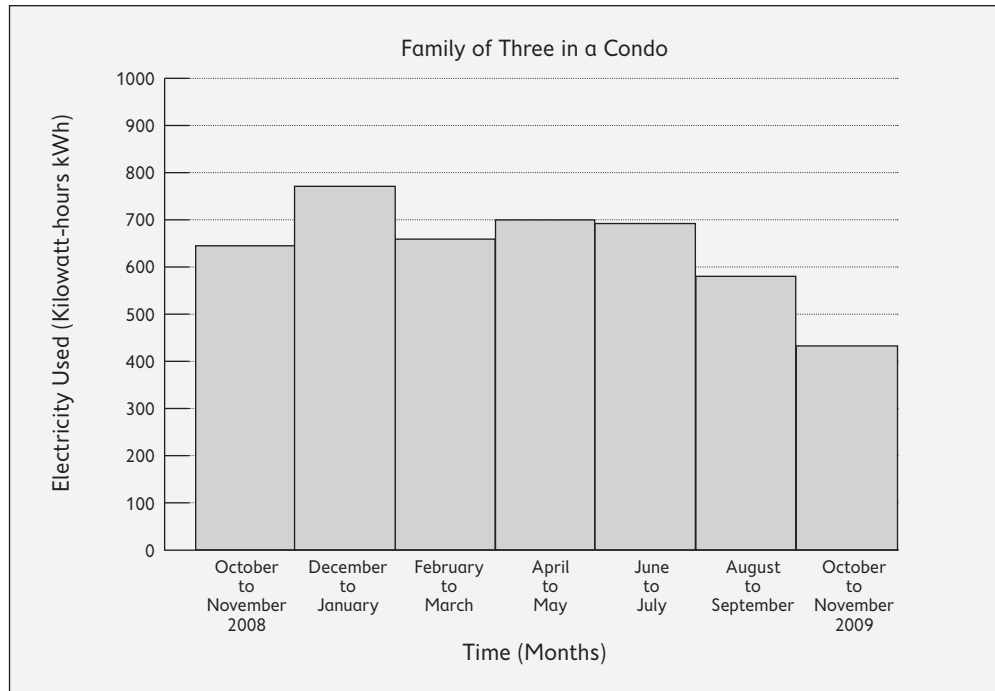
Activity 10: An Energy Story

**Assessment:**

Have students read and interpret another graph of energy used in a home/school/building.

**Procedure A:**

Using the graph below, and the text provided, analyse the family’s use of electricity.



This condo is on the third floor of a five-storey building in the downtown of a city. This family lives in a two-bedroom-plus-den condo, with two bathrooms. This bill indicates the amount of electricity for all appliances, entertainment, and other uses. Their daughter left for university September 2009.



**Procedure B:** As a class, talk about plant and animal life cycles. Look at the pattern in the graph. Can you relate this pattern to plant and animal life cycles over the period of time reflected in the graph? For example, when do plants and animals use more energy? When do plants and animals grow more? Do plants grow more when there is more sunlight? Students may use the activity sheet on page 38 to work independently or in small groups to answer the questions.

**Procedure A Analysis:** What inferences can you make about the family’s use of electricity during the year? As a class, brainstorm some ideas about the patterns of energy use in the graph. What are some inferences that might explain the drop in energy use from one October to the next? Is the energy use higher during the winter months?

**Procedure B Analysis:** Do plants require more water in the summer than in the winter? What happens to outside plants during the year? How do the life cycles of plants and animals look like the patterns in the graph above? Do plants grow more in the winter or in the summer?

## Inferences

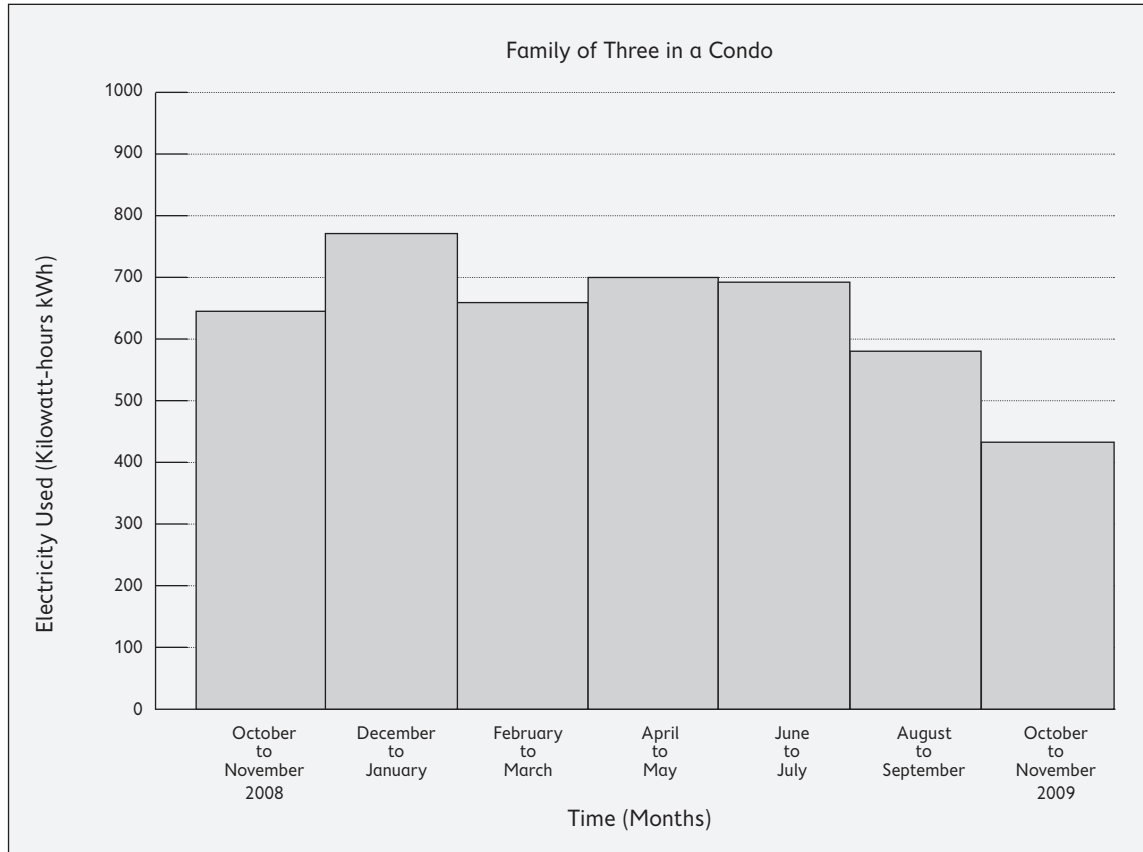
Discuss the following with students: Scientists collect data and use the data to make observations and inferences. Scientists make graphs from data. Graphs allow scientists to see patterns, make inferences about patterns, reach conclusions, or test again to confirm their inferences.



Student Name: \_\_\_\_\_

# Activity 10: An Energy Story

This graph shows the energy used for a family of three living on the third floor of an apartment building.



1. What inference(s) can you make about this family’s use of electricity?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. What might have happened from one October to the next?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. Is the energy use higher during winter months?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Activity 11: Charting Energy Use

**Outcomes:** *Students will be expected to*

Science

**Grade 2**

102-7 describe features of natural and human-made environments that support the health and growth of some familiar animals

100-16 describe changes in humans as they grow and contrast human growth with that of other organisms

**Grade 3**

102-12 describe ways in which plants are important to living things and the environment

102-13 identify parts of different plants that provide humans with useful products and describe the preparation that is required to obtain these products and how our supply of useful plants is replenished

203-5 respond to the ideas and actions of others and acknowledge their ideas about the uses and replenishing of plants

Mathematics

**Grade 2**

F2 create and interpret pictographs and symbolic bar graphs

**Grade 3**

F3 create bar graphs using simple scales

Social Studies

**Grade 2**

2.1.4 predict ways their community might change in the future and how they can contribute to that future

**Purpose:** to create a graph based on information provided in the table

**Assessment:** Have students create a bar graph based on energy use. Have students discuss this information.

**Materials:** Activity 11: Charting Energy Use

**Procedure:**

- This can be done as a whole-class activity or individually. Students will create a bar graph based on the information provided below.
- Students will answer questions using the information in the graph that they have constructed. Make sure graphs are labelled (both axes and a title).



Analysis:

EXAMPLE

## Activity 11: Charting Energy Use

Energy Use for Family of Six							
Month	Dec/Jan	Feb/Mar	Apr/May	Jun/Jul	Aug/Sep	Oct/Nov	Dec/Jan
Energy Used (kWh)	1000	900	900	700	800	600	800

This table shows the energy use for a family of six for one year. This family lives in the country and has solar panels on their roof, which they use to heat their water all year round. The house gets sun all day long because the living room, kitchen, and dining room windows all face south.

Draw a graph using the information from the table above. What story does the graph tell?

What inferences can we make about the family's electricity use from this graph? What patterns can you identify in the data?



Student Name: \_\_\_\_\_

# Activity 11: Charting Energy Use

Energy Use for Family of Six							
Month	Dec/Jan	Feb/Mar	Apr/May	Jun/Jul	Aug/Sep	Oct/Nov	Dec/Jan
Energy Used (kWh)							







# GRADE 3 ACTIVITIES



## Activity 12: Inside or Outside: Where Should I Live?

**Outcomes:** *Students will be expected to*

- |                |   |
|----------------|---|
| Science        | 200-1/201-5/202-4 question and record relevant observations and measurements while investigating various growing conditions for plants              |
|                | 200-3 make predictions about which conditions will be the best for plant growth   |
|                | 201-5 make and record relevant observations and measurements of plant growth during their investigations  |
|                | 100-29 draw inferences that identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow |
|                | 202-5 identify and suggest explanations for patterns and discrepancies in the growth rate of similar plants grown in varying conditions             |
| Social Studies | 3.1.2 identify and describe major physical features, climates, and vegetation of their province and region (Atlantic Canada)                        |

**Purpose:** to decide the better place for a plant to grow by examining data and supporting the answer with data

**Assessment:** Students will be able to identify how plants are affected by the conditions in which they are grown and to suggest explanations for patterns and discrepancies in the growth rate of similar plants grown in varying conditions.

**Materials:** graduated cylinders, latex-free gloves, peat pots, plant computer, soil, student thermometers, tomato seeds / bean seeds

**Procedure:**

- Plant two seeds of the same type in separate containers using identical amounts of soil. Take one outside and leave one inside.
- Make daily or weekly measurements of the amount of soil, the amount of water, and the temperature and the size of the plant.
- Record your data.

**Analysis:** Decide where your plant does better. What are some explanations for your plant's progress? What might explain the patterns of growth that you observe for your plant? What conclusions might you draw from your observations?



## Activity 13: I Am a Plant

**Outcomes:** *Students will be expected to*

Science	<p>200-3 make predictions about which conditions will be the best for plant growth</p> <p>200-1/201-5/202-4 question and record relevant observations and measurements while investigating various growing conditions for plants</p> <p>100-30 observe and describe changes, using written language, pictures, and charts, that occur through the life cycle of a flowering plant</p> <p>201-3/203-3/202-4 observe, describe, and measure, using written language, pictures, and charts, changes that occur through the life cycle of a flowering plant</p> <p>100-38 describe the effect of moisture on characteristics of the soils; compare the absorption of water by different soils</p> <p>201-5 make and record observations and measurements in investigations related to soil composition</p> <p>100-35 investigate and describe how living things affect and are affected by soils</p>
English Language Arts	<p>1.2 ask and respond to questions to clarify information and to explore possibilities or solutions to problems</p> <p>1.3 express and explain opinions and respond to the questions and reactions of others</p>
Mathematics	<p>F1 select appropriate strategies for collecting, recording, organizing, and describing relevant data</p>
<b>Purpose:</b> to explore how plants get the energy they need to grow and thrive	
<b>Assessment:</b> Students will be able to predict which conditions will be best for plant growth and to ask questions to investigate growing conditions for plants and how living things are affected by the conditions in which they live.	
<b>Materials:</b> Activity 13: I Am a Plant, energy beads, graduated cylinders, plant computer, rulers, see-through habitat, sieves kit	
<b>Procedure:</b> Discuss with students how plants use energy.	
<ul style="list-style-type: none"> <li>• Energy can mean many things. It can be what people use to heat water or run the television (electricity). It can come from food or nutrients that our bodies need to survive. Let's talk about what energy means to you.</li> <li>• Choose a plant (tree, flower, crop). Fill in the "I am a Plant" .</li> </ul>	
<b>Analysis:</b> Compare your plant with those of two other students. Do your plants have anything in common? How are they different?	



Student Name: \_\_\_\_\_

# Activity 13: I Am a Plant

<p><b>1</b> What plant am I?</p> <p>_____</p>	<p><b>2</b> What do I look like? (Draw a picture.)</p>
---	--

**3** What does energy mean to me (the plant)?

\_\_\_\_\_

\_\_\_\_\_

**4** What happens to me

- if I don't get electricity?

\_\_\_\_\_

\_\_\_\_\_

- if I don't have soil?

\_\_\_\_\_

\_\_\_\_\_

- if I don't get sun?

\_\_\_\_\_

\_\_\_\_\_

- if I don't get water?

\_\_\_\_\_

\_\_\_\_\_



## Activity 14: Plants with Different Needs

<b>Outcomes:</b>	<i>Students will be expected to</i>
Science	<p>100-29 draw inferences that identify and investigate life needs of plants and describe how plants are affected by the conditions in which they grow</p> <p>100-28 identify and describe parts of plants and their general function</p> <p>203-2 illustrate their construction process, using drawings with explanations, demonstrations, and written and/or oral descriptions, and describe the structures and components of structures they have built</p> <p>202-5 identify materials or parts of a structure that failed and suggest why</p> <p>102-17 evaluate simple structures to determine if they are effective and safe, if they make efficient use of materials, and if they are appropriate to the user and the environment</p>
<b>Purpose:</b>	to compare different plants and how they get energy
<b>Assessment:</b>	Students will be able to describe how plants are affected by the conditions in which they grow. They will be able to identify and describe parts of plants and their general function.
<b>Materials:</b>	maple leaf, spruce twig with needles
<b>Procedure:</b>	Students will compare a maple leaf with spruce or pine needles.
<b>Analysis:</b>	<p>As a class, make a chart that shows “same” and “different” for the following questions:</p> <ul style="list-style-type: none"> <li>• How do the leaves store energy?</li> <li>• How do the leaves store water?</li> <li>• What’s the difference between the types of leaves?</li> <li>• What’s the same between the types of leaves?</li> <li>• How do leaves help each tree get its energy?</li> <li>• Do the leaves have paths for the energy to flow through?</li> <li>• Compare how a tree gets energy to how you get energy.</li> <li>• How is the leaf system of food and water transport similar to your body?</li> <li>• How do plants breathe? Do they need energy to breathe?</li> </ul>



## Activity 15: Energy and Plants

**Outcomes:** *Students will be expected to*

- Science 100-37/201-3 investigate and describe soil components using appropriate tools such as spoons, magnifying glasses, jars, and filters
- 201-5 make and record relevant observations and measurements of plant growth during their investigations
- 100-38 describe the effect of moisture on characteristics of the soils; compare the absorption of water by different soils
- 200-3 make predictions about which conditions will be the best for plant growth
- 100-35 investigate and describe how living things affect and are affected by soils

**Purpose:** to design an experiment that looks at how energy affects plant growth

**Assessment:** Students will be able to design an experiment that demonstrates what happens to plant growth when plants receive differing amounts of energy.

**Materials:** Activity 15: Energy and Plants, energy beads, graduated cylinders, latex-free disposable gloves, plant computer (optional), plant containers, rulers, sieves, soil

- Procedure:**
- Plant two identical seeds in identical containers using the same amounts of soil. In the experiment, the controlled variables, or the things that will be kept the same throughout the whole experiment, will be the containers, the amount of soil, the amount of water, the time of watering, and the type of seed.
  - Sprinkle 10 energy beads around the base of each plant. Place one container in direct sunlight on the windowsill. Place the other container away from the light in a darker part of the classroom.
  - The variable being measured is the amount of sunlight received by the plant. Use the plant computer to measure the amount of light that the plant is receiving and record this data.
  - This activity can be done with the whole class, in partners, or individually. Have students make a chart, like the one that follows, in their science journals. Have them record observations of the plant and the energy beads.
  - After a few weeks, have a discussion with the class, or in small groups, about what they have noticed about how the plants are growing. What has happened to the energy beads that are in the sun? What has happened to the plant that is in the darker part of the classroom?



**Analysis:** In their science journals, students should reflect on the following question:  
How is a plant’s growth related to the amount of sunlight that it gets?

**EXAMPLE**

### Activity 15: Energy and Plants

Week 1	Height (cm)	Day and Time	Observation
Plant 1:	2	Monday March 9 1:30 pm	not growing much; energy beads one colour; watered
Plant 2:	1.5	Monday March 9 1:35 pm	not growing much; brown leaves; energy beads one colour; watered
Week 2	Height (cm)	Day and Time	Observation
Plant 1:	2.5	Monday March 16 1:30 pm	not growing much; energy beads one colour; watered
Plant 2:	1.75	Monday March 16 1:35 pm	not growing much; brown leaves; energy beads one colour; watered
Week 3	Height (cm)	Day and Time	Observation
Plant 1:	3	Monday March 23 1:30 pm	not growing much; energy beads one colour; watered
Plant 2:	2	Monday March 23 1:35 pm	not growing much; brown leaves; energy beads one colour; watered
Week 4	Height (cm)	Day and Time	Observation
Plant 1:	3.5	Monday March 30 1:30 pm	not growing much; energy beads one colour; watered
Plant 2:	2.25	Monday March 30 1:35 pm	not growing much; brown leaves; energy beads one colour; watered



Student Name: \_\_\_\_\_

# Activity 15: Energy and Plants

Week 1	Height (cm)	Day and Time	Observation
Plant 1:			
Plant 2:			
Week 2	Height (cm)	Day and Time	Observation
Plant 1:			
Plant 2:			
Week 3	Height (cm)	Day and Time	Observation
Plant 1:			
Plant 2:			
Week 4	Height (cm)	Day and Time	Observation
Plant 1:			
Plant 2:			





# APPENDICES





# Appendix A

## Grade 2 General Curriculum Outcomes

### STSE/KNOWLEDGE

**GCO 1:** Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology. (STSE)

**GCO 3:** Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science and apply these understandings to interpret, integrate, and extend their knowledge. (Knowledge)

### SKILLS

**GCO 2:** Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

### ATTITUDES

**GCO 4:** Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

## Grade 2 Specific Curriculum Outcomes

### PHYSICAL SCIENCE: RELATIVE POSITION AND MOTION

#### Position

*Students will be expected to*

- use materials to build objects that move in a specific manner and describe the object's position relative to other objects (201-3, 100-23, 203-2)
- describe the position of objects from different perspectives and answer questions that arise from how different students view the same object (100-24, 202-9)

#### Motion

*Students will be expected to*

- investigate and describe motion in terms of patterns of movement, change in position, and orientation relative to other objects and identify factors that affect movement (100-25, 100-22)
- question, demonstrate, and assess simple conclusions about the various factors that affect the motion of an object (200-3, 200-1, 200-2)
- compare and evaluate the abilities of their constructed objects to move (202-8)



## PHYSICAL SCIENCE: LIQUIDS AND SOLIDS

### The Three States of Water

*Students will be expected to*

- predict, investigate, and describe the characteristics of and changes in the three states of water (103-6, 200-3)
- make and record relevant observations during questioning and investigating the interactions of liquids and solids, using written language, pictures, and charts (201-5, 200-1)

### Properties and Interactions of Familiar Liquids and Solids

*Students will be expected to*

- examine and record the properties and interactions of familiar liquids and solids (100-17, 100-18, 201-5)
- demonstrate and communicate their evaluations of sinking and floating as they relate to various liquids and objects (202-2, 100-21, 202-8, 203-3)

### Mixing Liquids and Solids to Make New and Useful Materials

*Students will be expected to*

- select and use solids, liquids, and appropriate tools to create new materials that have characteristics different from the original components (100-19, 200-4, 201-3, 100-20)
- identify and use a variety of sources to get ideas for creating new materials (201-7)
- describe and demonstrate ways we use our knowledge of solids and liquids to maintain a clean and healthy environment (102-8)

## EARTH AND SPACE SCIENCE: AIR AND WATER IN THE ENVIRONMENT

### Air

*Students will be expected to*

- demonstrate that air is a substance and communicate their findings by conducting multiple activities (203-1, 102-10, 201-3)
- observe changes in air conditions in indoor and outdoor environments and describe and interpret these changes (100-26)

### Forms and Changes in Moisture

*Students will be expected to*

- identify and measure evidence of moisture in the environment, in materials, and in living things (102-9, 201-3)
- describe changes in the location, amount, and form of moisture and investigate and identify conditions that can affect these changes (100-27, 200-4, 201-5)

### Materials and Moisture

*Students will be expected to*

- predict, investigate, and communicate the properties of materials according to their ability to absorb water (200-3, 200-4, 200-1, 203-3)
- describe the effects of weather and ways to protect things under different weather conditions (103-7)



### Protecting Our Water Sources

*Students will be expected to*

- identify examples of water in the environment and describe ways that water is obtained, distributed, and used (102-11)
- identify the importance of clean water for humans and suggest ways they could conserve water (103-8)

## LIFE SCIENCE: ANIMAL GROWTH AND CHANGES

### Investigating the Needs and Life Cycle of an Organism

*Students will be expected to*

- select and use materials to observe an organism's life cycle and ask questions about the organism's needs and changes in growth (200-1, 200-4)
- describe and record observations, in various formats, of changes in the appearance and activity of an organism through its life cycle (101-7, 201-5, 203-3, 102-6)
- propose suggestions for meeting the needs of the organism being investigated and draw conclusions about its growth patterns or stages based on observations (202-7)
- identify new questions about the needs and growth patterns of other organisms (202-9)

### Comparing Life Cycles of Familiar Animals

*Students will be expected to*

- compare and make predictions about the life cycles of familiar animals (100-15, 200-3)
- describe features of natural and human-made environments that support the health and growth of some familiar animals (102-7)

### Human Growth and Development

*Students will be expected to*

- describe changes in humans as they grow and contrast human growth with that of other organisms (100-16)
- identify the basic food groups and describe actions and decisions that support a healthy lifestyle (103-5)

## Grade 3 General Curriculum Outcomes

### STSE/KNOWLEDGE

**GCO 1:** Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology. (STSE)

**GCO 3:** Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science and apply these understandings to interpret, integrate, and extend their knowledge. (Knowledge)



## SKILLS

**GCO 2:** Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

## ATTITUDES

**GCO 4:** Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

## Grade 3 Specific Curriculum Outcomes

### LIFE SCIENCE: PLANT GROWTH AND CHANGES

#### **Investigating Germination and Growing Conditions for Plants**

*Students will be expected to*

- place seeds in groups according to one or more attributes (202-2)
- question and record relevant observations and measurements while investigating various growing conditions for plants (200-1, 201-5, 202-4)
- identify and describe parts of plants and their general function (100-28)
- identify, investigate, and suggest explanations for life needs of plants and describe how plants are affected by conditions in which they grow (100-29)

#### **The Life Cycle of a Plant**

*Students will be expected to*

- observe, describe, and measure, using written language, pictures, and charts, changes that occur through the life cycle of a flowering plant (201-3, 203-3, 202-4)
- observe and describe changes that occur through the life cycle of a flowering plant (100-30)

#### **Uses for Plants**

*Students will be expected to*

- describe and respond to ways in which plants are important to living things and the environment and how the supply of useful plants is replenished (102-12, 102-13, 203-5)

### EARTH AND SPACE SCIENCE: EXPLORING SOILS

#### **Investigating Soils Composition**

*Students will be expected to*

- ask questions and make predictions that lead to exploration and investigation about the composition of soil (200-1, 200-3)
- investigate, describe, and record a variety of soils and their components using words and diagrams (100-36, 100-37, 201-3, 201-5)



**Water Absorption of Soils***Students will be expected to*

- describe, predict, and compare the absorption of water by different types of soil (100-38, 200-3)
- communicate procedures and results of investigations related to water absorption of soils, using drawings, demonstrations, and/or written and oral descriptions (203-3)

**Moving Water and Soil***Students will be expected to*

- observe and describe the effects of moving water on different types of soil (100-39)

**Interactions of Living Things and Soil***Students will be expected to*

- investigate and describe how living things affect and are affected by soils (100-35)

**Technological Products and Processes Related to Soil***Students will be expected to*

- demonstrate and describe earth materials while exploring objects made from them (101-12, 203-1)

**PHYSICAL SCIENCE: INVISIBLE FORCES****Magnetic Forces***Students will be expected to*

- investigate to identify and group materials that can be magnetized or attracted by magnets and distinguish these from materials that are not attracted to magnets (100-31, 202-2)
- investigate the polarity of a magnet, determine the orientation of its poles, and demonstrate that opposite poles attract and like poles repel (100-32)
- identify familiar uses of magnets (102-14)
- follow procedures and identify problems related to strength of temporary magnets and to magnetizing materials (200-2, 201-1)
- make predictions, record observations, and identify proposed questions about the number of objects that can be picked up by a magnet under different conditions (200-3, 201-5)
- construct and evaluate a toy that is moved by magnetic forces (201-3, 202-8)

**Electrostatic Forces (Forces Arising from Static Electricity)***Students will be expected to*

- demonstrate and describe ways to use everyday materials to produce static electric charges and describe how charged materials interact (101-8)
- identify and investigate conditions that affect the force of magnets and of static electric materials (100-33, 202-7)
- identify questions and describe examples of the effects of static electricity in their daily lives and ways in which it can be used safely or avoided (102-15)



## PHYSICAL SCIENCE: MATERIALS AND STRUCTURES

**Proposing Solutions to Building Challenges**

*Students will be expected to*

- identify problems to be solved while creating structures (200-2)
- describe, evaluate, and investigate common materials, their suitability for use in building structures, and ways to join materials together (100-34, 101-11)
- identify shapes that are part of natural and human-built structures and describe ways in which these shapes help provide strength, stability, or balance (102-16)
- identify materials that could be used to solve the problem posed and suggest a plan for how they will be used through oral, written, and/or illustrated responses (200-5, 203-3)

**Creating Solutions to Structural Challenges**

*Students will be expected to*

- safely use and follow safety procedures while using appropriate tools and materials to construct structures (101-10, 201-3, 201-8)
- manipulate materials and respond to the ideas of others to make changes in creating structures as deemed necessary (201-2, 203-5)

**Evaluating the Structural Solution**

*Students will be expected to*

- test the strength and stability of a personally built structure, identify ways to increase its strength, stability, form, and structure, and identify parts of the structure that failed (202-8, 101-9)
- evaluate simple structures to determine if they are effective and safe, if they make efficient use of materials, and if they are appropriate to the user and the environment (102-17)





# Appendix B

## Materials

Item	Grade	Activity
bug boxes	2	1
bug counters	2/3	6
energy beads	2/3	6
gloves	2 and 3	1, 12, 13, 15
graduated cylinders	3	12, 13, 15
magnifiers	2	1
plant computer	3	12, 13, 15
screen sieves	3	13
see-through habitat	2 and 3	1, 13
student thermometers	3	12



