CEREAL CITY SCIENCE by BCAMSC

Teacher Guide and Student Journal
Sample Activity and Planning Pages

Plant and Animal Relationships 2LNG

SECOND EDITION

A second grade unit supporting Next Generation Science Standards and Michigan Science Standards

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A second-grade unit supporting **Next Generation Science Standards** and the **Michigan Science Standards** developed and written by the Battle Creek Area Mathematics and Science Center for

CEREAL CITY SCIENCE™
by BCAMSC

Plant and Animal Relationships

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PLANNING

NEXT GENERATION SCIENCE STANDARDS

Disciplinary Core Ideas	Activities
LS2.A: Interdependent Relationships in Ecosystems • Plants depend on water and light to grow. • Plants depend on animals for pollination or to move their seeds around.	4,5,6
2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.	4
2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds and pollinating plants.	5,6
LS4.D: Biodiversity and Humans • There are many different kinds of living things in any area, and they exist in different places on land and in water.	1,2,3
2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.	1,2,3
ETS1.B: Developing Possible Solutions • Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.	5,6
2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds and pollinating plants.	5,6

NEXT GENERATION SCIENCE STANDARDS

Science and Engineering Practices	Activities
Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. • Develop a simple model based on evidence to represent a proposed object or tool.	5,6
2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds and pollinating plants.	5,6
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. • Make observations (firsthand and from media) to collect data which can be used to make comparisons.	1,2,3,4,5
2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.	4
2-LS4-1. Make observation of plants and animals to compare the diversity of life in different habitats.	1,2,3

NEXT GENERATION SCIENCE STANDARDS

Crosscutting Concepts	Activities
Cause and Effect • Events have causes that generate observable patterns.	
2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.	
Structure and Function • The shape and stability of structures of natural and designed objects are related to their function(s).	
2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds and pollinating plants.	

COMMON CORE STATE STANDARDS - READING

Reading Standards for Informational Text—Grade 2	Activities
Key Ideas and Details	
RI.2.1: Ask and answer such questions as *who, what, where, when, why,* and *how* to demonstrate understanding of key details in a text.	1,2,5,6
RI.2.2: Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.	1,2,5,6
RI.2.3: Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.	1,2,5,6
Craft and Structure	
RI.2.4: Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.	1,2,5,6
RI.2.5: Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently.	
RI.2.6: Identify the main purpose of a text, including what the author wants to answer, explain, or describe.	1,2,5,6
Integration of Knowledge and Ideas	
RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.	1,2,5,6
RI.2.8: Describe how reasons support specific points the author makes in a text.	1,2,5,6
RI.2.9: Compare and contrast the most important points presented by two texts on the same topic.	2
Range of Reading and Level of Text Complexity	
RI.2.10: By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 2–3 text complexity band proficiently, with scaffolding as needed at the high end of the range.	1,2,5,6

COMMON CORE STATE STANDARDS - WRITING

Writing Standards—Grade 2	Activity
Text Types and Purposes	
W.2.1: Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, using linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section.	2,6
W.2.2: Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.	1,3,4,5,6
W.2.3: Write narratives in which they recount a well-elaborated event or short sequence of events, include details to describe actions, thoughts, and feelings, use temporal words to signal event order, and provide a sense of closure.	6
Production and Distribution of Writing	
W.2.4: (Begins in grade 3)	
W.2.5: With guidance and support from adults and peers, focus on a topic and strengthen writing as needed by revising and editing.	1,3,6
W.2.6: With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.	5
Research to Build and Present Knowledge	
W.2.7: Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).	1,2,3,4,5,6
W.2.8: Recall information from experiences or gather information from provided sources to answer a question.	1,2,3,4,5,6

COMMON CORE STATE STANDARDS - LANGUAGE

Language Standards—Grade 2	Activities
Conventions of Standard English	
L.2.1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. a. Use collective nouns (e.g., *group*). b. Form and use frequently occurring irregular plural nouns (e.g., *feet, children, teeth, mice, fish*). c. Use reflexive pronouns (e.g., *myself, ourselves*). d. Form and use the past tense of frequently occurring irregular verbs (e.g., *sat, hid, told*). e. Use adjectives and adverbs, and choose between them depending on what is to be modified. f. Produce, expand, and rearrange complete simple and compound sentences (e.g., *The boy watched the movie; The little boy watched the movie; The action movie was watched by the little boy*).	1,2,3,4,5,6
L.2.2: Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. a. Capitalize holidays, product names, and geographic names. b. Use commas in greetings and closings of letters. c. Use an apostrophe to form contractions and frequently occurring possessives. d. Generalize learned spelling patterns when writing words (e.g., *cage → badge; boy → boil*). e. Consult reference materials, including beginning dictionaries, as needed to check and correct spellings.	1,2,3,4,5,6
Knowledge of Language	
L.2.3: Use knowledge of language and its conventions when writing, speaking reading, or listening. a. Compare formal and informal uses of English.	1,2,3,4,5,6

COMMON CORE STATE STANDARDS - LANGUAGE

Language Standards—Grade 2	Activities
Vocabulary Acquisition and Use	
L.2.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 2 reading and content, choosing flexibly from an array of strategies. a. Use sentence-level context as a clue to the meaning of a word or phrase. b. Determine the meaning of the new word formed when a known prefix is added to a known word (e.g., *happy/unhappy, tell/retell*). c. Use a known root word as a clue to the meaning of an unknown word with the same root (e.g., *addition, additional*). d. Use knowledge of the meaning of individual words to predict the meaning of compound words (e.g., *birdhouse, lighthouse, housefly; bookshelf, notebook, bookmark*). e. Use glossaries and beginning dictionaries, both print and digital, to determine or clarify the meaning of words and phrases.	1,2,3,4,5,6
L.2.5: Demonstrate understanding of word relationships and nuances in word meanings. a. Identify real-life connections between words and their use (e.g., describe foods that are spicy or juicy). b. Distinguish shades of meaning among closely related verbs (e.g., *toss, throw, hurl*) and closely related adjectives (e.g., *thin, slender, skinny, scrawny*).	1,2,3,4,5,6
L.2.6: Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe (e.g., When other kids are happy that makes me happy).	1,2,3,4,5,6

COMMON CORE STATE STANDARDS - MATHEMATICS

Mathematics—Grade 2	Activities
Mathematical Practices	
1. Make sense of problems and persevere in solving them.	1,2,3,4,5,6
2. Reason abstractly and quantitatively.	1,2,3,4,5,6
3. Construct viable arguments and critique the reasoning of others.	1,2,3,4,5,6
4. Model with mathematics.	5,6
5. Use appropriate tools strategically.	1,2,3,4,5,6
6. Attend to precision.	1,2,3,4,5,6
7. Look for and make use of structure.	1,2,3,4,5,6
8. Look for and express regularity in repeated reasoning.	1,2,3,4,5,6
2.OA Operations and Algebraic Thinking	
A. Represent and solve problems involving addition and subtraction.	
1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings, and equations with a symbol for the unknown number to represent the problem.	
B. Add and subtract within 20.	
2. Fluently add and subtract within 20 using mental strategies. By end of grade 2, know from memory all sums of two one-digit numbers.	
C. Work with equal groups of objects to gain foundations for multiplication.	
3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by twos; write an equation to express an even number as a sum of two equal addends. 4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	
2.MD Measurement and Data	
A. Measure and estimate lengths in standard units.	
1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	1
2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	

COMMON CORE STATE STANDARDS - MATHEMATICS

Mathematics—Grade 2	Activities
2.MD Measurement and Data	
A. Measure and estimate lengths in standard units. - *Continued*	
3. Estimate lengths using units of inches, feet, centimeters, and meters.	
4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	
B. Relate addition and subtraction to length.	
5. Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.	
6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2,… and represent whole-number sums and differences within 100 on a number line diagram.	
C. Work with time and money.	
7. Tell and write time from an analog and digital clocks to the nearest 5 minutes, using a.m. and p.m.	
8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?	
D. Represent and interpret data	
9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same objects. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.	
10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.	4

UNIT AT A GLANCE

Activity	Time to Complete	Lesson Level Learning Goal	Phenomenon/ Engineering Challenge	Summary: Students will...
1 Observing Different Habitats	Preparation: 20 min. Activity 1: Lesson 1A: 45–50 min. 2 classes Lesson 1B: 45–50 min. Lesson 1C: 45–50 min. 2-3 classes Lesson 1D: 45–50 min.	Make observations and collect information to compare different living things that are able to live in a given area.	Observations of the whirligig beetle.	• make observations of a picture of the whirligig beetle. • make observations of a photo of a pond with a variety of different plants and animals. • read information about the variety of living things on and around a pond ecosystem. • make observations of a variety of photos of different living things in different habitats.
2 Schoolyard Detectives	Preparation: Activity 2: Lesson 2A: 45–50 min. Lesson 2B: 45–50 min. Lesson 2C: 45–50 min., 3–4 classes	Conduct a field study of a given area to make observations of the plants and animals that live there.	Observation in a given area leads to the phenomenon that many plants and animals live there.	• conduct outdoor field study in a given area of the schoolyard. • make observations and record data over time. • relate their observations in the schoolyard to information in text.
3 Conducting an Investigation Through Field Study	Preparation: Activity 3: Lesson 3A: 45–50 min., 2 classes Lesson 3B: 45–50 min. Lesson 3C: 45–50 min., 2-3 classes	Plan and carry out an investigation based on our field study observations and questions.	Observation in a given area leads to the phenomenon that many plants and animals live there.	• conduct an investigation based on findings through field study. • conduct an investigation with a team. • interpret their observations, data, and findings.

UNIT AT A GLANCE

Students Figure Out How To:	Practices and Crosscutting Concepts	Assessment
• develop and revise a model of the whirligig beetle in its habitat as ideas and information are gathered. • raise questions about different organisms based on observations. • make comparisons of different living things that live in different regions. • obtain information from text and compare the information to findings through observation.	**Asking Questions and Defining Problems** **Planning and Carrying Out Investigations** **Obtaining, Evaluating, and Communicating Information** **Patterns**	**Formative Assessment** Activity Pages Science Talks Journal Entries t-chart Journal Entry/Respond to Text
• make observations that lead to questions and data. • record and organize findings from observations. • compare and contrast personal observations with observations in text. • determine when measurement is important in observations. • recognize patterns from observations and data.	**Asking Questions and Defining Problems** **Planning and Carrying Out Investigations** **Obtaining, Evaluating, and Communicating Information** **Patterns**	**Formative Assessment** Science Talk Pre-Writing Strategy Journal Entry/Respond to Text Schoolyard Observation Log
• develop an investigable question based on observations and patterns from field study. • determine the materials needed to conduct an investigation. • carry out an investigation. • construct an explanation based on evidence.	**Asking Questions and Defining Problems** **Planning and Carrying Out Investigations** **Constructing Explanations** **Analyzing and Interpreting Data** **Patterns**	**Formative Assessment** Science Talk student-generated questions **Summative Assessment** Science Talk Activity Pages Journal Entry

UNIT AT A GLANCE

Activity	Time to Complete	Lesson Level Learning Goals	Phenomenon/ Engineering Challenge	Summary: Students will...
4 Plants Need Water and Sunlight	Preparation: Activity 4: Lesson 4A: 45–50 min., 2 classes Lesson 4B: 55–60 min. Lesson 4C: 45–50 min., 2 classes	Raise questions to plan and carry out an investigation into how plants need water and sunlight.	Observe growth of a potted plant over time. Observe that the plant grew toward the light.	• conduct an investigation to find out the effect of water and sunlight on plants. • set up an investigation. • make observations. • collect data.
5 Plants and Animals Interact to Help Plants Reproduce	Preparation: Activity 5: Lesson 5A: 45–50 min. Lesson 5B: 45–50 min. Lesson 5C: 45–50 min. Lesson 5D: 45–50 min. Lesson 5E: 45–50 min.	Use observations and resources to determine different methods of seed dispersal. Design a model that mimics how animals interact with plants to disperse seeds.	Exploding seeds videos: Some plants have seed pods that burst open, spreading seeds away from the parent plant.	• view a video of exploding seed pods. • share ideas of how seeds move from place to place. • collect seeds from the schoolyard. • investigate different ways seeds disperse.
6 Not Enough Bees	Preparation: 20 min. Activity 6: Lesson 6A: 45–50 min. Lesson 6B: 45–50 min. Lesson 6C: 45–50 min. Lesson 6D: 45–50 min., 2–3 classes	Use observations and resources to gain an understanding of how animals interact with plants to gather nectar and pollen. Design a model of a hand pollinator.	Bee moving from blossom to blossom.	• use a model to demonstrate pollination. • make a model of an apple blossom. • read about the importance of pollen in pollination and plant reproduction.

UNIT AT A GLANCE

Students Figure Out How To:	Practices and Crosscutting Concepts	Assessment
• raise questions and plan and carry out an investigation based on the phenomenon of a plant growing toward the light. • design the investigation. • collect and record data. • construct an explanation based on evidence.	**Asking Questions and Defining Problems** **Planning and Carrying Out Investigations** **Constructing Explanations** **Patterns** **Cause and Effect**	**Formative Assessment** Science Talk Activity Page, questions 1–3 **Summative Assessment** Activity Page Science Talk Student Led Investigations Journal Entry
• obtain information from text. • relate information to experiences. • develop a model that aids in seed dispersal. • plan and carry out an investigation into seed dispersal.	**Planning and Carrying Out Investigations** **Developing and Using Models** **Obtaining, Evaluating, and Communicating Information** **Cause and Effect** **Structure and Function** **Patterns**	**Formative Assessment** Science Talk t-chart **Summative Assessment** Summary Discussion Activity Pages Science Talk Journal Entry/Respond to Text Seed models and presentations "Seedy Characters" Website
• obtain information from text and media to help develop a hand pollinator. • develop a hand-pollinator model to aid in pollination of fruit trees in orchards with too few bees.	**Developing and Using Models** **Obtaining, Evaluating, and Communicating Information** **Cause and Effect** **Structure and Function**	**Formative Assessment** What We Think chart Activity Page class discussion **Summative Assessment** Journal Entry/Respond to Text Models and presentations Engineering challenge solutions What We Think chart

Dear Parent,

Your child is beginning a unit created at the Battle Creek Area Mathematics and Science Center. This unit was designed to promote science and engineering literacy and integrate reading and writing skills into high-interest science content. During the next twelve weeks, your child will be actively involved with the *Plant and Animal Relationships* unit. This unit is geared for second graders and focuses on the following main areas of study:

- Make observations to discover the diverse population of plants and animals that lives in an area.
- Use evidence to describe how plants need water and sunlight to grow.
- Develop models to explain how animals help in pollination and seed dispersal.
- Demonstrate how plants and animals interact to help one another.
- Obtain information from media and text to explain how seeds disperse and how plants are pollinated.
- Use information to solve a pollination or seed dispersal problem using the Engineering Design Process.

During this unit of study your child will learn about the interdependent relationship between plants and animals. Students will make observations of an area in the schoolyard to find out about the different plants and animals that live there. They will also be engaged in designing and carrying out investigations into how plants need water and sunlight to grow. Your student will become an engineer and develop a model of a seed and seed dispersal. Students will use their science and engineering knowledge to develop a model to help solve the problem of too few bees. Students plan, develop, and test a hand pollinator to help apple and cherry growers pollinate their orchards.

Through observations, investigations, informational text, and developing models, your child will be describing how diverse the plant and animal population is and how the interactions between plants and animals helps them to survive.

Your child will be actively involved in constructing and reflecting on new scientific knowledge as he or she becomes a learner as well as a user of knowledge. Asking questions, developing solutions, interpreting and reconstructing information, and reflecting on knowledge are all components incorporated into this unit.

Suggestions for activities to do at home are included with this letter. These activities will reinforce the concepts taught during this unit instruction.

May you enjoy quality time with your child while discussing the concepts involved with the unit. Let us know if we may be of assistance.

The Outreach Staff
Battle Creek Area Mathematics and Science Center
(269) 213-3907 or (269) 213-3908

ACTIVITIES TO DO AT HOME

1. Take a walk with your child around your yard, the neighborhood, or a nearby park and look for evidence of the diverse kinds of plants and animals that survive there.
2. Take a walk in a field or meadow and collect seeds. Take time to make observations of the seeds and discuss how seeds are dispersed and what they need to sprout and grow.
3. Plant an indoor or outdoor garden with your student. Discuss the need for water and sunlight to allow your garden to grow.
4. Visit a cherry or apple orchard in the spring and sit under a tree and listen for the bees. Make observations of bees buzzing from blossom to blossom. Pick one blossom, find the parts of the flower, and test for pollen in the center of the blossom.
5. Go to the library and check out books to read related to habitats, plants, seeds, and pollinators. Example titles:

   The Tiny Seed by Eric Carle

   On One Flower by Anthony Fredericks

   Jack's Garden by Henry Cole

   In One Tidepool by Anthony Fredericks

   Near One Cattail by Anthony Fredericks

   A Log's Life by Wendy Pfeffer

   Animal Pollinators by Jennifer Boothroyd

   Flip, Float, Fly: Seeds on the Move by JoAnn Early Macken

   How Do Plants Make and Spread Their Seeds? by Ruth Owen

ACTIVITY 1

OBSERVING DIFFERENT HABITATS

Teacher Background Information
The following lessons include opportunities for students to learn the Disciplinary Core Idea of biodiversity across habitats, the Science and Engineering Practice of planning and carrying out investigations, and the Crosscutting Concept of patterns through outdoor observations. The lessons provide opportunities for students to learn skills necessary for field study, such as making observations, using scientific tools for observation, and data collection. They learn how to use evidence to make sense of patterns in data and the variety of living things observed.

The initial lesson focuses on making scientific observations and how to use scientific tools to assist with observations that are detailed and useful. Initial observations begin indoors for the purpose of developing and honing the skills of scientific observation, data collection, and recognizing patterns.

The whirligig beetle and its unusual behavior of swimming in wild circles on the surface of water is the anchoring phenomenon that drives the beginning lessons. Through the investigation into the beetles' habitat, food source, and role in the food web, students discover the diverse organisms that make their home in the pond ecosystem.

Engage the Learner
This initial phase of learning activates students' prior knowledge and preconceptions about the diversity of plants and animals in different habitats and how plants and animals demonstrate an interdependent relationship. Students begin to make connections between what they have observed in their area and the diversity of plants and animals that can live in different habitats. The phenomena emerge over time as the students collect data on the variety of plants and animals that live in different habitats.

Considerations for Students with Special Needs
All prompts and passages in the Student Journal should be read aloud, with repeated directions, and checking for understanding prior to writing.

Students are asked to draw and write in their Student Journals. Students may benefit by working with a partner in the longer writing pieces. Students with an IEP should be allowed to dictate their ideas and answers.

ESTIMATED TIME
Lesson 1A: 45–50 minutes, 2 classes
Lesson 1B: 45–50 minutes
Lesson 1C: 45–50 minutes, 2–3 classes
Lesson 1D: 45-50 minutes

LESSON LEVEL LEARNING GOALS
Make observations and collect information to compare different living things that are able to live in a given area.

MATERIALS NEEDED
For each student:
student pages
For the class:
potted plant
Teacher provides:
chart paper
markers
digital camera, optional

LS4.D: BIODIVERSITY AND HUMANS
There are many different kinds of living things in any area, and they exist in different places on land and in water.

TEACHING TIP

If your class is equipped with 1:1 electronic devices, encourage the groups to review the video clip and discuss additional information from the second viewing without sound.

TEACHING TIP

During facilitation of group discussions, carry a clipboard with possible questions to help draw out student ideas. Record their ideas and questions to use during the Science Talk and Summary Discussion.

SCIENCE TALK

Science Talk is a critical component of science lessons. Science Talk provides an avenue for the exploration of ideas and exchange of points of view, and is intellectually and academically challenging. Science Talk is not an add-on to the lesson and provides academically productive talk that is critical for learning in science. (See Science Talk in the appendix.)

LESSON 1A: WHERE DOES THE WHIRLIGIG BEETLE LIVE?

Advance Preparation

The organisms provided in this unit are potted plants. One plant is intended as a prop that provides a phenomenon for students to observe as the unit progresses. Place the potted plant in a location in your room where the plant is not quite in the sunlight. The placement of the plant will force the plant to grow toward the sunlight coming through a window. When you water the plant, pour the water over the soil on one side of the pot. Use a digital camera or phone and take a picture of the plant when you first placed it in the location. You may want to occasionally take pictures as the plant begins to grow and lean toward the window or light source. In Activity 4, students will be given the opportunity to figure out why the plant is growing toward the light in the context that plants need light to grow and survive.

What We Think About Whirligig Beetles

What We Think	Questions We Have	What We Did	What We Figured Out	How Does That Help Us to Figure Out the Phenomenon?

Preview videos of the whirligig beetle on YouTube.

Do a Google search using the term whirligig beetle.

https://www.youtube.com/watch?v=piCtr0O4Ju0

https://www.youtube.com/watch?v=RIbzOeNcaxE

Have the videos cued on your computer to show the first one with multiple beetles moving in circles and then the second one that shows a close-up of two beetles that appear to be moving randomly.

Create a What We Think About Whirligig Beetles chart.

Procedure

Engage the learner.

Set the climate in your classroom for heightened curiosity and interest by presenting the phenomenon as a personal story. Example:

"I was hiking with my family and we stopped by a small body of water along the trail. I noticed these small bugs that were just swimming in circles. They didn't seem to be headed in any direction; they just swam in random circles. I took a short video of the bugs with the camera on my phone. This is what I saw…"

Project the video of the whirligig beetle with no sound. As the video is playing ask:

- What do you think it is?
- Has anyone else observed the same behavior in a bug?
- Why do you think they are swimming in circles?
- How can we find out about these very odd bugs that just swim in circles?
- Where do you think they live? What do they eat?
- What other animals might live in the same area? What other animals might eat them?

Have students draw and write their observations and questions about the beetle in their Student Journals.

1. *Draw a model of the whirligig beetle and where it lives. Label the parts that you observed.*
2. *Write a list of observations of the whirligig beetle.*
3. *Write questions you have about the whirligig beetle.*

Divide the class into groups of four students and allow time for students to share their models, observations, and questions. The small-group discussion demonstrates the idea that scientists do not always observe and interpret information in the same way.

Encourage students to make adjustments to their observations based on their discussion with others. Facilitate the student recording and discussions of their observations. To help students elaborate on their observations, ask:

- What did you observe that makes you think that?
- How do you know?
- What do you mean when you say…?
- Tell me more about…
- How might you find out or confirm?

Carry a clipboard with paper and pencil to record interesting observations, questions, and comments that will help facilitate the Science Talk and help the class generate a list of their questions about the whirligig beetle. If time permits, show the video of the whirligig beetle a second time and provide sufficient time for students to add to their initial models and observations.

Refer to the What We Think About Whirligig Beetles Chart.

DEVELOPING AND USING MODELS

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatizations, or storyboard) that represent concrete events or design solutions.

- Distinguish between a model and the actual object, process, and/or events the model represents.
- **Compare models to identify common features and differences.**
- **Develop and/or use a model to represent amounts, relationships, relative scales, and/or patterns in the natural and designed world(s).**
- ~~Develop a simple model based on evidence to represent a proposed object or tool.~~

ASKING QUESTIONS AND DEFINING PROBLEMS

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.

- **Ask questions based on observations to find more information about the natural and/or designed world(s).**
- Ask and/or identify questions that can be answered by an investigation.
- ~~Define a simple problem that can be solved through the development of a new or improved object or tool.~~

PLANNING AND CARRYING OUT INVESTIGATIONS

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- ~~With guidance, plan and conduct an investigation in collaboration with peers (for K).~~
- ~~Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.~~
- **Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.**
- **Make observations (firsthand and from media) to collect data that can be used to make comparisons.**
- **Make predictions based on prior experiences.**

Science Talk

Conduct a whole-class sharing of their observations and questions about the whirligig beetle. To start the student sharing with one another, ask:

- _____, when you were sharing your observations with your group, you said _____. Can you share that idea with the rest of the class?
- Can someone add to that idea?
- Who has another observation to share?
- Did anyone else have a similar observation? What makes that characteristic interesting or important?
- Did anyone come up with some ideas about what the bug is doing and why it is swimming in circles?
- Do the rest of you agree? Why or why not?

Record student observations and questions on the What We Think chart. The chart will be used to develop questions for further investigation. Listen for questions that will lead to an understanding that the whirligig beetle is just one of very many organisms that live in a pond ecosystem.

Organize their observations on the chart using physical characteristics or descriptions, behavioral characteristics or descriptions, and inferences about where the beetle lives and what other animals and plants share the same habitat.

Possible questions that lead toward discovering the habitat of the whirligig beetle and the diversity of animals that live there:

- Where does the whirligig beetle live?
- What does it eat?
- What are predators of the whirligig beetle? What eats the whirligig beetle?
- What other organisms, plants and animals, live in the same area as the whirligig beetle?
- Does the whirligig beetle only live in the water or does it go on the land too?

Replay the video and have students observe and listen for answers to the key questions. At the completion of the video, ask students to describe the habitat of the whirligig beetle.

Review the terms *habitat* and *ecosystem* with the class. As a class, develop definitions for the terms and have students write their definitions in the Key Terms section of the Student Journal.

Ask students what more they would like to learn about the whirligig habitat and the plants and animals that live there. Students may have questions about the physical characteristics of the whirligig beetle that can be answered as they dig deeper into the behavioral characteristics. The behavioral characteristics will give them clues about the different animals and plants that live in the same habitat.

Have students revisit their initial entries in the Student Journal and make revisions to their models of the whirligig beetle based on their Science Talk.

Assessment: Formative
Use the Activity Page and Science Talk to assess the students' initial ideas about the whirligig beetle and where it lives.

LESSON 1B: PLANTS AND ANIMALS INTERACT

Advance Preparation

You will need an interactive whiteboard or document camera to display the *Nature Pictures* card.

Procedure

Explore the concept.

Review the students' initial ideas about the whirligig beetle and where it lives. Inform the class that in the following lessons they are going on a pretend field trip to many different regions around the world in search of the habitat best suited for the whirligig beetle. The purpose of the pretend field trip is to search for the many different kinds of plants and animals that live in different regions and to keep a log of students' observations and findings.

Invite students to share their experiences with trips and if they have ever visited a pond, lake, forest, river, etc. Encourage students to recall the different types of plants and animals they observed. Make a class list of their previous experiences, and their observations and ideas about habitats or different regions they can explore. Invite students to ask questions about the pretend field trip and the areas they might be visiting.

Divide the class into groups of three or four students. Distribute the Student Journal to each student. Review the Activity Pages as a class.

Picture #2 (Dragonfly):

1. *Draw and label what you observe in the picture of the dragonfly and plant part.*
2. *Write what you think is happening in the picture.*
3. *Write your questions about the living things in the picture.*

Project picture 2 (Dragonfly) from the *Nature Pictures Card Set* for the whole class to observe. Ask students to draw, label, and write what they observe in the picture. Allow sufficient time for each student to complete the initial observations and questions in their Student Journal and then encourage group members to talk and share what they recorded. The small-group discussion demonstrates the idea that scientists do not always observe and interpret information in the same way.

Turn the document camera off when all groups enter their discussion and sharing. Facilitate the group discussions by circulating among the students, listening to and recording their exchange of ideas. Check and make note of how students organized their data.

MATERIALS NEEDED

For each student:
- student pages
- hand lens

For the class:
- *Picture #2 (Dragonfly)* from *Nature Pictures Card Set*
- potted plant

Teacher provides:
- chart paper
- markers
- document camera

TEACHING TIP

Some students may only refer to mammals when recalling observations of animals. Remind students that insects, reptiles, birds, fish, etc. are animals too.

LS4.D: BIODIVERSITY AND HUMANS

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

TEACHING TIP
Throughout the activities in the Teacher Guide you will notice that specific student instructions from the Student Journal pages are given first and italicized. Additional information for the teacher follows the italicized instructions in plain print.

OBTAINING, EVALUATING, AND COMMUNICATING INFORMATION
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- ~~Read grade-appropriate texts and/or use media to obtain information to determine patterns in and/or evidence about the natural and designed world(s).~~
- **Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.**
- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.
- **Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.**

To check student progress and help students elaborate on their ideas, ask:

- Can someone explain what observations were common with everyone in the group?
- What did you notice about _____?
- What do you mean when you say _____?
- How might you explain that in your drawing and writing?
- Did everyone see the same things, or are there some parts of the picture that only one or two of you noticed?
- Do you think you could find more details if you were given the opportunity to take a closer look?
- What do you think is happening in the picture?
- What do you think you would hear, smell, and feel if you were there? Do you think you might see a whirligig beetle if you were there?
- What clues from the picture make you think that?
- What questions do you have about the picture and the living things you observe in the picture?

After groups have had the opportunity to share and discuss their observations and infer what is happening in the picture, project the picture again and allow sufficient time for students to confirm their initial observations and the observations of others, and to make additional observations by taking a second look. Allow students to take a closer look and move toward the screen. Demonstrate how to use the hand lens to magnify different pieces of the picture and gain more detail in the observation.

Science Talk
Conduct a whole-class discussion and sharing of their observations. Invite the class to sit in a circle and face one another for the Science Talk. Invite a student volunteer to project his or her Activity Pages and explain the observations and writing then return to the circle for sharing. Allow time for all groups to share their observations and ideas.

Take this opportunity to comment on the different attempts at organizing the observations in the Student Journal. Ask students how they might organize data into a chart that will help the class find similarities and differences in their entries.

Introduce the possibility of a chart to help organize their findings.

Sample chart:

Picture #2: Dragonfly

Plants	Description	Animals	Description
weed		dragonfly	

Students may list the different kinds of animals but struggle with identifying plants. The focus of the observations is not on plant and animal identification, but on the ability to make observations with detail and make inferences based on the observations.

Allow time for students to make adjustments and additions to their Student Journals based on the Science Talk and new information that was shared by the whole group. Take sufficient time to discuss the importance of careful observation and compare their initial entries in the Student Journal with their final entries.

Discuss the possibility of finding a whirligig beetle living in the habitat shown in the picture. Ask students if they think the whirligig could survive in the same area as the dragonfly in the picture. Have them justify their responses.

Read the Journal Entry as a class. Allow sufficient time for students to complete the writing.

Journal Entry
Your class was introduced to the whirligig beetle. Write if you think the whirligig beetle could live in the same area as the dragonfly. Use your observations of the whirligig video and the dragonfly picture and explain why you think it could or could not survive.

Assessment: Formative
Use the Activity Page, Journal Entry, and Science Talk to assess the students' ability to make observations to collect data for comparisons and to make inferences.

Use the Activity Page and Science Talk to assess the students' understanding that many different kinds of plants and animals live in the pond habitat.

ANALYZING AND INTERPRETING DATA
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- **Record information (observations, thoughts, and ideas).**
- Use and share pictures, drawings, and/or writings of observations.
- **Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions and solve problems.**
- Compare predictions (based on prior experiences) to what occurred (observable events).
- ~~Analyze data from tests of an object or tool to determine if it works as intended.~~

WRITING
Text Types and Purposes
W.2.2: Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.
Research to Build and Present Knowledge
W.2.7: Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).
W.2.8: Recall information from experiences or gather information from provided sources to answer a question.

LESSON 1C: WHAT LIVES OVER AND UNDER THE POND?

Teacher Background Information

This lesson gathers information about the living things on and around a pond and the habitat of the whirligig beetle as well as the dragonfly. Students will begin to recognize that there is a diverse population of plants and animals in different habitats.

Advance Preparation

Prepare a *Word Sort Card Set* for each group of four students. (See Materials Needed.)

Preview the book *Over and Under the Pond*. Mark pages and passages that need discussion for understanding.

Procedure

Explain the concept and define the terms.
Review the observation chart from the previous lesson and ask students to comment on the detail of the plant and animal that they observed in *Picture #2 (Dragonfly)*. Check for understanding or agreement that the whirligig beetle and dragonfly live in or near a pond habitat.

Introduce the book *Over and Under the Pond* to the class. Explain that you will be using the book to learn more about what kinds of plants and animals live in a pond habitat. Point out the title, author, and illustrator of the book and check for understanding of the role of the author and illustrator. Ask students why they think the author chose the title *Over and Under the Pond*. Make predictions about the information they can obtain from the book.

Read the book through in its entirety. Ask students to listen for ideas in the book that relate to their observation findings from the previous lesson and their questions about the whirligig beetle.

Science Talk

Conduct a whole-class reading conference and Science Talk to connect the information obtained through observation in the previous lesson to information obtained through the reading.

Ask student volunteers to reread different sections of the text. At the end of each passage, ask students to list the living things the author described. Make a t-chart and list the plants and animals mentioned on each page.

Sample chart:

Plant	Animal

MATERIALS NEEDED

For each student:
student pages

For each group of 4:
Word Sort Card Set (plants, animals, different, over, under, surface, water, pond, habitat)

For the class:
book: *Over and Under the Pond*

Teacher provides:
chart paper/markers

OBTAINING, EVALUATING, AND COMMUNICATINGINFORMATION

Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- ~~Read grade-appropriate texts and/or use media to obtain information to determine patterns in and/or evidence about the natural and designed world(s).~~
- **Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.**
- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.
- **Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.**

LESSON 1C

LS4.D: BIODIVERSITY AND HUMANS

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

READING

Key Ideas and Details

RI.2.1: Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details in a text.

RI.2.2: Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.

RI.2.3: Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Craft and Structure

RI.2.4: Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.

RI.2.6: Identify the main purpose of a text, including what the author wants to answer, explain, or describe.

Integration of Knowledge and Ideas

RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.

Range of Reading and Level of Text Complexity

RI.2.10: By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 2–3 text complexity band proficiently, with scaffolding as needed at the high end of the range.

When the chart is complete, compare the different plants and animals from the reading with the class t-chart from their picture observations. Ask if it makes sense that you might find both a dragonfly and whirligig beetle in the same area. Discuss the differences and similarities between the two animals. Discuss the similarities and differences and the very different characteristics of the different living things.

Ask students for any questions they may have about specific plants and animals mentioned in the book. Use the appendix pages from the book to learn more about the characteristics and habits of the animals.

Allow sufficient time for students to revisit their models of the whirligig beetle in its habitat from Lesson 1A and make additions and adjustments based on new information from the reading. Encourage students to include other animals and plants that might live in the same habitat as the whirligig beetle.

Review the What We Think chart and ask students if they have gathered new information about the whirligig beetle and where it lives and answered any of their questions. Record their ideas in the What We Did, What We Figured Out, and How Does That Help Us columns of the chart. Ask students if the reading inspired new questions or ideas about where the whirligig beetle lives and its habitat.

Read the Student Journal/Respond to Text as a class.

Pre-Writing Strategy: Science Talk/*Word Sort Card Set*

Divide the class into groups of four students. Distribute the *Word Sort Card Set* to each group. Encourage the students to discuss the terms on the cards and how they might be useful in their responses in the Student Journal.

Give students sufficient time to orally express what they are going to write and listen to the ideas of others. Encourage the groups to read the words to one another and decide how they will help them answer the Journal Entry. Have teams put the words in a sequence that will help them in their writing. Facilitate the Science Talk by circulating among the groups and listening to their exchange.

Journal Entry/Respond to Text

1. *Write the question the boy and mother in the boat answer through their exploration of the pond.*
2. *The boy and his mother find out _____.*
3. *Write about one new thing you learned about living things that live over and under the pond.*

   One new thing I learned about living things that live over and under the pond is _____.

Assessment: Formative

Use the t-chart, Science Talk and Journal Entry/Respond to Text to assess the students' understanding of the diversity of living things that can live in one area.

Use the Science Talk, t-chart, and Journal Entry/Respond to Text to assess the students' ability to obtain and relate information from text.

DEVELOPING AND USING MODELS

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatizations, or storyboard) that represent concrete events or design solutions.

- Distinguish between a model and the actual object, process, and/or events the model represents.
- **Compare models to identify common features and differences.**
- **Develop and/or use a model to represent amounts, relationships, relative scales, and/or patterns in the natural and designed world(s).**
- ~~Develop a simple model based on evidence to represent a proposed object or tool.~~

LESSON 1D: WHERE ELSE DO PLANTS AND ANIMALS LIVE?

Teacher Background Information

This lesson continues the gathering of information about the living things in a variety of areas. At this point in their learning, students have had the opportunity to make close observations of a photo of one habitat and obtain information from text about a pond ecosystem and the variety of plants and animals that live there. This lesson introduces different plants and animals and allows time for comparison of the characteristics of the different living things that survive in each area. Students are given the opportunity to apply their skills and understanding from the pond habitat exploration to different habitats.

In Lesson 1D, the class goes on a pretend field trip using *Nature Picture Cards.* In the following lesson, the class goes outside on an outdoor exploration.

Advance Preparation

For the following lessons, conduct a survey of the schoolyard or nearby park. Determine areas with full sun, areas with shade, and areas that may include a body of water. Select different locations for the plots to be studied. Mark off each plot as a 3ft. x 3 ft. square using four survey flags and string. Try to locate plots that vary in contents, some being a combination of grass and rocks and others having planted flowers within them. Some plots may have different soil content, such as mulch or bark chips. Some plots may have seeds, such as acorns that drop into the plot. Some parts should be in the shade and others in full sun.

Procedure

Elaborate on the concept.

Explain to the class that at this point in their pretend field trip, they are going to divide into small exploration groups. Each group will be given an area to explore. Each exploration team will be expected to share their findings with the rest of the class.

Divide the class into groups of three or four students. Review the Student Journal Activity Pages as a class.

Distribute one *Nature Picture Card* to each group. Ask students to draw, label, and write what they observe in the picture.

Picture #_____

1. *Draw and label what you observe in the picture of the different plants and animals.*
2. *Write what you think is happening in the picture.*
3. *Write your questions about the living things in the picture.*
4. *Write if you think the whirligig beetle can live in the habitat in your picture. Tell why you think that.*

MATERIALS NEEDED

For each student:
- student pages
- hand lens

For each group of 4:
- 1 *Nature Picture Card*

For the class:
- *Nature Picture Card Set*
- 16 survey flags
- ball of string

Teacher provides:
- chart paper
- markers
- document camera

LS4.D: BIODIVERSITY AND HUMANS

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

PLANNING AND CARRYING OUT INVESTIGATIONS

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- ~~With guidance, plan and conduct an investigation in collaboration with peers (for K).~~
- ~~Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.~~
- **Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.**
- **Make observations (firsthand and from media) to collect data that can be used to make comparisons.**
- **Make predictions based on prior experiences.**

LESSON 1D

READING
Key Ideas and Details
RI.2.1: Ask and answer such questions as *who, what, where, when, why,* and *how* to demonstrate understanding of key details in a text.
RI.2.2: Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.
RI.2.3: Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
Craft and Structure
RI.2.4: Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.
RI.2.6: Identify the main purpose of a text, including what the author wants to answer, explain, or describe.

Sample Anchor Chart:

When We Make Observations, We…
- draw pictures
- label
- use descriptive words: color, size, shape
- use our senses
- predict
- gather and use facts

Allow sufficient time for each student to complete the initial observations in their Student Journal and then encourage group members to talk and share what they recorded. The small-group discussion demonstrates that we do not all observe the same details and that collaboration allows for greater detail and understanding.

Facilitate the group discussions by circulating among the students, listening to and recording their exchange of ideas.

To check student progress and help students elaborate on their ideas, ask:

- Can someone explain what observations were common with everyone in the group?
- What did you notice about _____?
- What do you mean when you say _____?
- How might you explain that in your drawing and writing?
- Would it be helpful to make a t-chart to organize your observations of plants and animals?
- Did everyone see the same things, or are there some parts of the picture that only one or two of you noticed?
- What do you think is happening in the picture?
- What do you think you would hear, smell, and feel if you were there?
- What clues from the picture make you think that?
- What questions do you have about the area in the picture and the living things you observe there?
- Can you make any connections between the picture and what we have discovered about the whirligig beetle and its habitat? How are they similar? How are they different?

After groups have had the opportunity to share and discuss their observations and infer what is happening in the picture, allow sufficient time to take another look at the picture. Allow time for students to confirm their initial observations, the observations of others, and additional observations by taking a second look. Allow students to take a closer look using the hand lens.

As a class, develop an anchor chart that will serve as a guide in making good observations. The chart will be revisited as students begin to make observations in the field study in following lessons. Title the chart When We Make Observations, We… (see sample, left).

Write the terms *observe* and *observation* on the board. As a class, develop definitions of the terms and have students write their definitions in the Key Terms section of the Student Journal.

Evaluate the students' understanding of the concept.

Science Talk

Conduct a whole-class discussion and sharing of their observations of plants and animals in different areas. Invite the class to sit in a circle and face one another for the Science Talk. Invite one group to project the picture they observed and explain their observations and Student Journal entry. Make a t-chart for each group's presentation to use as a tool to compare their findings of different plants and animals in different areas.

Allow sufficient time for all groups to present their findings from their picture observations. Ask the class to look at the collected data from their pretend field trips to different areas. Ask students to look for trends or patterns in the data on the t-charts. To help the students collectively make sense of their findings, ask:

- When we look at the data from all the groups, are there any patterns in our findings where plants or animals that we observed live in one or more areas?
- Why do you think that happens?
- How do you think a _____ can live in a _____ and a _____?
- What do you mean when you say…?
- What do you think about what _____ said?
- Do the rest of you agree? Why or why not?
- Can someone explain why that makes sense?
- What other patterns or statements can we make based on our data?

As a class, collectively write a scientific explanation that summarizes their findings about the wide variety of living things that live in different areas.

Sample:

Many different kinds of plants and animals grow and live in many different areas. Some plants and animals are alike and others are very different.

Journal Entry

1. *Write your class findings from your pretend field trip.*
2. *Write one example that supports your findings.*

Assessment: Formative

Use the Science Talk and Journal Entry to assess the students' ability to support a claim with evidence.

WRITING

Text Types and Purposes

W.2.2: Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.

Production and Distribution of Writing

W.2.5: With guidance and support from adults and peers, focus on a topic and strengthen writing as needed by revising and editing.

Research to Build and Present Knowledge

W.2.7: Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

W.2.8: Recall information from experiences or gather information from provided sources to answer a question.

PATTERNS

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

APPENDIX

ENGINEERING DESIGN PROCESS

The Engineering Design Process provides students with a series of steps to guide them as they solve problems and design and test products, models, and solutions. The process is cyclical, yet not necessarily in an order. Students are encouraged to evaluate as they progress through the process, revisit the mission often, and revise thinking and their plan multiple times as the process unfolds.

Engineers do not always follow the Engineering Design Process steps in order, one after another. It is very common to design something, test it, find a problem, and then go back to an earlier step to make a modification or change the design. Engineers must always keep in mind the mission or problem they are trying to solve and the limitations (cost, time, material, etc.) that are part of the solution to the problem. Two key elements in working as an engineer are teamwork and design-test-and-redesign.

Mission
- Defines the problem and what the engineers are trying to design or build.
- Describes the limitations within which the engineers must solve the problem.

Brainstorm Ideas
- Imagine, discuss, and sketch possible solutions.
- Conduct research into what has already been done.
- Discover what materials are available, time frame, and other limitations.

Plan and Design
- Draw and write a plan.
- Design your solution through drawing and manipulating materials.
- Develop a plan or steps and a schedule.

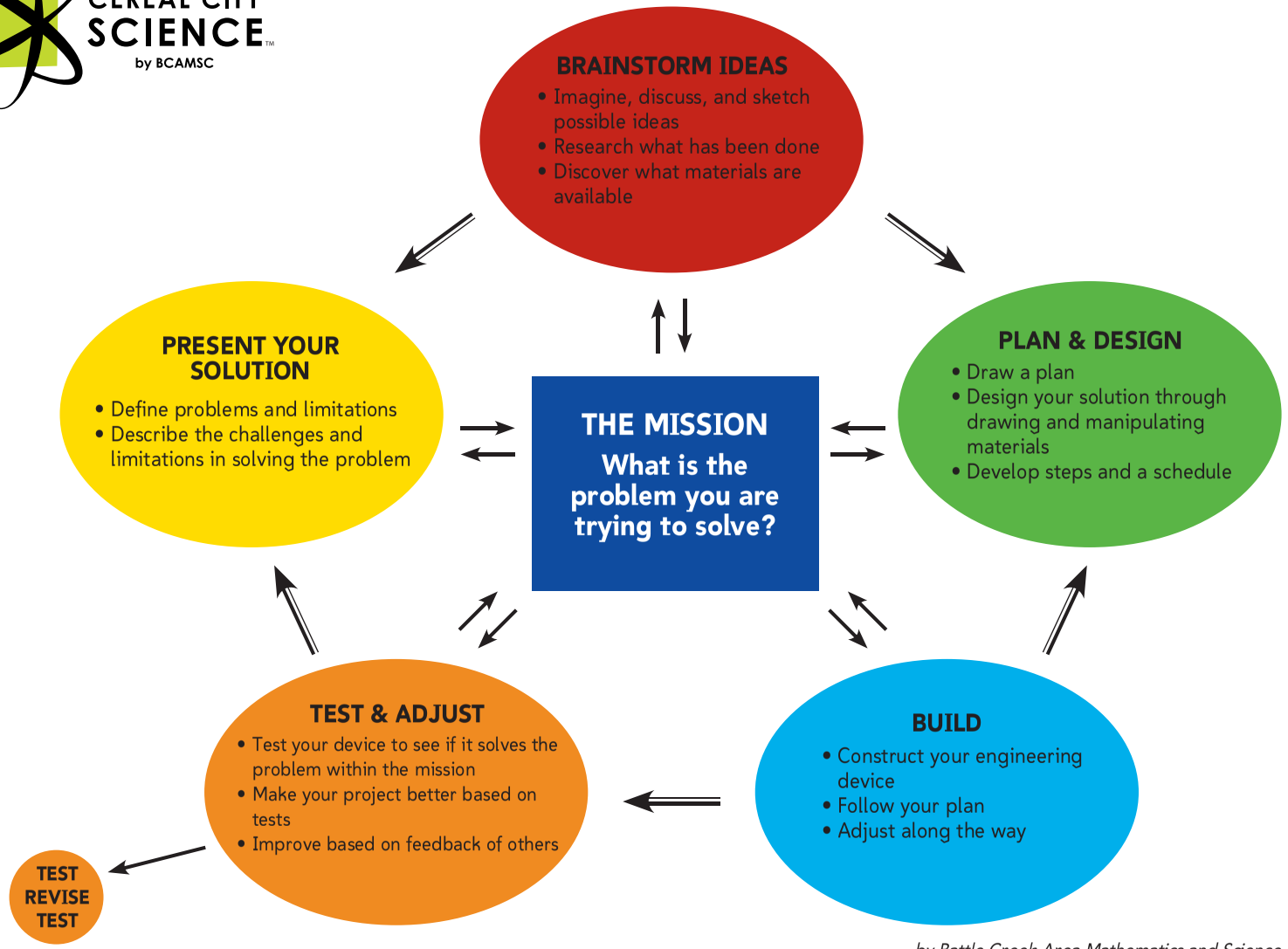
Build
- Construct your engineering device or project.
- Follow your plan.
- Adjust and test along the way.

Test and Adjust
- Test your device to see if it solves the problem within the mission and limitations.
- Make your project better based on tests: Test → Revise → Test.
- Improve based on feedback of others.

Present Your Solution
- Demonstrate how your solution solves the problem.
- Define problems and limitations.
- Describe the challenges and limitations in solving the problem.
- Describe additional revisions that could improve the device or project.

CEREAL CITY SCIENCE by BCAMSC

ENGINEERING DESIGN PROCESS



by Battle Creek Area Mathematics and Science Center
Cereal City Science
Adopted from the Carnegie Mellon Robotics Academy

APPENDIX

CEREAL CITY SCIENCE™ by BCAMSC

Student Journal
2.LS.NGSS

Plant and Animal Relationships 2LNG

SECOND EDITION

A second grade unit supporting Next Generation Science Standards and Michigan Science Standards

Name:_____

Name _____

Date _____

ACTIVITY

Where Does the Whirligig Beetle Live? 1A

1. Draw a picture of the whirligig beetle and where it lives. Label the parts that you observed.

1A ACTIVITY
Where Does the Whirligig Beetle Live?

Name _____

Date _____

2. Write a list of observations of the whirligig beetle.

3. Write questions you have about the whirligig beetle.

Name _____

Date _____

Picture #2 (Dragonfly)

1. Draw and label what you observe in the picture of the dragonfly and plant part.

Name _____

Date _____

2. Write what you think is happening in the picture.

3. Write your questions about the living things in the picture.

Name _____

Date _____

Your class was introduced to the whirligig beetle. Write if you think the whirligig beetle could live in the same area as the dragonfly. Use your observations of the whirligig video and the dragonfly picture to explain why you think it could or could not survive.

1C

RESPOND TO TEXT

What Lives Over and Under the Pond?

Name _____

Date _____

1. Write the question the boy and mother in the boat answer through their exploration of the pond.

2. The boy and his mother find out

3. Write about one new thing you learned about living things that live over and under the pond.

   One new thing I learned about living things that live over and under the pond is

Name _____

Date _____

ACTIVITY

Where Else Do Plants and Animals Live? **1D**

Picture #_____

1. Draw, label, and write what you observe in the picture of the different plants and animals.

1D

ACTIVITY

Where Else Do Plants and Animals Live?

Name _____

Date _____

2. Write what you think is happening in the picture.

3. Write your questions about the living things in the picture.

4. Write if you think the whirligig beetle can live in the habitat in your picture. Tell why you think that.

Name _____

Date _____

JOURNAL

Where Else Do Plants and Animals Live? **1D**

1. Write your class findings from your pretend field trip.

2. Write one example that supports your findings.

KEY TERMS

Name _____

Date _____