GRADE 1

Building Blocks OF SCIENCE™ | 3D

Exploring Organisms

Program Highlights and Lesson Sampler

Phenomenon-Based Investigations with Digital Support—in 30-Minute Lessons

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Exploring Organisms

Teacher's Guide

3rd Edition

Building Blocks OF SCIENCE™ | 3D

Kit Materials

Material	Quantity Needed from Kit	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Animal Parents and Their Babies Card Set	12				■	
Bean seed	52	■				
Craft dough			■			
External Structures Photo Card Set	1					■
Foam tray	12	■	■			
Hand lens	24		■		■	■
Insect Collection Set 2	1		■			
Literacy Reader: *Exploring Organisms* (below grade level)*	1	■	■	■	■	■
Literacy Reader: *Exploring Organisms* (on grade level)*	1	■	■	■	■	■
Living vs. Nonliving Card Set	12	■				
Petri dish	13	■				
Plant Poster	1				■	■
Planter cup	26	■				
Plastic egg	12		■			
Plastic spoon	12	■				
Plastic tank	6	■	■			
Resealable plastic bags	48	■	■		■	
Rubber bands	24		■			
Seed Starter Mix		■				
Spray bottle	4	■				

* The below-grade literacy reader is distinguished from the on-grade literacy reader by a yellow dot near the bottom left corner of the back cover.

Needed But Not Supplied Materials

Material	Quantity Needed	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Art supplies						■
Chart paper or whiteboard		■	■	■		■
Cleaning supplies, such as sponges, rags, dustpan, and broom		■				
Craft supplies (optional)						■
Drawing paper or poster board (optional)						■
Gloves (optional)	6–12		■			
Index card	12					■
Internet access				■		
Light bank	1	■				
Marker		■	■	■		■
Masking tape		■				■
Newspapers		■				
Pair of scissors	1	■			■	
Paper towels						■
Photograph of student with family	24				■	
Photograph of teacher as a baby or of an animal baby	1			■		
Photographs of teacher as a baby, a child, a teen, and an adult	4				■	
Photograph of teacher with family or of an animal family	1				■	
Projection system (optional)	1			■	■	
Science notebook	24	■	■	■	■	■
Towel (optional)	6		■			
Videos or images of animal parents interacting with their young				■		
Water		■	■			

NOTES

Unit Overview: *Exploring Organisms*

Our world is composed of living and nonliving things that are in constant interaction. All living organisms have the same basic needs for survival: air, food, water, and shelter (space). How organisms access resources to meet these needs differs greatly. Plants and animals have specific structures to suit their specific needs and environments. Some organisms receive care from their parents that helps them reach adulthood. The hands-on, inquiry-based investigations of *Exploring Organisms* focus on phenomena that support concepts related to the growth, survival, and reproduction of organisms. Through a series of four lessons, students identify structures that are unique to different organisms, explain life cycles and parent–offspring relationships, and draw conclusions about the characteristics, or traits, of organisms and how those traits indicate family relationships. Students make comparisons between all these concepts and their own human abilities and needs.

At the beginning of this unit, students distinguish between living and nonliving things. They support this concept by planting a bean seed and by making comparisons between the characteristics and needs of plants and animals. Specific structures are identified, and each is related to a function. Students are challenged to consider how the appearance of different structures differ among organisms and how these differences are related to the environment in which each organism lives. As an introduction to life cycles, students observe seeds, plant them, and continue to make observations as the plant develops. They also compare the appearances of baby and parent animals and draw conclusions about how organisms develop at different rates. The needs of baby organisms differ, and students come to understand that parents care for young in different ways. By reading, students identify the different ways that parents provide their young with resources and knowledge to increase the likelihood of their survival. To summarize what they have learned, students design a model that mimics plant or animal structures to solve a human problem.

Credit: GOLFX/Shutterstock.com

Next Generation Science Standards

The Building Blocks of Science unit *Exploring Organisms* integrates process skills as defined by the Next Generation Science Standards (NGSS).

Performance Expectations

- **1-LS1-1:** Use materials to design a solution to a human problem by mimicking how plants and/ or animals use their external parts to help them survive, grow, and meet their needs.
- **1-LS1-2:** Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
- **1-LS3-1:** Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
- **K-2-ETS1-2:** Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Disciplinary Core Ideas

- **LS1.A:** Structure and Function
- **LS1.B:** Growth and Development of Organisms
- **LS1.D:** Information Processing
- **LS3.A:** Inheritance of Traits
- **LS3.B:** Variation of Traits
- **ETS1.B:** Developing Possible Solutions

Science and Engineering Practices

- Developing and Using Models
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Crosscutting Concepts

- Patterns
- Structure and Function

Important Terms Related to Science Instruction

Science and science instruction rely on specific terminology. Many scientific terms are likely to be new or unfamiliar to students. Below is a list of terms that are used throughout Building Blocks of Science units. Each is followed by a student-friendly definition to help students understand the meaning of the term in a scientific context. A brief description of how Building Blocks employs each of these scientific skills and tools is intended to help you help students model the behavior of scientists.

- **Analyze:** To examine. *Students are asked to examine (analyze) data they collect to help develop their understanding of core ideas and crosscutting concepts.*
- **Claim:** A statement. *To help students develop their understanding of concepts, they will make statements (claims) concerning various scenarios based on observations and data they have collected*.
- **Classify:** To arrange things in groups or categories. *As students investigate and collect data, they will arrange (classify) their data to look for patterns that may help to support claims that they make.*
- **Communicate:** To share information. *Students are continually asked to share experiences, questions, observations, data, and evidence (communicate) within their groups and with the class as a whole. Communication takes many forms, including discussions, the creation of models, designing solutions to problems, and formal presentations.*
- **Compare:** To note similarities and differences among things. *Like classifying, noting how things are alike and different (comparing) is another skill that students will use to analyze their data and look for patterns, cause and effect relationships, and other crosscutting concepts.*
- **Conclude:** To arrive at an opinion by reasoning. *The scientific practices of conducting investigations, collecting and analyzing evidence, and sharing and discussing information lead students to form opinions based on reasoning (to conclude). The conclusions that students develop during the unit will help you assess their understanding of the unit's core ideas.*
- **Evaluate:** To form an idea based on evidence. *Throughout each unit, students will look at (evaluate) the observations and data they collect and discuss their conclusions with classmates in order to form ideas about concepts based on evidence.*
- **Evidence:** Information to show whether something is true or valid. *Students will use the observations and data (evidence) they collect to support claims they make as being valid or true.*
- **Explain:** To describe in detail. *Throughout investigations, students will analyze the data they collect, make claims supported by evidence, and share their information with one another to make sense of (explain) core ideas and phenomena.*
- **Investigate:** To use a standard process to discover facts or information. *Students will carry out standard processes (investigate), sometimes developing those processes themselves, to discover facts or information related to scientific ideas.*
- **Model:** A representation of an object or idea. *Using a representation of an object or idea (a model) helps student scientists communicate and evaluate ideas regarding phenomena. Students will develop many types of models during a unit, including drawings, physical models, diagrams, graphs, and mathematical representations.*

- **Phenomena:** Occurrences or events that can be observed and cause one to wonder and ask questions. *Presenting occurrences or events (phenomena) related to the science concepts being studied engages students through real-world events and ensures common experiences for all students. Presenting phenomena also allows students to develop their own questions and take ownership of their learning.*

- **Predict:** To develop anticipated results of an event based on prior experience or knowledge. *Students are asked to anticipate (predict) the results of events based on experience and data from prior events.*

- **Reasoning:** Thinking about something in a logical way. *Students are asked to make claims, support them with evidence, and explain their claims in a logical fashion (with reasoning). Making claims supported with evidence and reasoning is scientific, or evidence-based, argumentation.*

- **Record:** To write down. *During investigations, students will keep track of their observations (record) by drawing or writing in their science notebooks or on student investigation sheets.*

- **Variable:** A factor that is able to be changed. *As students conduct investigations, they will consider which factors can be changed or manipulated (variables) to test something during the investigation.*

The 5E Instructional Model

Building Blocks of Science uses a constructivist approach to learning by encouraging students to build upon existing ideas using the 5Es. This instructional model cycles through five phases:

- **Engage:** Students draw upon prior knowledge to make connections to a new concept or topic.
- **Explore:** Students are provided with an activity related to a concept or topic and are encouraged to make claims and observations, collect evidence, and ask questions.
- **Explain:** Students use observations and discussion to construct an explanation for a concept or topic they are studying.
- **Elaborate:** Students must draw upon their experiences and apply their knowledge to a new situation in order to demonstrate understanding.
- **Evaluate:** Students assess their knowledge and review what they have learned.

In each Building Blocks of Science unit, students begin with an engaging pre-assessment activity, which allows the teacher to gauge levels of previous knowledge. The following lessons cycle through the explore, explain, and elaborate phases, and then in the final lesson, students are evaluated using project-based and summative assessments.

Incorporating Phenomena

Building Blocks of Science uses phenomena, or observable occurrences, to encourage students to develop questions that will lead to deeper understanding of the core ideas investigated in each unit and to support inquiry-based learning. Each unit includes both an anchoring phenomenon and lesson-specific investigative phenomena.

The unit's anchoring phenomenon, introduced to students in the first lesson, serves as the main focus of the unit. The anchoring phenomenon is introduced through a descriptive narrative in the Teacher's Guide and supported visually by a short online video. This visual teaser of the anchoring phenomenon piques students' interest and helps them to think more deeply and to develop questions. Viewing the video again at the end of the unit prompts students to make connections between the anchoring phenomenon and its applications beyond the scope of the unit's investigations.

An investigative phenomenon is presented to students at the beginning of each lesson to encourage them to develop additional questions. At the end of each lesson, the class revisits its questions and addresses them based on the evidence they collected during the lesson investigations, making connections to the lesson's investigative phenomenon.

As students begin to develop a deeper understanding of the unit's core ideas, they begin to make sense of the phenomena introduced throughout the unit. Students draw connections between what they have learned and how it applies to the world around them. In the last lesson, students engage in a performance task in which they are challenged to synthesize their knowledge to make connections to the unit's anchoring phenomenon. Students may be asked to build a model or design a solution to a problem. When communicating their designs and findings to their classmates, students explain their reasoning using evidence-based claims and answer questions during their presentation.

Each unit's literacy and digital components provide examples of connections between a concept and a phenomenon and ask students to make their own. Teachers are encouraged to support these connections by selecting related articles and videos or by engaging the class in discussion. Teacher Tips within the Teacher's Guide suggest other opportunities to identify related phenomena.

Anchoring phenomenon videos kick off each unit

The Engineering Cycle

Building Blocks of Science incorporates an engineering design process to support the engineering, technology, and application of science (ETS) core idea outlined in the National Research Council's "A Framework for K–12 Science Education" (NRC, 2012, pp. 201–202). This ETS core idea has been brought into action through the NGSS ETS performance expectations, which allow students to practice systematic problem solving as they apply scientific knowledge they have acquired.

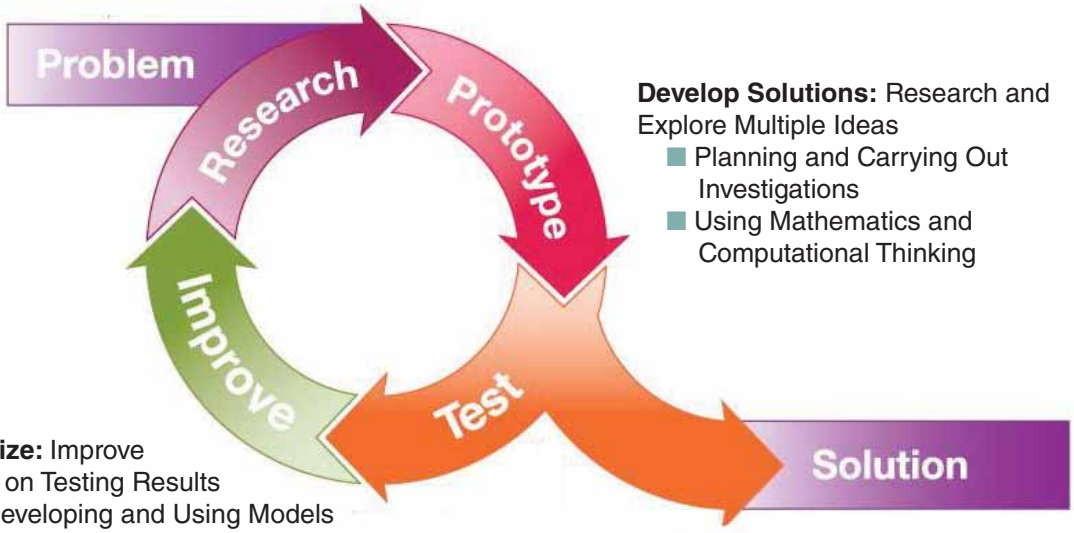
Through scientific engineering and design, students apply what they have learned to creatively solve real-world problems. This 21st-century skill encourages students to collaborate and exposes them to the idea that one problem can have multiple solutions.

An engineering design process can be thought of in three phases: defining a problem, developing solutions, and optimizing the design. Each phase can be correlated with NGSS Science and Engineering Practices as depicted in the graphic below.

Engineering Design Process

Define Problem: Identify Constraints and Criteria for Success

- Asking Questions and Defining Problems
- Obtaining and Evaluating Information



Develop Solutions: Research and Explore Multiple Ideas

- Planning and Carrying Out Investigations
- Using Mathematics and Computational Thinking

Optimize: Improve Based on Testing Results

- Developing and Using Models
- Analyzing and Interpreting Data

In each Building Blocks of Science unit, students employ this engineering cycle to assess their knowledge and build problem-solving skills. Depending on the activity, students may create a model, develop an experiment, or redesign an existing product. To increase student engagement, relate the engineering process to a task, a phenomenon, or a career.

Sensemaking: Developing Claims Supported with Evidence and Reasoning

Scientific argumentation, or evidence-based argumentation, is defined as making scientific explanations (claims) using empirical data (evidence) to justify an argument (reasoning). Scientists use this type of argumentation to make sense of phenomena and refine their ideas, explanations, and experimental designs. In the classroom, students should be introduced to scientific argumentation to guide them in sensemaking, or building an understanding of phenomena based on evidence gained through observations, investigations, and data analysis. Through sensemaking, students refine and revise their understanding as new evidence is acquired and information is shared through class discussions.

Building Blocks of Science units offer multiple opportunities for students to make sense of scientific concepts by developing claims and supporting their claims with evidence and reasoning. At the start of an investigation, students are presented with a question related to a scientific concept. To make sense of a phenomenon or concept, students must draw upon their previous knowledge and experiences to develop a statement or conclusion that answers the question. To support that claim, students must provide relevant and specific data as evidence. This data may come from previous investigations, inference clues, texts, or class discussions. Students may even reference personal experience. Reasoning provides justification for why the selected evidence supports the claim. Relevant scientific principles should be incorporated into this reasoning. After the investigation, students should revisit their initial claims and determine if they are supported by newly gathered evidence. If the available evidence does not support students' initial claims, students should identify misunderstandings and present a claim that is supported.

To support students who struggle with scientific argumentation, ask them to use sentence frames such as "I think _____ because _____" to help with sensemaking. Explain that the first blank is the claim and the second blank is the evidence and reasoning.

Science Notebooks

Science notebooks are an integral part of the process of learning science because they provide a location for students to record their ideas, questions, predictions, observations, and data throughout the unit. The science notebook is used for notes, Tell Me More responses, diagrams, and outlines. Student investigation sheets can be glued, taped, or stapled into the science notebook as well.

Spiral notebooks are recommended and can be purchased inexpensively. If you choose to pre-assemble notebooks, consider including blank sheets of centimeter graph paper and plain paper for writing and drawing. It is recommended to create tabs for each lesson and to have students date each entry.

NOTE: Student investigation sheets use a specific numbering sequence to make it easier for students and teachers to identify them. The first number calls out the lesson, and the letter references the investigation. For example, Student Investigation Sheet 1A supports Investigation A of Lesson 1. If there are multiple student investigation sheets in one investigation, a second number will indicate the order of use (Student Investigation Sheet 2A.1, 2A.2, etc.).

Take-Home Science Activities

Take-Home Science activities are included in each unit and are called out within the related lesson. These activities reflect the science concepts and vocabulary that students are learning about and extend that learning to the home.

A reproducible letter explains how Take-Home Science activities work. Topic-specific activity sheets include directions for the parent, simple background information, and a space for the student to record observations or data. It is recommended that students share their findings and compare experiences as a class after completing the activity. Take-Home Science resources are found with the student investigation sheets at the end of the lesson in which they are assigned.

Assessment

Building Blocks of Science units provide assessment opportunities that correspond to specific lesson objectives, general science process skills, communication skills, and a student's ability to apply the concepts and ideas presented in the unit to new situations. The Teacher's Guide includes strategies for both formative and summative assessment. Each unit includes:

- **Pre-Unit Assessment and Post-Unit Assessment Opportunities:** The pre-unit assessment asks students to draw upon previous knowledge, allowing you to gauge their levels of understanding. The post-unit assessment touches upon the topics and concepts from the entire unit and evaluates students' learning. It is a beneficial practice to ask students to compare the pre-unit assessment and post-unit assessment activities to evaluate growth.

- **Formative Assessment Strategies:** At the end of each lesson, specific strategies are listed for each investigation. These include ways to utilize Student Investigation Sheets and Tell Me More questions as assessment tools. In lower grades, an Assessment Observation Sheet lists things to look for as you work with small groups of students.

- **Literacy and Digital Components:** These resources can be assigned to differentiate assignments and to assess student progress as needed.

- **General Rubric:** Appendix A includes a rubric that provides an expected progression of skills and understanding of science content. You can use these guidelines to assess students throughout the course of the unit.

- **Summative Assessment:** This unit-specific, cumulative assessment allows students to demonstrate their understanding of content presented by responding to questions in a variety of formats. Each question is aligned to performance expectations and provides insight on students' understanding of the concepts addressed. An answer key is provided, as well as a chart that indicates the performance expectation addressed by each question and lessons to revisit if remediation is required.

Additionally, there is a second end-of-unit assessment accessible only online. This digital summative assessment is **scenario-based** and touches upon all the standards from the unit. It includes both close-ended and open-ended questions.

Building Blocks of Science 3D—The Total Package

Phenomenon-Based Investigations with Digital Support—in 30-Minute Lessons

Hands-on materials are always included—not an extra purchase

Navigating the Teacher's Guide

Phenomenon

NGSS Standard and 5E Alignment

Investigation Overview with Time Considerations

Vocabulary

Tell Me More Formative Assessment Questions

Teacher Tips and Differentiation Strategies

LESSON 3

Push, Pull, Tumble

LESSON ESSENTIALS

Performance Expectations
- **K-PS2-1:** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
- **K-2-ETS1-2:** Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Disciplinary Core Ideas
- **PS2.A:** Forces and Motion
- **PS2.B:** Types of Interactions
- **ETS1.B:** Developing Possible Solutions

Science and Engineering Practice
- Planning and Carrying Out Investigations

Crosscutting Concept
- Cause and Effect

Literacy Components
- *Push, Pull, Go* Big Book pgs. 6, 11–14
- **Literacy Article 3A:** Falling Tree

Digital Component[1]
- **Simulation:** Dominoes

[1]Accessible at Carolina Science Online

PHENOMENON

Read the investigative phenomenon aloud to the class. Encourage students to generate questions about what they hear. Keep track of students' questions on a class chart, or have students record the questions in their science notebooks. Refer to these questions at the end of the lesson and throughout the unit to support the unit's anchoring phenomenon.

Investigative Phenomenon for Lesson 3: You wait to go down the slide. It's finally your turn. You slide down fast! Oh, no! Your friends are standing at the bottom of the slide. You can't stop sliding. You slide into one friend. He starts to fall. He falls into another friend. She falls over. It is important to look before you slide! What does this make you wonder?

Anticipated Questions:
- Why can't you stop sliding?
- Why does your friend fall over?
- Why does your friend knock another person over

LESSON OVERVIEW

In the previous lessons, students built their knowledge of fo
by rolling balls and observing swinging. They learned that c
applied to a system will change how the system moves. In t
begin to understand that the motion of an object is also affe
Students learn about systems and use what they learn to e
of falling dominoes. In the next lesson, students will extend
systems to explore the spinning motion of a toy top. They w
pulling force of gravity and its effect on motion.

INVESTIGATION OVERVIEW

Investigation A: How Can I Make Dominoes Tumble?
Using dominoes, students explore the motion of tumbling and further investigate forces.
- **Teacher Preparation:** 10 minutes
- **Lesson:** 30 minutes

Investigation
System?
Students further
manipulating the
dominoes.
- **Teacher Prep**
- **Lesson:** 30 m

LESSON 3

MATERIALS
- **Student**
  1 Science notebook*
  1 Student Investigation Sheet 3B: *How Do Dominoes Move After a Push?*
- **Team of two students**
  8 Dominoes
- **Teacher**
  1 Student Investigation Sheet 3B: *How Do Dominoes Move After a Push?* (Teacher's Version)
  Assessment Observation Sheet: Lesson 3

NOTE: A materials list for each investigation precedes the procedure within the lesson.

*These materials are needed but not supplied.

OBJECTIVES
- Demonstrate that a force is any push or pull.
- Investigate and demonstrate that force causes an object to start moving, stop moving, or change direction.
- Predict and explore what happens if a component of a system in motion is missing or not working properly.
- Build on the understanding that position and motion can be changed by pushing and pulling objects.
- Gather evidence that it takes a push or pull to change the motion of objects.
- Build an understanding that objects move in different patterns (e.g., straight line, zigzag, curved line).

VOCABULARY
- Force
- Gravity
- Motion

TEACHER PREPARATION

Investigation A

1. Make a copy of Assessment Observation Sheet: Lesson 3 for yourself. During the investigations in this lesson, use the questions and prompts on this sheet to formatively assess students as they work.

2. Find an online video that shows large, complex domino setups. It will be helpful if the video uses dominoes similar to the ones students will use in the investigation.

3. Have eight dominoes from the kit available for each team of two students.

Investigation B

1. Have one copy of Student Investigation Sheet 3B: *How Do Dominoes Move After a Push?* for each student.

2. Have eight dominoes from the kit available for each team of two students.

3. Have your Assessment Observation Sheet handy to continue formatively assessing students.

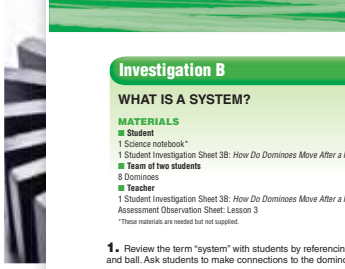


Figure 3.1:

LESSON 3

Investigation B

WHAT IS A SYSTEM?

MATERIALS
- **Student**
  1 Science notebook*
  1 Student Investigation Sheet 3B: *How Do Dominoes Move After a Push?*
- **Team of two students**
  8 Dominoes
- **Teacher**
  1 Student Investigation Sheet 3B: *How Do Dominoes Move After a Push?* (Teacher's Version)
  Assessment Observation Sheet: Lesson 3

*These materials are needed but not supplied.

1. Review the term "system" with students by referencing the swing or the ramp and ball. Ask students to make connections to the dominoes. Ask:
- What are the parts of this system? *(Eight dominoes)*
- What force causes changes in this system? *(A push)*
- What changes occur? *(A force causes the dominoes to tumble over.)*
- Do you think the system still work if you take away one part of it? Make a prediction.

2. Instruct students to use their dominoes to test their predictions. Allow time for pairs to set up their dominoes and then test what will happen if one domino is removed from the middle of the system. Assist students who appear to be struggling. When all students have tested their predictions, ask:
- What happens to the motion in the system when pieces are removed? How do you know?
- What do you think would happen if you removed two dominoes? Make a prediction and try it.
- How does changing a system affect the way it moves?

3. Provide each student with a copy of Student Investigation Sheet 3B: *How Do Dominoes Move After a Push?* Allow time for students to draw what happens to the line of dominoes and to complete the sentence prompts. Answer any questions students have as they work.

Disciplinary Core Ideas
- **PS2.A:** Forces and Motion
- **PS2.B:** Types of Interactions
- **ETS1.B:** Developing Possible Solutions

Science and Engineering Practice
- Planning and Carrying Out Investigations

Crosscutting Concept
- Cause and Effect

5Es
- Elaborate

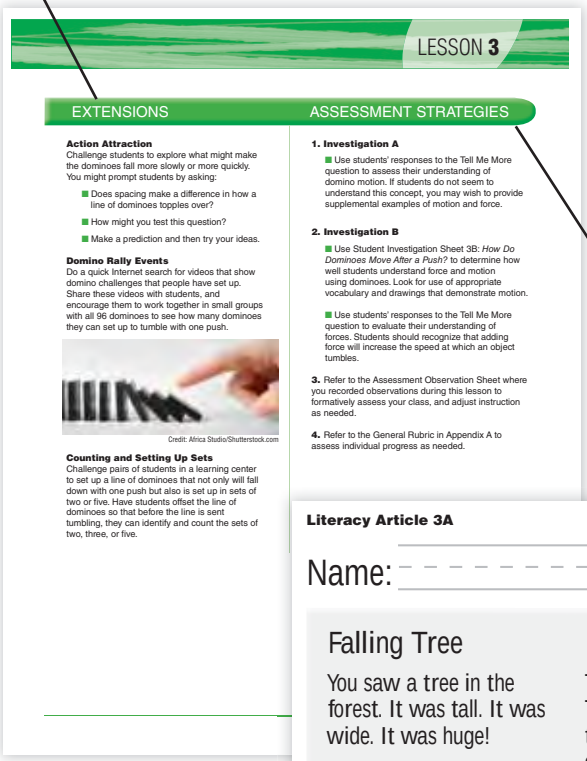
Teaching Tip

Depending on the setup, some students' dominoes may continue to fall if they are very close together. If students appear to struggle with this concept, you may wish to lead a demonstration. Show what happens when you remove one of the middle dominoes, when you remove two dominoes that are side by side, and when you remove two dominoes from different locations.

How can you change how fast something tumbles?

Tell Me More!

Extensions



LESSON 3

EXTENSIONS | ASSESSMENT STRATEGIES

Action Attraction
Challenge students to explore what might make the dominoes fall more slowly or more quickly. You might prompt students by asking:

- Does spacing make a difference in how a line of dominoes topples over?
- How might you test this question?
- Make a prediction and then try your ideas.

Domino Rally Events
Do a quick Internet search for videos that show domino challenges that people have set up. Share these videos with students, and encourage them to work together in small groups with all 96 dominoes to see how many dominoes they can set up to tumble with one push.

Credit: Africa Studio/Shutterstock.com

Counting and Setting Up Sets
Challenge pairs of students in a learning center to set up a line of dominoes that not only will fall down with one push but also is set up in sets of two or five. Have students offset the line of dominoes so that before the line is sent tumbling, they can identify and count the sets of two, three, or five.

1. Investigation A

- Use students' responses to the Tell Me More question to assess their understanding of domino motion. If students do not seem to understand this concept, you may wish to provide supplemental examples of motion and force.

2. Investigation B

- Use Student Investigation Sheet 3B: *How Do Dominoes Move After a Push?* to determine how well students understand force and motion using dominoes. Look for use of appropriate vocabulary and drawings that demonstrate motion.
- Use students' responses to the Tell Me More question to evaluate their understanding of forces. Students should recognize that adding force will increase the speed at which an object tumbles.

3. Refer to the Assessment Observation Sheet where you recorded observations during this lesson to formatively assess your class, and adjust instruction as needed.

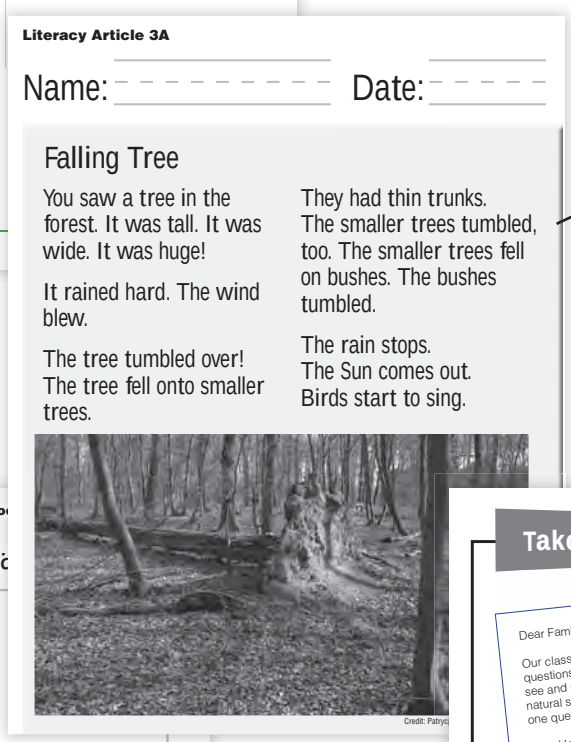
4. Refer to the General Rubric in Appendix A to assess individual progress as needed.

Additional Features

- Lesson Overview Charts
- Guide to Instructional Scaffolding
- Teacher Preparation
- Background Information
- NGSS Standards by Lesson
- Literacy and Digital Components
- Summative Assessment

Assessment Strategies

Literacy Articles



Literacy Article 3A

Name: _____ Date: _____

Falling Tree

You saw a tree in the forest. It was tall. It was wide. It was huge!

It rained hard. The wind blew.

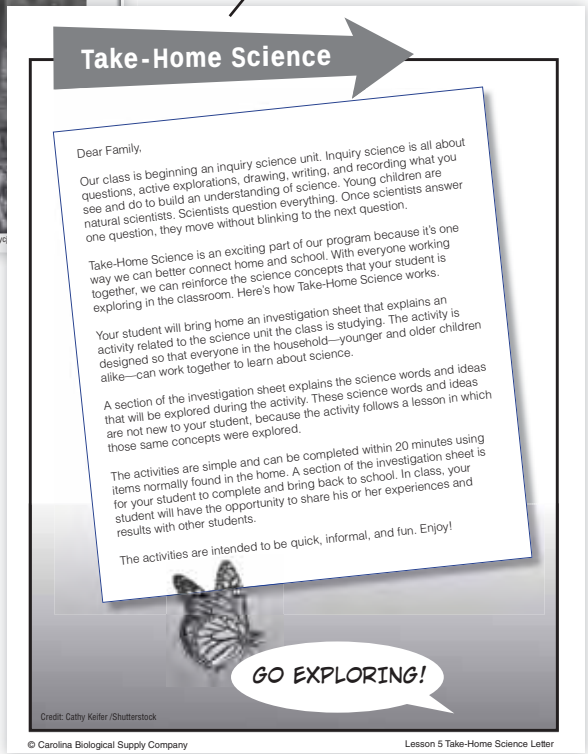
The tree tumbled over! The tree fell onto smaller trees.

They had thin trunks. The smaller trees tumbled, too. The smaller trees fell on bushes. The bushes tumbled.

The rain stops. The Sun comes out. Birds start to sing.

Credit: Patryc

Take-Home Science Activities



Take-Home Science

Dear Family,

Our class is beginning an inquiry science unit. Inquiry science is all about questions, active explorations, drawing, writing, and recording what you see and do to build an understanding of science. Young children are natural scientists. Scientists question everything. Once scientists answer one question, they move without blinking to the next question.

Take-Home Science is an exciting part of our program because it's one way we can better connect home and school. With everyone working together, we can reinforce the science concepts that your student is exploring in the classroom. Here's how Take-Home Science works.

Your student will bring home an investigation sheet that explains an activity related to the science unit the class is studying. The activity is designed so that everyone in the household—younger and older children alike—can work together to learn about science.

A section of the investigation sheet explains the science words and ideas that will be explored during the activity. These science words and ideas are not new to your student, because the activity follows a lesson in which those same concepts were explored.

The activities are simple and can be completed within 20 minutes using items normally found in the home. A section of the investigation sheet is for your student to complete and bring back to school. In class, your student will have the opportunity to share his or her experiences and results with other students.

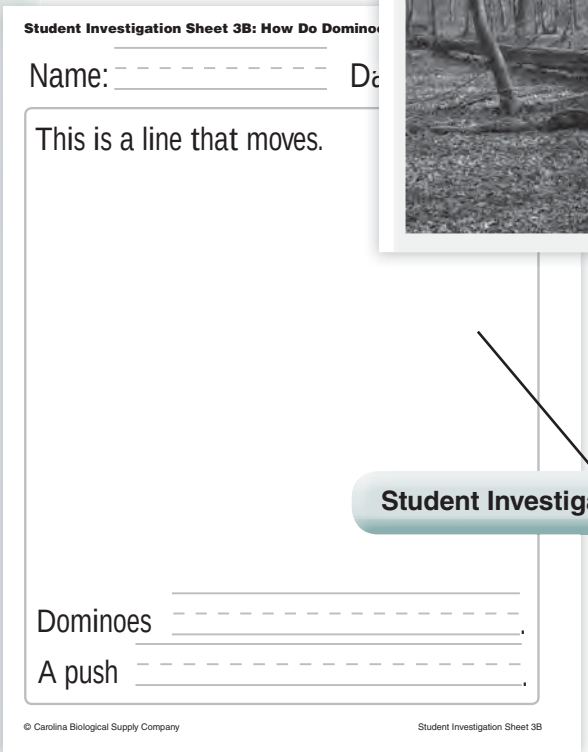
The activities are intended to be quick, informal, and fun. Enjoy!

GO EXPLORING!

Credit: Cathy Keifer /Shutterstock

© Carolina Biological Supply Company Lesson 5 Take-Home Science Letter

Student Investigation Sheets



Student Investigation Sheet 3B: How Do Dominoes

Name: _____ Da

This is a line that moves.

Dominoes _____.

A push _____.

© Carolina Biological Supply Company Student Investigation Sheet 3B

Every unit anchored in phenomena

Exploring Organisms

Unit Overview

Our world is composed of living and nonliving things that are in constant interaction. All living organisms have the same basic needs for survival: air, food, water, and shelter (space). How organisms access resources to meet these needs differs greatly. Plants and animals have specific structures to suit their specific needs and environments. Some organisms receive care from their parents that helps them reach adulthood. The hands-on, inquiry-based investigations of *Exploring Organisms* focus on phenomena that support concepts related to the growth, survival, and reproduction of organisms. Through a series of four lessons, students identify structures that are unique to different organisms, explain life cycles and parent–offspring relationships, and draw conclusions about the characteristics, or traits, of organisms and how those traits indicate family relationships. Students make comparisons between all these concepts and their own human abilities and needs.

Unit Anchoring Phenomenon

Students may have experience caring for something, such as a garden or a pet, and can recognize some of the needs that plants and animals have. However, they may not make connections between those needs and their own needs. All living things have parents and express the same foundational needs: air, water, food, and shelter. Beyond these similarities, different types of plants and animals vary in their dependence on parents, patterns of growth, and structures. The anchoring phenomenon for *Exploring Organisms* is the survival of plants and animals based on their environment and access to resources.

	LESSON 1	LESSON 2
INVESTIGATIVE PHENOMENA	You plant three different seeds in your backyard. One seed is planted in soil in the sunlight; it is supposed to grow into a sunflower. The second seed is planted in soil in the shade; it is supposed to grow into an oak tree. The third seed is planted in a pot with soil. The pot is put in a place with no sunlight. The seed is supposed to grow into a cactus. A few weeks later, you notice that only the sunflower and the oak tree plants have grown. The sunflower is much taller than the oak tree and has more leaves. What does this make you wonder?	You are helping to choose a class pet. One of your friends wants to get a fish. Another friend suggests baby chickens. Your teacher explains that the class pet must be able to communicate and easily adapt to the classroom environment. What does this make you wonder?
OBJECTIVES	■ Distinguish between living and nonliving things in the environment. ■ Identify the needs of living things. ■ Draw connections between body structures and their functions to explain how they are used to meet an organism's needs. ■ Recognize patterns in structures and their functions. ■ Set up an environment and make predictions about the growth of a bean plant.	■ Draw conclusions about insects based on their observable structures. ■ Identify plant and animal adaptations and how they are influenced by the environment. ■ Mimic organisms' structures to explain their adaptations.
SCAFFOLDING Students should know:	↓ Living and nonliving things exist on Earth. ↓ Nonliving things have never been alive, but they do interact with living things, which are alive or have been alive at one time. ↓ All living things, or organisms, have the same basic needs: air, water, food, and shelter. ↓ Plants begin as seeds. ↓ Organisms have body parts, or structures, that help them survive and meet their needs.	↓ Insects are animals, and their bodies often display similar patterns. ↓ Organisms have adaptations, which are structures and repetitive behaviors that help them survive in a specific environment. ↓ Adaptations vary for organisms in different environments. ↓ Humans have structures that allow them to communicate in complex ways. ↓ Organisms have specialized structures that help them to survive in their environments.

Concepts build from one lesson to the next

	LESSON 3	LESSON 4	LESSON 5
	Outside of the school, a goose lays its eggs. The mother goose sits on the eggs all day long. The father goose guards the mother and the eggs. The eggs hatch! Tiny goslings sit in the nest. You decide to take a closer look. The mother and father goose hiss and squawk at you. They bring food to their babies. Later, they lead the baby geese to a pond. They walk in a line behind the mother. What does this make you wonder?	Chicken eggs come in different varieties. Some are white, others are brown. Some eggs have speckles. The mother chicken sits on the eggs. After some time, baby chickens hatch from the eggs. She cares for the chicks. None of the baby chicks look like the mother. Some chicks have yellow feathers, while others are brown or black. All the chicks have the same mother. What does this make you wonder?	Crows like to eat grubs. Grubs can be hard to find because they live inside trees. Crows break twigs off trees and use their beaks to remove the bark from the twig. They bend the end of the twig into a hook. Crows use the hooked twig to scrape the grubs out of the tree. What does this make you wonder?
	■ Identify the ways parents care for their young. ■ Recognize that some but not all organisms require assistance from their parents during development. ■ Use text and media to determine patterns in the animal kingdom between parents and their offspring that provide offspring with a better chance of survival. ■ Use oral and written communication skills to explain that organisms develop at different rates and that some animal parents need to care for their offspring longer than others.	■ Compare similarities and differences between oneself and one's parents. ■ Use patterns to explain how traits are inherited, or passed, from parents to offspring. ■ Identify similarities and differences between animal offspring and their parents. ■ Observe a bean plant to collect evidence of the similarities and differences between plant parents and plant offspring. ■ Construct an evidence-based account that young plants and animals are similar but not identical to their parents.	■ Draw and label plant structures from a bean plant and describe their functions. ■ Identify specific adaptations of organisms and how they help the organism survive in its specific environment. ■ Design a solution to a human problem by mimicking how plants and/or animals use their external structures to help them survive. ■ Evaluate learning from throughout the unit about organisms, and compare that knowledge to initial ideas from the beginning of the unit.
	↓ Organisms develop at different rates. ↓ Some organisms develop inside their mother, others develop in eggs, and others develop from seeds. ↓ Though organisms have adaptations, they may not have the skills to survive on their own after they are born. ↓ Plants do not rely on their parents to help them get the resources they need to grow and develop. ↓ The relationship between a baby and its parent differs among animals. Animal parents can provide care by teaching, showing love, feeding, and protecting.	↓ Humans share traits with their family members, especially their parents and siblings. ↓ A baby gets its traits from both its mother and father. ↓ Most animal babies look similar to but not exactly like their parents. ↓ Some animals take a long time to develop before they look like their parents. ↓ Plants will look similar to but not exactly like the parent plant.	↓ Specialized structures that help an organism survive in its particular environment are often adaptations. ↓ Organisms living in the same environment often have similar structures. ↓ Plants begin as seeds and develop stems, roots, leaves, and other specialized structures. ↓ Plant structures vary based on the size, location, and type of plant. ↓ Some types of plants and animals have structures that act similarly to human structures.

NGSS correlations by lesson

Lesson 4: Comparing Parents and Their Young

Investigation Overview

Investigation A: Why Do Children Look Different from Their Parents?
5Es: Explore, Explain
Students analyze family photos to draw conclusions about how traits are shared among related organisms.
- **Teacher Preparation:** 15 minutes
- **Lesson:** 30 minutes

Tell Me More! Lion and tigers are both "big cats." Will baby lions and baby tigers look the same?

Investigation B: How Do Animal Babies Compare to Their Family Members?
5Es: Explore, Explain, Elaborate
Students sketch and match baby animals with their parents to explain patterns in their characteristics.
- **Teacher Preparation:** 20 minutes
- **Lesson:** 30 minutes

Tell Me More! A parent mouse has black eyes. Will the baby mouse have black eyes?

Investigation C: How Do Young Plants Compare to Their Parents?
5Es: Explore, Explain
Students observe their bean plants and make comparisons between their plants and a "parent" plant.
- **Teacher Preparation:** 5 minutes
- **Lesson:** 30 minutes

Tell Me More! One tree grows apples. Another tree grows bananas. Can these trees be siblings?

30-minute investigations fit into your busy day

Standards

Next Generation Science Standards Performance Expectation
- **1-LS3-1:** Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Disciplinary Core Ideas
- **LS1.B:** Growth and Development of Organisms
- **LS3.A:** Inheritance of Traits
- **LS3.B:** Variation of Traits

Science and Engineering Practices
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Crosscutting Concept
- Patterns

Language and Math Standards
Language Arts
- **RI.1.1:** Key Ideas and Details
- **RI.1.2:** Key Ideas and Details
- **RI.1.7:** Integration of Knowledge and Ideas
- **SL.1.1:** Comprehension and Collaboration
- **SL.1.2:** Comprehension and Collaboration
- **SL.1.4:** Presentation of Knowledge and Ideas
- **SL.1.5:** Presentation of Knowledge and Ideas

Math
- **1.MD.A.1:** Measure lengths indirectly and by iterating length units.
- **1.MD.C.4:** Represent and interpret data.

Integrated ELA and math

Resources

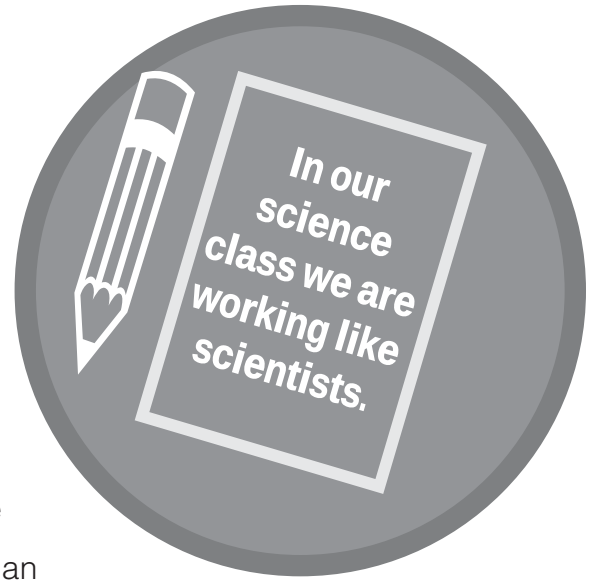
Student Investigation Sheets
- Student Investigation Sheet 4A: *What Are Your Family Traits?*
- Student Investigation Sheet 4B: *Can You Prove They Are Family?*
- Take-Home Science Activity: *Looking at the Past*

Literacy Components
- *Exploring Organisms* Literacy Reader, pgs. 8–10
- Literacy Article 4C: The Tree and The Frog

Digital Components
- Simulation: Factors of Plant Growth, Part 1
- Simulation: Organism Growth

Vocabulary
- Child
- Leaves
- Life cycle
- Roots
- Stem
- Trait

Safety Contract



In science class, I will:

- ■ Listen to directions
- ■ Complete each step of the experiment
- ■ Look, feel, smell, and listen but never taste
- ■ Wait to begin until my teacher tells me
- ■ Wear safety goggles when my teacher tells me
- ■ Ask my teacher to approve any experiment I plan on my own or with classmates
- ■ Keep my hands away from my mouth and eyes as I work
- ■ Tie back long hair
- ■ Tuck in loose clothing
- ■ Keep my workstation neat
- ■ Put away materials after use
- ■ Follow all safety rules

I have read this contract and will follow these safety rules in science class.

Student's signature _____

Date _____

I have read this safety contract and understand what is expected of my child during science class.

Parent/Guardian's signature _____

Date _____

Note to Parent/Guardian:
Science materials and activities are chosen for safety and age appropriateness.

All lessons are anchored in phenomena

Comparing Parents and Their Young

LESSON ESSENTIALS

Performance Expectation
- **1-LS3-1:** Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Disciplinary Core Ideas
- **LS1.B:** Growth and Development of Organisms
- **LS3.A:** Inheritance of Traits
- **LS3.B:** Variation of Traits

Science and Engineering Practices
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Crosscutting Concept
- Patterns

Literacy Components
- *Exploring Organisms* Literacy Reader, pgs. 8–10
- **Literacy Article 4C:** The Tree and the Frog

Digital Components‡
- **Simulation:** Factors of Plant Growth, Part 1
- **Simulation:** Organism Growth

‡Accessible at Carolina Science Online

VOCABULARY
- Child
- Leaves
- Life cycle
- Roots
- Stem
- Trait

PHENOMENON
Read the investigative phenomenon aloud to the class. Encourage students to generate questions about what they hear. Keep track of students' questions on a class chart, or have students record the questions in their science notebooks. Refer to these questions at the end of the lesson and throughout the unit to support the unit's anchoring phenomenon.

Investigative Phenomenon for Lesson 4: Chicken eggs come in different varieties. Some are white, others are brown. Some eggs have speckles. The mother chicken sits on the eggs. After some time, baby chickens hatch from the eggs. She cares for the chicks. None of the baby chicks look like the mother. Some chicks have yellow feathers, while others are brown or black. All the chicks have the same mother. What does this make you wonder?

Anticipated Questions:
- Why do the chicks look different from one another?
- Does the color of the egg affect how the chick looks?
- How does the mother chicken care for the chicks?

LESSON OVERVIEW
In the previous lesson, students focused on the relationships between offspring and their parents. In this lesson, students will compare the appearance of parents and their young. Students will examine photos of their own families to identify similarities and differences. They extend their ideas about parent–young relationships to plants by comparing their bean plants to a "parent" plant. Students should be able to make predictions about an organism's characteristics by examining its parents. In the next lesson, students will review what they have learned by drawing conclusions about organisms' structures and their needs for survival. They will be challenged to solve a human problem using animal or plant structures.

INVESTIGATION OVERVIEW
Investigation A: Why Do Children Look Different from Their Parents?
Students analyze family photos to draw conclusions about how traits are shared among related organisms.
- **Teacher Preparation:** 15 minutes
- **Lesson:** 30 minutes

Investigation B: How Do Animal Babies Compare to Their Family Members?
Students sketch and match baby animals with their parents to explain patterns in their characteristics.
- **Teacher Preparation:** 20 minutes
- **Lesson:** 30 minutes

Investigation C: How Do Young Plants Compare to Their Parents?
Students observe their bean plants and make comparisons between their plants and a "parent" plant.
- **Teacher Preparation:** 5 minutes
- **Lesson:** 30 minutes

Credit: GoDog Photo/Shutterstock.com

OBJECTIVES

- Compare similarities and differences between oneself and one's parents.
- Use patterns to explain how traits are inherited, or passed, from parents to offspring.
- Identify similarities and differences between animal offspring and their parents.
- Observe a bean plant to collect evidence of the similarities and differences between plant parents and plant offspring.
- Construct an evidence-based account that young plants and animals are similar but not identical to their parents.

MATERIALS

Student

1 Science notebook*
1 Student Investigation Sheet 4A: *What Are Your Family Traits?*
1 Student Investigation Sheet 4B: *Can You Prove They Are Family?*
1 Take-Home Science Letter
1 Take-Home Science Activity: *Looking at the Past*
1 Photograph of student with family*
1 Bean plant (from Lesson 1)
1 Hand lens

Team of two students

1 Animal Parents and Their Babies Card Set

Teacher

1 Plant Poster
12 Resealable plastic bags
1 Pair of scissors*
1 Photograph of yourself with your family or a photograph of an animal family*
Assessment Observation Sheet: Lesson 4
Photographs of yourself as a baby, a child, a teen, and an adult*
Projection system* (optional)

NOTE: A materials list for each investigation precedes the procedure within the lesson.

*These materials are needed but not supplied.

TEACHER PREPARATION

Investigation A

1. Make a copy of Student Investigation Sheet 4A: *What Are Your Family Traits?* for each student.

2. Locate a picture of yourself as a baby, a child, a teenager, and an adult. Alternatively, you may choose images of another person or an animal.

3. Locate a picture of yourself with your parent(s) and any siblings. Alternatively, you may choose images of another human or animal family.

4. Find alternative images for students who do not have access to family photos. See Planning Ahead in Lesson 2 for more details.

5. Students will observe one another's photos during this investigation. Determine a method for students to exchange photos with at least four other students.

6. Make a copy of Assessment Observation Sheet: Lesson 4 for yourself. During the investigations in this lesson, use the questions and prompts on this sheet to formatively assess students as they work.

Investigation B

1. Make a copy of Student Investigation Sheet 4B: *Can You Prove They Are Family?* for each student.

2. Locate the 12 Animal Parents and Their Babies Card Sets provided in the kit. If this is your first time using the cards, cut each of the sheets apart to make 12 sets of 16 cards (8 parents and 8 babies per set). Place each set of cards in a resealable plastic bag.

NOTE: Consider laminating these sheets before cutting out the cards for student use. This will increase their longevity over many uses. Store the card sets in the resealable plastic bags at the end of the investigation for use the next time you teach this unit.

3. For each student, make a copy of the Take-Home Science Activity: *Looking at the Past.* Make a copy of the Take-Home Science Letter to send home with the activity sheet.

4. Have your Assessment Observation Sheet ready to continue formatively assessing students.

Investigation C

1. Students will need to access their bean plants from Lesson 1. Also, have the plants you prepared earlier available for students to observe.

2. Have a hand lens from the kit available for each student.

3. Have available the Plant Poster from the kit materials.

4. Have your Assessment Observation Sheet ready to continue formatively assessing students.

Just-in-time background information

BACKGROUND INFORMATION

As young plants and animals make their way to adulthood, they grow and develop in a process that is commonly referred to as a **life cycle**. Life cycles vary from species to species. Some baby animals, such as tigers and alligators, mirror the appearance of their parents. Others undergo a more dramatic change, such as a caterpillar turning into a butterfly or a tadpole turning into a frog. On the other hand, plants typically begin as a seed and, once they germinate, will continue their life cycle if the environmental conditions and access to resources are favorable. Over time, a seed develops **roots**, a **stem**, and eventually **leaves**. The root system will begin to anchor the plant in the ground, allowing the stem to grow upward and break the soil. As the plant grows, its roots spread deeper and wider. Leaves also develop along the stem to increase the plant's surface area and absorb sunlight to make food.

Regardless of the type of organism, individuals within a species have many **traits** in common. Students should be able to group organisms based on their external structures and body arrangement; however, this lesson will ask students to compare the appearance of a baby organism with that of its parents. Students should understand that offspring look similar but not identical to their parents. This is related to the concept of heredity, or the passing of traits from parents to offspring by merging sperm and egg and combining DNA. Although genetics is a difficult topic for students at this level, they should understand that characteristics from the mother and the father combine to create the appearance of the baby organism. For example, they should recognize that their hair color may match their mother's, while their eye color is similar to their father's. Assist students in extending this idea to animals and plants by making observations and comparisons of external traits between young organisms and adults, such as color, size, and shape.

ELA connection SL1.1, SL.1.2, SL.1.4

3-dimensional learning

Investigation A

WHY DO CHILDREN LOOK DIFFERENT FROM THEIR PARENTS?

MATERIALS

- **Student**

1 Science notebook*
1 Student Investigation Sheet 4A: *What Are Your Family Traits?*
1 Photograph of student with family*

- **Teacher**

Assessment Observation Sheet: Lesson 4
Photograph of yourself with your family or of an animal family*
Photographs of yourself as a baby, a child, a teen, and an adult*
Projection system (optional)*

*These materials are needed but not supplied.

Disciplinary Core Ideas
- **LS1.B:** Growing and Development of Organisms
- **LS3.A:** Inheritance of Traits
- **LS3.B:** Variation of Traits

Science and Engineering Practice
- Engaging in Argument from Evidence

Crosscutting Concept
- Patterns

5Es
- Explore
- Explain

Literacy Components
- *Exploring Organisms* Literacy Reader, pg. 8

Digital Component
- **Simulation:** Organism Growth

1. Review the patterns of care that exist between parents and offspring of different species. Remind students that some animal parents provide care, food, and protection for their babies. Other animal and plant parents do not provide these things.

2. Display the pictures of yourself as a baby, a **child**, a teenager, and an adult. Encourage students to think about the progress of "growing up." Ask the following questions to guide a discussion:

- What do you notice about these pictures? (*Answers will vary. Students should note differences and similarities in characteristics such as appearance, age, and size.)*
- Which characteristics have stayed the same? Which have changed? *(Answers will vary.)*
- How long does it take to become an adult? Is this the same for all animals? *(Answers will vary. Students should explain that different animals require different lengths of time to become fully grown.)*

Digital Tip

Use the Organism Growth simulation to support the concept of growth. Make sure students can explain that all organisms require different lengths of time to become fully grown.

Digital simulations to enrich concepts

3. Explain that organisms change in appearance as they grow up and that they develop different characteristics from other organisms. Direct students to look at their neighbor and to carefully observe what he or she looks like. Ask:

- What traits do we all have in common as humans? *(Eyes, mouth, hair, legs, arms, thumbs, lips, ears, brain, heart, etc.)*
- Do you look exactly like anyone in this class? *(No)*
- Do you look like anyone you know? *(Students might suggest parents, siblings, or grandparents.)*
- Why do you think that is? *(Answers will vary.)*

Identify Phenomena

You may have a student who has an identical twin. Explain that this is rare but does happen. Explain that the appearance of the twins may be very similar but that they have different personalities and preferences.

4. Display a photo of your family or a photo of an animal family. Provide time for students to observe the photo, and ask them to list in their science notebooks the characteristics of each person (or animal) in photo. Guide a class discussion about resemblance and traits by asking the following questions:

- Everyone in this photo is related, or in the same family. Is everyone in this photo exactly the same? *(No)*
- What are some traits that I have in common with my family members? Do you notice any patterns? *(Answers will vary.)*
- What characteristics make me different from my family members? *(Answers will vary.)*

5. Ask students to observe the photograph of their family that they brought to class. Have them compare the characteristics of the family members. Remind students to focus on physical characteristics, such as hair color, eye color, hair type, and eye shape. Ask:

- In what ways do you look like your parents? In what ways do you look different from them?

6. Distribute a copy of Student Investigation Sheet 4A: *What Are Your Family Traits?* to each student. Explain that students will study other photos and observe the similarities and differences between family members. Guide students to fill in the first row by writing or drawing one similarity they have with a parent and one difference that they see.

Differentiation

Differentiation Strategy

These questions enforce the use of claims, evidence, and reasoning. If students struggle to provide reasoning, display images of animals that are related and animals that are not related. Encourage students to explain the patterns they see.

7. Tell students they will observe their classmates' photos. Explain how students will share photos. Tell students that they will fill in one row of the chart on the investigation sheet for every photo they observe. Allow ample time for students to observe photos and fill in the chart. Guide them through the process of exchanging photos as needed.

8. Gather as a class to discuss students' observations. Ask:

- What patterns did you notice as you looked at the photographs? *(Students should conclude that babies and children look similar to their parents but not exactly like them, or that everyone has things in common but some differences that make them unique, or special, as well.)*
- Do you think all living things look similar to but still a little bit different from their parents? *(Answers will vary.)*
- What evidence do you have to support your answer? *(Students may be able to come up with a specific example, such as that puppies usually look like their mother but have different colors or designs in their fur.)*
- Why do humans look similar to members of their family? *(Answers will vary. Students should explain that they look similar because they are related, or in the same family.)*

9. Summarize this investigation by explaining that certain traits, or characteristics, are passed on in families. Explain that each student is a combination of their mother's characteristics and their father's characteristics. Emphasize that each member of a family has similarities and differences. No two people or animals are exactly alike. We look similar to our parents and siblings but not exactly like them.

Formative assessment

? Lion and tigers are both "big cats." Will baby lions and baby tigers look the same?

Tell Me More!

Investigation B

HOW DO ANIMAL BABIES COMPARE TO THEIR FAMILY MEMBERS?

MATERIALS

- **Student**

1 Science notebook*
1 Student Investigation Sheet 4B: *Can You Prove They Are Family?*
1 Take-Home Science Letter
1 Take-Home Science Activity: *Looking at the Past*

- **Team of two students**

1 Animal Parents and Their Babies Card Set

- **Teacher**

1 Pair of scissors*
12 Resealable plastic bags
Assessment Observation Sheet: Lesson 4

*These materials are needed but not supplied.

Disciplinary Core Ideas
- **LS3.A:** Inheritance of Traits
- **LS3.B:** Variation of Traits

Science and Engineering Practices
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Crosscutting Concept
- Patterns

5Es
- Explore
- Explain
- Elaborate

Literacy Components
- *Exploring Organisms* Literacy Reader, pgs. 9–10

1. Review the idea that although human babies share traits with their parents, they do not look exactly like them. Ask:

- Do you think humans look more like their parents when they are babies or when they are older? *(A human will look more like its parents as it gets older.)*
- Think about a dog. Do puppies look like their parents when they are born? *(Puppies will look similar to but not exactly like their parents. Puppies are smaller than their parents and might be a different color.)*
- Think about a frog. Do frogs look like their parents when they hatch from their eggs? *(No, frogs look different from their parents because they are tadpoles and do not have legs or arms. Baby frogs appear to look more like fish.)*
- Imagine a fish tank full of goldfish. Would it be easy to tell which are the baby goldfish and which are the parents? *(Students should explain that the baby goldfish might be smaller than the parents, but otherwise they would look similar.)*

ELA connection SL.1.1, SL.1.2

Connect to phenomena

Identify Phenomena

Prompt students to think about how they look compared to their cousins or members of their extended family. This supports the idea that characteristics can be passed on through generations. Explain that animals also pass on traits. Use the image of the puppies from the Animal Parent and Baby Card Set as support.

2. Explain that students will compare baby animals to their parents in this investigation. Distribute a copy of Student Investigation Sheet 4B: *Can You Prove They Are Family?* to each student. Direct students to Part A and ask them to record a prediction about whether they think animal babies look exactly like, similar to, or nothing like their parents. After some time, ask a few volunteers to share their predictions. Ask them to explain their reasoning for their prediction to the class.

3. Provide each pair of students with an Animal Parents and Their Babies Card Set. Instruct students to work together to match each parent to the correct baby. Check parent-and-baby pairings as students complete the sort.

4. When all students have completed their pairings, ask them to complete Part B of the investigation sheet. Explain that students should work together to identify one parent-and-baby pairing that demonstrates each of the following:

- Baby looks exactly like the parent. *(Snake)*
- Baby looks similar to but not exactly like the parent. *(Toucan, mountain lion, duck, dog, shark)*
- Baby looks nothing like the parent. *(Butterfly/caterpillar, frog)*

Direct students to draw one parent-and-baby pair in each box in Part B of Student Investigation Sheet 4B and label each drawing as "exact," "similar," or "nothing like" using the line above the box.

Teaching Tip

Students do not need to understand genetics as the transmission of traits through generations or mutations, but you should explain that differences help make every living thing on this planet special, or unique.

5. After giving students time to complete the drawings, gather the class for a discussion about the patterns they noticed between animal babies and their parents. Ask the following questions:

- Which baby animals looked exactly like their parents? Similar to their parents? Nothing like their parents?
- Think about the baby animals that looked nothing like their parents. How did you know they were related, or part of the same family? *(Students should call upon previous knowledge to explain that tadpoles grow into frogs and caterpillars will grow into butterflies. Draw students' attention to the idea that organisms develop differently.)*
- Using the cards and your drawings, provide examples of ways that babies look the same as their parents. *(Answers will vary. For example, some babies had similar features, such as beaks or scales.)*
- Using the cards and your drawings, provide examples of ways that babies look different from their parents. *(Answers will vary. For example, some babies have different colors or have spots on their fur.)*
- Did you notice any patterns when comparing the baby animals and their parents? *(Most baby animals look similar to but not exactly like their parents.)*

- Why might it be difficult to tell if two animals are related? *(Answers will vary. Students may explain that babies can look different from their parents, so it can be difficult to tell if they are related.)*

6. Challenge students to employ claims, evidence, and reasoning to answer the following questions:

- How do baby animals compare to their parents? *(Students should explain that most baby animals tend to look similar to but not exactly like their parents. Some animals need time to develop, or grow, before they look like their parents.)*
- How do you know? *(We looked at images of many different types of animals, and we observed the same pattern again and again—the babies look like the parents but not exactly like them.)*
- Why don't babies look exactly like their parents? *(Answers will vary. If students struggle to explain this, prompt them to think about a baby having a combination of characteristics from each parent.)*

7. Ask students to make a conclusion in Part C of Student Investigation Sheet 4B by filling in the blanks to complete the sentence. Students should explain that animal parents and babies look similar to each other but not exactly alike.

8. Provide each student with the Take-Home Science Letter and Take-Home Science Activity: *Looking at the Past*. Explain that they will do an activity at home with their families and bring the completed sheet back to school to share with the class.

Tell Me More!

? A parent mouse has black eyes. Will the baby mouse have black eyes?

Take-Home Science

Looking at the Past
Students will compare family members to look for similarities and differences among them. Students will work with their families to locate photographs of different generations of family members. They will make a list of traits that family members have in common as well as a list of differences. Send home a copy of the Take-Home Science Letter with the investigation sheet.

ELA connection SL.1.4, SL.1.5

Disciplinary Core Ideas
- **LS1.B:** Growth and Development of Organisms
- **LS3.A:** Inheritance of Traits
- **LS3.B:** Variation of Traits

Science and Engineering Practice
- Engaging in Argument from Evidence

Crosscutting Concept
- Patterns

5Es
- Explore
- Explain

Literacy Component
- **Literacy Article 4C:** *The Tree and the Frog*

Digital Component
- **Simulation**: Factors of Plant Growth, Part 1

Literacy Tip

Transition into a discussion about plants by reading Literacy Article 4C: The Tree and the Frog. Prompt students to think about how each organism changes as it grows.

Literacy integration

Identify Phenomena

Some forests have been around for a very long time and have many lineages of trees. Explain that scientists can determine the age of a tree by cutting it down and counting its rings. Help students make connections to the idea that a single tree can produce hundreds of other trees in its lifetime.

Investigation C

HOW DO YOUNG PLANTS COMPARE TO THEIR PARENTS?

ELA connection SL.1.1, SL.1.4

MATERIALS

- **Student**

1 Science notebook*
1 Bean plant (from Lesson 1)
1 Hand lens

- **Teacher**

1 Plant Poster
Assessment Observation Sheet: Lesson 4
*These materials are needed but not supplied.

1. Ask students to summarize how human babies and other animal babies compare to their parents. Ask the following questions to review:

- Do all baby animals look like adults when they're born? *(No, most baby animals do not look like adults when they are born.)*
- When does a baby animal begin to look like an adult? *(Students should understand that this depends on the type of animal. Animals develop, or grow up, over different spans of time.)*
- Do baby animals look like their parents when they are adults? *(As a baby animal develops and gets older, it begins to look more similar to its parents, but it will not look exactly like the parents no matter how old it gets.)*
- Provide an example of a young animal that looks similar to its parents. Provide an example of a young animal that looks very different from its parents. *(Examples of young animals that look similar to parents are fish and reptiles. Examples of young organisms that do not look similar to their parents are mammals, insects, amphibians, and birds.)*

Instruct students to make a prediction about how young plants will compare to their parents and record it in their science notebooks. Allow time for some students to volunteer their predictions.

2. Ask students to think about how young plants compare to their parents. Have students discuss with a partner and make a prediction about how their beans plants would compare to a parent bean plant. After some time, invite students to share their ideas.

3. Direct students to get their bean plants from Lesson 1 and bring them to their seats. Provide each student with a hand lens. Allow time for students to make observations about their plants and record those observations individually in their science notebooks.

4. Guide a class discussion about student's plants using the following questions:

- What did your plant look like when you first planted it? *(A seed)*
- How has your plant changed? *(It has grown taller, it has structures, it is coming out of the soil.)*
- Can you identify any structures, or parts, of your plant? *(Students should be able to identify the leaves, stem, and flowers, if applicable.)*
- What major plant part can't we see right now? Why can't we see it? *(Students may know that the roots can't be seen because they are in the soil.)*

5. Display the Plant Poster. Prompt students to observe the diagram and analyze how and why their bean seeds were able to grow into plants. Explain that, like animals, all plants have a life cycle.

6. Display the bean plant you have been growing throughout the unit. This plant should be more developed than students' plants at this point. Describe this plant as the "parent." Instruct students to compare and contrast their plants with your plant, and write their ideas in their science notebooks.

7. Allow time for students to make comparisons of the plants. Invite students to share their observations and make comparisons between the parent and baby plants in a class discussion. Help students use claims, evidence, and reasoning when describing their observations as a way to assess students' understanding. Ask:

- How do young plants compare to their parents? *(The young plant looks similar but not identical to the parent.)*
- What evidence do you have? *(The young plant and parent plant share similar characteristics, but there also differences between them.)*
- Do you think all plants, including flowers, grass, and trees, look similar to but different from their parents? *(Answers will vary.)*
- Why do you think the parent plant and the young plant look slightly different from each other? *(The young plant is still growing and developing, but the parent plant is fully grown.)*
- Can you think of a reason two sibling plants might look different from each other? For example, what if one plant was growing inside and one plant was growing outside? *(Students should make the connection that sibling plants might have not have access to the same resources or their needs might be met in similar ways, and that this might affect how the look and grow.)*

Math connection 1.MD.A.1

Digital Tip

Use the simulation Factors of Plant Growth, Part 1, to demonstrate what plants need to grow. Make connections to the resources that were used to help students' bean seeds grow.

Teaching Tip

Encourage students to observe their classmates' plants as well. Challenge students to consider if these plants are more like "siblings" or "cousins."

Tell Me More!

One tree grows apples. Another tree grows bananas. Can these trees be siblings?

Connecting ideas about phenomena to evidence

Phenomenon

Review students' questions about the investigative phenomenon from the beginning of this lesson. Guide students in applying the concepts explored in this lesson and connecting them to the anchoring phenomenon: the survival of plants and animals based on their location and access to resources. By the end of the lesson, students should be able to explain that:

- A mother chicken cares for her babies by sitting on the eggs to keep them warm. She also teaches the chicks to find food and water.
- The baby chickens look different from their parents but share some similar structures.
- Before hatching, chickens get their nutrients from the inside of the egg. After they hatch, chicks get food from their mother or father.
- Chicks change in appearance over time, growing larger feathers and wings, developing a comb on their head, and possibly changing in color. While the chicks develop, they depend on their parents to help them get the resources they need to grow.

NOTES

EXTENSIONS

How Animal Babies Stay Safe Literacy Extension

Obtain a copy of *How Animal Babies Stay Safe* by Mary Ann Fraser. Read the book as a class, and ask students to point out ways that animal parents protect and care for their young. Encourage students to look for patterns, and create a chart to describe different strategies. Ask the following questions to facilitate a conversation:

- Did all the animal parents act the same way? *(No)*
- Which animal parents did things that were similar, or close to the same, as one another?
- Considering all the behaviors we read about, what do you think are the four main ways that animals take care of their young? *(Protect, feed, show love, and teach)*

Comparing Babies

Challenge students with word problems that compare the number of babies that two different sets of parents have. Have students determine whether they should use a less-than, greater-than, or equal sign when comparing the two numbers. Use those provided or create your own.

- A sea turtle lays 96 eggs that will hatch into babies. A snake lays 42 eggs that will hatch into babies. Compare the numbers of babies using a >, <, or = sign. *(96 > 42)*
- A mouse has 21 babies, and a rabbit has 23 babies. Compare the numbers of babies using >, <, or =. *(21 < 23)*

Math connection
1.MD.C.4

Introduction to Genetics

Genetics involves many complex concepts, but pea plants provide strong examples of trait inheritance that are simple enough for young students to understand. Research Gregor Mendel's experiment with pea plants and summarize the patterns of inheritance for the class. Share images of various pea plants (short, tall, purple flower, white flower, yellow pods, green pods, etc.) to show the different traits. Use a symbol to designate which trait is dominant, and explain that a dominant trait is what is shown in the baby plant. Choose one of the traits, create homozygous parent crossings, and then ask students to predict the resulting plant. Use the following examples:

- Cross a tall plant with a short plant *(The tall plant is dominant, so the resulting plant would be tall.)*
- Cross a plant with purple flowers with one with white flowers *(Purple flowers are dominant, so the resulting plant would have purple flowers.)*
- Cross a plant with yellow pods with one that has green pods *(Green pods are dominant, so the resulting plant would have yellow pods.)*
- Cross a plant that produces round peas with one that produces wrinkled peas *(Round peas are dominant, so the resulting plant would produce round peas.)*

Animal Theater

Divide students into groups, and have each group choose one or two leaders to be the "parents" of the group. Give each group a sticky note or an index card that lists a type of animal and the ways that the animal cares for its young. Allow time for groups to develop a skit that displays all the parental care actions listed on their card. Invite groups to perform their skits for the class. While each group performs, the students in the audience should try to figure out what animal is being represented and the care methods being portrayed.

ASSESSMENT STRATEGIES

Formative assessment

1. Investigation A

- Use Student Investigation Sheet 4A: *What Are Your Family Traits?* to determine if students can provide examples of how their peers look similar to and different from their family members.
- Use students' responses to the Tell Me More question to determine if they understand that although some animals may have similar features, they are not related, or part of the same family.

2. Investigation B

- Use Student Investigation Sheet 4B: C*an You Prove They Are Family?* to gauge students' ability to draw examples of baby animals and their parents. Do not focus on how accurate the example is; rather, make sure students show that some animals look exactly like, similar to, or nothing like their parents.
- Depending on students' ability to accurately match the Animal Parents and Their Babies Cards, provide additional review.
- Use students' responses to the Tell Me More question to determine if they understand that babies can have different characteristics from their parents.

3. Investigation C

- Use students' responses to the Tell Me More question to determine if they understand that not all trees are related even though they have similar structures. Students should understand that there are different types of trees that grow different fruits. If students appear to struggle with this concept, provide supplemental review.

4. Refer to the Assessment Observation Sheet where you recorded observations during this lesson to assess your class, and adjust instruction as needed.

5. Refer to the General Rubric in Appendix A to assess individual progress as needed.

NOTES

Student Investigation Sheet 4A: What Are Your Family Traits?

Name: _____ Date: _____

ELA connection SL.1.2

Look at family photos of yourself and your classmates. List ways that the members of each family are similar and different.

Person	How are they the same?	How are they different?
Me		

Student Investigation Sheet 4B: Can You Prove They Are Family?

Name: _____ Date: _____

ELA connection
SL.1.5, RI.1.7

A. Predict

I think animal babies look _____ their parents.

B. Evidence

Animal Parent and Baby #1: _____

Animal Parent and Baby #2:

Animal Parent and Baby #3:

C. Conclude

Animal parents and babies look _____ to each other but not _____.

Take-Home Science

Connecting science to families.

Dear Family,

Our class is beginning an inquiry science unit. Inquiry science is all about questions, active explorations, drawing, writing, and recording what you see and do to build an understanding of science. Young children are natural scientists. Scientists question everything. Once scientists answer one question, they move without blinking to the next question.

Take-Home Science is an exciting part of our program because it's one way we can better connect home and school. With everyone working together, we can reinforce the science concepts that your student is exploring in the classroom. Here's how Take-Home Science works.

Your student will bring home an investigation sheet that explains an activity related to the science unit the class is studying. The activity is designed so that everyone in the household—younger and older children alike—can work together to learn about science.

A section of the investigation sheet explains the science words and ideas that will be explored during the activity. These science words and ideas are not new to your student because the activity follows a lesson in which those same concepts were explored.

The activities are simple and can be completed within 20 minutes using items normally found in the home. A section of the investigation sheet is for your student to complete and bring back to school. In class, students will have the opportunity to share their experiences and results with one another.

The activities are intended to be quick, informal, and fun. Enjoy!

GO EXPLORING!

Credit: Cathy Keifer/Shutterstock.com

Take-Home Science

Looking at the Past

Credit: leungchopan /Shutterstock.com

Vocabulary

Trait: A feature such as nose shape or eye color.

In class we have been discussing how animal babies look like, but not exactly like, their parents. We have looked at photographs of our parents and observed ways that we are similar to and different from them. The physical features that we observed are called traits. We looked at other animal babies and their parents and noticed that there were similarities and differences between them as well.

Activity

1. Locate photographs of different generations of your family. Find a photograph of you with your parents for your child to observe. If possible, find photograph of your parents with their parents so your child can observe different generations of traits. If this photograph is not available, locate a photo of another family member's family, such your sibling's family or your uncle's family.

2. Using the photograph that your student took to school, ask your student to summarize the traits they have already observed during class that make the two of you similar and different.

3. Show your student the photograph of you with your parents and ask him or her to point out similarities and differences. After some time making observations, ask your student to complete this sentence:

- We are _____ our parents but not _____ them. *(Answers: like, exactly like)*

4. Display the photo of another generation or branch of your family. Ask your student to observe and discuss the similarities and differences between the parent and child shown.

5. Challenge your student by asking which traits seem to appear again and again within the family.

6. On the next page of this sheet, have your student draw some similarities and differences that they noticed in the new photograph you observed together in Steps 3 and 4 of this activity. Ask your student to write or dictate words that describe what traits they are and if they are similar to or different from the traits of the parent.

Take-Home Science

Name: _____ Date: _____

Draw some similarities and differences among members of your family.

ELA connection
RI.1.1, RI.1.2

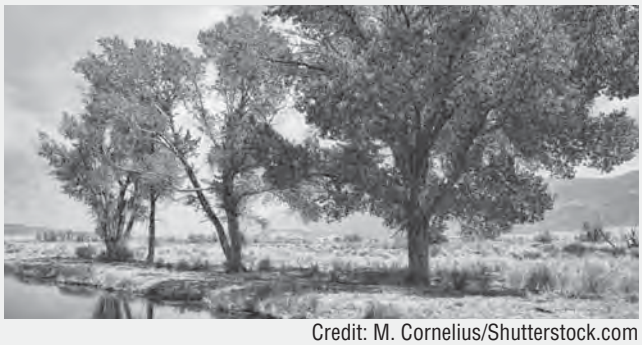
Name: _____ Date: _____

The Tree and the Frog

Living things grow and change. They have life cycles.

A tall tree grows in a wet environment. It is a cottonwood tree. Tiny flowers form. The flowers make seeds. The seeds look like tiny cotton balls. They float in the wind. Some land on pond water. Some land on soil. Some will grow into trees. They will grow tall if they get enough sunlight, air, and water. Not all seeds grow into trees.

There is a river near the cottonwood tree. An animal lives there. It is a frog. She lays eggs in the water. The eggs hatch. Tadpoles swim in the water. They have gills like fish. They have long tails to help them swim. The tadpoles get older. They grow legs. Their tails disappear. They become adult frogs. They live on land and in water. The frogs have lungs and breathe air. They eat insects. Some frogs grow larger than others. They need food to grow.



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Formative assessment—how are they progressing?

Assessment Observation Sheet

Lesson 4—Comparing Parents and Their Young

Consider the following observations and talking points during student exploration activities, quiet conversations, and class discussions.

A. Can students compare the appearance of young organisms and their parents? Do they notice patterns in their appearance?

B. Do students recognize that organisms develop at different rates? Do they demonstrate an understanding of life cycles?

C. Can students make observations to help them conclude that young organisms are similar to but not exactly like their parents? Can they explain that traits are inherited from both parents?

D. Encourage students to identify the variations in appearance of related organisms. Listen for students' ability to describe and compare traits.

E. Note students who struggle to understand that young organisms do not always look like exactly their parents. Provide additional practice as needed.

F. Additional considerations:

NOTES

Summative Assessment

What have they learned?

Name: _____ Date: _____

1. All these kittens have the same mother. Choose the trait that the mother shared with all her babies.

Credit: Eric Isselee/Shutterstock.com>

a. Black-and-white color

b. Short ears

c. Stripes

2. Circle the traits that ALL birds have in common.

a. Beaks

b. Teeth

c. Eggs

d. Can fly

e. Feathers

Building Blocks of Science Student Literacy

Build students' literacy skills with literacy components found within lessons and Literacy Readers.

Building Blocks of Science Literacy Components can be used to:

- Introduce a new lesson
- Support an investigation
- Incorporate science connections into your language arts sessions
- Differentiate instruction
- Review previously learned concepts

Literacy Readers—**on-level and below-level** readers in **English and Spanish** and available in **print or digital format**—provide informational text that:

- Incorporates English language arts and literacy standards
- Uses supporting text with graphs, vocabulary, charts, data, illustrations, and photographs to address **science concepts** related to lessons
- Provides opportunities to practice skills such as analysis and reasoning, and communication of ideas through **crosscutting concept** questions
- Challenges students to exercise and apply knowledge to a **science and engineering practice** activity
- Features a career that provides real-world insight into related science content

What else to look for?

Literacy Articles—These encourage students to elaborate upon unit topics, discuss real-world applications and phenomena, and ask students to connect this to concepts in the unit. Corresponding questions ask students to access high-level thinking and draw upon previous knowledge. (See page 40 of this sampler for an example.)

Science in the News Article Report—Students analyze a content-relevant reading or current event article, developing literacy skills as students identify important information, apply vocabulary, and draw connections to science content.

Building Blocks OF SCIENCE™ | 3D

Exploring Organisms

Student literacy–available in digital and print

A Little Bigger

The little birds grow fast. They begin to look similar to, but not exactly like, their parents. They have **traits**, such as feathers, like their parents.

The young birds are starting to change.

A Lot of Work

The parents take care of the little birds to help them survive. They make many trips every day to find food.

Robins are **omnivores**. That means they eat both plants and animals. Robins eat fruit, insects, and worms.

They need a lot of food to grow.

Robins eat many different kinds of fruits, insects, and worms.

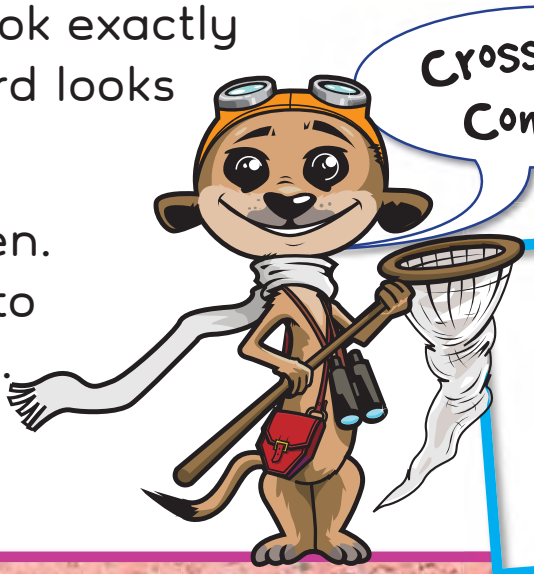
The Little Birds Grow Up

A Little Stronger

The little birds are about 10 days old.

They look more like their parents. But they do not look exactly the same. Each bird looks a little different.

Their eyes are open. They are starting to grow real feathers. These structures will help them fly.



How can children look similar to their relatives? How can they look different?

The baby birds begin to look more like their parents.

A Lot Bigger

The little birds have grown a lot. They can **perch** on the edge of the nest. Their wings are getting stronger every day. But they are not yet ready to fly.

They are starting to learn about their environment. Their **environment** is everything around them.

Environments are not the same in different areas of the world.

Careers

Science in the world

Aerospace Engineer

Aerospace engineers like to make things fly. They study how the structure of a bird's wings help it fly.

This helps them design things that can move through the air, like airplanes, helicopters, spaceships, and rockets.

Would I like this career?	You might like this career if • you are interested in how things can move through the air. • you are interested in space.
What would I do?	• You would design and test things that can move through the air. • You would work with a team and share your ideas.
How can I prepare for this career?	• Study engineering, science, and math. • Build model planes and rockets.

Aerospace engineers test their designs in wind tunnels.

Profesiones

Spanish literacy–available in digital and print

Ingeniero aeroespacial

A los ingenieros aeroespaciales les gusta hacer que las cosas vuelen. Estudian cómo la estructura de las alas de un ave la ayuda a volar.

Esto los ayuda a diseñar cosas que pueden moverse por el aire, como aviones, helicópteros, naves espaciales y cohetes.

¿Me gustaría esta profesión?	Podría gustarte esta profesión si: • te interesa cómo las cosas pueden moverse por el aire. • te interesa el espacio.
¿Qué haría?	• Diseñarías y probarías cosas que pueden moverse por el aire. • Trabajarías con un equipo y compartirías tus ideas.
¿Cómo puedo prepararme para esta profesión?	• Estudia ingeniería, ciencias y matemáticas. • Construye aviones y cohetes a escala.

Los ingenieros aeroespaciales prueban sus diseños en túneles de viento.

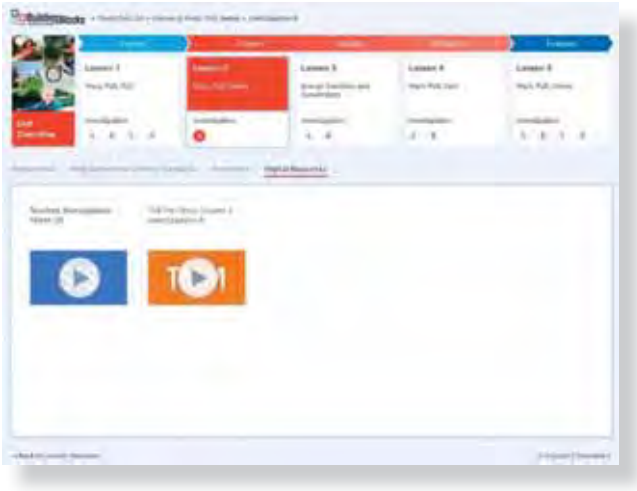
The Right Blend of Hands-On Investigation and Technology

Along with hands-on learning, Building Blocks of Science provides digital resources to enhance the classroom experience, offering an additional method of delivering content and support for teachers.

Support for Teachers

Everything you need to teach the lesson

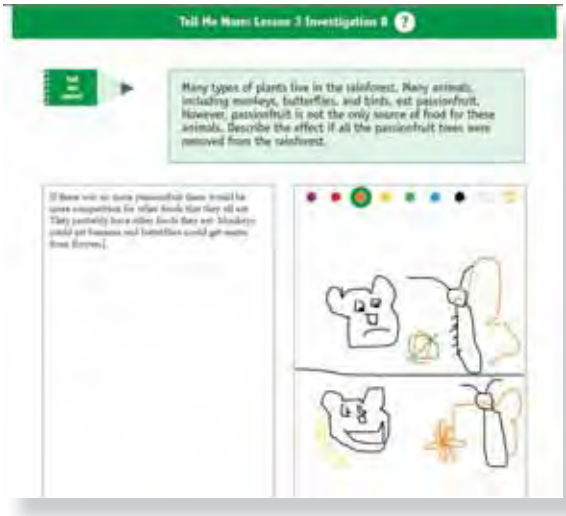
- Identification of where a lesson falls within the **5E Learning Cycle**
- Preparation—Includes investigation overview, materials list, and step-by-step teacher preparation instructions
- **NGSS Standards**—Includes the PEs, DCIs, SEPs, and CCCs that will be addressed within the investigation
- **Lesson Procedure**—Step-by-step instruction for each investigation within a lesson
- **Digital Resources**—All the digital resources available in one place, by lesson and by individual investigations within each lesson



Digital resources by lesson

Everything you need to teach ALL your students

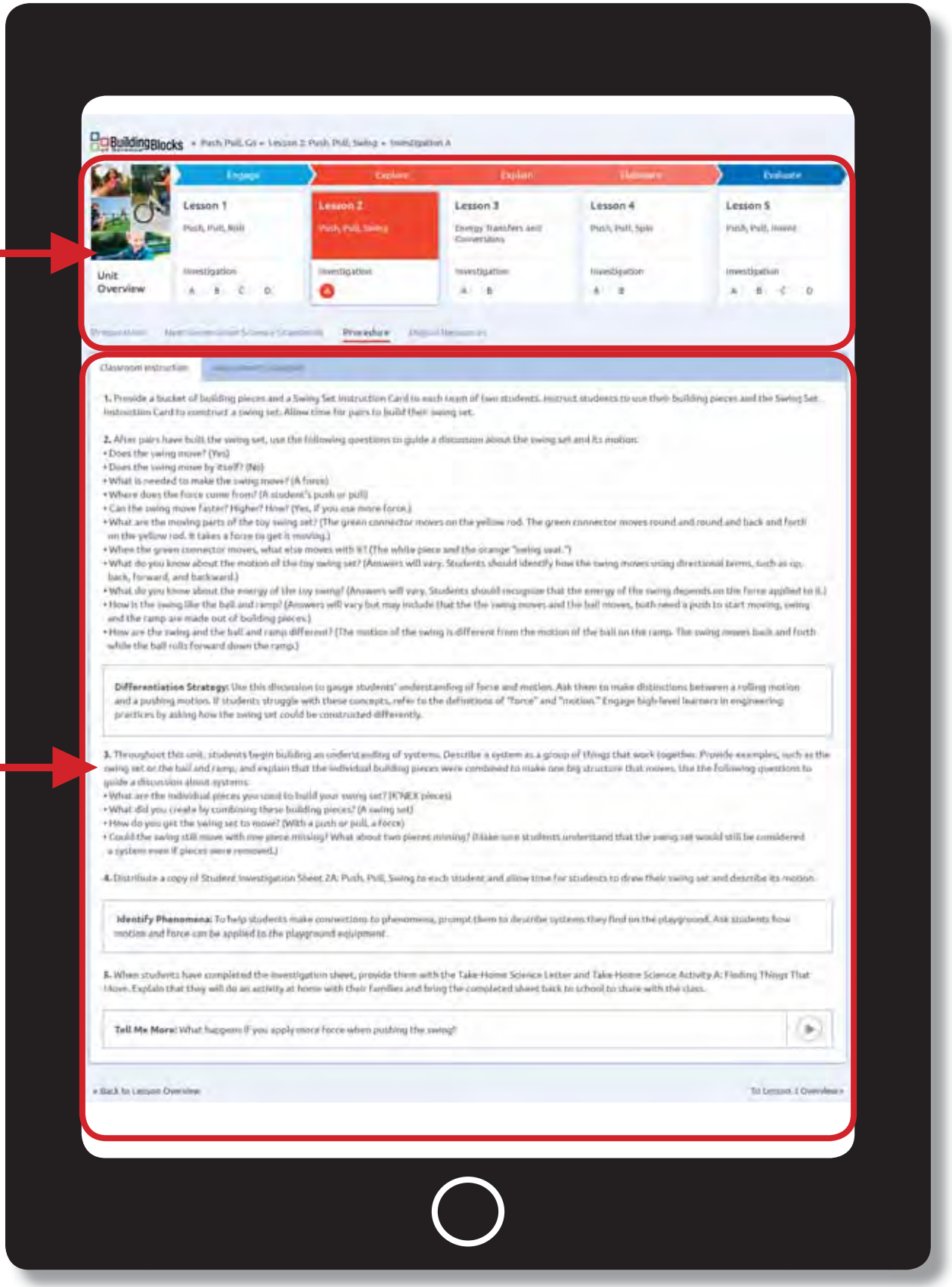
- Step-by-step instruction including guiding questions and anticipated responses
- Differentiation strategies at point of use within each investigation
- **Identify Phenomena** provides teachers with prompts to help students make connections to phenomena addressed within an investigation
- Assessment Strategies including **Tell Me More** formative assessment to help gauge student understanding



Tell Me More, a formative assessment strategy

For a closer look, visit:

www.carolina.com/bbs3dreview


BuildingBlocks
Engage
Explore
Explain
Elaborate
Evaluate
Lesson 1
Push, Pull, Roll
Lesson 2
Push, Pull, Swing
Lesson 3
Energy Transfers and Conversions
Lesson 4
Push, Pull, Spin
Lesson 5
Push, Pull, Invent
Unit Overview
Investigation
Procedure
Classroom Instruction
1. Provide a bucket of building pieces and a Swing Set Instruction Card to each team of two students. Instruct students to use their building pieces and the Swing Set Instruction Card to construct a swing set. Allow time for pairs to build their swing set.
2. After pairs have built the swing set, use the following questions to guide a discussion about the swing set and its motion:
• Does the swing move? (Yes)
• Does the swing move by itself? (No)
• What is needed to make the swing move? (A force)
• Where does the force come from? (A student's push or pull)
• Can the swing move faster? Higher? How? (Yes, if you use more force.)
• What are the moving parts of the toy swing set? (The green connector moves on the yellow rod. The green connector moves round and round and back and forth on the yellow rod. It takes a force to get it moving.)
• When the green connector moves, what else moves with it? (The white piece and the orange "swing seat.")
• What do you know about the motion of the toy swing set? (Answers will vary. Students should identify how the swing moves using directional terms, such as up, back, forward, and backward.)
• What do you know about the energy of the toy swing? (Answers will vary. Students should recognize that the energy of the swing depends on the force applied to it.)
• How is the swing like the ball and ramp? (Answers will vary but may include that the the swing moves and the ball moves, both need a push to start moving, swing and the ramp are made out of building pieces.)
• How are the swing and the ball and ramp different? (The motion of the swing is different from the motion of the ball on the ramp. The swing moves back and forth while the ball rolls forward down the ramp.)
Differentiation Strategy: Use this discussion to gauge students' understanding of force and motion. Ask them to make distinctions between a rolling motion and a pushing motion. If students struggle with these concepts, refer to the definitions of "force" and "motion." Engage high-level learners in engineering practices by asking how the swing set could be constructed differently.
3. Throughout this unit, students begin building an understanding of systems. Describe a system as a group of things that work together. Provide examples, such as the swing set or the ball and ramp, and explain that the individual building pieces were combined to make one big structure that moves. Use the following questions to guide a discussion about systems:
• What are the individual pieces you used to build your swing set? (K'NEX pieces)
• What did you create by combining these building pieces? (A swing set)
• How do you get the swing set to move? (With a push or pull, a force)
• Could the swing still move with one piece missing? What about two pieces missing? (Make sure students understand that the swing set would still be considered a system even if pieces were removed.)
4. Distribute a copy of Student Investigation Sheet 2A: Push, Pull, Swing to each student and allow time for students to draw their swing set and describe its motion.
Identify Phenomena: To help students make connections to phenomena, prompt them to describe systems they find on the playground. Ask students how motion and force can be applied to the playground equipment.
5. When students have completed the investigation sheet, provide them with the Take-Home Science Letter and Take-Home Science Activity A: Finding Things That Move. Explain that they will do an activity at home with their families and bring the completed sheet back to school to share with the class.
Tell Me More: What happens if you apply more force when pushing the swing?
« Back to Lesson Overview
To Lesson 1 Overview »

Digital Components to Support Instruction and Assessment

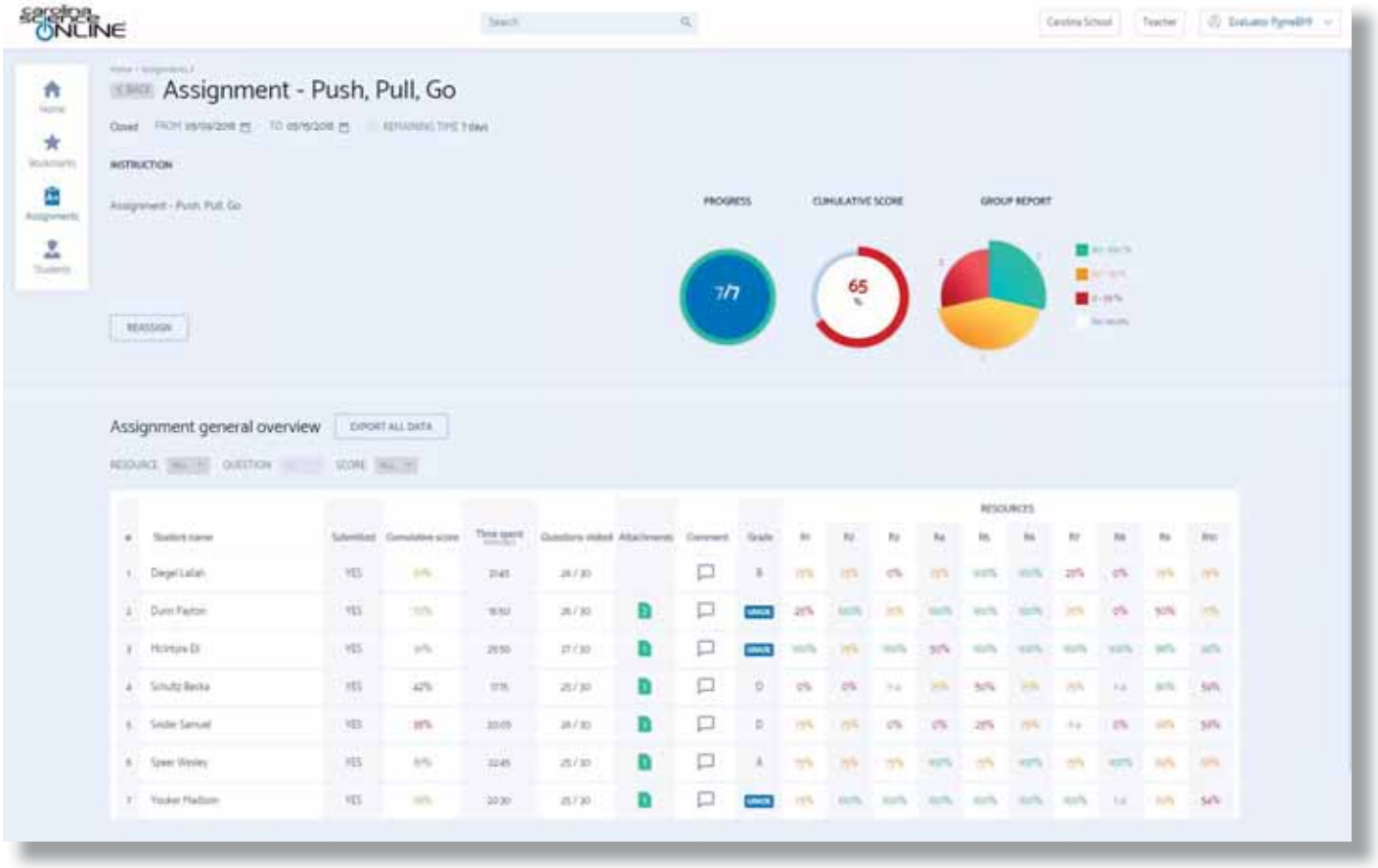
For the Teacher—Customizable Digital Planning at Your Fingertips

Building Blocks of Science 3D goes beyond just providing you access to your content. You can also:

- Use the assignment management system to create and grade custom assignments for classes and individual students to help differentiate instruction
- Create customizable bookmarks that include your student and instruction resources as well as URL links, PDF files, PowerPoint® presentations, and video files

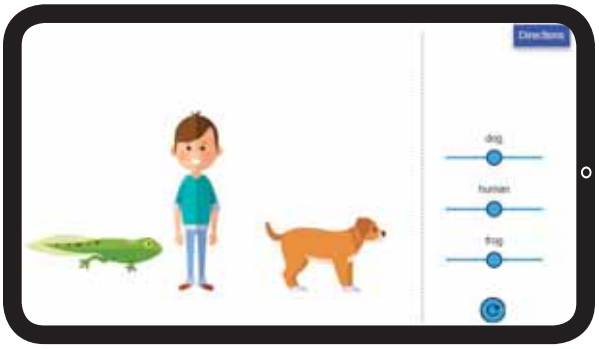
The assignment management system dashboard allows you to:

- Track the progress of your classes and individual students
- See student assignment results for the class at a glance and by individual student in detail
- Automatically grade close-ended questions (e.g., multiple choice, matching, fill-in-the-blank)
- Adjust student grades based on individual student performance and open-ended responses
- Assign remediation to student groups that need additional support or enrichment to groups that need a challenge



Digital components for students enhance and deepen student understanding, differentiate learning, and provide multiple modalities for delivering information.

"Digital Tips" take the guesswork out of integrating the following digital resources with hands-on investigations:



Simulations: Flexible enough to be used to introduce, support, or review a topic or concepts. Simulations are manipulative and provide a visual for differentiation.

Interactive Whiteboard Activities: With typing and drawing capabilities, IWB activities bring investigation-aligned classroom charts to life and are perfect for individual student review.

Student Investigation Sheets:
Students record their observations and data digitally when completing investigations.

Interactive Literacy Readers:
These enhanced versions of the printed student readers include check-for-understanding questions and animations to support the concepts covered in the text, enforce literacy skills, and provide additional practice.

Building Blocks OF SCIENCE™ | 3D

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Learning Framework

Kindergarten	**Push, Pull, Go** *K-PS2-1; K-PS2-2; K-2-ETS1-1;K-2-ETS1-2*	**Living Things and Their Needs** *K-LS1-1; K-ESS2-2;K-ESS3-1;K-ESS3-3; K-2-ETS1-2*	**Weather and Sky** *K-PS3-1;K-PS3-2;K-ESS2-1; K-ESS3-2; K-2-ETS1-1; K-2-ETS1-2*
1st Grade	**Light and Sound Waves** *1-PS4-1; 1-PS4-2; 1-PS4-3; 1-PS4-4; K-2-ETS1-1; K-2-ETS1-2*	**Exploring Organisms** *1-LS1-1; 1-LS1-2; 1-LS3-1; K-2-ETS1-2*	**Sky Watchers** *1-ESS1-1; 1-ESS1-2*
2nd Grade	**Matter** *2-PS1-1; 2-PS1-2; 2-PS1-3; 2-PS1-4; K-2-ETS1-1; K-2-ETS1-2*	**Ecosystem Diversity** *2-LS2-1; 2-LS2-2; 2-LS4-1; K-2-ETS1-2; K-2-ETS1-3*	**Earth Materials** *2-PS1-1; 2-ESS1-1; 2-ESS2-1; 2-ESS2-2; 2-ESS2-3; K-2-ETS1-1; K-2-ETS1-2*
3rd Grade	**Forces and Interactions** *3-PS2-1; 3-PS2-2; 3-PS2-3; 3-PS2-4; 3-5-ETS1-1; 3-5 ETS1-2*	**Life in Ecosystems** *3-LS1-1; 3-LS2-1; 3-LS3-1; 3-LS3-2; 3-LS4-1; 3-LS4-2; 3-LS4-3; 3-LS4-4; 3-5-ETS1-2*	**Weather and Climate Patterns** *3-ESS2-1; 3-ESS2-2;3-ESS3-1; 3-5-ETS1-2*
4th Grade	**Energy Works** *4-PS3-1; 4-PS3-2; 4-PS3-3; 4-PS3-4; 4-PS4-1; 4-PS4-3; 4-ESS3-1; 3-5 ETS1-2; 3-5-ETS1-3*	**Plant and Animal Structures** *4-LS1-1; 4-LS1-2; 4-PS4-2; 3-5-ETS1-2*	**Changing Earth** *4-ESS1-1; 4-ESS2-1; 4-ESS2-2; 4-ESS3-2; 3-5-ETS1-2*
5th Grade	**Structure and Properties of Matter** *5-PS1-1; 5-PS1-2; 5-PS1-3; 5-PS1-4; 3-5-ETS1-2*	**Matter and Energy in Ecosystems** *5-PS3-1; 5-LS1-1; 5-LS2-1; 5-ESS2-1; 5-ESS3-1; 3-5-ETS1-3*	**Earth and Space Systems** *5-PS2-1; 5-ESS1-1; 5-ESS1-2; 5-ESS2-1; 5-ESS2-2; 5-ESS3-1; 3-5-ETS1-2*

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