GRADE 2

Building Blocks OF SCIENCE™ | 3D

Matter

Program Highlights and Lesson Sampler

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

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Matter

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
Balloon	7		■			
Bottle of white vinegar †	1					■
Chunk of calcite †	6					■
Compressed sponge	6			■		
Foam ball	6				■	
Graduated cylinder	6		■			
Hand lens	24		■			■
Literacy Reader: *Matter* (below grade level)*	1	■	■	■	■	■
Literacy Reader: *Matter* (on grade level)*	1	■	■	■	■	■
Pack of sticky notes	6			■		
Metal cube	6				■	
Pair of forceps	24		■			
Pipet	1		■			
Plastic cup, 9 oz	12				■	■
Plastic cup with lid, 1 oz	36		■	■		■
Sand	2 cups		■	■		
Unifix® cubes	316	■				■
Wooden cube	6				■	

† A Safety Data Sheet (SDS) for this item is available at www.carolina.com/SDS

* 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
Access to a freezer or cooler	1		■			■
Access to a sunny window or a heater	1		■			
Chart paper or whiteboard		■	■	■		
Crayon or pencil	24	■				
Coconut oil	6 oz					■
Glue stick	24		■			
Hot pot or electric kettle	1		■			
Ice cube	10		■			
Images of videos of Egyptian pyramids		■				
Large bag of ice	1					■
Liquid dish soap	½ cup			■		
Markers		■	■	■		
Measuring cup, ½ cup	1		■			
Paper clip	6			■		
Paper towels			■	■	■	■
Rubber band	6			■		
Rice	½ cup			■		
Science notebook	24	■	■	■	■	■
Scissors	24		■			
Sheet of paper	1				■	
Vegetable oil	½ cup			■		
Water	7 ½ cups		■	■	■	

NOTES

Unit Overview: *Matter*

Although matter makes up everything that surrounds us, the concept is abstract and often difficult to describe. To help students understand matter, the hands-on investigations in this Building Blocks of Science unit encourage students to manipulate materials, ask questions, and make connections between matter and phenomena. Throughout a series of five lessons, students build upon the concept that all objects are made of smaller parts and those smaller parts are composed of particles. Depending on the state of matter—solid, liquid, or gas—those particles behave differently. Students also explore the effect of mixing different kinds of matter and the effect of adding or taking away energy. This unit is an important introduction to chemistry that students can build upon.

During a pre-unit assessment activity, students explore the concept of matter by building a pyramid using Unifix® cubes. Students then create different structures using the same number of cubes and compare structures with their classmates. These activities prime students to understand that all matter, regardless of shape and size, is made of smaller parts. Students identify these "parts" as particles by exploring water in its three states: solid ice, liquid water, and gaseous vapor. Students connect state of matter to particle attraction and explain why these particles are not visible. Students build upon this knowledge as they focus on solids, liquids, and mixtures. Students compare sand and water to explain the different properties of matter. They also explore the concept that the physical properties of matter may change without changing the state of matter. To clarify this idea, students describe the physical properties of recognizable materials and determine the ability of each to float. They make connections between each material and how it is used in real life to construct different structures and objects. The last lesson focuses on physical and chemical changes. Students first examine coconut oil and its ability to change state due to an increase in heat energy. Then students cause a chemical reaction by combining calcite and vinegar, which leads to an identity change. To combine the concepts from the lesson, student pairs design a new structure using Unifix cubes, describe where this structure would be found, and identify the building materials that would be needed and describe their properties. Students evaluate their peers' structures and decide if the materials chosen match the intended function of the structure.

Credit: HLPhoto/Shutterstock.com

Next Generation Science Standards

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

Performance Expectations

- **2-PS1-1:** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
- **2-PS1-2:** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
- **2-PS1-3:** Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
- **2-PS1-4:** Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
- **K-2-ETS1-1:** Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- **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

- **PS1.A:** Structure and Properties of Matter
- **PS1.B:** Chemical Reactions
- **ETS1.A:** Defining and Delimiting Engineering Problems
- **ETS1.B:** Developing Possible Solutions

Science and Engineering Practices

- Analyzing and Interpreting Data
- Planning and Carrying Out Investigations
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence

Crosscutting Concepts

- Patterns
- Cause and Effect
- Energy and Matter

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

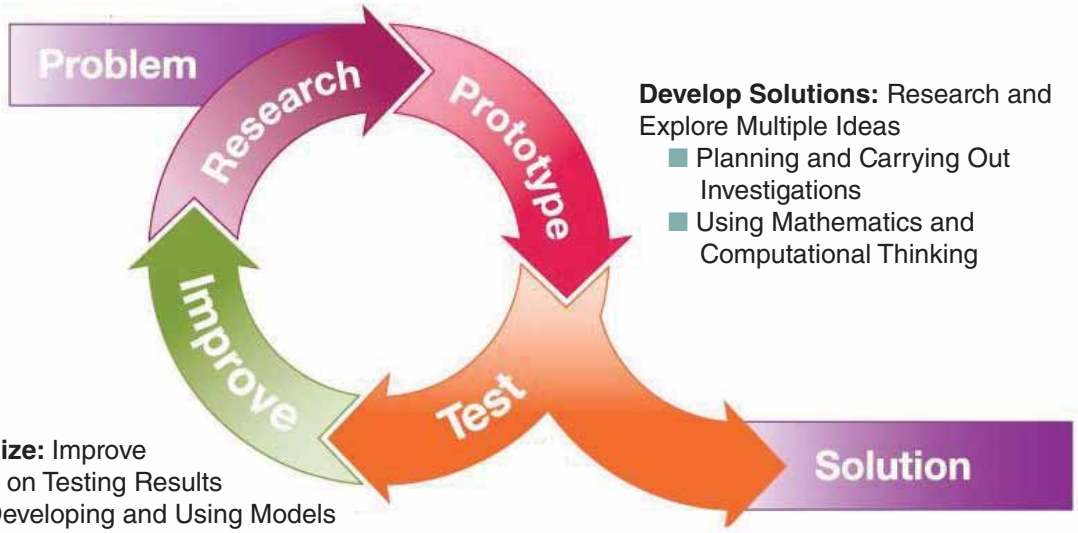
Building Blocks of Science incorporates an engineering design process to support the engineering, technology, and application of science (ETS) core idea outlined in the National Research Council's "A Framework for K–12 Science Education" (NRC, 2012, pp. 201–202). This ETS core idea has been brought into 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 indicate 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

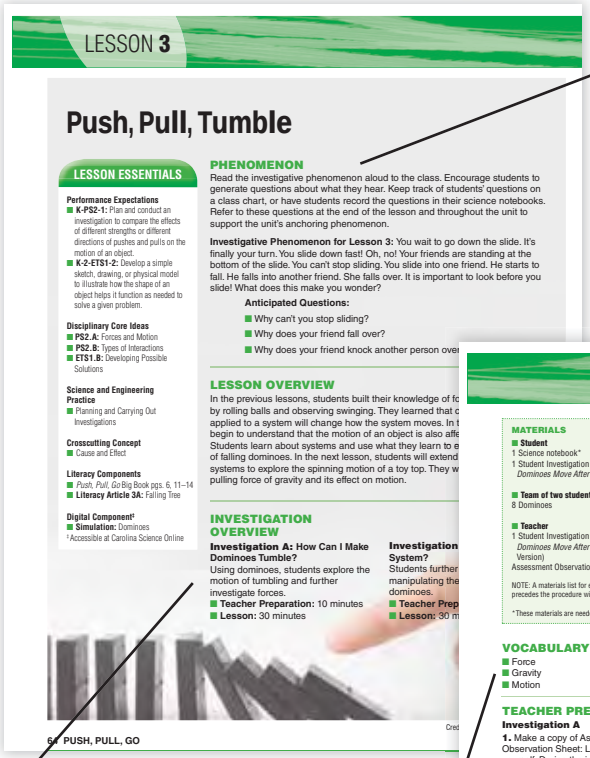
NGSS Standard and 5E Alignment

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 Component²
- Simulation: Dominoes

² 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

Cred

64 PUSH, PULL, GO

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.

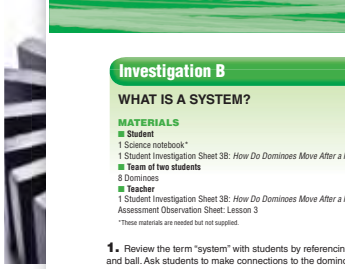


Figure 3.1:

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.

? How can you change how fast something tumbles?

Tell Me More!

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.

LESSON 3 ■ PUSH, PULL, TUMBLE 69

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

Student Investigation Sheet 3B: How Do Domino

Name: _____ Da

This is a line that moves.

Dominoes _____.

A push _____.

© Carolina Biological Supply Company Student Investigation Sheet 3B

Student Investigation Sheets

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.

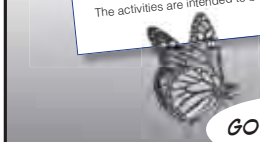
Take-Home Science is an exciting part of our program because it's one way we can better connect home and school. With everyone working together, we can reinforce the science concepts that your student is exploring in the classroom. Here's how Take-Home Science works.

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!

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

Every unit anchored in phenomena

Matter

Unit Overview

Although matter makes up everything that surrounds us, the concept is abstract and often difficult to describe. To help students understand matter, the hands-on investigations in this Building Blocks of Science unit encourage students to manipulate materials, ask questions, and make connections between matter and phenomena. Throughout a series of five lessons, students build upon the concept that all objects are made of smaller parts and those smaller parts are composed of particles. Depending on the state of matter—solid, liquid, or gas—those particles behave differently. Students also explore the effect of mixing different kinds of matter and the effect of adding or taking away energy. This unit is an important introduction to chemistry that students can build upon.

Unit Anchoring Phenomenon

An engineer, builder, or inventor must consider many factors when choosing the materials to construct something. Whether it's a pencil, a skyscraper, or a sailboat, the materials used in the object are carefully chosen based on its function. The anchoring phenomenon for *Matter* is making connections between a material and how it is used.

	LESSON 1	LESSON 2
INVESTIGATIVE PHENOMENA	Three birds, Byron, Reggie, and Greta, need a home. They want to build a birdhouse out of wood. Greta collects many small pieces of wood. Reggie collects many large pieces of wood. Byron can find only one very large piece of wood. The three birds need instructions to build a birdhouse. What does this make you wonder?	The three birds begin building their birdhouse on a hot day. They work for a very long time. Byron decides to take a break and cool down in the birdbath. The water in the birdbath is very hot. It looks like there is steam rising from the water. Byron adds ice cubes to the water. He goes back to work and tells Greta about the ice. Greta wants to take a break, too. She flies to the birdbath and sees that the ice cubes have disappeared. What does this make you wonder?
OBJECTIVES	■ Use a model to provide evidence that large structures can be made by combining small pieces. ■ Collect evidence to prove that individual pieces can be rearranged to create structures with different shapes. ■ Identify the specifications to build a structure.	■ Define the three states of matter of water. ■ Provide evidence for the existence of particles and explain why they cannot be seen. ■ Draw distinctions between each state of matter by explaining how its particles move. ■ Use balloons to draw conclusions about gases and the behavior of their particles. ■ Construct an argument for how particle behavior changes as matter changes state.
SCAFFOLDING Students should know:	↓ Specifications are the directions to build something. ↓ Pieces, or building blocks, can be rearranged to create new structures. ↓ Some objects can be built using many materials, and some objects can be built using material. ↓ Smaller pieces are used to make larger structures.	↓ There are three states of matter: liquid, solid, and gas. ↓ All matter is made of small particles that cannot be seen. ↓ Solids, liquids, and gases have unique properties. ↓ The movement of particles changes as matter changes state. ↓ As matter changes from solid to liquid to gas, the particles become less attracted to one another and experience more and more movement.

Concepts build from one lesson to the next

	LESSON 3	LESSON 4	LESSON 5
	The three birds use glue to hold the walls of the birdhouse together. They notice that the glue moves very slowly when they tip the bottle upside down. The liquid glue slides slowly out of the bottle and is very thick and sticky. Suddenly, it begins raining. The rain makes the wood wet. The rain mixes with the glue. ater, the Sun comes out and the wood dries. It does not look different. The birds begin building again. They notice that the glue is not as thick or sticky. What does this make you wonder?	The wooden birdhouse is almost complete, but it is missing a roof. The birds have no more wood to make a roof. Reggie thinks they should build the roof out of metal because it is very strong. Greta disagrees. She thinks the roof should be made with cardboard because it is light and easy to bend. Byron thinks the roof should be made of a material that will float in case there is a flood. What does this make you wonder?	The birdhouse is finally finished! It has wood walls and a metal roof. They decide to have a party and celebrate. Greta bakes a cake, and the house smells like vanilla. They live very happily in the house. After many months, they notice the metal roof has changed colors. It began as silver, but now it is red. The wood did not change color. What does this make you wonder?
	■ Determine the properties related to solids by comparing different materials. ■ Determine the properties related to liquids by comparing different materials. ■ ake conclusions about the properties of a material by creating a mixture. ■ Identify physical changes that occur when matter is mixed.	■ Identify buoyancy as a property of matter. ■ Test the buoyancy of different materials and make connections between the results and how the materials are used. ■ Analy e the properties of materials and identify their uses.	■ bserve state changes to construct an argument about physical changes. ■ bserve a chemical reaction to construct an argument about chemical changes. ■ Distinguish physical reactions from chemical reactions by their reversibility. ■ Analy e data to determine if a material is suited for a particular use. ■ valuate learning by completing a summative assessment.
	↓ Solids and liquids can be described by their physical properties, or characteristics. ↓ Solids can be made of different materials, some of which are malleable, or able to be formed into different shapes. ↓ Liquids can be viscous or fluid, meaning they flow slower or faster. ↓ atter can be combined into a mixture. ↓ When some matter is mixed, it results in physical changes.	↓ ther physical properties can be used to describe matter, such as buoyancy. ↓ Some materials sink, and other materials float. ↓ The physical properties of a material help to determine its function, or use.	↓ atter can undergo physical changes, which can be observed when matter changes state, color, or shape. ↓ atter can undergo chemical changes, which can be observed when matter changes state, color, or shape; or gives off heat or light; or forms a gas. ↓ Chemical reactions occur during chemical changes. ↓ ost physical changes are reversible, but chemical changes are never reversible. ↓ It is important to evaluate and test building plans to determine if the materials and specifications are appropriate.

Lesson 3: Solids, Liquids, and Mixtures

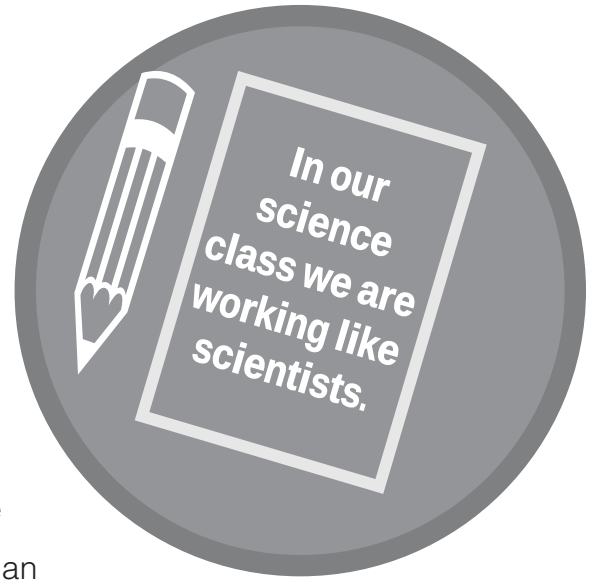
NGSS correlations by lesson

Investigation Overview	Standards	Resources
Investigation A: What Are the Properties of Solids? **5Es:** Explore, Explain Students are provided with samples of solid materials and identify words to describe and distinguish between them. ■ **Teacher Preparation:** 5 minutes ■ **Lesson:** 30 minutes **Tell Me More!** Draw or write about an example of a physical change. **Investigation B: What Are the Properties of Liquids?** **5Es:** Explore, Explain Students are provided with samples of liquid materials and identify words to describe and distinguish between them. ■ **Teacher Preparation:** 15 minutes ■ **Lesson:** 30 minutes **Tell Me More!** Is a pool of maple syrup more viscous or more fluid than a pool of water? Explain how you know. **Investigation C: What Is a Mixture?** **5Es:** Explore, Explain, Elaborate Students are introduced to the concept of mixtures by creating their own mixtures and identifying physical changes. ■ **Teacher Preparation:** 15 minutes ■ **Lesson:** 30 minutes **Tell Me More!** Brass, which is used to make instruments like trumpets, is made by mixing two metals: copper and zinc. What must happen before these metals can be mixed?	**Next Generation Science Standards Performance Expectation** ■ **2-PS1-1:** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. **Disciplinary Core Idea** ■ **PS1.A:** Structure and Properties of Matter **Science and Engineering Practices** ■ Planning and Carrying Out Investigations ■ Constructing Explanations and Designing Solutions **Crosscutting Concepts** ■ Patterns ■ Cause and Effect **Language Arts and Math Standards** **Language Arts** ■ **L.2.1:** Conventions of Standard English ■ **L.2.2:** Conventions of Standard English ■ **L.2.4:** Presentation of Knowledge and Ideas ■ **L.2.6:** Vocabulary Acquisition and Use ■ **RF.2.3:** Phonics and Word Recognition ■ **RI.2.3:** Key Ideas and Details ■ **RI.2.4:** Craft and Structure ■ **RI.2.6:** Craft and Structure ■ **RI.2.9:** Integration of Knowledge and Ideas ■ **SL.2.1:** Comprehension and Collaboration ■ **SL.2.2:** Comprehension and Collaboration ■ **W.2.8:** Research to Build and Present Knowledge **Math** ■ **2.G.A.1:** Reason with shapes and their attributes.	**Student Investigation Sheets** ■ Student Investigation Sheet 2A: *What Are the States of Matter?* (from Lesson 2) ■ Student Investigation Sheet 3C: *Which Materials Will Mix?* **Literacy Components** ■ *Matter* Literacy Reader, pg. 13 ■ Literacy Article 3C: Making Salad Dressing **Digital Components** ■ Interactive Whiteboard: Describing Properties ■ Simulation: Create a Mixture **Vocabulary** ■ Characteristic ■ Fluid ■ Fluidity ■ Malleability ■ Mixture ■ Property ■ Viscosity

30-minute investigations fit into your busy day

Integrated ELA and math

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

Solids, Liquids, and Mixtures

LESSON ESSENTIALS

Performance Expectation
- **2-PS1-1:** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

Disciplinary Core Idea
- **PS1.A:** Structure and Properties of Matter

Science and Engineering Practices
- Planning and Carrying Out Investigations
- Constructing Explanations and Designing Solutions

Crosscutting Concepts
- Patterns
- Cause and Effect

Literacy Components
- *Matter* Literacy Reader, pg. 13
- **Literacy Article 3C:** Making Salad Dressing

Digital Components‡
- **Interactive Whiteboard:** Describing Properties
- **Simulation:** Create a Mixture

‡ Accessible at Carolina Science Online

OBJECTIVES
- Determine the properties related to solids by comparing different materials.
- Determine the properties related to liquids by comparing different materials.
- Make conclusions about the properties of a material by creating a mixture.
- Identify physical changes that occur when matter is mixed.

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: The three birds use glue to hold the walls of the birdhouse together. They notice that the glue moves very slowly when they tip the bottle upside down. The liquid glue slides slowly out of the bottle and is very thick and sticky. Suddenly, it begins raining. The rain makes the wood wet. The rain mixes with the glue. Later, the Sun comes out and the wood dries. It does not look different. The birds begin building again. They notice that the glue is not as thick or sticky. What does this make you wonder?

Anticipated Questions:
- What makes glue a liquid?
- Did the rain affect the wood?
- Why isn't the glue sticky after the rainstorm?

INVESTIGATION OVERVIEW

Investigation A: What Are the Properties of Solids?
Students are provided with samples of solid materials and identify words to describe and distinguish between them.
- **Teacher Preparation:** 5 minutes
- **Lesson:** 30 minutes

Investigation B: What Are the Properties of Liquids?
Students are provided with samples of liquid materials and identify words to describe and distinguish between them.
- **Teacher Preparation:** 15 minutes
- **Lesson:** 30 minutes

Investigation C: What Is a Mixture?
Students are introduced to the concept of mixtures by creating their own mixtures and identifying physical changes.
- **Teacher Preparation:** 15 minutes
- **Lesson:** 30 minutes

LESSON OVERVIEW
In the previous lessons, students learned that particles are the building blocks of everything around us, including liquids, solids, and gases. Students have used water, sand, and balloons to explore these states of matter. In this lesson, students continue exploring matter by identifying the properties of solids and liquids. Students use words like "malleable," "fluid," and "viscous" to describe different materials. They use these properties to make predictions about how materials will mix. In the next lesson, students will apply concepts about mixtures to compare materials and draw conclusions about how they are used.

VOCABULARY

- Characteristic
- Fluid
- Fluidity
- Malleability
- Mixture
- Property
- Viscosity

MATERIALS

Student

1 Science notebook*
1 Student Investigation Sheet 3C: *Which Materials Will Mix?*
1 States of Matter Vocabulary Book (from Lesson 2)

Team of four students

1 Activated sponge
1 Marker*
1 Pack of sticky notes
1 Paper clip*
1 Plastic cup of liquid dish soap (with lid)
1 Plastic cup of rice (with lid)
2 Plastic cups of sand (with lids)
1 Plastic cup of vegetable oil (with lid)
2 Plastic cups of water (with lids)
1 Rubber band*

Teacher

1 Student Investigation Sheet 3C: *Which Materials Will Mix?* (Teacher's Version)
6 Compressed sponges
½ C Liquid dish soap*
36 Plastic cups (1 oz) with lids
½ C Rice*
1 C Sand
½ C Vegetable oil*
1 C Water*
Assessment Observation Sheet: Lesson 3
Chart paper or whiteboard*
Markers*
Paper towels*

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. Have markers and chart paper or a whiteboard available to create a class chart titled "Words to Describe Properties." Beneath the title, draw a frame for a T-chart, but do not title the columns at this time. Alternatively, you may use Interactive Whiteboard: Describing Properties.

2. Activate the compressed sponges by running them under water and then wringing them out so they are damp but not wet.

3. Have available one paper clip, one rubber band, one sponge, one pack of sticky notes, and a marker for each team of four students.

4. 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.

Investigation B

1. Have available a marker and the "Words to Describe Properties" chart from Investigation A.

2. Prepare a set of three liquid samples for each group of four students. Fill each of three 1-oz plastic cups halfway with one of the following liquids: dish soap, vegetable oil, water. Secure the lid on each cup.

3. Have one pack of sticky notes and a marker available for each team of four students.

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

Investigation C

1. Make one copy of Student Investigation Sheet 3C: *Which Materials Will Mix? for* each student.

2. For each group of four students, prepare a set of solids. Fill two 1-oz plastic cups halfway with sand and a third halfway with rice. Secure the lid on each cup.

3. For each group of four students, fill one 1-oz plastic cup halfway with water and secure the lid.

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

Credit: Waj/Shutterstock.com

Just-in-time background information

BACKGROUND INFORMATION

Properties of Solids and Liquids

Properties are **characteristics** that can be used to describe matter. The properties of solids and liquids go beyond the arrangement of particles. One **property** of solids is that they have a relatively rigid and definite shape; however, many solids can still be manipulated or distorted by stretching or compressing. This property is known as **malleability**. Students should be able to identify solids based on these properties and their ability to manipulate them.

One property of liquids is that they flow easily and take the shape of the container in which they are placed. Liquids flow at different rates. The tendency of a liquid to flow easily is called **fluidity**. The resistance to flow is called viscosity. The **viscosity** of a substance is dependent on the size and shape of the particles and how strongly attracted they are to one another. The strength of the attraction between particles dictates how easily they slide past one another. Liquids vary in fluidity and viscosity. Students should be able to identify liquids based on these properties.

Matter composed of grains (like sand, soil, and spices) can act as both a solid and a liquid, appearing to take the shape of its container, depending on the conditions. Sand and salt are small, solid grains that are not strongly attracted to one another; the grains flow past one another just like the particles in liquids do. One difference between liquids like water and solids like sand is that you can visually observe each grain of sand move, but the particles of liquid water move together to fill a container. Students may struggle with understanding how grainy matter is a solid with liquid-like properties. Make sure students do not confuse a single grain of sand with a particle. Explain that many particles make up a grain of sand and that those particles are strongly attracted, as in a solid.

Mixtures

A **mixture** is a combination of two or more different types of matter. Mixtures can contain solids, liquids, or gases. For example, air is a mixture of different gases. A salad is a mixture of different solids. Mixtures can even be made up of two different states of matter. Salad dressing is a mixture of liquids and solids. Smoke is a mixture of a solid and a gas, and salt water is a mixture of a solid and a liquid. It is likely that students interact with mixtures every day. Encourage them to consider the effects of mixing different states of matter and whether the effect can be reversed (e.g., if sand and water are mixed, how does the appearance of the sand change? Will the sand dry?).

NOTES

3-dimensional learning

Investigation A

WHAT ARE THE PROPERTIES OF SOLIDS?

MATERIALS

Student

1 Science notebook*
1 States of Matter Vocabulary Book (from Lesson 2)

Team of four students

1 Activated sponge
1 Marker*
1 Pack of sticky notes
1 Paper clip*
1 Rubber band*

Teacher

Assessment Observation Sheet: Lesson 3
Chart paper or whiteboard*
Marker*

*These materials are needed but not supplied.

Disciplinary Core Idea
- **PS1.A:** Structure and Properties of Matter

Science and Engineering Practice
- Planning and Carrying Out Investigations

Crosscutting Concept
- Patterns

5Es
- Explore
- Explain

Digital Component
- **Interactive Whiteboard:** Describing Properties

1. Define a "property" as a characteristic of something. Instruct students to use their States of Matter Vocabulary Books and science notebooks to respond to the following:

- Describe how the behavior of particles differs for each state of matter. *(Particles in solids do not move and are tightly arranged. Particles in liquids move around but are still attracted to each other. Particles in gases move around freely.)*
- What is unique about a solid when it is moved to different containers? *(A solid does not change shape even when it is placed in different containers.)*
- Provide an example of a solid. Write down as many properties of that solid as you can. *(Answers will vary.)*

Allow a few volunteers to share their answers.

ELA connection
L.2.1, L.2.4, L.2.6, SL.2.2, W.2.8
Math connection
2.G.A.1

2. Distribute a paper clip, a rubber band, an activated sponge, a pack of sticky notes, and a marker to each team of four students. Explain that students will be investigating the properties of each of these materials. Allow time for each team of students to develop a list of questions they could ask to determine if an object is a solid.

3. Write the words "paper clip," "rubber band," and "sponge" horizontally across the board. Explain that students will choose one object at a time and ask their questions to determine if that object is a solid. Once the group has determined if the object is a solid, they will write descriptive words (adjectives) that can be used to describe and distinguish the object on sticky notes. Tell students to use a separate sticky note for each descriptive word. When groups are done, they should place their sticky notes under the appropriate headings on the board. Allow ample time for groups to complete this activity.

4. Once students finish putting words on the board, post the chart you prepared titled "Words to Describe Properties." Title the left column of the T-chart "Solids." Instruct students to copy the chart into their science notebooks.

Differentiation Strategy

For English language learners, it might be helpful to associate a picture or an example with each descriptive word they are unfamiliar with.

5. As a class, review the descriptive words that students posted to the board for each of the items. As you discuss each item, move the sticky notes from the board to the chart under the "Solids" column. Be sure students list the adjectives in the chart in their notebooks during the discussion.

ELA connection SL.2.1

6. Compare and contrast the three solids as a class. Ask:

- What do the rubber band, the sponge, and the paper clip have in common? How are they different? *(Answers will vary. Students should acknowledge that all the objects are solids.)*
- Have you ever seen a rubber band, a paper clip, or a sponge turn into a liquid or a gas? *(No, these items are usually found as solids.)*
- What could you do to find more differences between these objects? *(Answers will vary. Students might suggest melting them, putting them in water to see if they sink or float, or determining magnetism.)*

Teaching Tip

If students struggle to make comparisons, ask more specific questions (Which objects are flexible? Stretchy? Which objects can be bent and maintain their shape?) Describe the paper clip as malleable, and explain that this means that even though the paper clip is hard, it can still be bent to change its shape. Make sure students can identify differences between the three solid objects.

7. Remind students about the term "physical change," and have them define it and provide an example. Remind students that physical changes do not have to include changes in state, but could also be shown by a change in shape, color, or size. Ask:

- What physical changes can be observed with the rubber band? Paper clip? Sponge? *(The rubber band can be stretched, the paper clip can be bent, and the sponge can be compressed.)*

Tips for teaching in every lesson

8. Wrap the rubber band around the sponge and attach the paper clip to the rubber band. Show students what you have created and ask:

- What did I do to these items? *(Combined or mixed them.)*
- Did any of the items experience a physical change? *(The rubber band was stretched.)*
- Did you observe any state changes? *(No)*
- Are there other ways to organize these items? *(Yes)*

Formative assessment

9. Collect all materials. Retain the paper clips, rubber bands, sponges, sticky notes, and markers for reuse. Keep the class chart for use in Investigation B of this lesson.

Tell Me More!

Draw or write about an example of a physical change.

ELA connection L.2.1, SL.2.1, W.2.8

Investigation B

WHAT ARE THE PROPERTIES OF LIQUIDS?

MATERIALS

- **Student**

1 Science notebook*
1 States of Matter Vocabulary Book (from Lesson 2)

- **Team of four students**

1 Marker*
1 Pack of sticky notes
1 Plastic cup of liquid dish soap (with lid)
1 Plastic cup of vegetable oil (with lid)
1 Plastic cup of water (with lid)

- **Teacher**

½ C Liquid dish soap*
18 Plastic cups (1 oz) with lids
1 Roll of paper towels*
½ C Vegetable oil*
½ C Water*
Assessment Observation Sheet: Lesson 3
Chart paper or a whiteboard*
Marker*
*These materials are needed but not supplied.

1. Instruct students to use their States of Matter Vocabulary Books and science notebooks to respond the following:

- What are some properties of liquids? *(A liquid takes the shape of its container, and its particles move around.)*
- Provide an example of a liquid. Write down as many properties of that liquid as you can. *(Answers will vary.)*

2. Remind students that water is affected by heat and cooling. Ask students to explain how water can transform into ice or vapor. Encourage them to notice patterns related to particle behavior.

3. Distribute a set of three liquids, a pack of sticky notes, and a marker to each team. Allow time for teams to observe the contents of the cups closely and explain how they know the cups contain liquids. Encourage students to gently shake or swirl the liquids, but tell them not to remove the lids.

4. After students have had time to make observations about the liquids, ask them to answer the following questions with their groups and to record their answers in their science notebooks. Facilitate a class discussion to review students' responses. Ask:

- What pattens do you observe to know these are liquids? *(They are visible and take the shape of their container.)*
- How are these liquids similar? How are they different? *(Answers will vary. Students should explain that they all take the shape of their container but describe differences in how they move.)*
- What physical properties can you use to describe all liquids? *(Answers will vary. Examples include wet and flexible.)*

Disciplinary Core Idea
- **PS1.A:** Structure and Properties of Matter

Science and Engineering Practice
- Planning and Carrying Out Investigations

Crosscutting Concept
- Patterns

5Es
- Explore
- Explain

Differentiation Strategy

To help students visualize the connection between water's three states of matter, write each word on the board and draw arrows between them to show a cycle. Label the arrows with the terms "melting," "freezing," and "boiling/evaporating." At this level, students do not need to know about condensation or sublimation.

Differentiation

Identify Phenomena

Ask students to think about a time when they tried to get ketchup or honey out of a container. Encourage students to relate this experience to viscosity and fluidity.

5. Draw attention to how each liquid moves. Explain that the soap moves slowly because it is thick and viscous. The oil moves around more easily because it is thinner and more **fluid** than the soap. Ask students to develop their own definitions for "viscous" (to be slow-moving and resist flow) and "fluid" (to move around easily).

Connect to phenomena

6. Write the words "soap," "oil," and "water" horizontally across the board. Instruct groups to come up with as many adjectives as they can to describe the physical properties of each of the liquids. They should write each word on a separate sticky note and stick it under the appropriate word on the board. Allow ample time for groups to choose their words.

7. When students have finished putting words on the board, post the "Words to Describe Properties" chart from Investigation A. Ask students to locate this chart in their science notebooks. Title the right column of the chart "Liquids," and instruct students to do the same. As a class, review the words that students used to describe the physical properties of liquids. Place all the sticky notes that appropriately describe liquids in this column of the T-chart. Instruct students to copy their list into their science notebooks.

8. Guide students to think about how the properties of a liquid might change. Remind students that physical changes do not result only from heating and cooling. Ask:

- What physical changes could be observed with these liquids? *(Answers will vary. Students should mention heating and freezing but should also suggest changes like adding food coloring or lathering the soap.)*
- Do you think a physical change would result if we mixed two of these liquids together?
- Make a prediction about what will happen if you mix two liquids. *(Answers will vary.)*

ELA connection W.2.8

9. Collect the materials. Retain the markers and the packs of sticky notes. Direct students to empty the water into the sink. Collect these cups for reuse. Students should dispose of the cups of dish soap and vegetable oil in the trash. Alternatively, you may choose to recycle the vegetable oil if your school's kitchen does so.

Tell Me More!

Is a pool of maple syrup more viscous or more fluid than a pool of water? Explain how you know.

Investigation C

WHAT IS A MIXTURE?

MATERIALS

- **Student**

1 Science notebook*
1 Student Investigation Sheet 3C: *Which Materials Will Mix?*

- **Team of four students**

1 Plastic cup of rice (with lid)
2 Plastic cups of sand (with lids)
1 Plastic cup of water (with lid)

- **Teacher**

1 Student Investigation Sheet 3C: *Which Materials Will Mix?* (Teacher's Version)
24 Plastic cups (1 oz) with lids
½ C Rice*
1 C Sand
½ C Water*
Assessment Observation Sheet: Lesson 3
Paper towels*

*These materials are needed but not supplied.

1. Display the "Words to Describe Properties" class chart. Ask students to work individually and choose words from the chart to describe water and sand, and to list these in their science notebooks. Invite a few students to share the properties they chose for each. Then ask the class the following questions:

- What is a location where you see a lot of sand and water? *(A beach)*
- Imagine that you build a sand castle near the water. Suddenly a wave hits the castle, and it seems to disappear. Did the sand turn into water? Explain. *(No, the sand was pulled into the water, but it did not become water.)*
- Now imagine that you are eating a sandwich at the beach, and it falls into the sand. What would happen? *(Some sand would stick to the sandwich.)*

2. Distribute a copy of Student Investigation Sheet 3C: *Which Materials Will Mix?* to each student. Provide two cups of sand, one cup of rice, and one cup of water to each team of four students. Explain that students will explore mixtures in this investigation. Ask students to talk within their groups and use their science notebooks to create their own definition for the word "mixture." They should also list some mixtures they know of.

3. Preview the directions for Part A of the investigation sheet with the class. Explain that students will predict what will happen when sand and rice are mixed together. Allow time for students to make their predictions and complete Part A, including describing what their mixture looks like.

Disciplinary Core Idea
- **PS1.A:** Structure and Properties of Matter

Science and Engineering Practices
- Planning and Carrying Out Investigations
- Constructing Explanations and Designing Solutions

Crosscutting Concepts
- Patterns
- Cause and Effect

5Es
- Explore
- Explain
- Elaborate

Literacy Components
- *Matter* Literacy Reader, pg. 13
- **Literacy Article 3C:** Making Salad Dressing

Digital Component
- **Simulation:** Create a Mixture

ELA connection
L.2.1, L.2.6

Teaching Tip

If students are not familiar with making a prediction, assist them in setting up an "I think ____ because ____" statement.

Identify Phenomena

Challenge students by asking how spraying perfume or air freshener creates a mixture of liquid and gas. Explain that even though the smell of the air changes, neither the air nor the perfume changes state.

4. Refer students to their definition for "mixture," and ask if they would like to make any changes to it based on what they have observed.

5. Preview the directions for Part B of the investigation sheet with the class. Explain that students will predict what will happen when sand and water are mixed together. Allow time for students to make their predictions and complete Part B, including describing what their mixture looks like.

6. Refer students to their definition for "mixture," and ask if they would like to make any changes to it based on what they have observed.

Teaching Tip

Use the Create a Mixture simulation to support the class discussion. Ask students to make a prediction for each possible mixture.

7. Review the results of the investigation as a class. Ask the following questions to facilitate a group discussion:

- What is your final definition for the term "mixture"? *(A combination of two or more materials or substances.)*
- What states of matter did you mix in Part A? In Part B? (*Part A mixed two solids, and Part B mixed a solid and a liquid.)*
- Did you notice any patterns in how the substances mixed? *(Each substance stayed the same and did not change state.)*
- Did you notice any physical changes after mixing? *(The sand became wet and heavier when it was mixed with water.)*
- Do you think these results will be the same for all mixtures? *(Answers will vary.)*
- Think about the scenario on the beach from earlier. Is there a way you could separate the sand from the water? Could you separate the sand from your sandwich? *(Answers will vary. Students may mention collecting sand in a bucket and let it dry to get rid of water or wiping the sand off the sandwich.)*

ELA connection RI.2.9

Literacy Tip

To support the concepts in this investigation and make connections to phenomena, ask students to read Literacy Article 3C: Making Salad Dressing.

8. Direct students to Part C of their investigation sheet, and review the questions as a class. Allow time for students to answer these questions with their group members. Ask a few volunteers to share their conclusions, and discuss them as a class. Guide students to understand that separating mixtures is not always a simple task.

9. Direct students in cleanup. Collect the cups of rice and sand. Have students empty the water into the sink, and collect these cups as well. Save all for reuse.

Tell Me More!

Brass, which is used to make instruments like trumpets, is made by mixing two metals: copper and zinc. What must happen before these metals can be mixed?

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: making connections between a material and how it is used. By the end of the lesson, students should be able to explain that:

- A liquid is matter that will take the shape of its container. The glue is a liquid because it takes the shape of its container.
- Some liquids are very viscous, or thick, and move slowly. Other liquids are fluid and move around their container easily. Glue is a viscous liquid, and water is fluid.
- Matter can be mixed. Two different kinds of matter were mixed when it began raining on the wood. The wood became temporarily wet but did not change.
- Sometimes mixing matter causes physical changes. When the glue and rain mixed, it caused the glue to become less sticky and thick.

NOTES

Formative assessment

EXTENSIONS

ELA connection RI.2.9

Comparing States of Matter

Read aloud *States of Matter* by Suzanne Slade (Book 1) and *States of Matter: A Question and Answer Book* (Book 2) by Fiona Bayrock. Draw a Venn diagram on the board, and label the left section "Book 1," the right section "Book 2," and the middle section "Both Books." Have students determine where topics discussed in the texts belong on the diagram. Once the diagram is complete, have students review the topics presented on the Venn diagram for each book. Ask:

- Which book explored more topics?
- Do you think one book did a better job explaining states of matter based on the number of topics mentioned?
- Why do you think so?

Credit: Fotos59/Shutterstock.com

Liquid Lava

Explain that lava is rock that is heated to such an extremely high temperature that it flows as a liquid from active volcanoes. Some volcanoes have thick, pasty lava that moves slowly, while other volcanoes have thinner lava that flows quickly. Point out that quick-flowing, runny lava is mainly found deep under the ocean where Earth's crust is being formed. One rare location on land where fluid lava can be found is Iceland. Display a world map and show students where Iceland is located.

ASSESSMENT STRATEGIES

1. Investigation A

- Use students' responses to the Tell Me More question to check for understanding of physical changes. Students should be able to correctly identify a physical change. Note students who offer examples unrelated to what they have seen in class.

2. Investigation B

- Use students' responses to the Tell Me More question to gauge their understanding of viscosity and fluidity. Students should identify maple syrup as more viscous because it is thicker and moves more slowly than water. If students appear to struggle with this concept, provide supplemental material.

3. Investigation C

- Use Student Investigation Sheet 3C: *Which Materials Will Mix?* to gauge students' understanding of mixtures. Review Part C to identify above-level students who can describe how mixtures can be separated.
- Use students' responses to the Tell Me More question to determine if they recognize that metal is usually a solid and so must be melted before it can be mixed to form brass. If students appear to struggle with this concept, provide supplemental review.

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

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

Name: _____ Date: _____

Making Salad Dressing

ELA connection
RF.2.3, L.2.4, RI.2.4, RI.2.6, W.2.8

You make a salad for dinner. Oh, no! You're out of dressing. Time for a trip to the store. You look at the different types of salad dressing. Some parts of salad dressing don't want to mix. It has layers. The oil sits on top of the vinegar.

You can make your own salad dressing. Start by choosing vinegar. There are many kinds. Balsamic vinegar is black. There are also white and red vinegars. Check out the different types of vinegar in your grocery store.

Oil is the second thing you need. There are many kinds of oils. Some oils are made of olives. Other oils are made of corn. Coconut oil is a solid. It is not a good choice for salad dressing.

You need something to keep the oil and vinegar mixed. You can use mayonnaise, honey, or mustard. What's your favorite? Now you can make the dressing. Put the vinegar in a bowl with the mustard. Add salt and pepper if you like. Add the oil slowly. Use a whisk to mix everything together as you pour in the oil.

Your salad dressing is ready! Pour it over a salad full of your favorite vegetables. How does it taste?

Questions:

1. Is salad dressing a mixture? How do you know?
2. You let salad dressing sit for a long time. What does salad dressing separate into?
3. Which ingredient was added to help oil and vinegar mix?

Credit: Svetlana Foote/Shutterstock.com

Student Investigation Sheet 3C: Which Materials Will Mix?

Name: _____ Date: _____

ELA connection
L.2.1, L.2.2, RI.2.3, W.2.8

A. Predict, Observe, and Record: Mixture of a Solid and a Solid

1. What do you think will happen when you mix rice and sand? _____

2. Make a mixture of two solids. Pour the cup of rice into the cup of sand.
3. Secure the lid and gently shake it to mix the rice and sand together.
4. Describe what the mixture looks like below.

B. Predict, Observe, and Record: Mixture of a Solid and a Liquid

1. What do you think will happen when you mix sand and water? _____

_____

2. Make a mixture of sand and water. Pour the cup of water into the cup of sand.

3. Secure the lid and gently shake the cup to mix the sand and the water together.

4. Describe what the mixture looks like below.

_____

_____

_____

_____

_____

_____

_____

_____

C. Conclude

1. Could the mixtures you made be separated? Describe how you would separate the mixed items.

2. Can all mixtures be separated? Use evidence to support your answer.

Assessment Observation Sheet

Lesson 3—Solids, Liquids, and Mixtures

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

A. Can students accurately describe the particle interaction of the different states of matter? Can they identify the different properties of each state of matter?

B. Can students distinguish the different properties of solids and liquids?

C. Do student-recorded observations in science notebooks, including drawings and dictated words and sentences, demonstrate their developing knowledge of the way different liquids move?

D. Can students identify a mixture and provide an example?

E. Are there students who seem to be having difficulty understanding the differences between the varying characteristics within liquids and solids?

F. Are students using appropriate terminology to describe solids, liquids, and mixtures?

G. Additional considerations:

NOTES

Formative assessment—how are they progressing?

Making Salad Dressing

You make a salad for dinner. Oh, no! You're out of dressing. Time for a trip to the store. You look at the different types of salad dressing. Some parts of salad dressing don't want to mix. It has layers. The oil sits on top of the vinegar.

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Your salad dressing is ready! Pour it over a salad full of your favorite vegetables. How does it taste?

Credit: Svetlana Foote/Shutterstock.com

Questions:

1. Is salad dressing a mixture? How do you know? *(Students should identify salad dressing as a mixture because it is a combination of several substances.)*

2. You let salad dressing sit for a long time. What does salad dressing separate into? *(Oil and vinegar.)*

3. Which ingredient was added to help oil and vinegar mix? *(Mayonnaise, mustard, or honey.)*

Student Investigation Sheet 3C: Teacher's Version

Which Materials Will Mix?

A. Predict, Observe, and Record: Mixture of a Solid and a Solid

1. What do you think will happen when you mix rice and sand? *(Predictions will vary.)*

2. Make a mixture of two solids. Pour the cup of rice into the cup of sand.

3. Secure the lid and gently shake it to mix the rice and sand together.

4. Describe what the mixture looks like below. (*Students should explain that the rice and the sand do not change state or interact.)*

B. Predict, Observe, and Record: Mixture of a Solid and a Liquid

1. What do you think will happen when you mix sand and water? *(Predictions will vary.)*

2. Make a mixture of sand and water. Pour the cup of water into the cup of sand.

3. Secure the lid and gently shake the cup to mix the sand and the water together.

4. Describe what the mixture looks like below. *(Students should observe that the sand and the water do not change states. Students may explain that the sand becomes wet.)*

C. Conclude

1. Could these mixtures be separated? Describe how you would separate the mixed items. *(Answers will vary. Students may explain that the water can be poured out of the cup or the rice can be picked out of the sand.)*

2. Can all mixtures be separated? Use evidence to support your answer. *(No, not all mixtures can be separated. Sometimes the materials mix, such as two liquids, and cannot be separated.)*

Summative Assessment

What have they learned?

Name: _____ Date: _____

1. Which state change can be observed when a pot of water is placed on the stove to boil?

a. Solid → liquid
b. Liquid → gas
c. Gas → solid

2. Which of the following is true of building a house with bricks?

a. The more bricks added, the larger the house becomes.
b. The house cannot be destroyed.
c. The bricks will change shape in sunlight.
d. The house can only be a cube.

NOTES

Building Blocks of Science Student Literacy

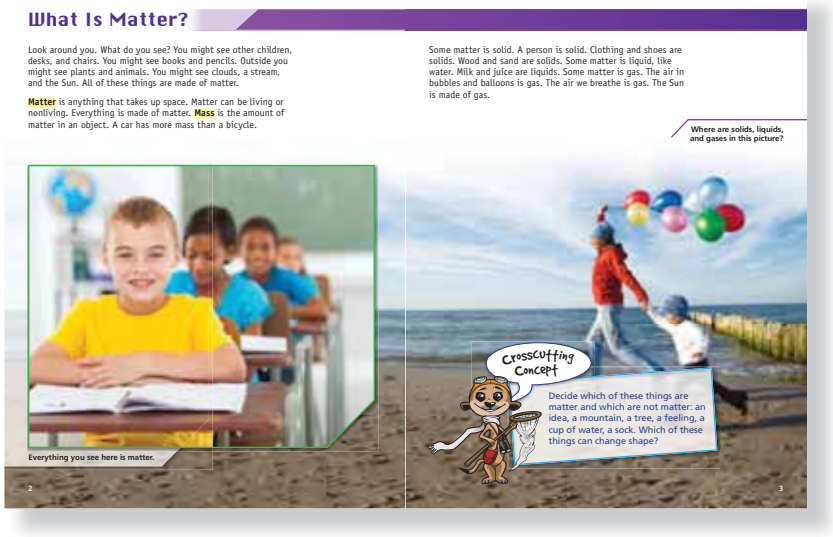
Build students' literacy skills with literacy components found within lessons and Literacy Readers.

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



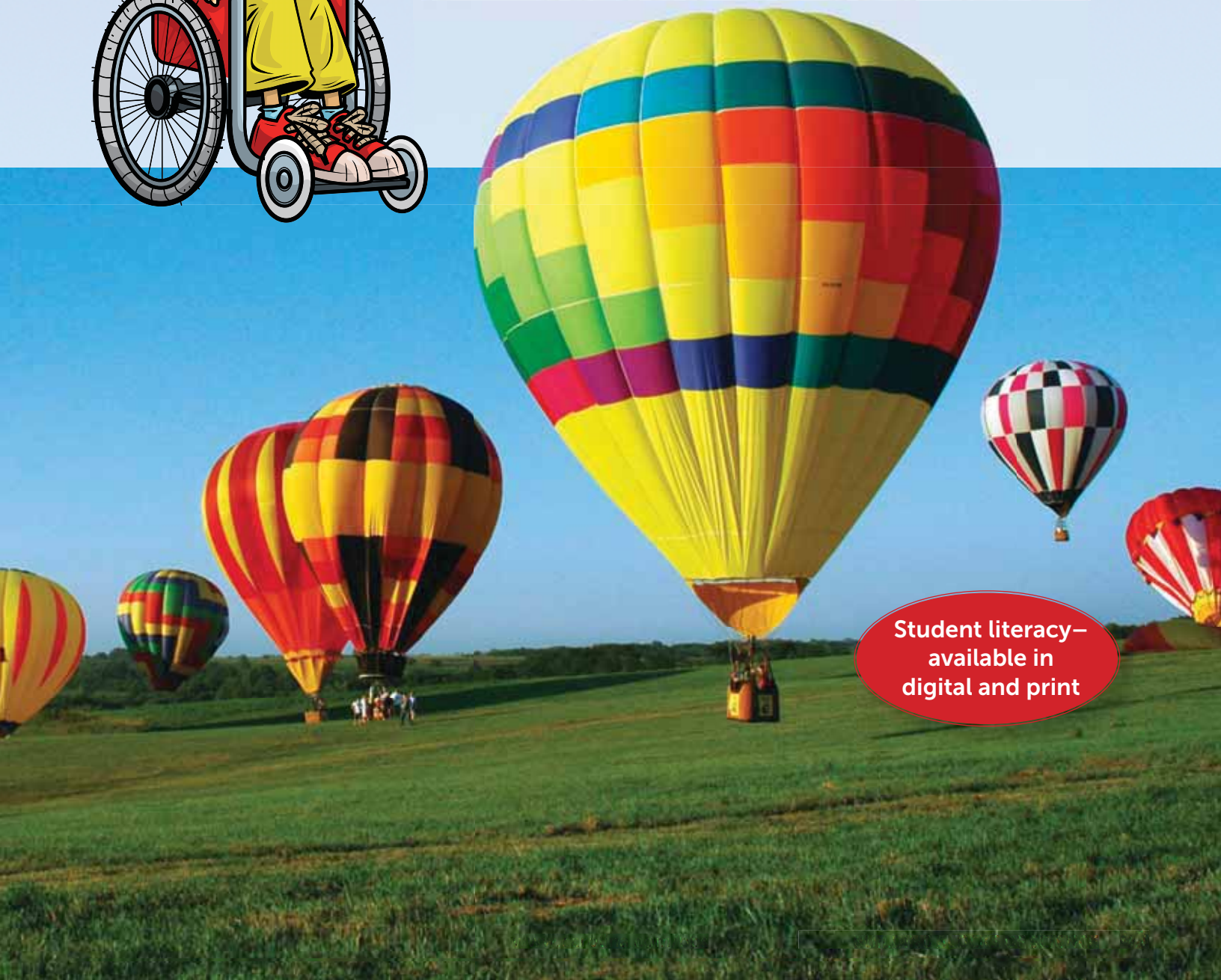
What else to look for?

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 32 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

Matter



Student literacy–available in digital and print

States of Matter

Form is another important property of matter. Water does not always look and feel the same. Sometimes water flows, like in a river. When water forms ice, it is hard. When water is heated, it forms a gas you cannot see. The water is still water. It just has another form.

The different forms of matter are called **states of matter**. State is a property. There are three states of matter. These are solid, liquid, and gas.

The people, the wood, and the fishing rod are solid. The water is liquid. The air is gas that we breathe.

Ice is a solid. A **solid** keeps its shape and size. A toy car is a solid. You can move it around. But its shape and size stay the same.

A **liquid** keeps its size, but not its shape. When you pour water as a liquid into a cup, the water takes the shape of the cup.

Water in the air is a gas. A **gas** does not keep its size or shape. A gas spreads out. It takes all the space it can. Air as a gas fills this hot air balloon.

Mixtures

Many types of matter are mixtures. A **mixture** is two or more kinds of matter mixed together. Mud is a mixture of water and soil. Dirt is a mixture of small rocks and pieces of once-living things.

A mixture does not change into a different kind of matter. The parts of a mixture keep their properties. The water and soil that make up mud are still water and soil. The things that make up dirt are still rocks and pieces of once-living things. Mixtures can be taken apart. A salad is a mixture of different foods. You can pull parts out of a salad.

A salad is a mixture.

Science and Engineering Practices

Investigate Properties!

Properties can be described and sorted. See what you can learn from sorting.

1. Gather objects like these: a quarter, a cork, a large metal paper clip, and a plastic ruler.
2. Compare the sizes. Sort the objects in a line from smallest to biggest. Which one is smallest? Which one is biggest?
3. Test each object to see how easy it is to bend. Bend, but do not break, the objects. Sort them in a line from easiest to hardest to bend. Which one is easiest to bend? Which one is hardest to bend?
4. Test how hard the objects are. Try to scratch one object with another. Harder matter scratches softer matter. Be careful not to scratch yourself. Sort the objects in a line from softest to hardest. Which one is softest? Which one is hardest?
5. What other property can you compare this way? Try it. Make a drawing and label it.

Builders pick the properties of matter that are best for what they want to make.

Careers

Science in the world

Toy Maker

Which kind of matter makes the best toy truck or doll? Toy makers know. They think of ideas for new toys. They decide which matter works best for each toy. They study the properties of matter. They look at how easy it is to get a certain type of matter. They consider how rare or expensive it is. They figure out how to make toys fun and safe.

Would I like this career?	You might like this career if • you like to think of new ideas. • you like to make things.
What would I do?	• You would study the properties of matter. • You would compare types of matter. • You would think of new toys and figure out how to make them.
How can I prepare for this career?	• Study science, math, and art. • Develop good drawing and measuring skills.

Toy makers choose matter that is easy to get, does not cost much, and is safe for toys.

Profesiones

Spanish literacy—available in digital and print

Creador de juguetes

¿Con qué tipo de materia se pueden hacer los mejores camiones o muñecas de juguete? Los fabricantes de juguetes lo saben. Piensan ideas para nuevos juguetes. Deciden qué materia da los mejores resultados para cada juguete. Estudian las propiedades de la materia. Analizan qué tan sencillo es obtener cierto tipo de materia. Consideran qué tan raro o costoso es. Conciben cómo hacer que los juguetes sean divertidos y seguros.

¿Me gustaría esta profesión?	Te gustaría esta profesión si • te gusta pensar en nuevas ideas. • te gusta crear cosas.
¿Qué tendría que hacer?	• Estudiarías las propiedades de la materia. • Compararías tipos de materia. • Idearías nuevos juguetes y descubrirías cómo construirlos.
¿Cómo puedo prepararme para esta profesión?	• Estudia ciencias, matemáticas y arte. • Desarrolla buenas destrezas de dibujo y medición.

Los fabricantes de juguetes eligen materiales fáciles de obtener, que no cuesten mucho y que sean seguros para fabricar juguetes.

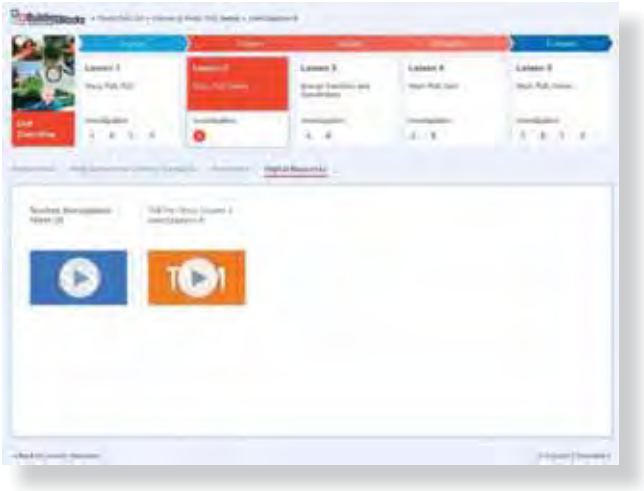
The Right Blend of Hands-On Investigation and Technology

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

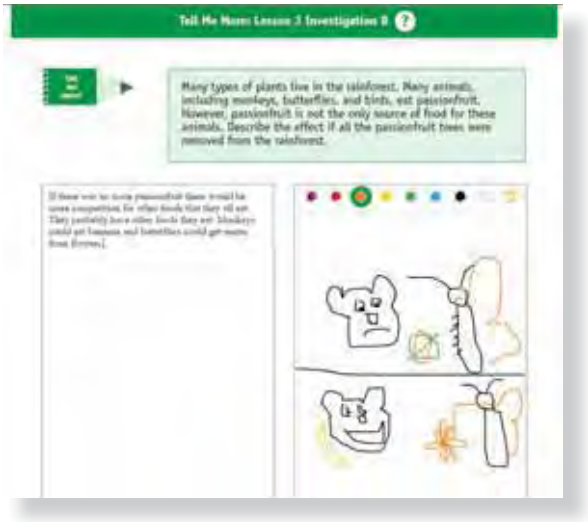
- Identification of where a lesson falls within the **5E Learning Cycle**
- Preparation—Includes investigation overview, materials list, and step-by-step teacher preparation instructions
- **NGSS Standards**—Includes the PEs, DCIs, SEPs, and CCCs that will be addressed within the investigation
- **Lesson 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

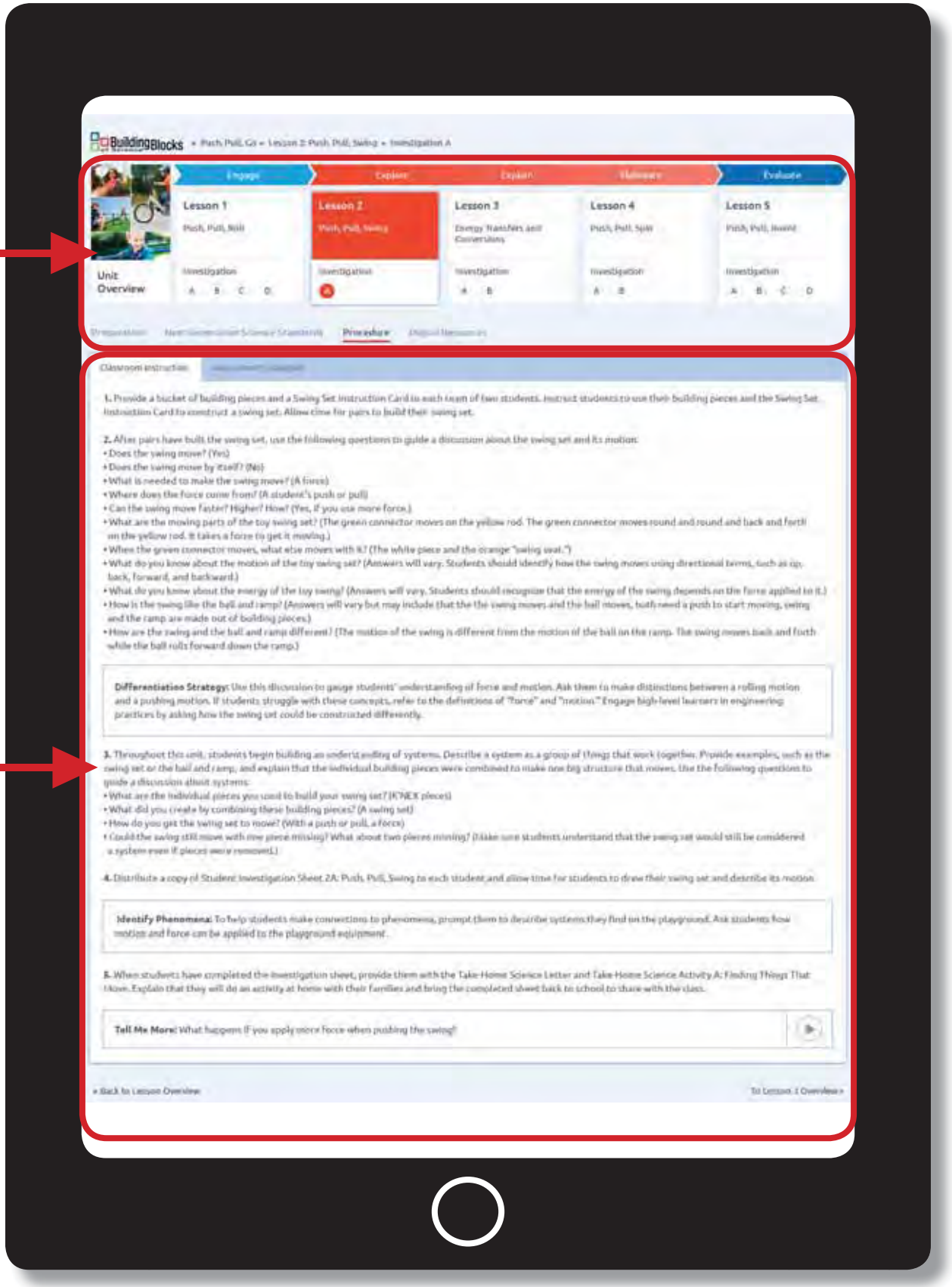
- Step-by-step instruction including guiding questions and anticipated responses
- Differentiation strategies at point of use within each investigation
- **Identify Phenomena** provides teachers with prompts to help students make connections to phenomena addressed within an investigation
- Assessment 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
Lesson 1
Lesson 2
Lesson 3
Lesson 4
Lesson 5
Unit Overview
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 2 Overview »

Digital Components to Support Instruction and Assessment

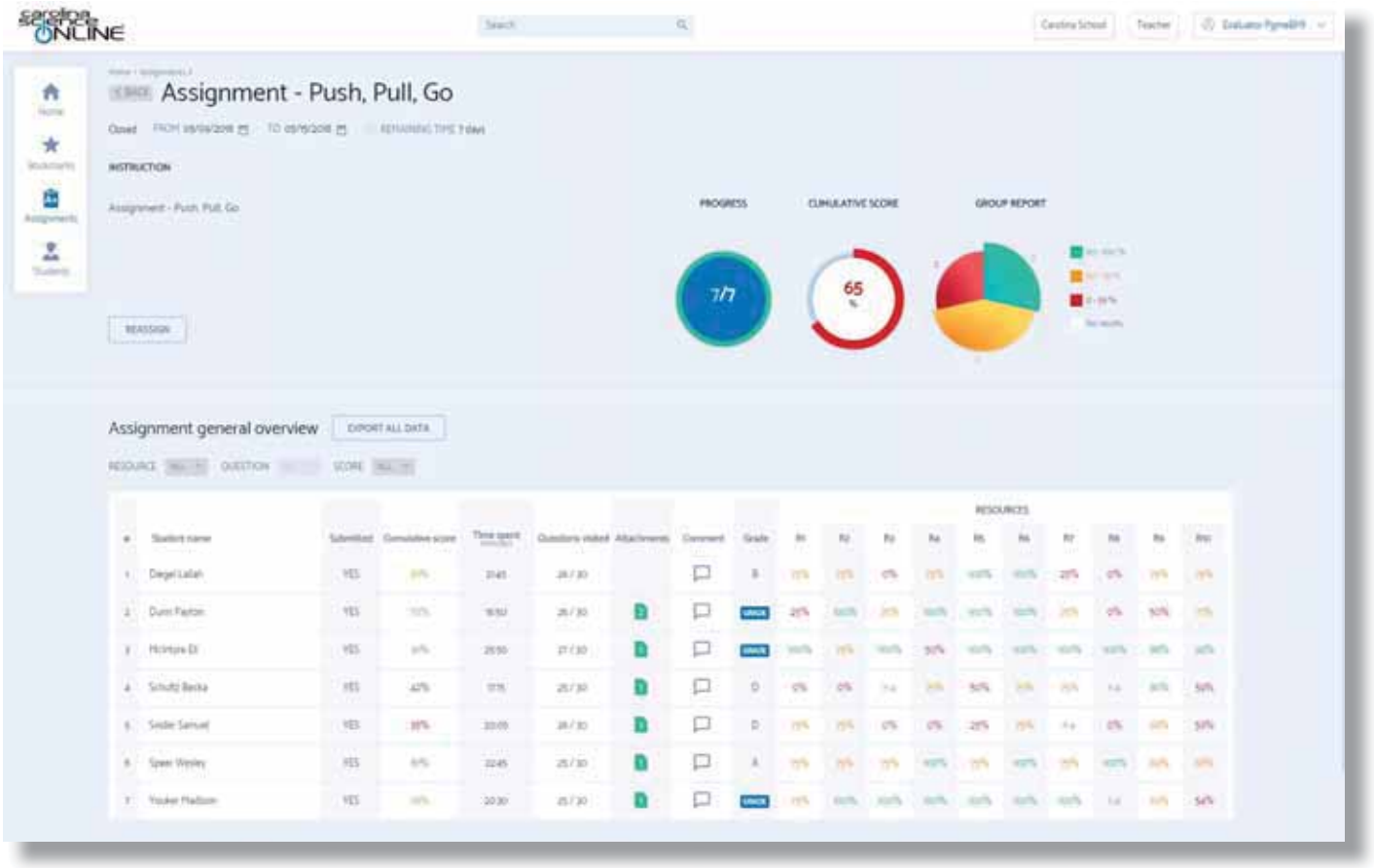
For the Teacher—Customizable Digital Planning at Your Fingertips

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.

NOTES

NOTES

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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*

Phenomenon-based investigations with digital support in 30-minute lessons!

For more information, visit www.carolina.com/bbs