CAROLINA
UNLEASH LEARNING™



2025/26 New Haven Public Schools, Worthington Hooker Middle School, Grade 6 STCMS Matter and Its Interactions: Lesson 1

What Does High-Quality Science Instruction Look Like?

Practical Walk-Through Tools for District Leaders (K–12)

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Today's session isn't about evaluating teachers—it's about learning to recognize evidence that students are actively making sense of science.



By the end of today's session, you will be able to:

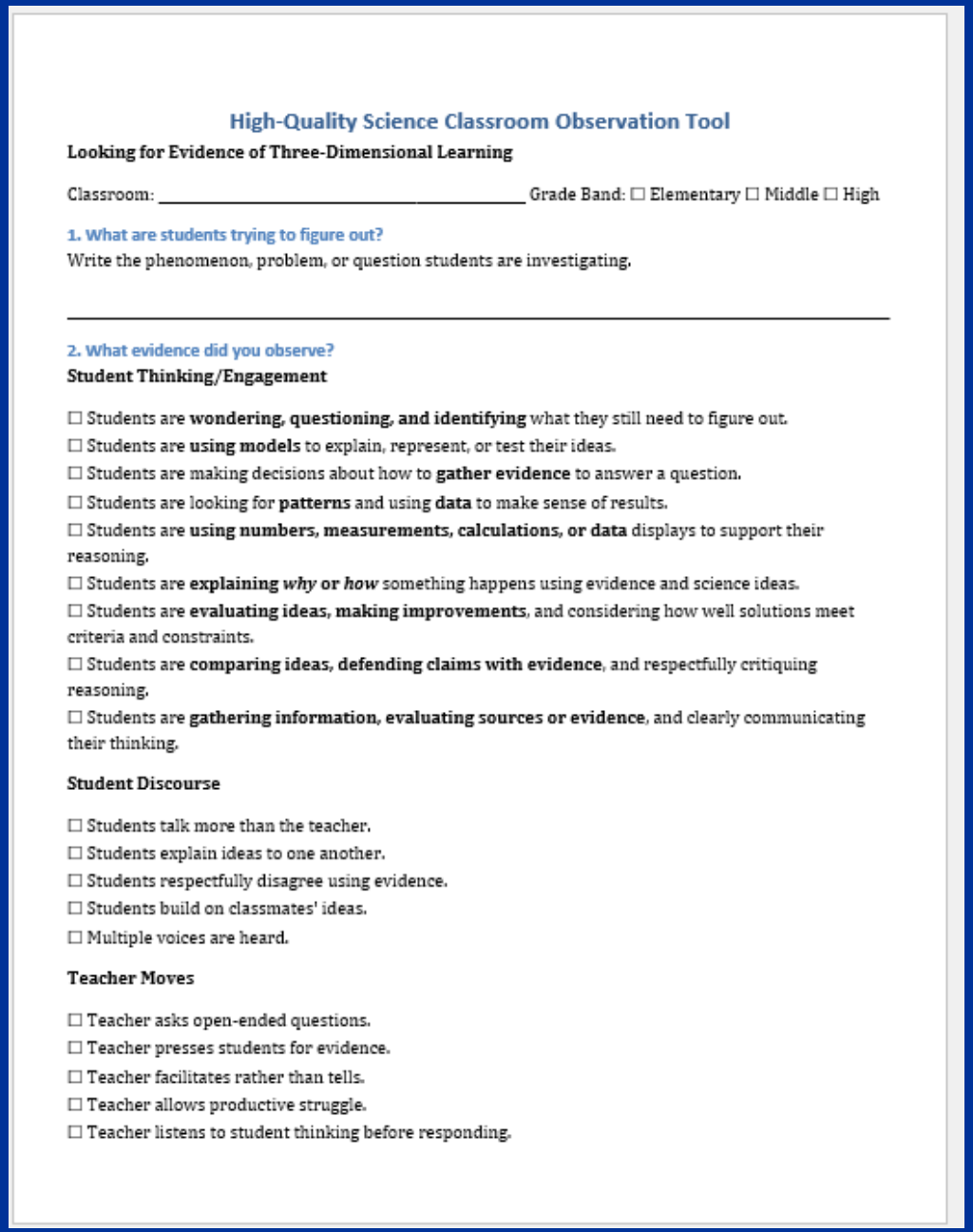
- Develop a common vision of high-quality science instruction.
- Practice using a walk-through tool across K–8 classrooms.
- Identify evidence of student thinking and sensemaking.
- Leave with practical coaching and leadership strategies.

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

A Different Lens

Look for evidence of:

- Students making sense of a phenomenon or problem.
- Students using evidence.
- Students talking with one another.
- Students revising ideas.
- Teacher moves that support—not replace—thinking.



High-Quality Science Classroom Observation Tool

Looking for Evidence of Three-Dimensional Learning

Classroom: _____ Grade Band: ☐ Elementary ☐ Middle ☐ High

1. What are students trying to figure out?

Write the phenomenon, problem, or question students are investigating.

_____

2. What evidence did you observe?

Student Thinking/Engagement

☐ Students are **wondering, questioning, and identifying** what they still need to figure out.
☐ Students are **using models** to explain, represent, or test their ideas.
☐ Students are making decisions about how to **gather evidence** to answer a question.
☐ Students are looking for **patterns** and using **data** to make sense of results.
☐ Students are **using numbers, measurements, calculations, or data** displays to support their reasoning.
☐ Students are **explaining *why* or *how*** something happens using evidence and science ideas.
☐ Students are **evaluating ideas, making improvements**, and considering how well solutions meet criteria and constraints.
☐ Students are **comparing ideas, defending claims with evidence**, and respectfully critiquing reasoning.
☐ Students are **gathering information, evaluating sources or evidence**, and clearly communicating their thinking.

Student Discourse

☐ Students talk more than the teacher.
☐ Students explain ideas to one another.
☐ Students respectfully disagree using evidence.
☐ Students build on classmates' ideas.
☐ Multiple voices are heard.

Teacher Moves

☐ Teacher asks open-ended questions.
☐ Teacher presses students for evidence.
☐ Teacher facilitates rather than tells.
☐ Teacher allows productive struggle.
☐ Teacher listens to student thinking before responding.

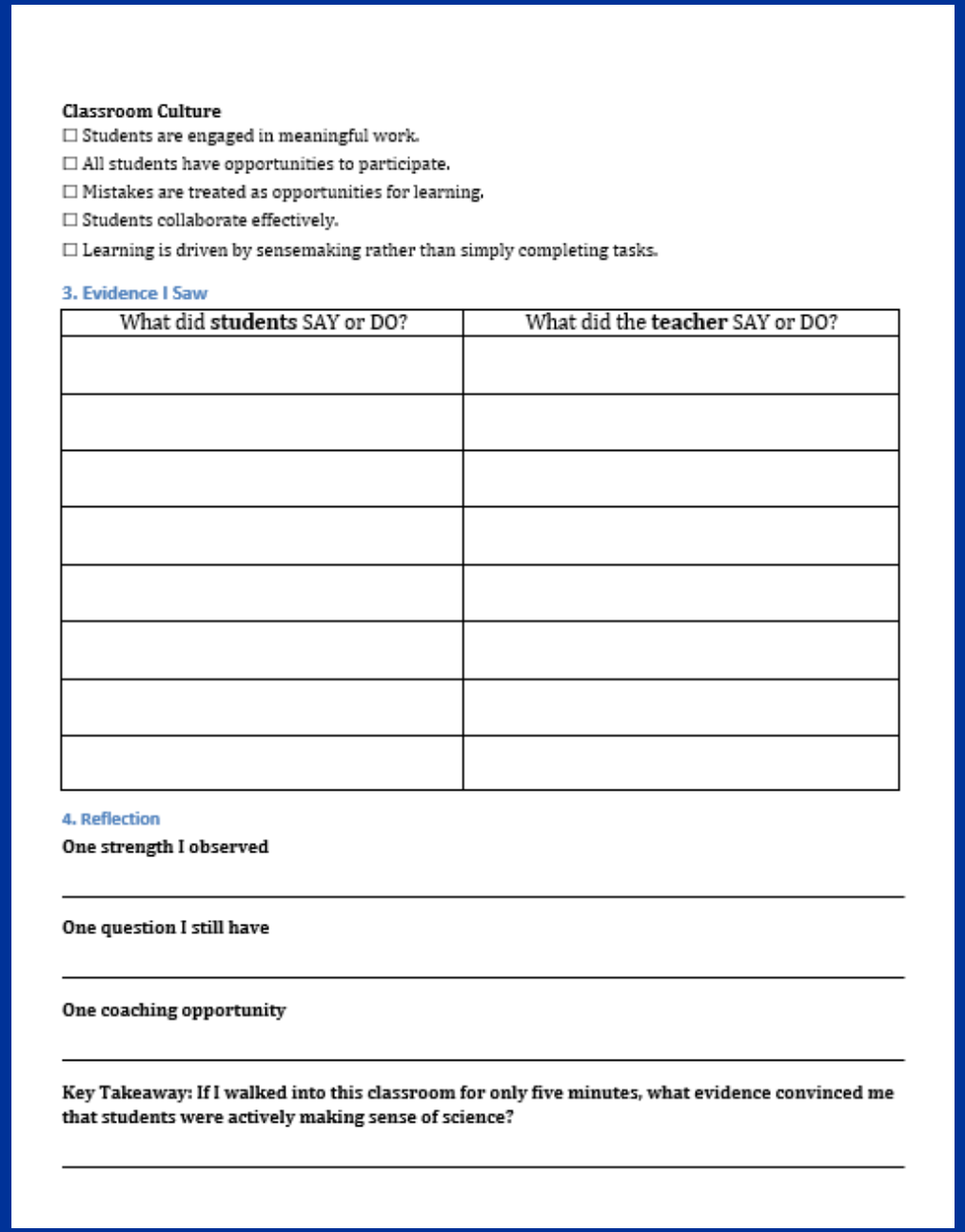
CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Before We Watch

Your job:

- Use the walk-through tool to collect **evidence**.
- *Not opinions.*
- *Not recommendations.*
- Just **evidence**.



Classroom Culture

☐ Students are engaged in meaningful work.
☐ All students have opportunities to participate.
☐ Mistakes are treated as opportunities for learning.
☐ Students collaborate effectively.
☐ Learning is driven by sensemaking rather than simply completing tasks.

3. Evidence I Saw

What did **students** SAY or DO?	What did the **teacher** SAY or DO?

4. Reflection

One strength I observed

_____

One question I still have

_____

One coaching opportunity

_____

Key Takeaway: If I walked into this classroom for only five minutes, what evidence convinced me that students were actively making sense of science?

_____

CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Elementary Sample
Smithsonian Science for the Classroom





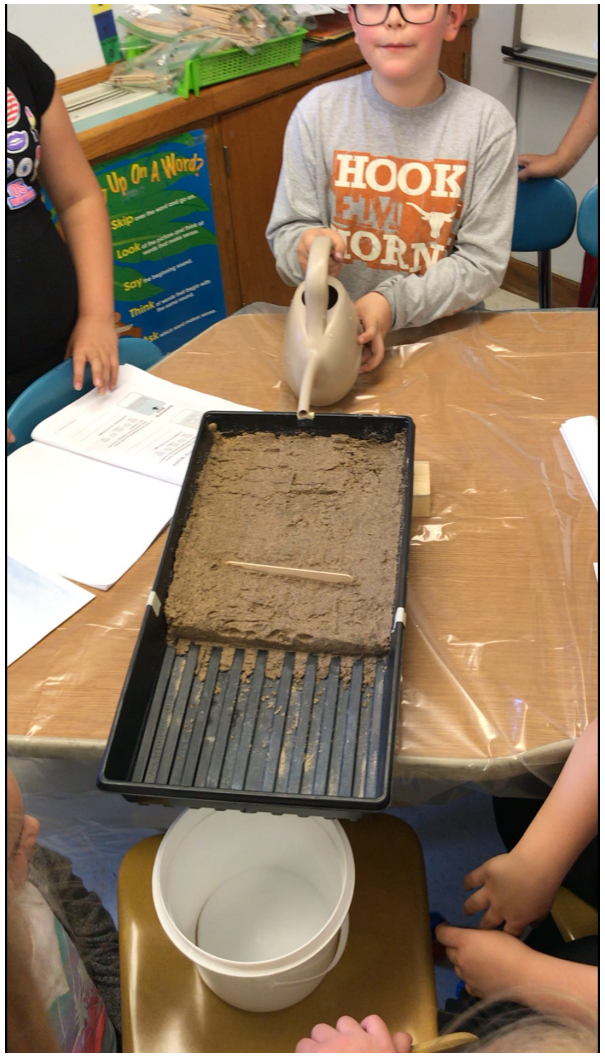

Lessons 5 & 6

2nd Grade Scientists & Engineers
Onondaga Road Elementary
6/7/2018

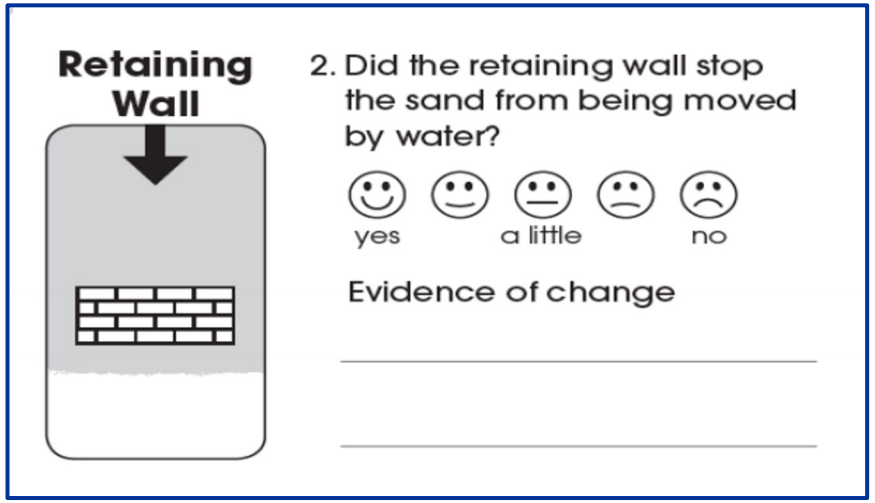
CAROLINA
UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Retaining Wall





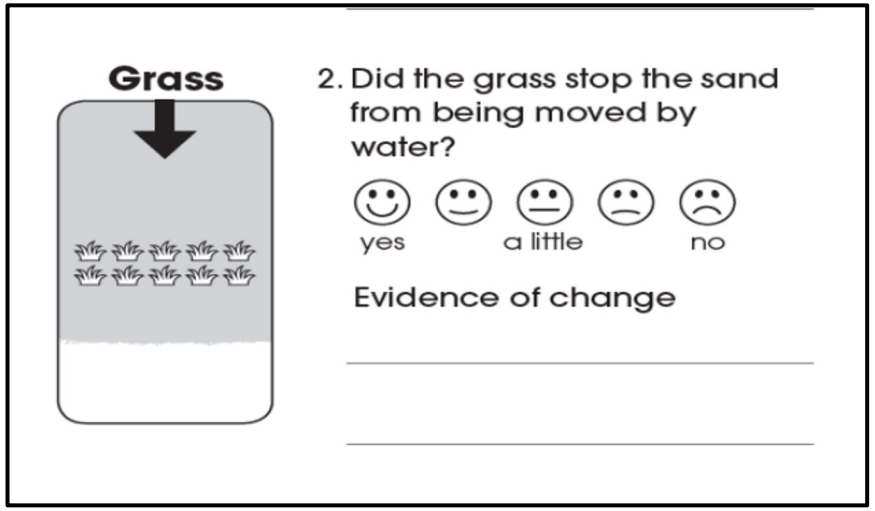


©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Grass







©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

What are students trying to figure out?

Phenomenon – Problem – Question?









How can we model ways to stop soil from washing away?

CAROLINA
UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Which model worked best?









CAROLINA
UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

How can we compare solutions to the erosion problem?

Lesson 6

Mrs. Eassa's 2nd Grade Scientists & Engineers

Onondaga Road Elementary

6/7/2018

CAROLINA
UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

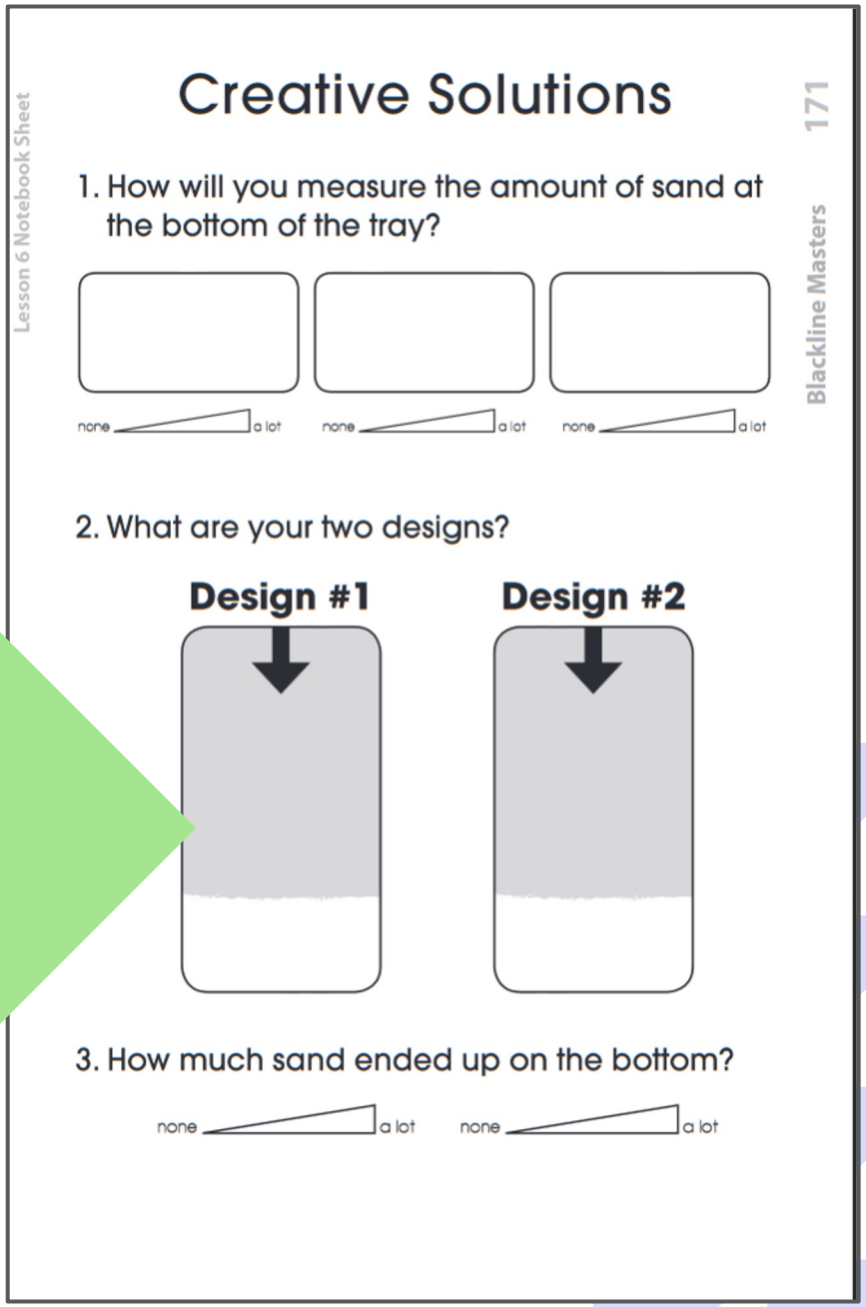
Creative Solutions

Engineers work together!

Choose **2** of the following materials:

- Retaining Walls (1)
- Grass (10)
- Trees (2)
- Sandbags (4)

1. Draw both designs.
2. Get designs approved.
3. Gather materials.
4. Test Design 1.
5. STOP & Record.



Creative Solutions

Lesson 6 Notebook Sheet

171

Blackline Masters

1. How will you measure the amount of sand at the bottom of the tray?

none a lot none a lot none a lot

2. What are your two designs?

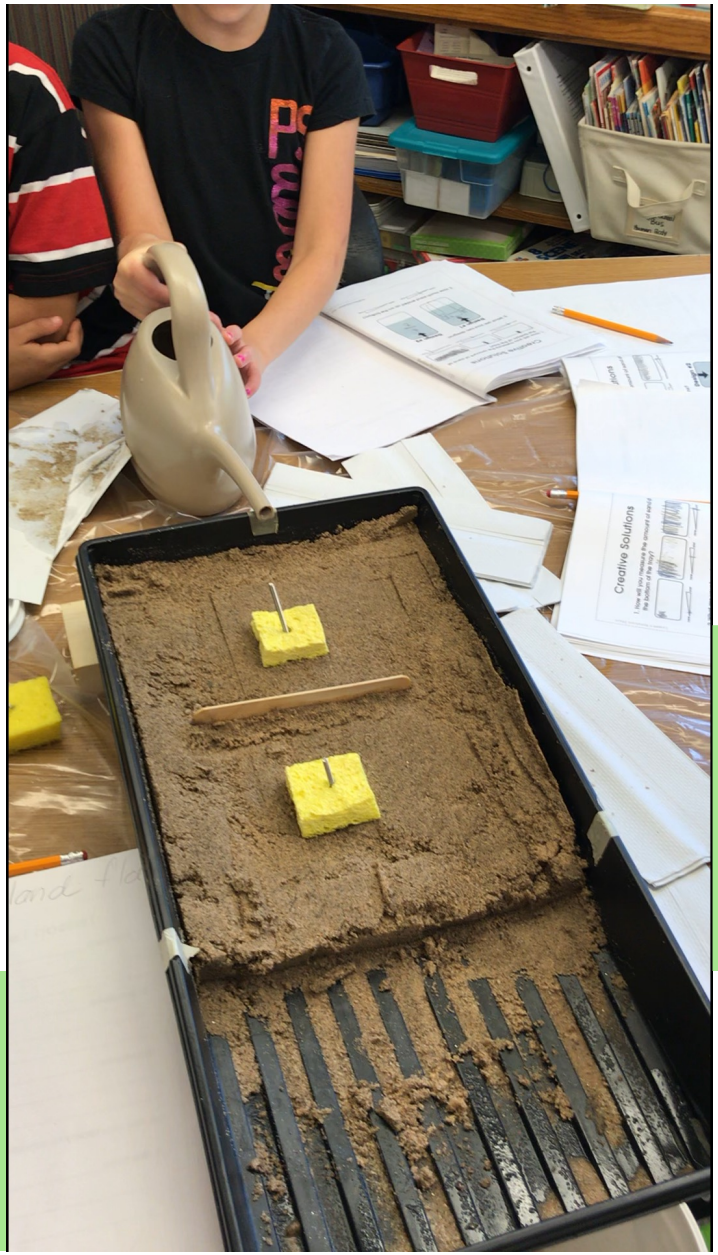
Design #1 Design #2

3. How much sand ended up on the bottom?

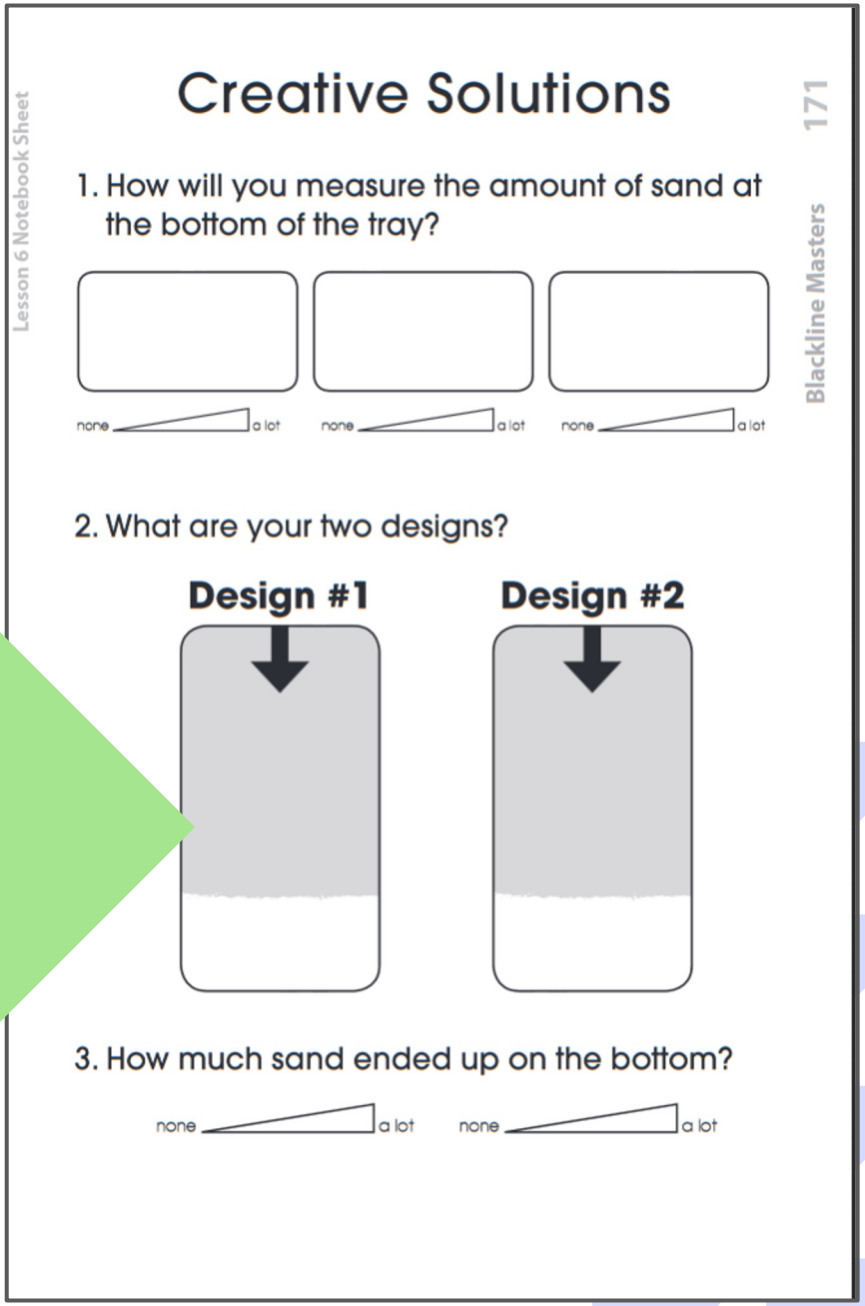
none a lot none a lot

CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.



1. Draw both designs.
2. Get designs approved.
3. Gather materials.
4. Test Design 1.
5. STOP & Record.



Lesson 6 Notebook Sheet

Creative Solutions

171

Blackline Masters

1. How will you measure the amount of sand at the bottom of the tray?

none a lot none a lot none a lot

2. What are your two designs?

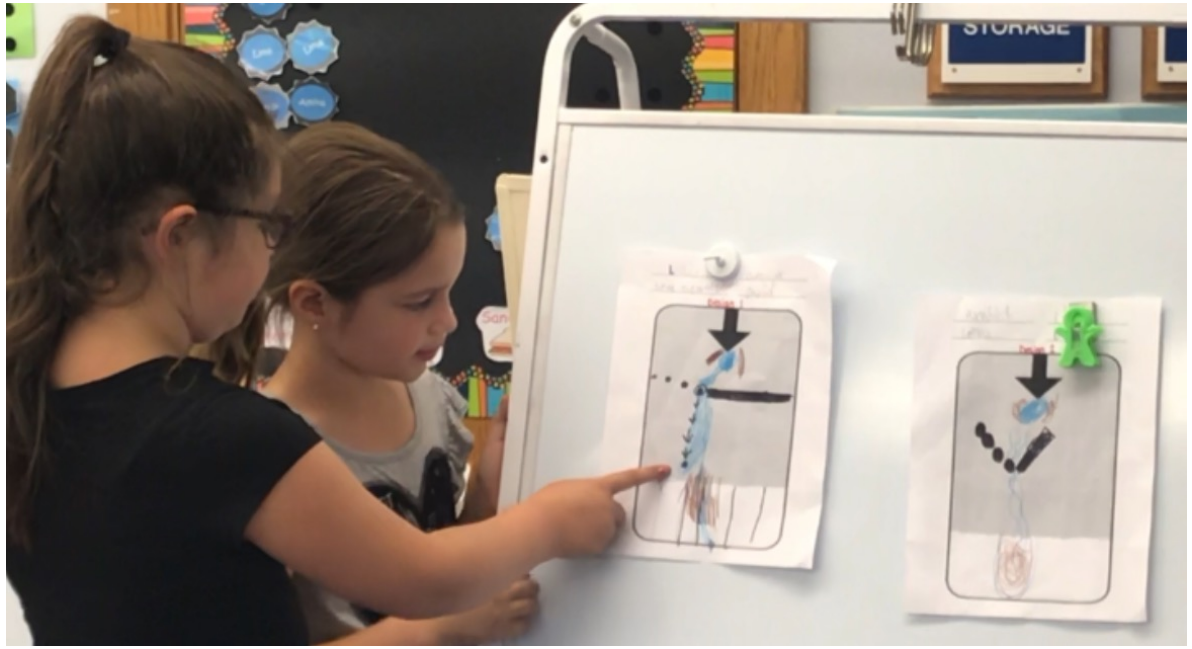
Design #1 **Design #2**

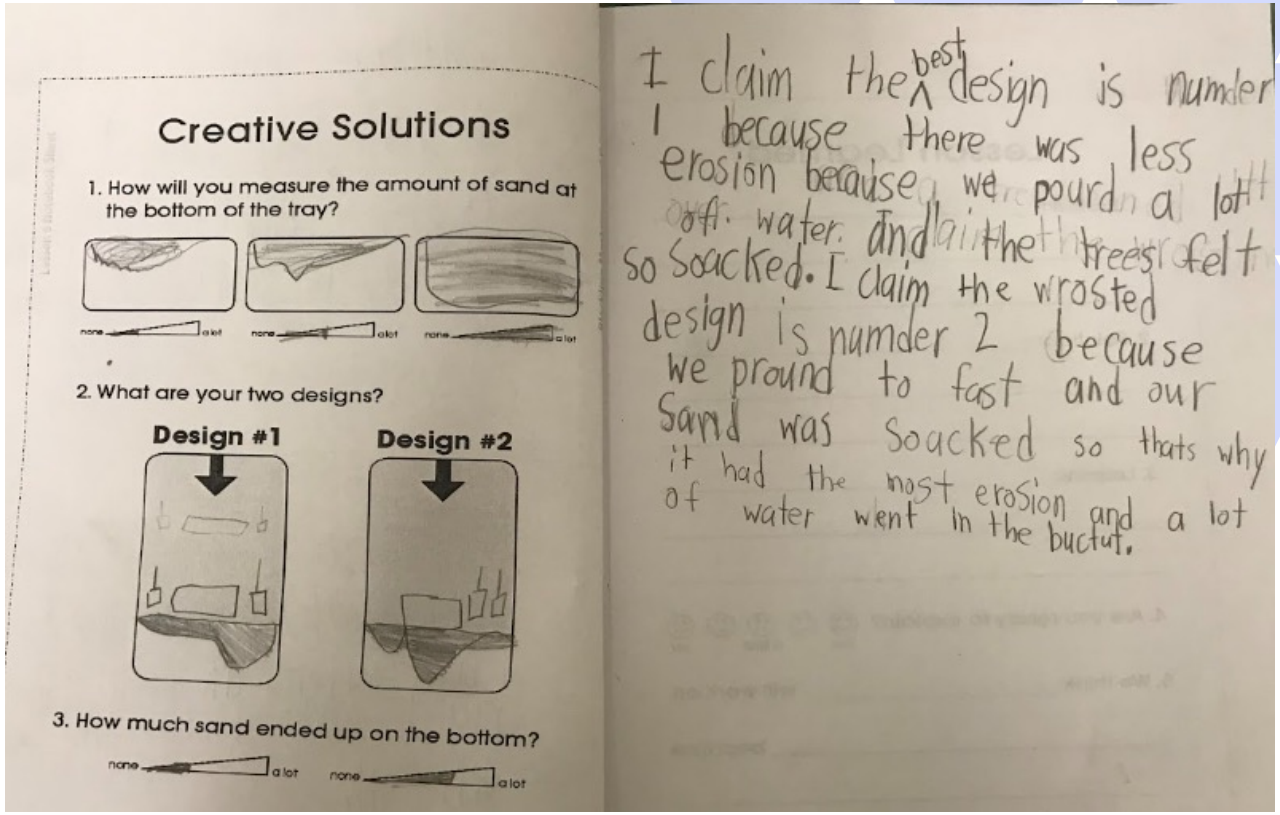
3. How much sand ended up on the bottom?

none a lot none a lot

CAROLINA
UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.





Creative Solutions

1. How will you measure the amount of sand at the bottom of the tray?

none a lot none a lot none a lot

2. What are your two designs?

Design #1 **Design #2**

3. How much sand ended up on the bottom?

none a lot none a lot

I claim the best design is numder 1 because there was less erosion because we pourd a lott off. water. and I claim the treest felt so soacked. I claim the wrosted design is numder 2 because we pround to fast and our Sand was soacked so thats why it had the most erosion and a lot of water went in the bucfut.

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Debrief



What did you notice?

Discuss with a partner:

- What evidence did you collect?
- What surprised you?
- What convinced you students were making sense of science?

CAROLINA
UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Lesson 5: Built to Last-Formative Assessment

Assessed Task
Activity: Step 7 (STEM notebook)

	Concepts and Practices	*Indicators of Success*	*Indicators of Difficulty*
Disciplinary Core Ideas	Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.	☐ Students use and understand the diagrams representing the setup for each material. ☐ Students accurately communicate their findings next to the appropriate diagram.	☐ Students struggle to interpret the diagrams for setup. ☐ Students struggle to determine where to record findings for each test.
Science and Engineering Practices	Analyzing and interpreting data	☐ Students include multiple details in evidence of change. ☐ Evidence of change matches the "face" selected in scale.	☐ Students do not include much detail under evidence of change, e.g., they say it looked different. ☐ Evidence of change does not match the "face" selected in scale.
Crosscutting Concepts	Stability and change	☐ Students are attentive to change and note even minor details.	☐ Students have difficulty distinguishing between stability and change; they are inattentive to detail.

Lesson 6: Creative Solutions-Formative Assessment

Assessed Task
Activity: Step 14 (STEM notebook)

	Concepts and Practices	*Indicators of Success*	*Indicators of Difficulty*
Disciplinary Core Ideas	Because there is always more than one possible solution to a problem, it is useful to compare and test designs.	☐ Response shows how student has learned from testing and comparison. ☐ Student indicates that more testing would be helpful.	☐ Response shows that student treated the designs separately and did not think about comparing them. ☐ Student does not indicate that more testing and modification would be helpful.
Science and Engineering Practices	Analyzing and interpreting data	☐ Results of both design tests are recorded according to the scale set above.	☐ Results of design tests are not recorded. ☐ Results are described using a different scale than the one set above.
Crosscutting Concepts	Scale, proportion, and quantity	☐ Relative scale is accurately represented visually with sketches (from not much sand to lots of sand).	☐ Relative scale is not represented. ☐ Relative scale is inaccurately represented (inversed, or otherwise out of sequence).
	Systems and system models	☐ Reflect response mentions something about how the components relate to each other.	☐ Reflect response only refers to one material and does not consider its role in the system.

CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.



SEPs in Action

Experience the Practice

See Student Thinking

Unpack the Design

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

©Smithsonian Institution

Lesson 1
Pre-Assessment

What do you know about matter?

Timer for PowerPoint



STC-Middle School™
Matter and Its Interactions

Investigation 1.1 Describing Matter

Investigation 1.2 The Bottle and the Balloon

Investigation 1.3 The Burning Candle

Investigation 1.4 Comparing Three Mixtures

Investigation 1.5 Reacting a Tablet

Investigation 1.6 Beads in a Bottle

Investigation 1.7 Floating and Sinking

Investigation 1.8 Filtering a Mixture

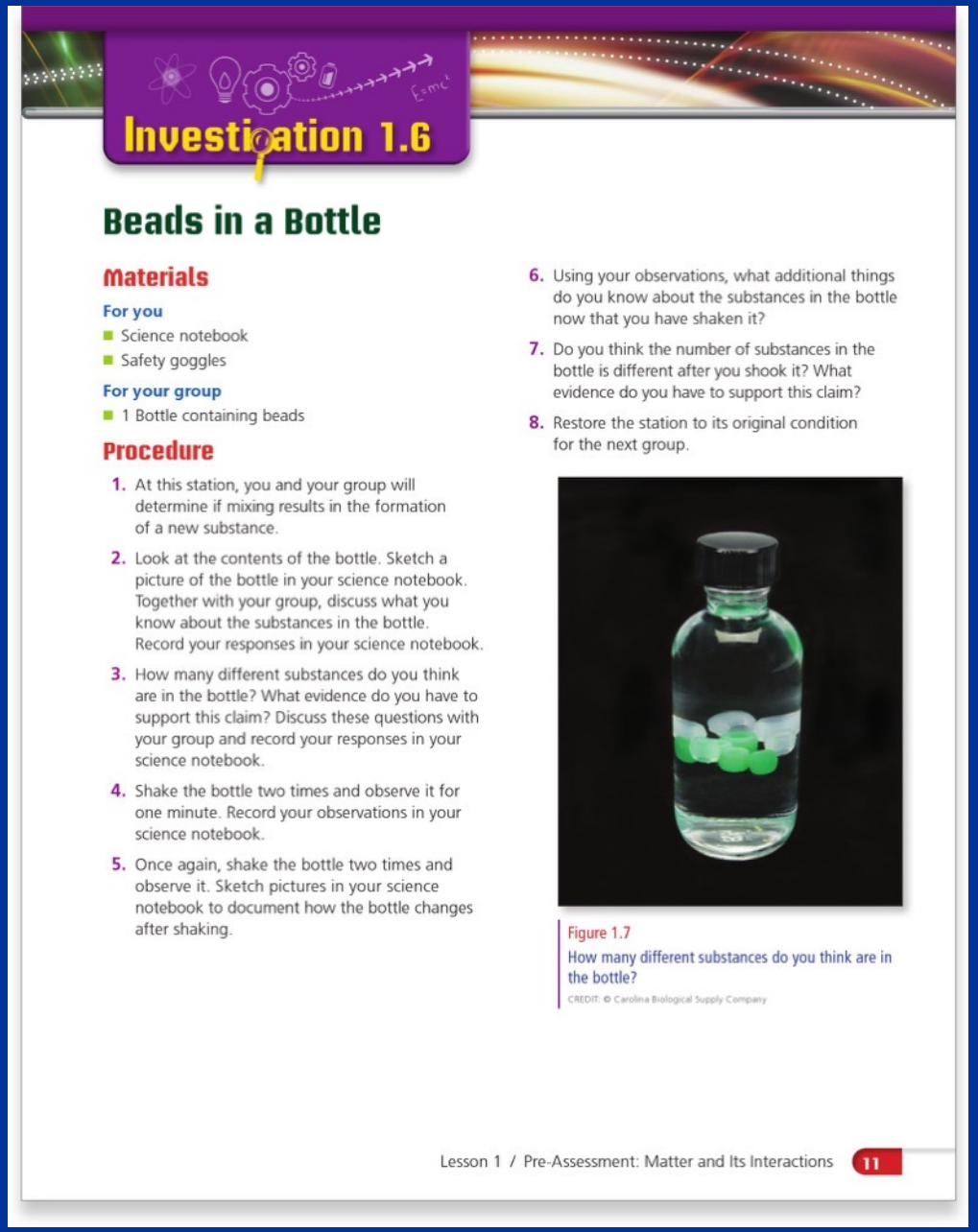


CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.
©Smithsonian Institution

Investigation 1.6

Matter and Its Interactions
Lesson 1
Investigation 1.6



Investigation 1.6

Beads in a Bottle

Materials

For you

- Science notebook
- Safety goggles

For your group

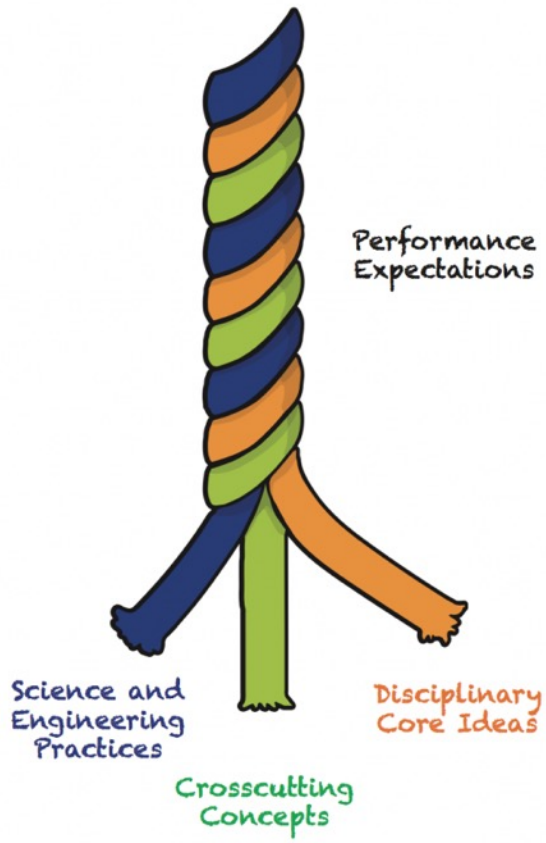
- 1 Bottle containing beads

Procedure

1. At this station, you and your group will determine if mixing results in the formation of a new substance.
2. Look at the contents of the bottle. Sketch a picture of the bottle in your science notebook. Together with your group, discuss what you know about the substances in the bottle. Record your responses in your science notebook.
3. How many different substances do you think are in the bottle? What evidence do you have to support this claim? Discuss these questions with your group and record your responses in your science notebook.
4. Shake the bottle two times and observe it for one minute. Record your observations in your science notebook.
5. Once again, shake the bottle two times and observe it. Sketch pictures in your science notebook to document how the bottle changes after shaking.
6. Using your observations, what additional things do you know about the substances in the bottle now that you have shaken it?
7. Do you think the number of substances in the bottle is different after you shook it? What evidence do you have to support this claim?
8. Restore the station to its original condition for the next group.

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.
©Smithsonian Institution

Three-Dimensional Reflection



What practices did you actively engage in?

1. Asking questions (for science) and defining problems (for engineering).
2. Developing and using models.
3. Planning and carrying out investigations.
4. Analyzing and interpreting data.
5. Using mathematics and computational thinking.
6. Constructing explanations (for science) and designing solutions (for engineering).
7. Engaging in argument from evidence.
8. Obtaining, evaluating, and communicating information.

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.
©Smithsonian Institution

SEPs in Action

Experience the Practice

See Student Thinking

Unpack the Design



2025/26 New Haven Public Schools, Worthington Hooker Middle School, Grade 6 STCMS Matter and Its Interactions: Lesson 1

©Smithsonian Institution

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

MELANIE SEEGER

Worthington Hooker School
New Haven Public Schools
Grades 5/6



CLASSROOM DEMOGRAPHICS

50 min. daily instruction

Class size: 22 per section
IEP: 20%
504: 5%
MLL: 9%

SPOTLIGHT STRENGTHS

- Notebooking
- Building routines
- 3 Dimensional teaching

SPOTLIGHT GOAL

The students will have a deeper understanding of the science when doing investigations, specifically understanding analogous relationships, how tools in the investigation are mimicking a real-world phenomenon.

STUDENT GROWTH

Students have grown in their confidence and willingness to take risks and share their thinking.

SPOTLIGHT EDUCATOR

"Using the **Smithsonian K-8** curriculum over the past several years has strengthened my teaching and helped my students grow as confident thinkers, collaborators, and problem solvers."







2025/26 New Haven Public Schools, Worthington Hooker Middle School, Grade 6 STCMS Matter and Its Interactions: Lesson 1

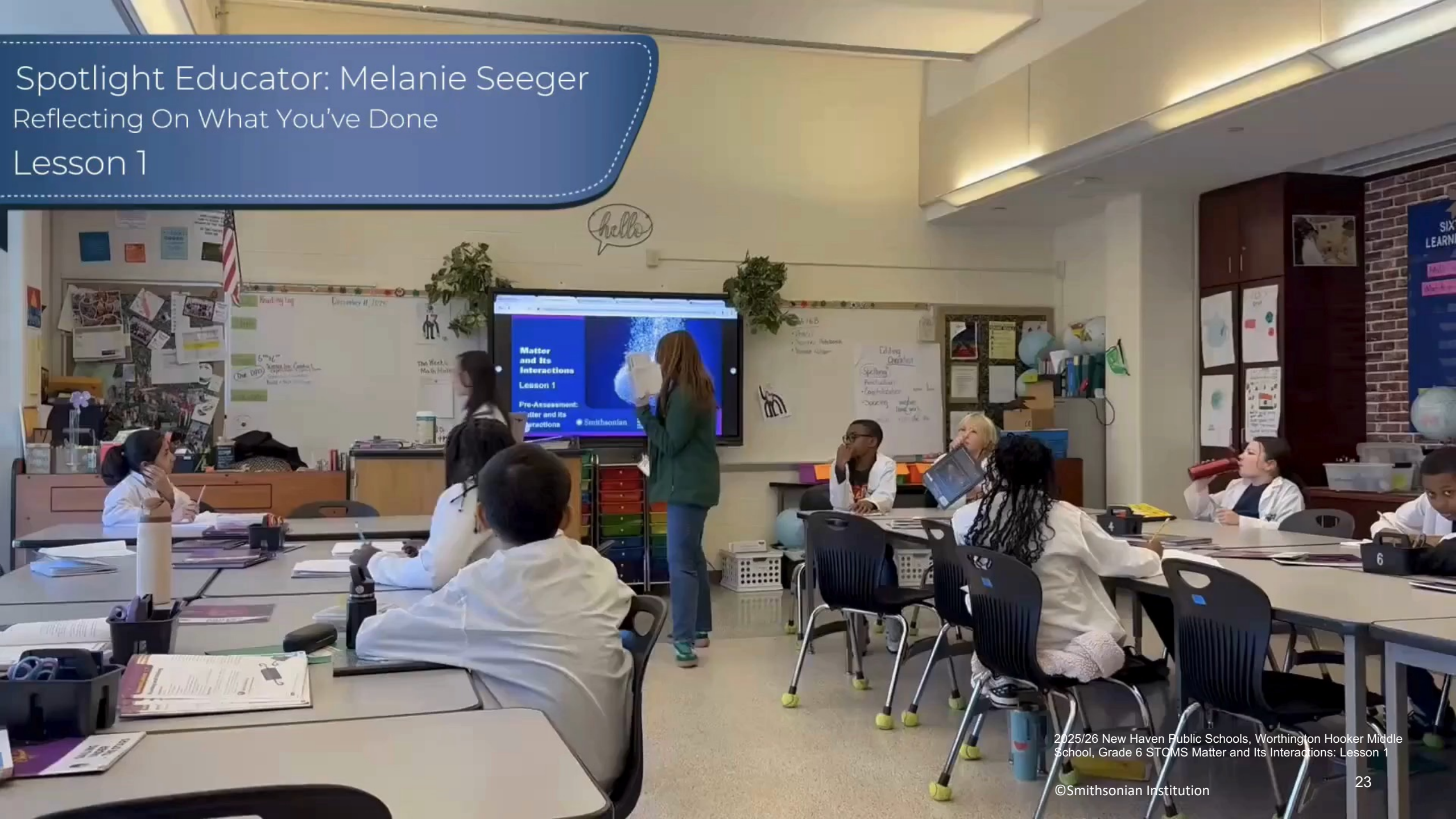
CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Spotlight Educator: Melanie Seeger

Reflecting On What You've Done

Lesson 1



©Smithsonian Institution

Analyze Authentic Student Thinking

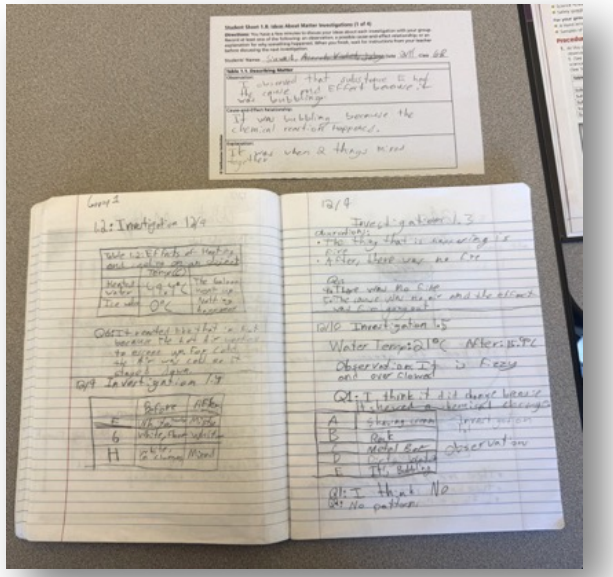
Timer for PowerPoint



What do you notice?
How is student thinking similar to or different from yours?

What ideas or misconceptions are visible?
What patterns or partial understandings do you see?

What questions might students still have?
How could instruction build from these ideas?

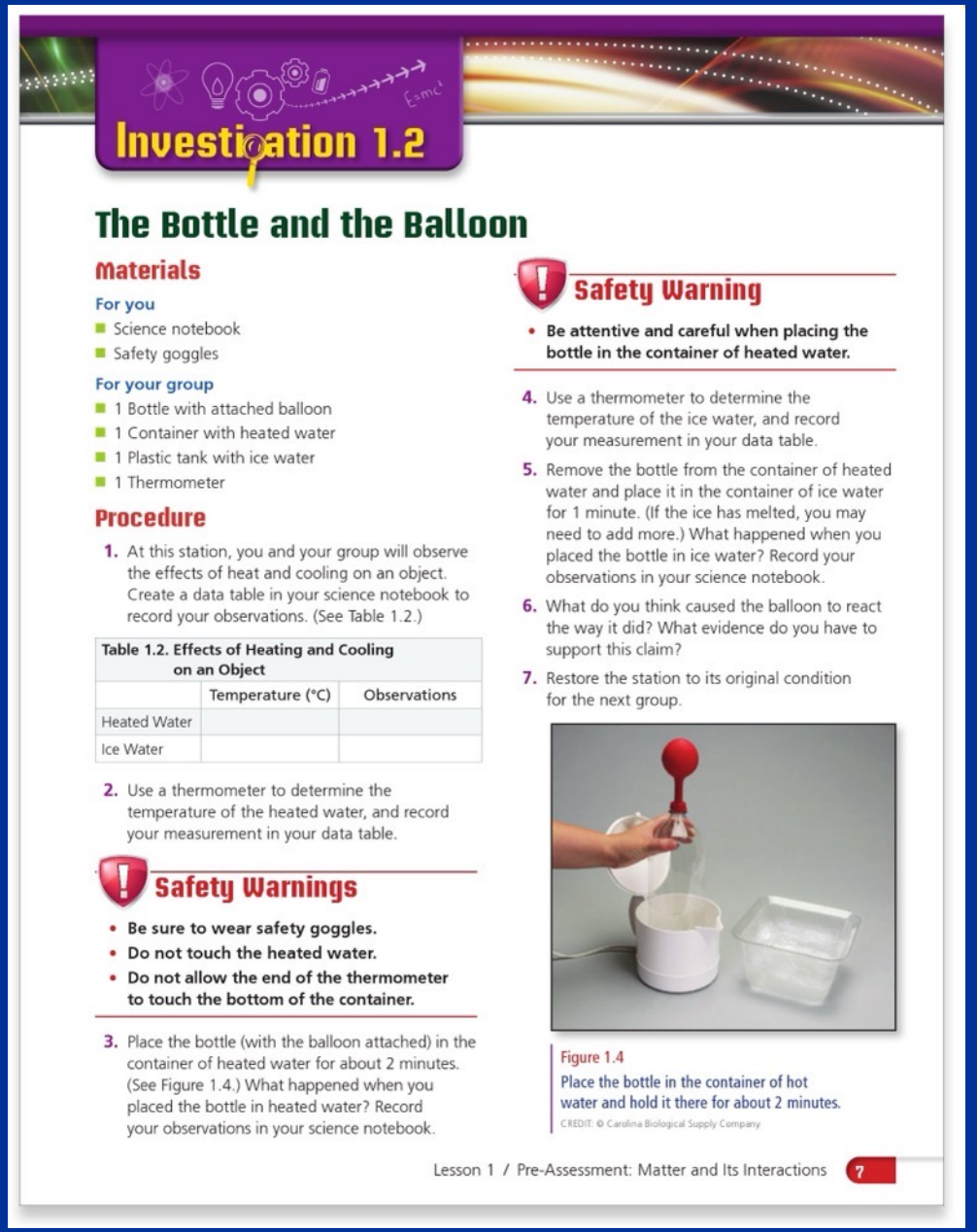


CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.
©Smithsonian Institution

Investigation 1.2

Matter and Its Interactions
Lesson 1
Investigation 1.2



Investigation 1.2

The Bottle and the Balloon

Materials

For you

- Science notebook
- Safety goggles

For your group

- 1 Bottle with attached balloon
- 1 Container with heated water
- 1 Plastic tank with ice water
- 1 Thermometer

Procedure

1. At this station, you and your group will observe the effects of heat and cooling on an object. Create a data table in your science notebook to record your observations. (See Table 1.2.)

Table 1.2. Effects of Heating and Cooling on an Object

	Temperature (°C)	Observations
Heated Water		
Ice Water		

2. Use a thermometer to determine the temperature of the heated water, and record your measurement in your data table.

Safety Warnings

- **Be sure to wear safety goggles.**
- **Do not touch the heated water.**
- **Do not allow the end of the thermometer to touch the bottom of the container.**

3. Place the bottle (with the balloon attached) in the container of heated water for about 2 minutes. (See Figure 1.4.) What happened when you placed the bottle in heated water? Record your observations in your science notebook.

Safety Warning

- **Be attentive and careful when placing the bottle in the container of heated water.**

4. Use a thermometer to determine the temperature of the ice water, and record your measurement in your data table.
5. Remove the bottle from the container of heated water and place it in the container of ice water for 1 minute. (If the ice has melted, you may need to add more.) What happened when you placed the bottle in ice water? Record your observations in your science notebook.
6. What do you think caused the balloon to react the way it did? What evidence do you have to support this claim?
7. Restore the station to its original condition for the next group.

Figure 1.4
Place the bottle in the container of hot water and hold it there for about 2 minutes.
CREDIT: © Carolina Biological Supply Company

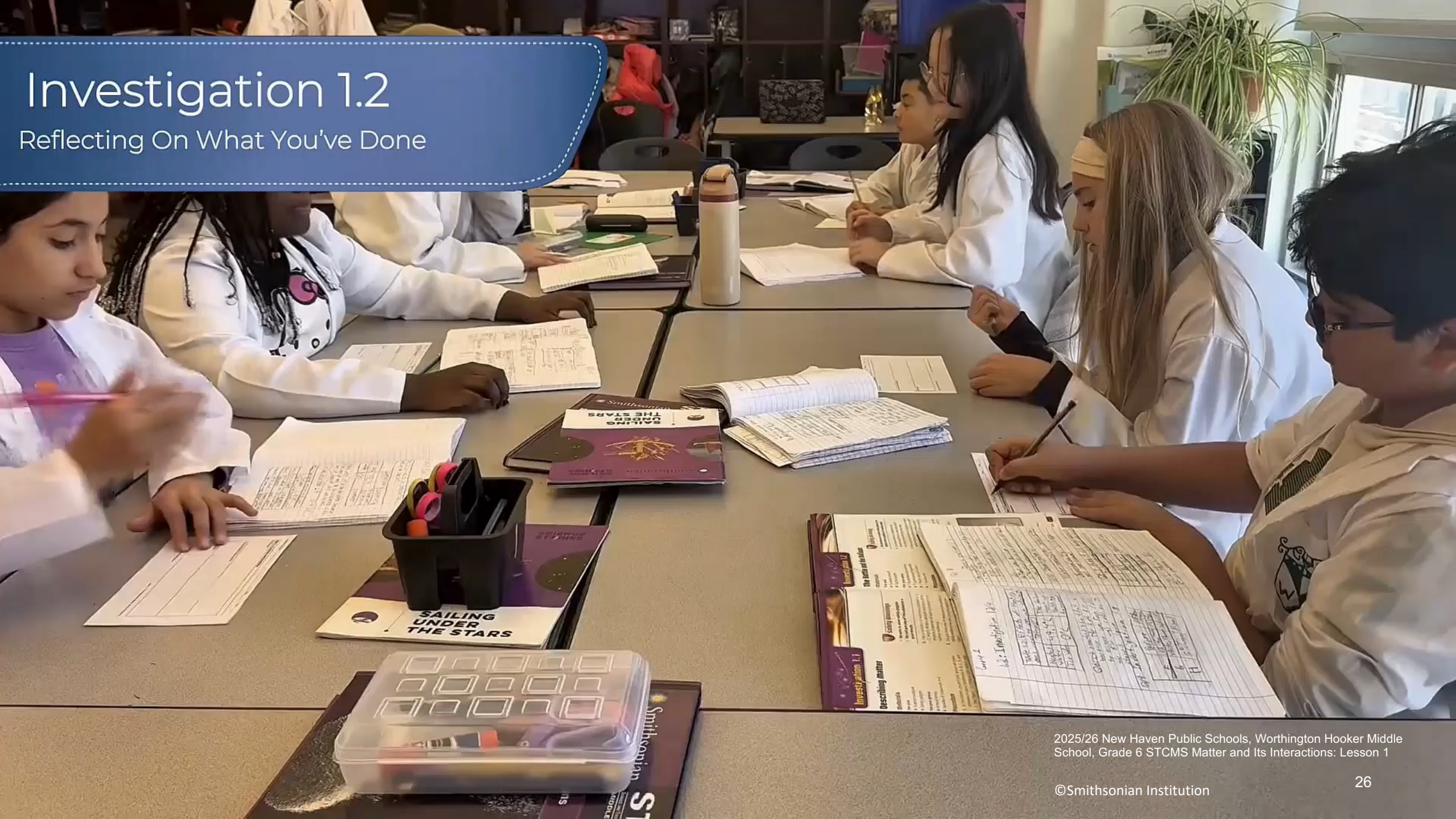
Lesson 1 / Pre-Assessment: Matter and Its Interactions 7

CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.
©Smithsonian Institution

Investigation 1.2

Reflecting On What You've Done



©Smithsonian Institution

Debrief



What did you notice?

Discuss with a partner:

- What evidence did you collect?
- What surprised you?
- What convinced you students were making sense of science?

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.



SEPs in Action

Experience the Practice

See Student Thinking

Unpack the Design

2025/26 New Haven Public Schools, Worthington Hooker Middle School, Grade 6 STCMS Matter and Its Interactions: Lesson 1

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

©Smithsonian Institution

Reflecting On What You've Done

Teachers' Next Steps:

Read selected student ideas and invite opinions. Focus on inconsistencies that may signal misconceptions, while avoiding evaluation or correction**. Do not provide right or wrong answers.** Encourage students to generate questions that can be investigated later.

Students' Next Steps:

Read *Extending Your Knowledge: Where Did Matter Come From?* Discuss the questions with your group and record responses in your science notebook. **How does this reading influence or revise your ideas about matter?**



EXTENDING YOUR KNOWLEDGE READING SELECTION

Where Did Matter Come From?

Where did all the stuff in the universe—Earth, the Sun, rocks, plants, animals, even you—come from? Was it made at a certain time? If so, how long has it been around? Has it always been there? People have asked these questions since the earliest times.

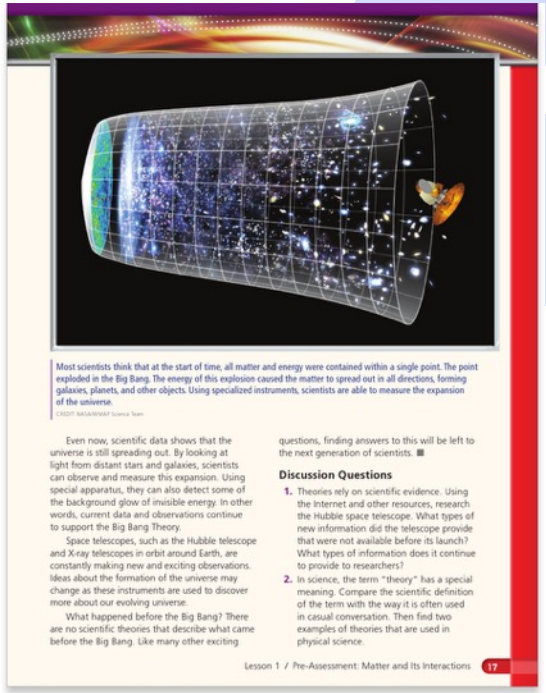
Most cultures have stories of how the universe was created. For instance, the Aboriginal people of Australia tell a story about the Sun, Moon, and stars sleeping beneath the ground. Their ancestors also slept there. One day, the ancestors woke up and came to the surface. The Aboriginal people of Australia call this the Dreamtime. During the Dreamtime, the ancestors walked Earth as animals such as kangaroos, lizards, and wombats. The ancestors made people out of beings that were half animal and half plant. They then went back to sleep. Some went underground, but some became objects such as trees and rocks. The Dreamtime is an important part of Australian Aboriginal culture.

Scientists have also tried to answer the question of how the universe began. When scientists try to answer questions, they sometimes make observations, carry out investigations, and collect data. Scientists use their observations and data to analyze and interpret the phenomena they are studying. After gathering data on many related hypotheses, scientists develop theories. A theory is a unifying explanation for a broad range of hypotheses and observations that have been supported by testing. A theory allows scientists to make predictions about how matter will behave in different situations. If new knowledge does not fit into a theory, the theory is expanded or revised. Scientists have to pose their ideas and leave them open to other scientists to critique. By doing so, a community of scientists ensures that the strongest explanations and ideas can move the field forward.

Over the years, as scientists have gained new knowledge about the universe, new theories have replaced old theories. To gain such knowledge, scientists use models to study systems such as the universe that are too large to observe directly. Many decades of experiments, observations, and scientific argumentation have led to our current theories. Currently, most scientists think the universe started with the Big Bang. The Big Bang theory suggests that all the matter and energy in the universe exploded out from one point. As the explosion occurred, energy and matter spread outward and formed the universe. Matter from the Big Bang formed clouds of gas. As these gases cooled and condensed, stars, galaxies, and eventually planets and other structures that make up the universe were formed.

continued

These Aboriginal people of Australia are painting images of their Dreamtime story.



Most scientists think that at the start of time, all matter and energy were contained within a single point. The point exploded in the Big Bang. The energy of this explosion caused the matter to spread out in all directions, forming galaxies, planets, and other objects. Using specialized instruments, scientists are able to measure the expansion of the universe.

Even now, scientific data shows that the universe is still spreading out. By looking at light from distant stars and galaxies, scientists can observe and measure this expansion. Using special apparatus, they can also detect some of the background glow of invisible energy. In other words, current data and observations continue to support the Big Bang Theory.

Space telescopes, such as the Hubble telescope and X-ray telescopes in orbit around Earth, are constantly making new and exciting observations. Ideas about the formation of the universe may change as these instruments are used to discover more about our evolving universe.

What happened before the Big Bang? There are no scientific theories that describe what came before the Big Bang. Like many other exciting questions, finding answers to this will be left to the next generation of scientists. ■

Discussion Questions

1. Theories rely on scientific evidence. Using the Internet and other resources, research the Hubble space telescope. What types of new information did the telescope provide that were not available before its launch? What types of information does it continue to provide to researchers?
2. In science, the term "theory" has a special meaning. Compare the scientific definition of the term with the way it is often used in casual conversation. Then find two examples of theories that are used in physical science.

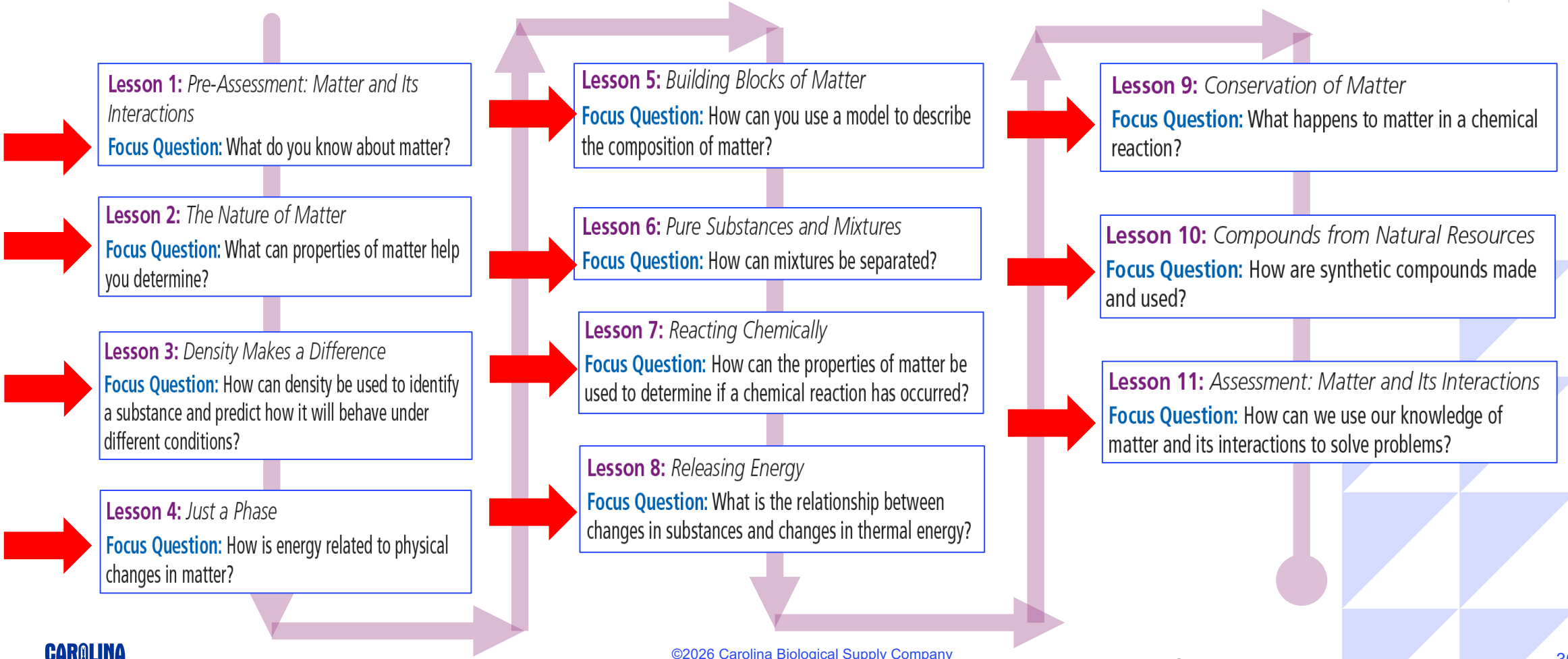
CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

©Smithsonian Institution

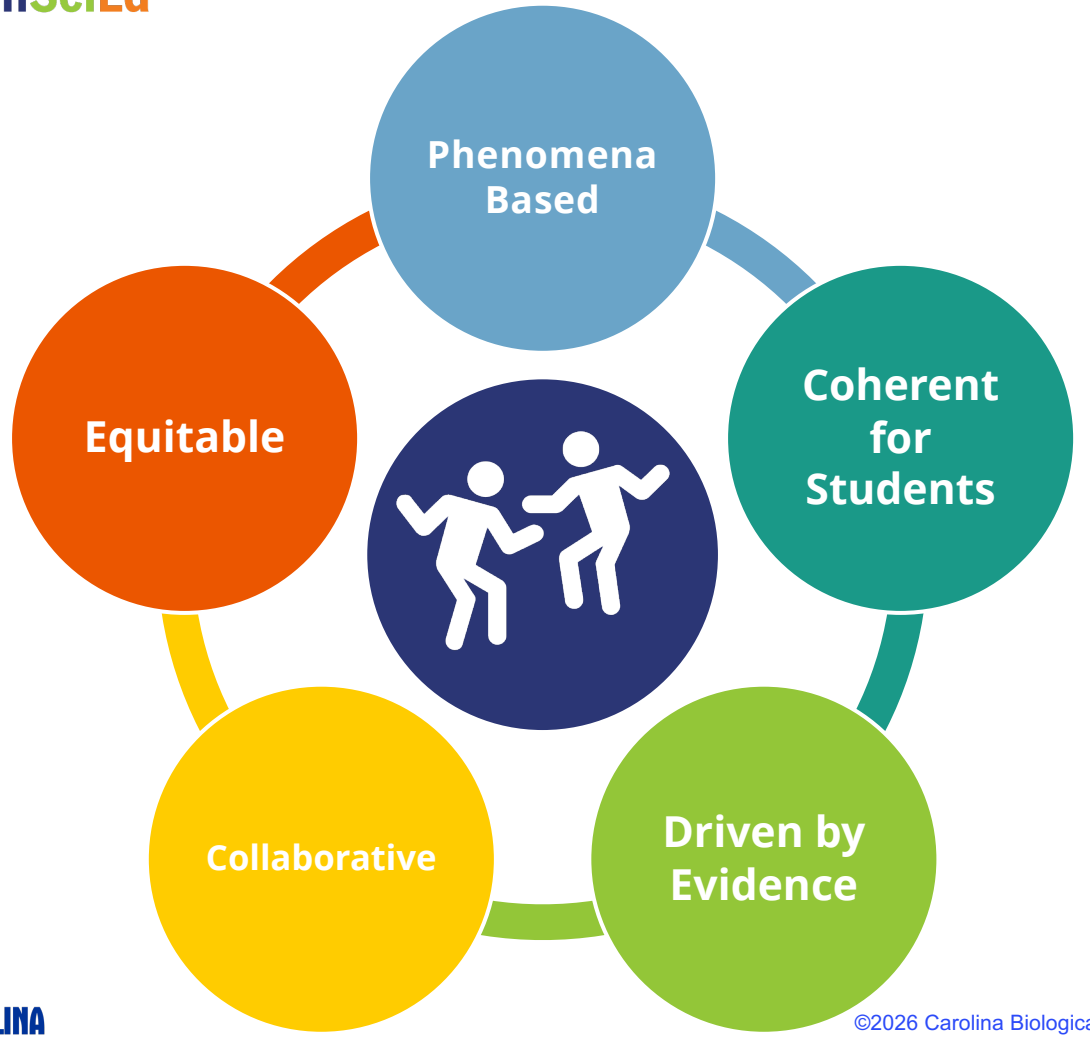
Matter & Its Interactions

Unit Driving Question: How does matter and its interactions affect everyday life?



©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.
©Smithsonian Institution

Designed and Built with Students Front and Center



- Exploration is driven by **students'** questions and ideas
- Builds on **students'** prior knowledge and experiences
- **Students** use evidence to revise their thinking
- **Students** figure out ideas as a classroom community

Transforming Science Education

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Instructional Routines

Each step is driven by student questions about the phenomenon.

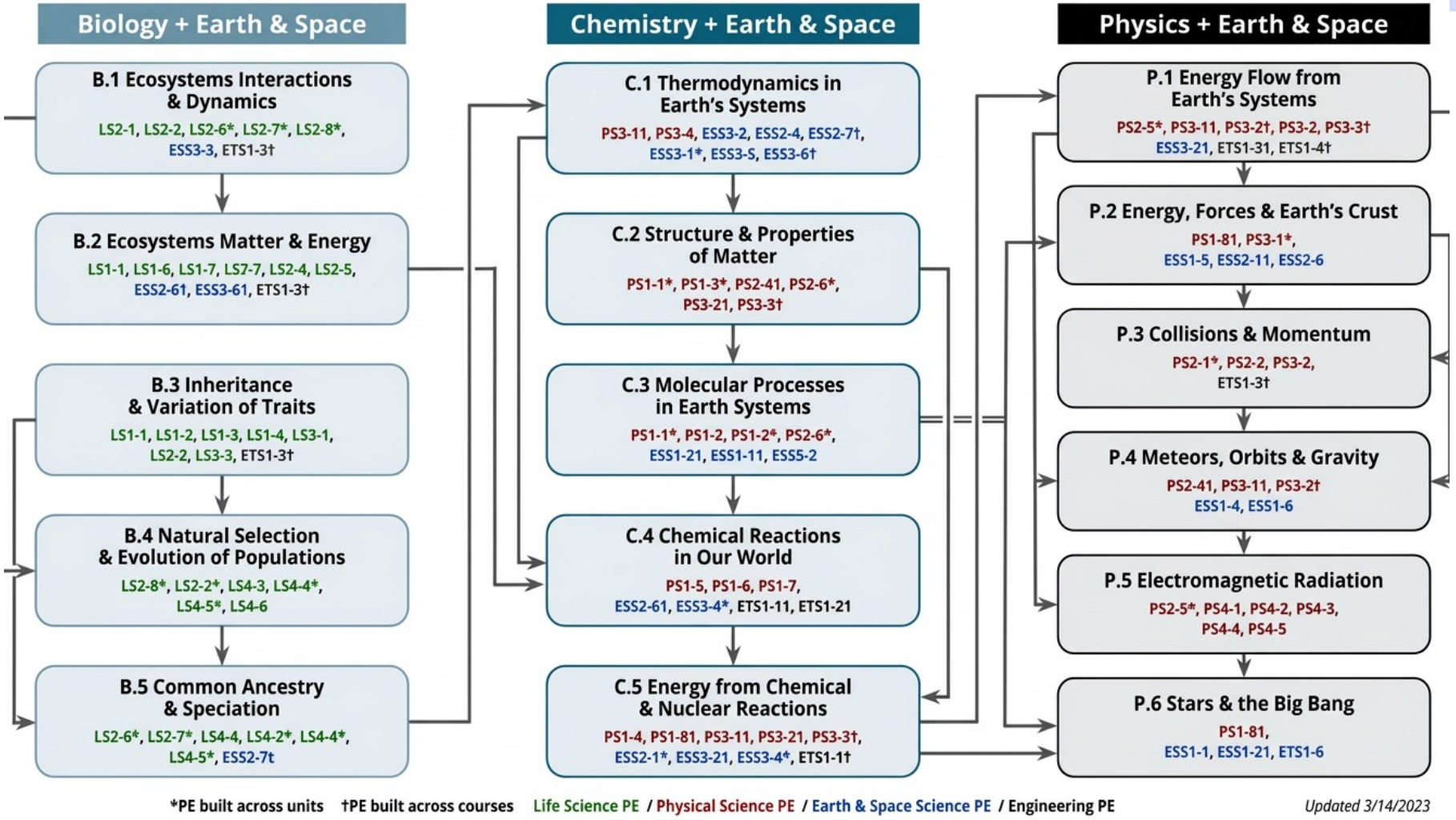
Anchoring Phenomenon Routine	How do we kick off investigations in a unit?
Navigation Routine	How do we work with students to motivate the next step in an investigation?
Investigation Routine	How do we help students use practices to figure out pieces of the science ideas?
Putting the Pieces Together Routine	How do we help students put together pieces of the disciplinary core ideas and crosscutting concepts?
Problematizing Routine	How do we push students to go deeper and revise their science ideas?

OpenSciEd

CAROLINA UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

High School Scope & Sequence

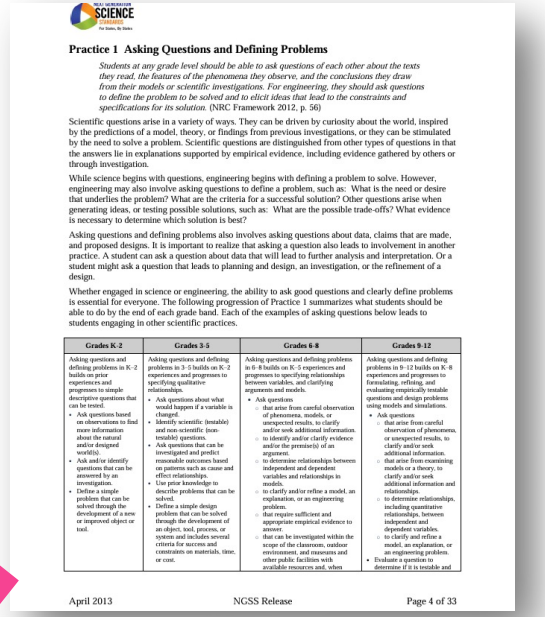


©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Search for Sensemaking



More Tools!



Practice 1 Asking Questions and Defining Problems

Students at any grade level should be able to ask questions of each other about the texts they read, the features of the phenomena they observe, and the conclusions they draw from their models or scientific investigations. For engineering, they should ask questions to define the problem to be solved and to elicit ideas that lead to the constraints and specifications for its solution. (NRC Framework 2012, p. 56)

Scientific questions arise in a variety of ways. They can be driven by curiosity about the world, inspired by the predictions of a model, theory, or findings from previous investigations, or they can be stimulated by the need to solve a problem. Scientific questions are distinguished from other types of questions in that the answers lie in explanations supported by empirical evidence, including evidence gathered by others or through investigation.

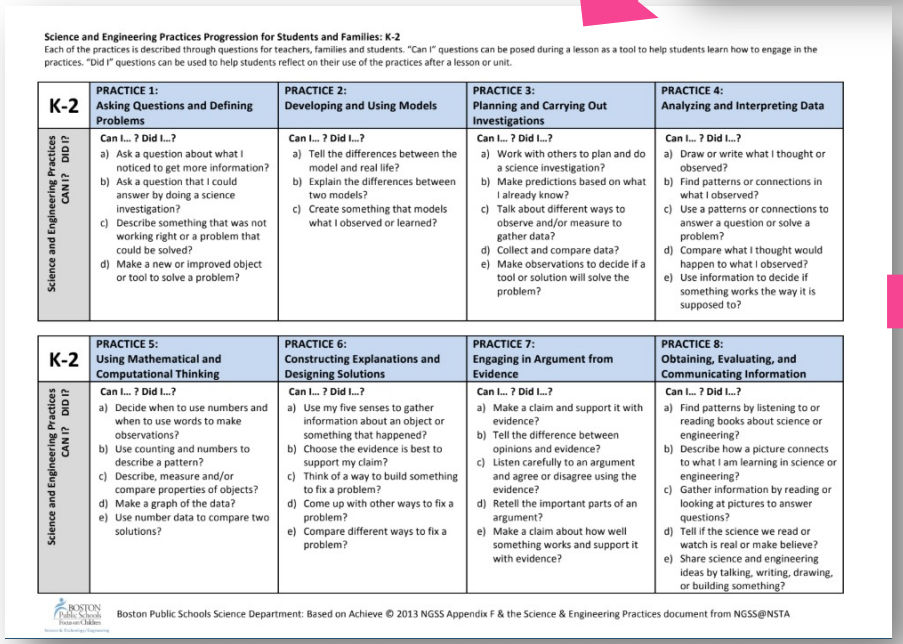
While science begins with questions, engineering begins with defining a problem to solve. However, engineering may also involve asking questions to define a problem, such as: What is the need or desire that underlies the problem? What are the criteria for a successful solution? Other questions arise when generating ideas, or testing possible solutions, such as: What are the possible trade-offs? What evidence is necessary to determine which solution is best?

Asking questions and defining problems also involves asking questions about data, claims that are made, and proposed designs. It is important to realize that asking a question also leads to involvement in another practice. A student can ask a question about data that will lead to further analysis and interpretation. Or a student might ask a question that leads to planning and design, an investigation, or the refinement of a design.

Whether engaged in science or engineering, the ability to ask good questions and clearly define problems is essential for everyone. The following progression of Practice 1 summarizes what students should be able to do by the end of each grade band. Each of the examples of asking questions below leads to students engaging in other scientific practices.

Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
Asking questions and defining problems in K-2 builds on prior experiences and progresses to simple descriptive questions that can be tested. • Ask questions based on observations to find more information about the natural and/or designed world(s). • Ask and/or identify questions that can be answered by an investigation. • Define a simple problem that can be solved through the development of a new or improved object or tool.	Asking questions and defining problems in 3-5 builds on K-2 experiences and progresses to specifying qualitative relationships. • Ask questions about what would happen if a variable is changed. • Identify scientific (testable) and non-scientific (non-testable) questions. • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. • Use prior knowledge to describe problems that can be solved. • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.	Asking questions and defining problems in 6-8 builds on K-5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models. • Ask questions ○ that arise from careful observation of phenomena, models, or unexpected results, to clarify and/or seek additional information. ○ to identify and/or clarify evidence and/or the premise(s) of an argument. ○ to determine relationships between independent and dependent variables and relationships in models. ○ to clarify and/or refine a model, an explanation, or an engineering problem. ○ that require sufficient and appropriate empirical evidence to answer. ○ that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when	Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. • Ask questions ○ that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information. ○ that arise from examining models or a theory, to clarify and/or seek additional information and relationships. ○ to determine relationships, including quantitative relationships, between independent and dependent variables. ○ to clarify and refine a model, an explanation, or an engineering problem. • Evaluate a question to determine if it is testable and

April 2013 NGSS Release Page 4 of 33



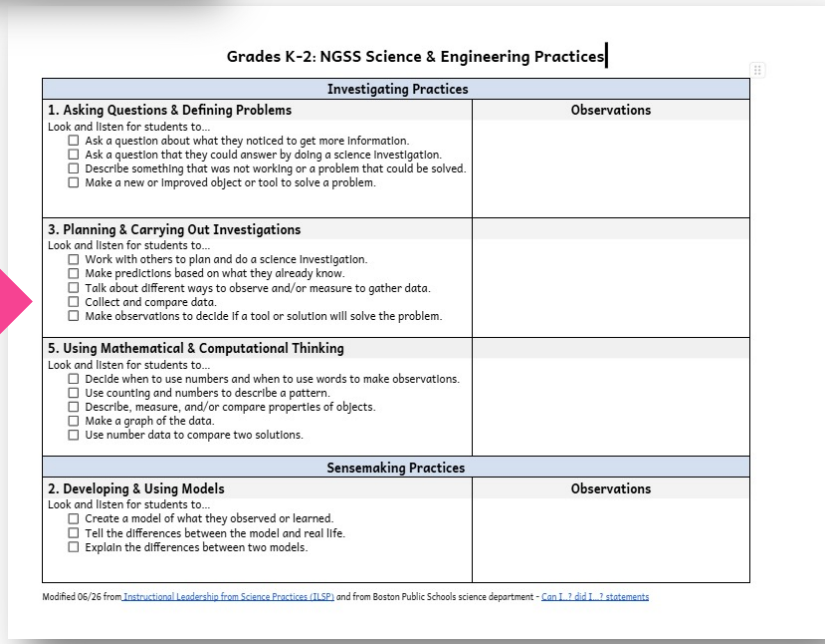
Science and Engineering Practices Progression for Students and Families: K-2

Each of the practices is described through questions for teachers, families and students. "Can I" questions can be posed during a lesson as a tool to help students learn how to engage in the practices. "Did I" questions can be used to help students reflect on their use of the practices after a lesson or unit.

K-2	PRACTICE 1: Asking Questions and Defining Problems	PRACTICE 2: Developing and Using Models	PRACTICE 3: Planning and Carrying Out Investigations	PRACTICE 4: Analyzing and Interpreting Data
Science and Engineering Practices CAN I? DID I?	**Can I... ? Did I...?** a) Ask a question about what I noticed to get more information? b) Ask a question that I could answer by doing a science investigation? c) Describe something that was not working right or a problem that could be solved? d) Make a new or improved object or tool to solve a problem?	**Can I... ? Did I...?** a) Tell the differences between the model and real life? b) Explain the differences between two models? c) Create something that models what I observed or learned?	**Can I... ? Did I...?** a) Work with others to plan and do a science investigation? b) Make predictions based on what I already know? c) Talk about different ways to observe and/or measure to gather data? d) Collect and compare data? e) Make observations to decide if a tool or solution will solve the problem?	**Can I... ? Did I...?** a) Draw or write what I thought or observed? b) Find patterns or connections in what I observed? c) Use a patterns or connections to answer a question or solve a problem? d) Compare what I thought would happen to what I observed? e) Use information to decide if something works the way it is supposed to?

K-2	PRACTICE 5: Using Mathematical and Computational Thinking	PRACTICE 6: Constructing Explanations and Designing Solutions	PRACTICE 7: Engaging in Argument from Evidence	PRACTICE 8: Obtaining, Evaluating, and Communicating Information
Science and Engineering Practices CAN I? DID I?	**Can I... ? Did I...?** a) Decide when to use numbers and when to use words to make observations? b) Use counting and numbers to describe a pattern? c) Describe, measure and/or compare properties of objects? d) Make a graph of the data? e) Use number data to compare two solutions?	**Can I... ? Did I...?** a) Use my five senses to gather information about an object or something that happened? b) Choose the evidence is best to support my claim? c) Think of a way to build something to fix a problem? d) Come up with other ways to fix a problem? e) Compare different ways to fix a problem?	**Can I... ? Did I...?** a) Make a claim and support it with evidence? b) Tell the difference between opinions and evidence? c) Listen carefully to an argument and agree or disagree using the evidence? d) Retell the important parts of an argument? e) Make a claim about how well something works and support it with evidence?	**Can I... ? Did I...?** a) Find patterns by listening to or reading books about science or engineering? b) Describe how a picture connects to what I am learning in science or engineering? c) Gather information by reading or looking at pictures to answer questions? d) Tell if the science we read or watch is real or make believe? e) Share science and engineering ideas by talking, writing, drawing, or building something?

Boston Public Schools Science Department: Based on Achieve © 2013 NGSS Appendix F & the Science & Engineering Practices document from NGSS@NSTA



Grades K-2: NGSS Science & Engineering Practices

Investigating Practices	
1. Asking Questions & Defining Problems Look and listen for students to... ☐ Ask a question about what they noticed to get more information. ☐ Ask a question that they could answer by doing a science investigation. ☐ Describe something that was not working or a problem that could be solved. ☐ Make a new or improved object or tool to solve a problem.	**Observations**
3. Planning & Carrying Out Investigations Look and listen for students to... ☐ Work with others to plan and do a science investigation. ☐ Make predictions based on what they already know. ☐ Talk about different ways to observe and/or measure to gather data. ☐ Collect and compare data. ☐ Make observations to decide if a tool or solution will solve the problem.	
5. Using Mathematical & Computational Thinking Look and listen for students to... ☐ Decide when to use numbers and when to use words to make observations. ☐ Use counting and numbers to describe a pattern. ☐ Describe, measure, and/or compare properties of objects. ☐ Make a graph of the data. ☐ Use number data to compare two solutions.	
Sensemaking Practices	
2. Developing & Using Models Look and listen for students to... ☐ Create a model of what they observed or learned. ☐ Tell the differences between the model and real life. ☐ Explain the differences between two models.	**Observations**

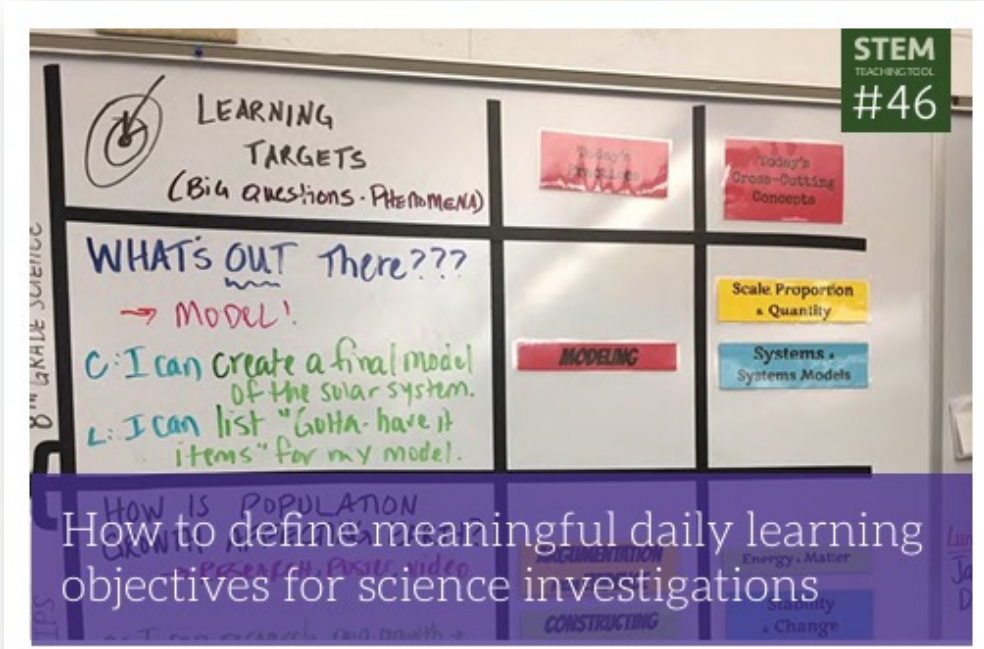
Modified 06/26 from Instructional Leadership from Science Practices (ILSP) and from Boston Public Schools science department - Can I...? did I...? statements

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Search for Sensemaking



More Tools!



What Is The Issue?

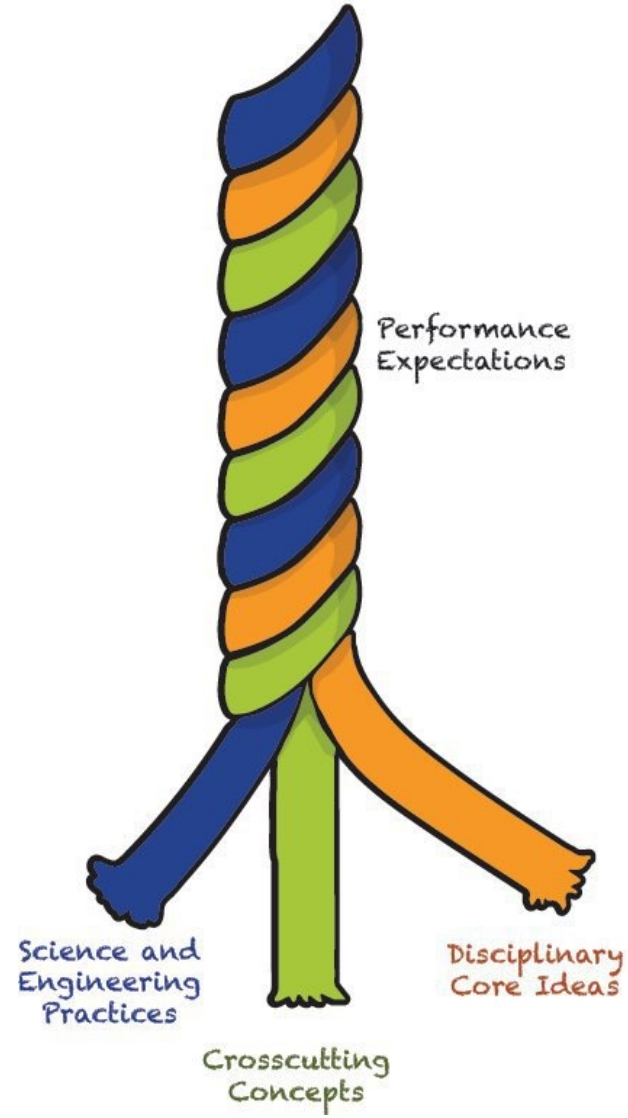
Many schools require teachers to post the day's learning target, objective, or standard on the board. However, displaying the target concept to be learned—the disciplinary core idea that is the focus of instruction—"gives away" what students should actually be figuring out as they make sense of phenomena by engaging in the science and engineering practices. Many teachers face a dilemma when they try to meet their administrator's requirements. It is important for teachers and administrators to come to consensus around developing and using objectives that are consistent with 3D learning.

WHY IT MATTERS TO YOU

- **Teachers** should have the authority to design instruction by involving students in developing daily objectives.
- **District Staff & PD Providers** should help teachers learn how to define and sequence 3D learning performances across the units they teach that culminate in students understanding performance expectation bundles.
- **School Leaders** should learn how to see and support science instruction that engages students in making sense of phenomena and should consider how daily learning objectives might be different in a 3D instruction classroom.

BY WILLIAM R. PENUEL, MICHAEL NOVAK, TARA MCGILL, KATIE VAN HORNE & BRIAN J. REISER | MARCH 2017

STEMteachingtools.org/brief/46



CAROLINA
UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Today's session wasn't about evaluating teachers—it was about learning to recognize evidence that students are actively making sense of science.







After attending today's session, you will be able to:

- Develop a common vision of high-quality science instruction.
- Practice using a walk-through tool across K–8 classrooms.
- Identify evidence of student thinking and sensemaking.
- Leave with practical coaching and leadership strategies.

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.

Join us on social media to stay up to date with new kits and free lessons!

YouTube @CarolinaScience

@CarolinaScience

LinkedIn Carolina® Science

@carolinascience

CAROLINA
UNLEASH LEARNING

©2026 Carolina Biological Supply Company
Unauthorized reproduction, distribution, or display of copyrighted materials is prohibited.