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**CMS Launchpad Login**
- Username
- Password
- Sign In
- Staff sign in here

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**Elementary Science Matters**

**Summer Updates**
- There are still a few spots left for the July - 5th Grade Science Professional Learning. MyTalent Course #425793 Sections 6-10
- PS 5.1 Unit 1 Student Science Sheets
- K-5 Science Protocol Poster Templates
- Science and Engineering Practices Poster Templates
- K-5 Elementary Scope and Sequence Document 2024-2025
- K-4 Elementary Science Canvas Hub Pages are linked below. 5th grade is under construction.
The 5th grade page will go live the morning of June 27, 2024. The Under Construction sign will be removed and the 5th grade page will be linked.
1. Open the unit in a separate tab to more easily view the unit.
2. Use the Anchoring Phenomena section within the unit for an outline of the lessons.
3. These units are live documents and are subject to change. Use the links below to ensure that you always have the most current version.
Fifth grade will have 2 options to choose from.

- Option 1: 45 minutes of Science or Social Studies with alternating units taught 2nd and 3rd quarter.
- Option 2: 45 minutes of science everyday with extension lessons.
K–5 Science Curricular Resources

**Student**

**Hands-on**

- Kit Materials

**Reading**

- Student Texts

**Writing**

- Student Notebooks

**Teacher**

**Instruction**

- Unit 1: Matter and its Interactions
Leadership

Lesson Navigation

PLC Planning Document

Classroom Look Fors

Families

Family Website

Family Letters
<table>
<thead>
<tr>
<th>Segment 1 Part 1</th>
<th>8:00-8:45</th>
<th>Welcome! Goals for Students in Science/STEM What is Sensemaking?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 2</td>
<td>8:45-11:00</td>
<td>Experience Sensemaking In Unit 1 Lesson 1 and 2; Reflect on Routines</td>
</tr>
<tr>
<td></td>
<td>15 Min Break</td>
<td></td>
</tr>
<tr>
<td>Segment 3</td>
<td>11:00-12:00</td>
<td>Experience Sensemaking In Unit 1 Lesson 3; Reflect on Doing Science</td>
</tr>
<tr>
<td>Lunch</td>
<td>12:00 – 1:00</td>
<td></td>
</tr>
<tr>
<td>Segment 3 continued</td>
<td>1:00-2:00</td>
<td>Experience Sensemaking In Unit 1 Lesson 4; Reflect on Coherence</td>
</tr>
<tr>
<td>Segment 4</td>
<td>2:00-2:40</td>
<td>Building the Storyline of Lessons 1-7</td>
</tr>
<tr>
<td>Segment 1 Part 2</td>
<td>2:40-3:00</td>
<td>Build and Revise Ideas about Sensemaking; Close Day 1</td>
</tr>
</tbody>
</table>
Welcome!

Making Sense of Three-Dimensional Teaching and Learning-Grade 5 Unit 1

Day 1

June 25-26, 2024
8 am - 3 pm
Today’s Presenters

Kristen Moorhead
NSTA Professional Learning Facilitator
kristen.moorhead@gmail.com

Jesse Semeyn
NSTA Professional Learning Facilitator
jessesemeyn@gmail.com

Cari Williams
NSTA Professional Learning Facilitator
cariw369@gmail.com
Our Goals

● Gain a deeper understanding of the vision for teaching and learning science called sensemaking.

● Gain a deeper understanding of how lessons/units are designed to support sensemaking.

● Experience as learners and learn how to teach Grade 5 Unit 1.
  ○ We will experience many of the unit’s lessons.
  ○ We will gain an understanding of how all the lessons fit together to make a cohesive unit.
Housekeeping

- This will be an interactive, action/thinking-packed two days. We invite you to engage as an active participant to make the most of our time together.
- We are here to support you! There is a parking lot for questions and requests.
- Lunch is 1 Hour - from 12-1 ish
- There will be an AM Break.
- Take care of your own needs along the way.
## Segment 1: What is sensemaking?

<table>
<thead>
<tr>
<th>What to prep</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chart paper per group for SM posters, Norms poster, Parking Lot, Number cards on tables (Kristen will provide.) Table bags with markers and sticky notes</td>
<td>paper strips - for example - 3 strips cut horizontally from a chart paper chart paper scrap paper</td>
</tr>
</tbody>
</table>
## Segment 1: What is sensemaking?

<table>
<thead>
<tr>
<th>Time</th>
<th>45 minutes</th>
</tr>
</thead>
</table>

**Segment Punchline**  
Sensemaking is the vision for science education for all students. That vision and our goals for students in science are aligned.

**Learning Arc**  
- We identify our goals for our students in science/STEM
- We make connections between our goals and the Framework vision for science education
- We begin to develop an understanding of what the Framework vision (sensemaking) looks like/feels like/sounds like in a classroom
- We develop a working description/list of characteristics of sensemaking.

**Navigation**  
By the end of segment 1: We recognize that the characteristics of sensemaking we observed embody the goals we have for students. We wonder, how do you make this happen in classrooms?  
**Where do we go next?** We experience sensemaking as learners to experience the characteristics of sensemaking first-hand.

**Artifacts**  
- “Our Goals for Students in Science” Poster (whole group)
- What is Sensemaking Poster (small group)
Meet Our Learning Community

Alone Zone (independent thinking time)

❖ Why do you think it is important for all students to learn science?

❖ What do you want your students to think, feel, and/or know about science when they leave your classroom?
Meet Our Learning Community

**Alone Zone** (independent thinking time)

❖ Why do you think it is important for all students to learn science?

❖ What do you want your students to think, feel, and/or know about science when they leave your classroom?

**Small Group**

❖ Share your thinking with your group.

❖ What is your group’s #1 hope or goal for students related to science?
Meet Our Learning Community

Small Group
❖ Share your thinking with your group.
❖ What is your group’s #1 hope or goal for students related to science?
❖ Record your group’s hope or goal on your paper strip with a marker in large lettering.
The framework is designed to help realize a vision for education in the sciences and engineering in which students, over multiple years of school, actively engage in science and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields.

The learning experiences provided for students should engage students with their own fundamental questions about the world and with how scientists have investigated and found answers to those questions.
Meet Ms. Katsanos’ Third-Graders

Students experienced the phenomenon of kidney beans germinating. (The beans look like kidney beans one day and then a few days later some kidney beans look like plants.)

Students have completed an investigation in which kidney beans with water and kidney beans without water were placed in sunny places and dark places.
Elementary Students Sensemaking

Students complete two tasks in this classroom video.

Task 1. **Reach a consensus [using patterns in data]** on what it means for a seed to *germinate* (0:24-3:25)

Task 2. **Make a claim** in answer to the question about the phenomenon, “What do kidney beans need to successfully *germinate*?” (3:40-6:25)
Elementary Students Sensemaking

Alone Zone

1. What are the students doing?

2. What is the teacher doing?

3. Based on what you observed, what is sensemaking?

https://www.teachingchannel.org/video/lesson-claims-evidence-reasoning
Elementary Students Sensemaking

Small Group

1. What are the students doing?

2. What is the teacher doing?

3. Based on what you observed, what is sensemaking?

https://www.teachingchannel.org/video/lesson-claims-evidence-reasoning
Sensemaking in a High School Classroom
High School Students Sensemaking

High school biology students explore the question, “Can nature change populations?” (populations change over time)

Task 1: Use a simulation to identify cause-and-effect relationships between an organism’s ability to avoid prey and changes in that organism’s population over time.

Task 2: Construct an explanation(s) using science ideas and cause-and-effect relationships to help answer the question about what causes population change. (2:53-7:11)
Alone Zone

1. What are the students doing?

2. What is the teacher doing?

3. Based on what you observed, what is sensemaking?

Video not available to the public
What is Sensemaking?

Small Group

• Discuss with your group members:
  o What were the students doing?
  o What was the teacher doing?

  *Cite specific examples from the classroom video.*

• As a group, describe *sensemaking*.

Set your poster aside; we’ll revisit these ideas later.
## Segment 2: What is the AP routine? How does it serve students?

<table>
<thead>
<tr>
<th>What to prep</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 trays for lesson 2; DQB science circle space Class initial model space Related phenomena chart Routines chart Put a bucket on each side of the room.</td>
<td>1. student sheet packet 2. Tray for each group - see photo and lesson 2. 3. AP tracker sheet 4. Class Initial Model (see photo below) 5. Class DQB 6. Class Related phenomena chart 7. Routines chart - for teacher reflection at end of segment. 8. Ideas to investigate chart</td>
</tr>
</tbody>
</table>
### Segment 2: What is the AP routine? How does it serve students?

<table>
<thead>
<tr>
<th>Time</th>
<th>120 minutes + 10 min break</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment Punchline</strong></td>
<td></td>
</tr>
<tr>
<td>Element 1 - all students have a common experience by observing the cake (access); co-constructing norms starts to build a safe space and belonging</td>
<td></td>
</tr>
<tr>
<td>Element 2 - we celebrate diversity of ideas and ways to represent; teacher gives neutral responses (poker face); we share ideas we agree on and questions we need to figure out</td>
<td></td>
</tr>
<tr>
<td>Element 3 - we blur the line between life experience and school learning for more meaningful and integrated science experiences.</td>
<td></td>
</tr>
<tr>
<td>Element 4 - We each contribute a question to the DQB; Our ideas are valued because we are going to pursue our own questions and use our ideas to investigate.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Learning Arc</strong></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>● We notice and wonder about a phenomenon (L1)</td>
<td></td>
</tr>
<tr>
<td>● We co-construct a few norms</td>
<td></td>
</tr>
<tr>
<td>● We make an individual and class consensus model (L1)</td>
<td></td>
</tr>
<tr>
<td>● We brainstorm related phenomena (L1)</td>
<td></td>
</tr>
<tr>
<td>● We reflect on elements 1, 2 and 3 of the AP routine</td>
<td></td>
</tr>
<tr>
<td>● We build a driving question board (L2)</td>
<td></td>
</tr>
<tr>
<td>● We reflect on element 4 of the AP routine and all 4 elements.</td>
<td></td>
</tr>
<tr>
<td>● We investigate by doing science to consider what it means to do science (L2)</td>
<td></td>
</tr>
<tr>
<td>● We reflect on working with the materials and the material routines and student collaboration routines.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Navigation</strong></th>
<th><strong>By the end of segment 2</strong>: We recognize lesson 1 and 2 have a specific purpose that is different than traditional science units.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Where do we go next?</strong></td>
<td>We experience figuring out some of our questions that we raised in lesson 1 and 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Artifacts</strong></th>
<th>Individual AP Routine Trackers; Individual Student Sheets</th>
</tr>
</thead>
</table>
Student Hat/Teacher “Hat”

Student Hat: Think like a student.

Student/Teacher Hat: Think like a student, but note teacher guidance.

Teacher “Hat”: Reflect on student experience and educator moves.
Learning Community Norms

- We use and build on other’s ideas.
- We use evidence to support our ideas, ask for evidence from others, and suggest ways to get additional evidence.
- We are open to changing our minds.
- We challenge ourselves to think in new ways.

From OpenSciEd Classroom Norms
Unit 1
Matter and its Interactions
Lesson 1
Learning Target

I can explore phenomena and record my observations.

Anchoring Phenomena

What happens when we make a cake?
Materials

- Cake Video
- Explore a New Phenomena
- Initial Model
- Sticky Notes
Phenomena:

Occurrences in the natural and human-made world that can be observed and cause one to wonder and ask questions.
Explore a new phenomenon

*Alone Zone*

As we watch the video, jot down on your student sheet what you:

<table>
<thead>
<tr>
<th>NOTICE</th>
<th>WONDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Notice”: describe what happened, what you saw or observed.</td>
<td>“Wonder”: write some questions you have or what you’re not sure about.</td>
</tr>
</tbody>
</table>

Be ready to share your ideas with the group.
STOP and JOT
**Explore a new phenomenon**
Add any other notices and wonderings.

<table>
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Be ready to share your ideas with the group.
What do you notice?

What do you wonder?

Share Observations

Notice | Wonder
---|---

Alone Zone
1 Min
What noticings and wonderings do you want to share?
## Share Observations

<table>
<thead>
<tr>
<th>NOTICE</th>
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</thead>
<tbody>
<tr>
<td></td>
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</table>

What do you notice?

What do you wonder?

Turn and Talk
Share Observations

<table>
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<tr>
<th>NOTICE</th>
<th>WONDER</th>
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</table>

What do you notice?
What do you wonder?

Whole Group
What is one notice or wondering you and your partner want to share with the class?
Model:
explain, describe, or predict how or why something happens. Scientists use models to show other people what they are thinking. Models can use words, drawings, or both.
Developing Models

Draw, write and use symbols to show your beginning ideas about what you think happens when you make a cake?

You can write questions and use ? to show you aren’t sure or wondering about something you draw or write.

### Alone Zone

3 Min
Learning Community Norms

- We use and build on other’s ideas.
- We use evidence to support our ideas, ask for evidence from others, and suggest ways to get additional evidence.
- We are open to changing our minds.
- We challenge ourselves to think in new ways.

From OpenSciEd Classroom Norms
Science Circle

Gather your group members and let’s make a big circle where everyone can be seen and heard.

As we transition, consider.... What might need to happen in the circle for you to feel comfortable sharing an idea?

What might prevent you from sharing an idea?

From [OpenSciEd Classroom Norms](https://www.nsta.org)
Fostering Belonging with Classroom Norms
Turn and Talk

Share 1 part of your model.

Share 1 part of your model.
Turn and Talk

Tell you partner one thing you noticed in their model.

Tell you partner one thing you noticed in their model.
Developing A Consensus Model

As a class, develop a model that explains what happens when you make a cake.

Science Circle
What do we agree about?
What do we wonder?
Identify related phenomena

What did your noticings and wonderings about the cake remind you of from your own experiences?
Silent Reflection

What happens when you make a cake?

How do we make a cake?
Teacher “Hat” Reflecting

Alone Zone
Reflect on student “hat” experiences and educator moves.

What was it like for you to experience a phenomenon (how a cake changes) and start the process of figuring out this phenomenon?

What teacher moves, structures, and strategies did you notice the facilitator (teacher) using?
Small Group
Reflect on student “hat” experiences and educator moves.

What was it like for you to experience a phenomenon (how a cake changes) and start the process of figuring out this phenomenon?

What teacher moves, structures, and strategies did you notice the facilitator (teacher) using?
### Anchoring Phenomenon Routine Tracker

<table>
<thead>
<tr>
<th>Element 1: Explore the Phenomenon</th>
<th>Element 2: Attempt to Make Sense of the Phenomenon</th>
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<tbody>
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<td>What do we notice?</td>
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</table>

<table>
<thead>
<tr>
<th>Notes about what you or the students did:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>How does this support figuring out?</th>
<th></th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>How does this support a classroom culture where all students have access?</th>
<th></th>
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How do the elements of the Anchoring Phenomenon Routine support all students in figuring things out?
Anchoring Phenomenon Routine

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</tbody>
</table>

Individually jot down some notes about what you did as students in Element 1.
Individually jot down some notes about what you did as students in Element 2.

## Anchoring Phenomenon Routine

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<th>Element 1: Explore the Phenomenon</th>
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</tr>
</tbody>
</table>

Notes about what you or the students did.

How does this support figuring out?

How does this support a classroom culture where all students have access?
Individually jot down some notes about what you did as students in Element 3.
How can the steps of the Anchoring Phenomenon Routine support all students in figuring things out?

- Work with a partner to reflect on each element #1, #2, and #3 using the Anchoring Phenomenon Routine Tracker.

### Anchoring Phenomenon Routine Tracker

<table>
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<tr>
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</table>
Unit 1
Matter and its Interactions
Lesson 2
**Learning Target**

I can conduct an investigation and use my senses to make observations.

**Anchoring Phenomena**

What happens when we make a cake?

**Lesson Question**

What changes can we observe with our senses to show that a change has occurred?
Think back to yesterday…
Think back to yesterday and the video we watched of making a cake. What questions did you have?

Decide on 3 questions you most think answering will help us explain what causes the changes in the cake.

Write one question on a sticky note.
Write one question on a sticky note.
Write one question on a sticky note.

Be ready to share ONE of your questions with the group.
Gather in a science circle.
Gather in a circle so that everyone has a front row seat to our class discussion. Bring your sticky note/s.

Be ready to share ONE of your questions with the group.
Building a Driving Question Board

1. Share a Question. Listen to the question to see if your question relates to it.
2. Share a next question that relates to what was shared. Share how it was related.
3. Continue to the process until one question is shared by each person.
4. Does your question seem unrelated? We will share those after all related questions are shared.
Investigating Our Questions

What are some ideas you have about what could we do to gather observations to answer our questions?
Individually jot down some notes about what you did as students in Element 4.
Anchoring Phenomenon Routine

How can the steps of the Anchoring Phenomenon Routine support all students in figuring things out?

- Work with a partner to reflect on element #3 and #4 using the Anchoring Phenomenon Routine Tracker.

<table>
<thead>
<tr>
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</tr>
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- Notes about what you or the students did.
- How does this support figuring out?
- How does this support a classroom culture where all students have access?
**Anchoring Phenomenon Routine**

## Whole-Group Discussion

How did each element of the Anchoring Phenomenon Routine support all students in **figuring things out**?

<table>
<thead>
<tr>
<th>Element 1: Explore the Phenomenon</th>
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</table>

- Notes about what you or the students did.
- How does this support **figuring out**?
- How does this support a **classroom culture where all students have access**?
Break 15 Minutes

Time to take a break
Investigating by Doing Science

How could we use these materials to investigate an idea we had on our investigations list?

Today’s Tray:
1 plastic cup of water
1 empty plastic cup
2 white solids
paper towels
How can we tell if there is a change?

Make Observations

Record your observations of the investigation.

<table>
<thead>
<tr>
<th>What did you hear?</th>
<th>What did you smell?</th>
<th>How did it feel?</th>
<th>What did you see?</th>
</tr>
</thead>
</table>

Images Source: freepik at flaticon.com
Pass the Tray Routine

Person 1: Get your table’s tray.
Person 2: Distribute Today’s Tray Materials
Person 3: Make sure everyone has a turn.
Person 4: Dispose of liquids in the assigned bucket.
Person 1: Return all materials on the tray.

Today’s Tray: 1 plastic cup of water, 1 empty plastic cup, 2 white solids, Paper Towels

Before getting materials…
Person 3 - ask each person what they think the team should do with the materials.
Person 4- Write or draw what your team is going to do.
STOP and JOT
In what ways did we do science?

What did it feel like to figure something out by doing science?
Did we observe anything today that relates to any of our questions on our DQB?

What other investigations could we do to learn more about the liquids and white solids we used today?
How was lesson 1 and 2 different from typical science units?
Routines

Whole Group

● What other routines did you observe us use?

● How are these routine similar to other classroom routines you spend time putting in place to build your classroom community?
Segment 3: How can we do science to build our science ideas?

<table>
<thead>
<tr>
<th>What to prep</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 trays for lesson 3</td>
<td>1. student sheet packet</td>
</tr>
<tr>
<td>Lesson 3 blank chart; Lesson ¾ concept map.</td>
<td>2. Tray for each group - see photo below for lesson 3.</td>
</tr>
<tr>
<td>.</td>
<td>3. Lesson 3 class data chart (blank)</td>
</tr>
<tr>
<td></td>
<td>4. Lesson 4 class data chart (we will use the filled out one on a slide instead.</td>
</tr>
<tr>
<td></td>
<td>5. Lesson 3 and 4 concept map</td>
</tr>
</tbody>
</table>
## Segment 3: How can we do science to build our science ideas?

<table>
<thead>
<tr>
<th>Time</th>
<th>120 mins - Lunch at noon</th>
</tr>
</thead>
</table>

### Segment Punchline
We do science to gather data to use to build our science ideas. As the teacher, we ask students to use their evidence to support their ideas and take note of student ideas, we don’t tell them the answers. The science and engineering practices are different than the scientific method because there is not a set sequence and not one “method” when scientists are authentically figuring something out - just like we use the practices in service of figuring something out.

### Learning Arc
- We conduct an investigation and find out even when the salt in water seems to disappear it is still there because the weight doesn’t change. (lesson 3)
- We reflect on the norms.
- We reflect on doing science and how this relates to the science and engineering practices.
- We walk through lesson 4; analyze premade data; we anticipate what students would write and draw at the end of the lesson. (lesson 4)
- We build a what/how we figured out concept map together for lesson 3 and 4.

### Navigation
**By the end of segment 3:** We recognize doing the science practices is in service of figuring something out which is different from a cookie cutter -single sequenced method.

**Where do we go next?** We gain understanding of lessons 5, 6, and 7 and build understanding of the storyline of these lessons.

### Artifacts
- Individual Student Sheets
- Lesson 3 class data chart
- Lesson 4 class data chart
Unit 1
Matter and its Interactions
Lesson 3
Lesson 2 Looking Back

● What did we observe?
Lesson 2 Looking Back

- What did we observe?
- Many of us wondered where the solid tablets went.
- Many of us wondered about bubbles.
Materials

Today’s Tray
● Plastic Cup
● White Solid (salt)
● Clear Liquid
● Paper Plate
● Paper Towel
● Digital Scale
● 1 Gallon Plastic Bag
● Plastic Bucket
Our Questions

- Do we have any questions on our DBQ we could answer or understand more about if we weighed stuff?
Learning Target

I can make observations and record the weight of matter before and after an investigation using a scale.

Anchoring Phenomena

What happens when we make a cake?

Lesson 3 Question
What happens to the weight of substances when they are mixed?
Pass the Tray Routine

Person 2: Get your table’s tray.
Person 3: Distribute Today’s Tray Materials
Person 4: Make sure everyone has a turn.
Person 1: Dispose of liquids in the assigned bucket.
Person 2: Return all materials on the tray.
Lesson Investigation

Digital Scales - Craft Stick, Crayon, Pencil

When we use the digital scale what are we measuring?
<table>
<thead>
<tr>
<th>Lesson 3</th>
<th>Lesson 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense observations before the interaction.</td>
<td>Sense observations after the interaction.</td>
</tr>
</tbody>
</table>
## Observation Data Chart

### Lessons 3, 4, and 5 Student Observation Data Chart

<table>
<thead>
<tr>
<th>Observation/Data</th>
<th>Lesson 3</th>
<th>Lesson 4</th>
<th>Lesson 5 Bottle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of Empty Cup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of Cup and Solid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of the Solid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of the Bag, Cup, and Liquid</td>
<td></td>
<td></td>
<td>Weight of bottle and liquid</td>
</tr>
<tr>
<td>Weight of the Bag, Cup, Liquid, and Solid Before the Interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Weight of the Bag, Cup, Liquid, and Solid Before the Interaction</td>
<td></td>
<td></td>
<td>Total Before</td>
</tr>
<tr>
<td>Total Weight of the Bag, Cup, Liquid, and Solid After the Interaction</td>
<td></td>
<td></td>
<td>Total After</td>
</tr>
<tr>
<td>Change of Weight</td>
<td></td>
<td></td>
<td>Change</td>
</tr>
</tbody>
</table>
Person 4: Make sure everyone has a turn weighing something before the interaction. All - Record the measurements.
Person 4: Make sure everyone has a turn weighing something before the interaction.
Investigating

Person 4: Add the solids to the water in the cup in the bag. Do Not Stir.

All: Observe and Record for 1 minute.
Investigating

Person 1: Stir carefully with the craft stick.

All: Observe and Record for 1 minute.
Investigating

Person 2: Carefully weigh the system.
Person 4: Make sure everyone has a turn weighing something before the interaction.

### Observation Data Chart

<table>
<thead>
<tr>
<th>Observation/Data</th>
<th>Lesson 3</th>
<th>Lesson 4</th>
<th>Lesson 5 Bottle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of Empty Cup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of Cup and Solid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of the Solid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of the Bag, Cup, and Liquid</td>
<td></td>
<td></td>
<td>Weight of bottle and liquid</td>
</tr>
<tr>
<td>Total Weight of the Bag, Cup, Liquid, and Solid Before the Interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Weight of the Bag, Cup, Liquid, and Solid After the Interaction</td>
<td>Person 2</td>
<td>All - Use Math</td>
<td>Total Before</td>
</tr>
<tr>
<td>Change of Weight</td>
<td></td>
<td></td>
<td>Total After</td>
</tr>
</tbody>
</table>

Person 2
Sense Observation Sheet
Record your sense observations from after the investigation.

<table>
<thead>
<tr>
<th>Matter and its Interactions - Sense Observation Sheet Lessons 3, 4, and 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 3</td>
</tr>
<tr>
<td>Sense observations before the interaction.</td>
</tr>
<tr>
<td>Lesson 3</td>
</tr>
<tr>
<td>Sense observations after the interaction.</td>
</tr>
</tbody>
</table>
STOP and JOT
Lunch 12:00-1:00

LUNCH TIME!!
I NOW FEEL T LUNCH.
Parking Lot and Burning Questions

What questions do we have on our parking lot?

What burning questions are bubbling up for you that you hope to have answered before the end of Day 2?
Looking at the Data

Look at your data chart.

- What do your data say?
- What do your data tell you?

How can we use the data to answer the question:

What happens to the weight of substances (water and salt) when they are mixed?
Looking at the Data

What happens to the weight of substances (water and salt) when they are mixed?

I observed....
The data show....
I think.... because....

I noticed....
I wonder ....
This reminds me of....

Helpful Hint:
Drawings, labels, symbols, and numbers can help us show our ideas too!
Looking at the Data

What happens to the weight of substances (water and salt) when they are mixed?

The data show that the weight of water and salt __________. The weight before mixing was _____. The weight after mixing was ______.

I noticed the salt ________.
I wonder ________.
This reminds me of ________.
Driving Question Board

Did you see/hear/smell/feel anything today that relates to our questions on the driving question board?

What are you ideas about what we could do next to find out more about things that stay the same and things that change when a cake is made?
Reflection on Our Norms

Alone Zone

- What is one thing you did to work together with your team to figure things out?
- What is one thing your team did that helped you figure things out together?

From OpenSciEd Classroom Norms
Reflection on Our Norms

Small Group

- What is one thing you did to work together with your team to figure things out?
- What is one thing your team did that helped you figure things out together?

Person 1: Be ready to share one idea with the group.

From OpenSciEd Classroom Norms
Teacher “Hat” Reflecting

Alone Zone
Reflect on student “hat” experiences and educator moves.

What ways were you doing science to figure something out?

What educator moves, structures, and strategies did you notice the facilitator (teacher) using to support your efforts to do science?
Small Group
Reflect on student “hat” experiences and educator moves.

What ways were you doing science to figure something out?

What educator moves, structures, and strategies did you notice the facilitator (teacher) using to support your efforts to do science?
Science and Engineering Practices (SEPs)

<table>
<thead>
<tr>
<th>Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Asking Questions (Science) and Defining Problems (Engineering)</td>
</tr>
<tr>
<td>2. Developing and Using Models</td>
</tr>
<tr>
<td>3. Planning and Carrying Out Investigations</td>
</tr>
<tr>
<td>4. Analyzing and Interpreting Data</td>
</tr>
<tr>
<td>5. Using Mathematics and Computational Thinking</td>
</tr>
<tr>
<td>6. Constructing Explanations (Science) and Designing Solutions (Engineering)</td>
</tr>
<tr>
<td>7. Engaging in Argument from Evidence</td>
</tr>
<tr>
<td>8. Obtaining, Evaluating, and Communicating Information</td>
</tr>
</tbody>
</table>

A focus on practices (in the plural) avoids the mistaken impression that there is one distinctive approach common to all science—a single “scientific method.”
K-12 Learning Progression for Developing and Using Models

GOALS
By grade 12, students should be able to

- Construct drawings or diagrams as representations of events or systems—for example, draw a picture of an insect with labeled features, represent what happens to the water in a puddle as it is warmed by the sun, or represent a simple physical model of a real-world object and use it as the basis of an explanation or to make predictions about how the system will behave in specified circumstances.
- Represent and explain phenomena with multiple types of models—for example, represent molecules with 3-D models or with bond diagrams—and move flexibly between model types when different ones are most useful for different purposes.
- Discuss the limitations and precision of a model as the representation of a system, process, or design and suggest ways in which the model might be improved to better fit available evidence or better reflect a design’s specifications. Refine a model in light of empirical evidence or criticism to improve its quality and explanatory power.
- Use (provided) computer simulations or simulations developed with simple simulation tools as a tool for understanding and investigating aspects of a system, particularly those not readily visible to the naked eye.
- Make and use a model to test a design, or aspects of a design, and to compare the effectiveness of different design solutions.

PROGRESSION
Modeling can begin in the earliest grades, with students’ models progressing from concrete “pictures” and/or physical scale models (e.g., a toy car) to more abstract representations of relevant relationships in later grades, such as a diagram representing forces on a particular object in a system. Students should be asked to use diagrams, maps, and other abstract models as tools that enable them to elaborate on their own ideas or findings and present them to others [15]. Young students should be encouraged to devise pictorial and simple graphical representations of the findings of their investigations and to use these models in developing their explanations of what occurred.
Students-as-Scientists (and Engineers)

 Alone Zone
As you watch the video, think about:
• What is the **phenomenon** scientists are trying to explain?
• Which **science and engineering practices** (SEPs) do they engage with to build to explain how or why the phenomenon occurred?
• How does this “science in action” compare to what your experiences in lessons 1-4?
Small Group

• How does the “science in action” in the video compare to what your experiences in lessons 1-4?

• What is different about doing science in the way compared to your own experiences with “school science” in your own K-12 experience?
Looking at the Data

Look at your data chart.

● What did you notice about what happened today compared to what happened with the salt and water mixture in the last lesson?

● What do you think might have caused this?
Segment 4: How do lesson 3-8 help us answer our questions about the cake and build science ideas?

<table>
<thead>
<tr>
<th>What to prep</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Got/needs chart for the end of the day</td>
<td>1. student sheet packet</td>
</tr>
<tr>
<td></td>
<td>2. lesson 5, 6, 7 (each person will have 1 of the 3 lessons)</td>
</tr>
<tr>
<td></td>
<td>3. Lesson 5 real data (this will be in a slide); lesson 7 data in a slide</td>
</tr>
<tr>
<td></td>
<td>4. Sample structure for the concept map -seem handwritten sample, but will be made with yellow stickies.</td>
</tr>
</tbody>
</table>
## Segment 4: What is the AP routine? How does it serve students?

<table>
<thead>
<tr>
<th>Time</th>
<th>45 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment Punchline</td>
<td>Lessons build on one another and our questions, what we have figured out and what we still need to figure out drive the lesson. Student ideas and questions drive the lessons.</td>
</tr>
</tbody>
</table>
| Learning Arc | ● We form new groups.  
● We read a lesson to understand the structure and features.  
● We read a lesson to figure out what students figure out and how they figure it out.  
● We build a concept map that shows what students figured out and how they figured it out (what in one color of post it note; how in another color of post it note)  
● We add how what we have figured out relates to the cake. |
| Navigation | **By the end of segment 4:** We recognize we are doing investigations in order to build science ideas and explain aspects of the cake phenomenon.  
**Where do we go next?** We reflect on our thinking about sensemaking |
| Artifacts  | Team concept maps. They will continue to build their maps on day 2. |
# Getting to Know Lessons 5, 6 and 7

## UNIT 1 LESSON 5

### Lesson Target
I can make observations and record the weight of matter before and after an investigation using a scale.

### Objective/s
PS 5.1.1 Carry out investigations to compare the weight of objects before and after an interaction.

### EXPLORE

### Lesson Materials
- PS.5.1 Unit 1 Lesson 5 Slidedeck
- PS.5.1 Unit 1 Lessons 3, 4 and 5 Observations Data Chart
- PS.5.1 Unit 1 Lessons 3, 4 and 5 Student Senses Observation Sheet
- PS.5.1 Unit 1 Lesson 3, 4, and 5 Class Data Chart from Lesson 3
- Video of bottle and materials

## UNIT 1 LESSON 6

### Lesson Target
I can use data to predict if a change will happen.

### Objective/s
PS 5.1.1 Carry out investigations to compare the weight of objects before and after an interaction.

### DATA

### Lesson Materials
- PS.5.1 Unit 1 Lesson 6 Slidedeck
- PS.5.1 Unit 1 Lessons 3, 4 and 5 Observations Data Chart from previous lessons.
- PS.5.1 Unit 1 Lesson 3, 4 and 5 Student Senses Observation Sheet

## UNIT 1 LESSON 7

### Lesson Target
I can record the temperature of matter before, during, and after an interaction using a digital thermometer.

### Objective/s
PS 5.1.2 Carry out investigations to explain whether the mixing of two or more substances result in new substances.

### EXPLORE

### Lesson Materials
- PS.5.1 Unit 1 Lesson 7 Slidedeck
- PS.5.1 Unit 1 Lesson 7 Observations Data Chart
- PS.5.1 Unit 1 Lessons 3, 4, and 5 Student Observation Data Chart
- PS.5.1 Unit 1 Lessons 3, 4 and 5 Student Senses Observation Sheet
- 4 buckets

## Groups
- Groups 1, 2, 3,
- Groups 4, 5, 6
- Groups 7, 8, 9
Sharing What You Found Out

Groups 1, 4, 7 Make a small sharing circle.
Groups 2, 5, 8 Make a small sharing circle.
Groups 3, 6, 9 Make a small sharing circle.

Step 5: Each group share what students figure out in the lesson you studied. Discuss how the lessons relate to each other and the cake phenomenon.

Step 6: Together create a concept map with one idea/writing/drawing per yellow sticky notes that show what students figure out in lessons 3-7.
### Segment 1: What is sensemaking? Part 2

<table>
<thead>
<tr>
<th>Time</th>
<th>45 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment Punchline</td>
<td>Sensemaking is the vision for science education for all students. That vision and our goals for students in science are aligned.</td>
</tr>
</tbody>
</table>

| Learning Arc | ● We add to and revise our ideas about sensemaking and add specific example from the day.  
● We discuss takeaways about sensemaking based on our experiences. |

| Navigation | By the end of segment 1: We can add more ideas about what we mean by sensemaking.  
Where do we go next? We will use participant ideas to connect to the 4 attributes of sensemaking on day 2. |

| Artifacts | “Our Goals for Students in Science” Poster (whole group)  
What is Sensemaking Poster (small group) |

---

Goals for Students

What is sensemaking?
What is Sensemaking?

Small Group

Revisit your initial ideas about sensemaking.

- What ideas might you want to add?
- What ideas might you want to say more about?
- What ideas might you want to change?
What is Sensemaking?

Whole Group Gallery Walk

- Observe each group’s poster.
- What are some patterns in our ideas about how we describe sensemaking?
Gots and Needs

As you walk out the door, please add a post it with one thing you “got” today and one thing you “need/want/hope for” tomorrow.

See you tomorrow for an 8am start.
CMS Professional Learning Attendance and Feedback Form

Please ensure you complete this form before leaving your PD each day.

bit.ly/CMSPD2425
<table>
<thead>
<tr>
<th>Segment 1 and Segment 4</th>
<th>8:00-9:00</th>
<th>Reflecting on Sensemaking How do Lessons 1 -9 relate to one another?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 5</td>
<td>9:00-9:30</td>
<td>Productive Talk Moves and Goals</td>
</tr>
<tr>
<td>Segment 6</td>
<td>9:30-12:00 with break</td>
<td>Lessons 10-11; Reflect on Developing Models</td>
</tr>
<tr>
<td>Lunch</td>
<td>12:00 – 1:00</td>
<td></td>
</tr>
<tr>
<td>Segment 7</td>
<td>1:00-2:30</td>
<td>Lessons 12-14; Reflect on Coherence</td>
</tr>
<tr>
<td>Segment 1</td>
<td>2:30-3:00</td>
<td>Celebrating Sensemaking Close Day 2</td>
</tr>
<tr>
<td>Segment 1 and Segment 4</td>
<td>8:00-10:30</td>
<td>Reflecting on Sensemaking Working with Lessons 1-9</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>15 Min Break</td>
<td></td>
</tr>
<tr>
<td>Segment 5</td>
<td>10:30-11:00</td>
<td>Productive Talk Moves and Goals</td>
</tr>
<tr>
<td>Segment 6</td>
<td>11:00-12:00</td>
<td>Lessons 10: Reflecting on Developing Models</td>
</tr>
<tr>
<td>Lunch</td>
<td>12:00 – 1:00</td>
<td></td>
</tr>
<tr>
<td>Segment 7</td>
<td>1:00-2:30</td>
<td>Lessons 12-14; Reflect on Coherence</td>
</tr>
<tr>
<td>Segment 1</td>
<td>2:30-3:00</td>
<td>Celebrating Sensemaking Close Day 2</td>
</tr>
</tbody>
</table>
Welcome!

Making Sense of Three-Dimensional Teaching and Learning-Grade 5 Unit 1

Day 2

June 25-26, 2024
8 am - 3 pm
Our Ideas about Sensemaking

- Investigating
- Arguing with evidence
- Asking question
- Students use evidence to support ideas
- Collaboration, discussion
- Building learning/knowledge
- Making mistakes and changing our minds
- Teacher asking questions
Design for Sensemaking

- Students experience a **phenomenon**;
- engage in **science and engineering practices** and
- **share ideas** to develop or apply the
- **science ideas** and **crosscutting concepts** needed to explain how or why the phenomenon occurs.
Small Group
Looking Back to Lesson 3.

● What did we figure out?
● How did we figure these things out?
● How might this help us answer some of our questions about what happens when we make a cake?
**Segment 4: How do lesson 3-8 help us answer our questions about the cake and build science ideas?**

**Part 2**

<table>
<thead>
<tr>
<th>What to prep</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 2: Word wall for lesson 8, Lesson 8 text</td>
<td>1. student sheet packet</td>
</tr>
<tr>
<td></td>
<td>2. lesson 5, 6, 7 (each person will have 1 of the 3 lessons)</td>
</tr>
<tr>
<td></td>
<td>3. Lesson 5 real data chart</td>
</tr>
<tr>
<td></td>
<td>4. Sample structure for the concept map - see sample from lessons - ours</td>
</tr>
<tr>
<td></td>
<td>will be a bit different.</td>
</tr>
</tbody>
</table>

---

![Sample structure for the concept map - see sample from lessons - ours will be a bit different.](image)
## Segment 4: What is the AP routine? How does it serve students? Part 2

<table>
<thead>
<tr>
<th>Time</th>
<th>45 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment Punchline</strong></td>
<td></td>
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<tr>
<td>Lessons build on one another and our questions, what we have figured out and what we still need to figure out drive the lesson. Student ideas and questions drive the lessons.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th><strong>Learning Arc</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>We build a concept map that shows what students figured out and how they figured it out (what in one color of post it note; how in another color of post it note)</td>
<td></td>
</tr>
<tr>
<td>We add how what we have figured out relates to the cake.</td>
<td></td>
</tr>
<tr>
<td><strong>Part 2 -</strong></td>
<td></td>
</tr>
<tr>
<td>We do lesson 8 as learners</td>
<td></td>
</tr>
<tr>
<td>We add to our concept maps with our concept map groups.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Navigation</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>By the end of segment 4:</strong> We recognize we are doing investigations in order to build science ideas and explain aspects of the cake phenomenon.</td>
<td></td>
</tr>
<tr>
<td><strong>Where do we go next?</strong></td>
<td>We reflect on our thinking about sensemaking</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Artifacts</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Team concept maps. They will continue to build their maps on day 2.</td>
<td></td>
</tr>
</tbody>
</table>
Unit 1
Matter and its Interactions
Lesson 4
Lesson 3 Review

- What did we observe?
- What happened when we mixed the substances—water and salt?
- What happened to the weight from before the interaction to after the interaction?
- What ideas did we have about what to investigate next?
Materials

Today’s Tray
● Plastic Cup with ¼ of cup water
● 2 White Solid Tablets
● Paper Plate
● Paper Towel
● Digital Scale
● 1 Gallon Plastic Bag
● Plastic Bucket

How can we do an investigation using these materials to find out more about weight and changes?
Pass the Tray Routine

Person 3: Get your table’s tray.
Person 4: Distribute Today’s Tray Materials
Person 1: Make sure everyone has a turn.
Person 2: Dispose of liquids in the assigned bucket.
Person 3: Return all materials on the tray.
# Sense Observation Sheet

Record your sense observations from before the investigation.

<table>
<thead>
<tr>
<th>Lesson 4</th>
<th>Lesson 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense observations before the interaction.</td>
<td>Sense observations after the interaction.</td>
</tr>
</tbody>
</table>
Observation Data Chart
Record your data from before the investigation.

<table>
<thead>
<tr>
<th>Observation/Data</th>
<th>Lesson 3</th>
<th>Lesson 4</th>
<th>Lesson 5 Bottle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of Empty Cup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of Cup and Solid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of the Solid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of the Bag, Cup, and Liquid</td>
<td></td>
<td></td>
<td>Weight of bottle and liquid</td>
</tr>
<tr>
<td>Total Weight of the Bag, Cup, Liquid, and Solid</td>
<td></td>
<td>Total Before</td>
<td></td>
</tr>
<tr>
<td><strong>Before</strong> the Interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Weight of the Bag, Cup, Liquid, and Solid</td>
<td></td>
<td></td>
<td>Total After</td>
</tr>
<tr>
<td><strong>After</strong> the Interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change of Weight</td>
<td></td>
<td></td>
<td>Change</td>
</tr>
</tbody>
</table>
Investigating

Rule: Keep the bag open when you mix the 2 tablets with the water.
STOP and JOT
Sense Observation Sheet
Record your sense observations from after the investigation.

<table>
<thead>
<tr>
<th>Lesson 4</th>
<th>Lesson 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense observations before the interaction.</td>
<td>Sense observations after the interaction.</td>
</tr>
<tr>
<td></td>
<td>G1</td>
</tr>
<tr>
<td>-------</td>
<td>----</td>
</tr>
<tr>
<td><strong>w-solid</strong></td>
<td>6g</td>
</tr>
<tr>
<td><strong>w-bag</strong></td>
<td>74g</td>
</tr>
<tr>
<td><strong>cup, liq.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Before</strong></td>
<td>80g</td>
</tr>
<tr>
<td><strong>Total After</strong></td>
<td>79g</td>
</tr>
<tr>
<td><strong>Change Weight</strong></td>
<td>1g less</td>
</tr>
</tbody>
</table>
Looking at the Data

How can we use the data to answer the question:

Is weight affected when changes take place?

I observed....
The data show....
I think.... because....
I think.... caused....
I noticed....
I wonder....
This reminds me....
Driving Question Board

Did you see/hear/smell/feel anything today that relates to our questions on the driving question board?

What new questions do you have?

What are you ideas about what we could do next to find out more about things that stay the same and things that change when a cake is made?
Teacher “Hat” Reflecting

Small Group
Looking Back to Lesson 4.

- What did we figure out?
- How did we figure these things out?
- How might this help us answer some of our questions about the cake?
# Getting to Know Lessons 5, 6 and 7

**UNIT 1 LESSON 5**

**Lesson Target**
I can make observations and record the weight of matter before and after an investigation using a scale.

**Objective/s**
PS 5.1.1 *Carry out investigations to compare* the weight of objects before and after an interaction.

**EXPLORE**

**Lesson Materials**
- FS.5.1 Unit 1 Lesson 5 Slidedeck
- FS.5.1 Unit 1 Lessons 3, 4 and 5 Observations Data Chart
- FS.5.1 Unit 1 Lessons 3, 4 and 5 Student Senses Observation Sheet
- FS.5.1 Unit 1 Lesson 3, 4, and 5 Class Data Chart from Lesson 3
- Video of bottle and materials

**UNIT 1 LESSON 6**

**Lesson Target**
I can use data to predict if a change will happen.

**Objective/s**
PS 5.1.1 *Carry out investigations to compare* the weight of objects before and after an interaction.

**DATA**

**Lesson Materials**
- FS.5.1 Unit 1 Lesson 6 Slidedeck
- FS.5.1 Unit 1 Lessons 3, 4 and 5 Observations Data Chart from previous lessons.
- FS.5.1 Unit 1 Lesson 3, 4 and 5 Student Senses Observation Sheet

**UNIT 1 LESSON 7**

**Lesson Target**
I can record the temperature of matter before, during, and after an interaction using a digital thermometer.

**Objective/s**
PS 5.1.2 *Carry out investigations to explain* whether the mixing of two or more substances result in new substances.

**EXPLORE**

**Lesson Materials**
- FS.5.1 Unit 1 Lesson 7 Slidedeck
- FS.5.1 Unit 1 Lesson 7 Observations Data Chart
- FS.5.1 Unit 1 Lessons 3, 4, and 5 Student Observation Data Chart
- FS.5.1 Unit 1 Lessons 3, 4 and 5 Student Senses Observation Sheet
- 4 buckets

**Groups 1, 2, 3, 4**

**Groups 5, 6, 7, 8**

**Groups 9, 10, 11, 12**
Getting to Know Lessons 5, 6 and 7

Step 1: Alone Zone: Read the lesson. Notice the features and support in the lesson.

Step 2: Small Group: Share what you noticed and wondered about the features of a lesson.
Key Lesson Features

- Lesson Overview and Materials Page 1
- Preparing the Lesson Section
- Same lesson structure for every lesson.
  - Introducing the Lesson
  - Carrying Out the Lesson
  - Closing the Lesson
  - Engaging in the Phenomenon or DQB

We want to use the academic language “investigations” instead of experiments. If students use experiments that is fine, when you phrase comments or questions be sure to use the word investigations.

*Italicized possible student responses.*

Slide Deck for Every Lesson
Lesson 5, 6, 7 Data

Lesson 5 Data

Lesson 6 - Recording space is on the Lesson 3, 4, 5 Data Sheet

Lesson 7 Data

<table>
<thead>
<tr>
<th>Observation/Data</th>
<th>Lesson 7</th>
<th>Sense Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature of the Liquid Before the Reaction</td>
<td>76 °F</td>
<td>Clear, strong smell</td>
</tr>
<tr>
<td>Temperature of the Solid Before the Reaction</td>
<td>76 °F</td>
<td>Small white powder</td>
</tr>
<tr>
<td>Temperature of the Solid and Liquid Interaction</td>
<td>66 °F</td>
<td>Big overflowing bubble then quickly big bubble</td>
</tr>
<tr>
<td></td>
<td>66 °F</td>
<td>Lots of small bubbles gone, rising in the liquid</td>
</tr>
<tr>
<td></td>
<td>66 °F</td>
<td>A small bit of solids</td>
</tr>
<tr>
<td></td>
<td>66 °F</td>
<td>Lots of smaller bubbles</td>
</tr>
<tr>
<td></td>
<td>66 °F</td>
<td>A little solid left</td>
</tr>
<tr>
<td></td>
<td>66 °F</td>
<td>Lots of tiny bubbles</td>
</tr>
<tr>
<td></td>
<td>10 °F</td>
<td>Temp decreased by 10 °C</td>
</tr>
</tbody>
</table>
Lesson 5 Bottle video

https://drive.google.com/file/d/1Kya-KJ5H0usMtwZjVqPsdDgJvCk9SkQI/view?usp=sharing
Getting to Know Lessons 5, 6 and 7

Step 3: Alone Zone: Re-read the lesson.

What are students figuring out?

How are they figuring it out?
Getting to Know Lessons 5, 6 and 7

What are students figuring out?
How are they figuring it out?

Step 4: Small Group: Come to Consensus.
- please create 1-3 yellow sticky notes with writing/drawing about what students figure out.
- please create 1-3 blue stickies with writing/drawing about how they figure it out.
- please create 1-3 pink stickies with writing/drawing how it might relate to the cake about how they figure it out.
Sharing What You Found Out

Groups 1, 5, 9  Make a small sharing circle.
Groups 2, 6, 10 Make a small sharing circle.
Groups 3, 7, 11 Make a small sharing circle.
Groups 4, 8, 12 Make a small sharing circle.

Step 5: Each group member share what students figure out and how they figure it out in the lesson you studied.

Step 6: Together create a concept map of lessons 5, 6, and 7.
Sharing What You Found Out

Groups 1, 5, 9 Make a small sharing circle.
Groups 2, 6, 10 Make a small sharing circle.
Groups 3, 7, 11 Make a small sharing circle.
Groups 4, 8, 12 Make a small sharing circle.

Step 7: What questions about the cake can we explain with the ideas we have figured out? Together add to the concept map with one idea/writing/drawing per pink sticky note that tells as aspect of the cake we can explain and/or questions we still wonder about.
Looking Back:
What have students figured out in lessons 1-7? What new questions might they have?

Looking Forward:
What have we figured out about the cake? What do we still need to figure out?
Unit 1
Matter and its Interactions
Lesson 8
Learning Target

I can use evidence to decide if original substances have changed into new substances.

Anchoring Phenomena

What happens when we make a cake?
Student Hat/Teacher “Hat”

Student Hat: Think like a student.

Student/Teacher Hat: Think like a student, but note teacher guidance.

Teacher “Hat”: Reflect on student experience and educator moves.
Materials

- Observation Data Chart from lesson 3, 4, 5
- Observation Data Chart lesson 7
- Matter and Change Evidence Student Sheet
- Matter and Change Student Text
Sense Observation Sheets from Lesson 3, 4, 5 and 7

What patterns did you notice in your observations in lessons 3, 4, 5 and 7?

<table>
<thead>
<tr>
<th>Lesson 3</th>
<th>Lesson 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense observations before the interaction.</td>
<td>Sense observations after the interaction.</td>
</tr>
</tbody>
</table>

### Lesson 7 Matter and its Interactions - Observation Data Chart

<table>
<thead>
<tr>
<th>Observation/Data</th>
<th>Lesson 7</th>
<th>Sense Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature of the Liquid Before the Interaction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature of the Solid Before the Interaction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature of the Solid and Liquid During the Interaction 30 Seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature of the Solid and Liquid</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson 8 Matter and Change Student Text

When conducting investigations and mixing substances it can be difficult to tell if a new substance has formed. What does it mean that a “new” substance has formed? Sometimes when two or more substances are mixed together there is an interaction that occurs that causes the original substances to change into a new substance. This type of interaction is called a chemical change.

! This reminds me of something I have observed or wondered about.

* This is an idea that might help me explain something I observed.

? I’m not sure about this.

Underline: This is an idea I want to use to explain to support my ideas about what caused the changes I have seen in different lessons or the cake.
Read, Note, Turn and Talk

When substances come together and undergo a chemical change, it's like witnessing a fascinating transformation happening before our eyes. Chemical changes do something incredible, but on a tiny, particle level. Let's explore how the properties change. Imagine you have two simple ingredients, like baking soda and vinegar. When you mix them together, they fizz and bubble, creating something entirely new: carbon dioxide gas, water, and sodium acetate! This is an example of a chemical reaction. One way properties change is through the formation of new substances. In our example, the properties of baking soda and vinegar, like their taste, color, and smell no longer exist because they re-combine to form the bubbly carbon dioxide, water, and sodium acetate.

Sometimes when these chemicals react, energy is either gained or lost. Loss of heat energy can cause a substance to freeze; a gain of heat energy can cause a substance to boil.

* This reminds me of something I have observed or wondered about.

! This is an idea that might help me explain something I observed.

? I’m not sure about this.

Underline: This is an idea I want to use to explain to support my ideas about what caused the changes I have seen in different lessons or the cake.
When substances change into new substances, there may be an odor or smell produced or even an unexpected color change. An example is when wood is burned it will produce a smoky smell, the wood changes into carbon dioxide, water vapor and ash. Again an odor being present does not automatically mean that the original substances changed but it is a good indicator when combined with other indicators. An example of an unexpected color change is when you mix strawberry Kool Aid and water so a chemical change occurs from clear liquid to a red liquid.

! This reminds me of something I have observed or wondered about.

* This is an idea that might help me explain something I observed.

? I’m not sure about this.

**Underline:** This is an idea I want to use to explain to support my ideas about what caused the changes I have seen in different lessons or the cake.
Read, Note, Turn and Talk

In most cases when original substances change into new substances the change is irreversible. What does that mean? Have you ever gone to the refrigerator and opened a jug of milk and thought.... “Yuck that smells sour!” Well that’s because it might be. When milk sours it changes from the original substance into a new substance. The sour milk will not change back to the original milk. Another example of irreversible change is the digestive process in the body. The body chemically digests the food we eat, and we cannot get the food back in its original state. This reminds me of something I have observed or wondered about.

* This is an idea that might help me explain something I observed.

? I’m not sure about this.

**Underline:** This is an idea I want to use to explain to support my ideas about what caused the changes I have seen in different lessons or the cake.
Sometimes original substances **physically change** but do not chemically change. In this case, the properties of the original substances remain unchanged, unlike in a chemical reaction where entirely new substances are formed. When you dissolve salt in water, the properties of salt and water remain the same. Salt dissolves in water, but the solution still contains salt. Interestingly, the water can be retrieved which you can use to dissolve the salt again.

! This reminds me of something I have observed or wondered about.

* This is an idea that might help me explain something I observed.

? I’m not sure about this.

**Underline:** This is an idea I want to use to explain to support my ideas about what caused the changes I have seen in different lessons or the cake.
If heat is added or removed from a substance it can cause a change. This does not necessarily mean that a new substance has formed. If this heat loss or gain causes the substance to change states (solid to liquid to gas or gas to liquid to solid) and still be the same substance it would be a physical change.

! This reminds me of something I have observed or wondered about.

* This is an idea that might help me explain something I observed.

? I’m not sure about this.

Underline: This is an idea I want to use to explain to support my ideas about what caused the changes I have seen in different lessons or the cake.
Chemical Change

Specialized Language
Chemical Change
Interaction where a new substance is formed.
Physical Change

Specialized Language

Physical Change

Change of state or shape without a new substance forming.
We know that matter has mass and takes up space. We know that we can weigh matter and that it can change either physically or chemically. The weight of substances can change depending on the system. A **closed system** does not allow matter to enter or exit. This means the weight before an interaction will be the same as the weight after an interaction. An **open system** however, will allow matter to enter or exit the system.

A **closed** plastic bag and putting a liquid in it will make the liquid **evaporate** (change to a gas). This means the bag is closed and the matter cannot exit the bag. An **open** then the weight will change as the matter will exit the system.

- ! This reminds me of something I have observed or wondered about.
- * This is an idea that might help me explain something I observed.
- ? I’m not sure about this.

**Underline**: This is an idea I want to use to explain to support my ideas about what caused the changes I have seen in different lessons or the cake.
Open System

Specialized Language
Closed System
Indicators of Change

Lesson 8 Matter and Change Evidence Student Sheet

<table>
<thead>
<tr>
<th>Matter and Change Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence of bubbles when substances are mixed.</td>
</tr>
<tr>
<td>Evidence of unexpected color changes when substances are mixed.</td>
</tr>
<tr>
<td>Evidence of an odor when substances are mixed.</td>
</tr>
<tr>
<td>Evidence of a change in temperature from before substances are mixed to after substances are mixed.</td>
</tr>
<tr>
<td>Evidence of an irreversible change when substances are mixed.</td>
</tr>
</tbody>
</table>

What indicators in the list do you think could be indicators of a chemical change?

What other information from the text could help you know if new substances have formed after an interaction?
Supporting or Revising our Claims

Record new information that support if a physical or chemical change took place.

If you changed your mind about your claim, you can record your new thinking on the blank page.

<table>
<thead>
<tr>
<th>Lesson 6 and Lesson 8</th>
<th>Lesson 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 6</td>
<td></td>
</tr>
<tr>
<td>Are the original substances the same or are they something different?</td>
<td></td>
</tr>
<tr>
<td>Lesson 6</td>
<td></td>
</tr>
<tr>
<td>What evidence supports your answer?</td>
<td></td>
</tr>
<tr>
<td>Lesson 8</td>
<td></td>
</tr>
<tr>
<td>Information from the text that supports your answers.</td>
<td></td>
</tr>
</tbody>
</table>

Lesson 3, 4, 5
STOP and JOT
Teacher “Hat” Reflecting

Alone Zone
Reflect on student “hat” experiences and educator moves.

What did you notice about how text was used in lesson 8?

How is this use of text different from other experiences you have had with science texts?

How does using text in this way help students figure things out?
Teacher “Hat” Reflecting

Small Group
Reflect on student “hat” experiences and educator moves.

What did you notice about how text was used in lesson 8?

How is this use of text different from other experiences you have had with science texts?

How does using text in this way help students figure things out?
# Meaning-Making in the Science Classroom

## Language Instructional Shifts

<table>
<thead>
<tr>
<th>Modalities</th>
<th>Registers</th>
<th>Student Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linguistic</strong></td>
<td></td>
<td>• One-to-one</td>
</tr>
<tr>
<td>➢ Talk</td>
<td>Everyday Language</td>
<td>• One-to-small group</td>
</tr>
<tr>
<td>(listening, speaking)</td>
<td>Specialized Language</td>
<td>• One-to-many</td>
</tr>
<tr>
<td>➢ Text</td>
<td>Precise Ideas and Precise Language</td>
<td>• Small group-to-many</td>
</tr>
<tr>
<td>(reading, writing)</td>
<td></td>
<td>Explicit beyond the &quot;here&quot; and &quot;now&quot;</td>
</tr>
<tr>
<td><strong>Visual</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Drawing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Symbol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Gesture</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lee, Quinn, & Valdes (2013)
Sharing What You Found Out

Groups 1, 5, 9  Make a small sharing circle.
Groups 2, 6, 10 Make a small sharing circle.
Groups 3, 7, 11 Make a small sharing circle.
Groups 4, 8, 12 Make a small sharing circle.

Step 8: What questions about the cake can we explain with the ideas we have figured out? Together add to the concept map with one idea/writing/drawing per pink sticky note that tells as aspect of the cake we can explain and/or new questions we still wonder about.
Unit 1
Matter and its Interactions
Lesson 9
Build a Class Concept Map

What do you notice about the features this sample concept map?

What do you wonder about the features or purpose of a concept map?
Build a Class Concept Map

Group 1 Lesson 3
Group 2 Lesson 4
Group 3 Lesson 5
Group 4 Lesson 7
Group 5 Lesson 8 - Changes
Group 6 Lesson 8 - Systems

Create 3-5 Yellow Stickies (one idea per sticky) with drawings and writing about what you figured out in that lesson.
Build a Class Concept Map

Which of our ideas on our class concept map can we use to explain something about what happens when you make a cake?

Each group record 3 ideas/ one per sticky note and place them on our class model.
Performance Task 2 Parts
You will be watching a video of a cake being made. Using the information in the video, complete the two parts below.

1. Make a model explaining what happens when you make a cake from before to after. Be sure to label changes that you observe.
2. If you had to decide if a new substance had been formed, what observations or data would you want to help you decide?
Lesson 9

PS.5.1 Matter and Its Interactions Performance Task

Before watching the video, what evidence would you need to observe or have that would tell you that a chemical change had occurred? Record your answers below.

<table>
<thead>
<tr>
<th>Before Making the Muffin</th>
<th>After Making the Muffin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before mixing, the ingredients (Circle one: have or have not) changed. I know this because ...</td>
<td>After baking, the ingredients (Circle one: have or have not) changed. I know this because ...</td>
</tr>
</tbody>
</table>
Segment 5: How can we support students in sensemaking discussions?

<table>
<thead>
<tr>
<th>What to prep</th>
<th>Materials</th>
</tr>
</thead>
</table>
| ● Preview Embedded Videos  
● Handout        | ● Talk Goals and Moves Handout (1 per person)  
● chart paper     |
## Segment 5: How can we support students in sensemaking discussions?

<table>
<thead>
<tr>
<th>Time</th>
<th>30 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment Punchline</td>
<td>Intentional use of norms, talk goals and talk moves supports equitable sensemaking.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Arc</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>● We reflect on how talk supported sensemaking during the immersion. (4 Min)</td>
<td></td>
</tr>
<tr>
<td>● We get to know a new tool: productive talk goals and moves. (8 Min)</td>
<td></td>
</tr>
<tr>
<td>● We set the context before observing classroom talk video by sharing the gist of what they are discussing. We observe and analyze student talk as it relates to sensemaking (10 Min)</td>
<td></td>
</tr>
<tr>
<td>● We consider why intentionally planning and working on talk matters and how we might apply this to our own practice (6 Min)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Navigation</th>
<th><strong>By the end of segment 5:</strong> We recognize that intentional use of norms and talk moves help us reach talk goals that are needed for equitable sensemaking.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>We wonder what other things do we need to be intentional about for sensemaking?</td>
</tr>
<tr>
<td></td>
<td><strong>Where do we go next?</strong> We experience intentional use of SEPs- developing models from lesson 10 and 11.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Artifacts</th>
<th>None</th>
</tr>
</thead>
</table>
Sensemaking Discussions

How can we support students in sensemaking discussions?
Each of the eight practices, as it is introduced and elaborated and experienced in the classroom, requires that students externalize their reasoning. It requires that they work with the reasoning of other students. …teacher and student talk is the vehicle by which every student can make his or her way into a deep and productive relationship with the science and engineering practices.
Reflect on Current Science Talk

Alone Zone

- What kinds of science talk happen most frequently in your classroom?
- What kinds of science talk would you like students to engage in within your classroom?
Being able to identify and support productive talk is an important part of building a culture of equitable sensemaking.

Productive talk allows students to:

- make their thinking public
- reason about complex ideas
- develop arguments and evidence-based explanations
Goals for Productive Talk

- **Goal 1**: Help individual students share, expand, and clarify their own thinking
- **Goal 2**: Help students listen carefully to one another
- **Goal 3**: Help students deepen their reasoning
- **Goal 4**: Help students think with others
Goals and Talk Moves

Alone Zone

- Read through the Goals and Talk Moves Handout.
- Reflect: Have you observed an instance of one or more of these moves today?
Goals and Talk Moves

Share with a partner:

- Which Goal (1, 2, 3, or 4) is most in use in your own classroom?
- Which Goal (1, 2, 3, or 4) is newest or newer to you?

### Productive Talk Goals and Moves

<table>
<thead>
<tr>
<th>Goal One: Help individual students share, expand, and clarify their own thinking</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Time to think:</strong> Partner talk: writing as think time; wait time</td>
<td></td>
</tr>
<tr>
<td>2. <strong>Say more:</strong> “Can you say more?”; “What do you mean by that?”; “Give an example”</td>
<td></td>
</tr>
<tr>
<td>3. <strong>So, are you saying...?</strong> “So, let me see if I’ve got what you’re saying. Are you saying...?” (always leaving space for the original student to agree or disagree and say more)</td>
<td></td>
</tr>
</tbody>
</table>

| Goal Two: Help students listen carefully to one another |  |
| 4. **Who can rephrase or repeat?** “Who can repeat what Javon just said or put it into their own words?” (After a partner talk) “What did your partner say?” |  |

| Goal Three: Help students deepen their reasoning |  |
| 5. **Asking for evidence or reasoning:** “Why do you think that?” “What’s your evidence?” “How did you arrive at that conclusion?” |  |
| 6. **Challenge or Counterexample:** “Does it always work that way?” “How does that idea square with Sonia’s example?” “What if it had been a copper cube instead?” |  |

| Goal Four: Help students think with others |  |
| 7. **Agree/Disagree and Why?** “Do you agree/disagree? (And why?)” “What do people think about what Ian said?” “Does anyone want to respond to that idea?” |  |
| 8. **Add On:** “Who can add onto the idea that Jamal is building?” “Can anyone take that suggestion and push it a little further?” |  |
| 9. **Explaining What Someone Else Means:** “Who can explain what Aisha means when she says that?” “Why do you think he said that?” |  |

Other Observations:

Adapted from TERC (2012), Talk Science in the Inquiry Project
Observing Productive Talk

Record observations related to the Goals and Moves.

Video Context:
After previously creating individual models, students now share ideas and the class begins to develop their initial class consensus model about why Mt. Everest moves northeast at 4 cm/year and grows taller each year.

<table>
<thead>
<tr>
<th>Productive Talk Goals and Moves</th>
<th>Observations</th>
</tr>
</thead>
</table>
| **Goal One:** Help individual students share, expand, and clarify their own thinking | 1. Time to think: Partner talk; writing as think time; wait time
2. Say more: “Can you say more?”; “What do you mean by that?”; “Give an example”
3. So, are you saying...? “So, let me see if I’ve got what you’re saying. Are you saying...? (always leaving space for the original student to agree or disagree and say more)
| **Goal Two:** Help students listen carefully to one another | 4. Who can rephrase or repeat?: “Who can repeat what Jaxon just said or put it into their own words?” (After a partner talk) “What did your partner say?”
| **Goal Three:** Help students deepen their reasoning | 5. Asking for evidence or reasoning: “Why do you think that?” “What’s your evidence?” “How did you arrive at that conclusion?”
6. Challenge or Counterexample: “Does it always work that way?” “How does that idea square with Sonia’s example?” “What if it had been a copper cube instead?”
| **Goal Four:** Help students think with others | 7. Agree/Disagree and Why?: “Do you agree/disagree? (And why?)” “What do people think about what Ian said?” “Does anyone want to respond to that idea?”
8. Add On: “Who can add onto the idea that Jamal is building?” “Can anyone take that suggestion and push it a little further?”

Other Observations:

Adapted from TERC (2012), Talk Science in the Inquiry Project
Classroom Video Analysis

Alone Zone

● What talk moves do you notice from this video clip?

● What other strategies do you notice the teacher using?

Use the transcript as evidence of the talk or other moves.
Observing Productive Talk

Teacher: Interesting. Those seem like different ideas. Right. And that's interesting and puzzling too, right?
Observing Productive Talk

Small Group:

- What talk moves do you notice from this video clip?
- What other strategies did you notice the teacher using?
- How did the talk moves and other strategies support all students in engaging in equitable sensemaking?
Observing Productive Talk

Small Group:

● What talk moves do you notice from this video clip?
● What other strategies did you notice the teacher using?
● How did the talk moves and other strategies support all students in engaging in equitable sensemaking?

Whole Group:

● Share some key ideas from your small group
Rationale for Talk Moves
Teacher Interview
Reflecting on Talk Moves and Other Strategies

What are talk moves and/or strategies you would like to try to support productive talk in your own classroom? Why?
# Segment 6: Developing Models

<table>
<thead>
<tr>
<th>What to prep</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Lesson 10 and 11 materials- Make sure the water isn’t boiling when you put the bag in. The bag will melt!</td>
<td>- Lesson 10 and 11 materials</td>
</tr>
<tr>
<td>- Handouts in packet</td>
<td>- chart paper</td>
</tr>
<tr>
<td></td>
<td>- Norms with additions from day 1.</td>
</tr>
</tbody>
</table>
## Segment 6: Developing Models

<table>
<thead>
<tr>
<th>Time</th>
<th>90 Minutes</th>
</tr>
</thead>
</table>

### Segment Punchline

Participants develop models to explain a phenomenon; must-have lists and co-constructing ideas and revising ideas as supports for making thinking visible and explaining phenomena hows and whys.

### Learning Arc

**Student Hat**
- We experience lesson 10 and 11.
- We develop models of what we think causes the changes.

**Teacher Hat**
- We reflect on the practice of developing models.

### Navigation

**By the end of segment 6:** We recognize the when we are developing models we are trying to explain how or why something happens in a model.

We wonder what other things do we need to be intentional about for sensemaking? **Where do we go next?** We experience intentional use of SEP - Constructing Explanations and Analyzing and Interpreting Data

### Artifacts
Student Hat/Teacher “Hat”

Student Hat: Think like a student.

Student/Teacher Hat: Think like a student, but note teacher guidance.

Teacher “Hat”: Reflect on student experience and educator moves.
Learning Community Discourse Norms

- We use and build on other’s ideas.
- We use evidence to support our ideas, ask for evidence from others, and suggest ways to get additional evidence.
- We are open to changing our minds.
- We challenge ourselves to think in new ways.

From OpenSciEd Classroom Norms
Unit 1
Matter and its Interactions
Lesson 10
We had a lot of questions about heat and temperature.

How could we investigate some of those questions?
Learning Target

I can explain how materials respond when heated.

Anchoring Phenomena

What happens when we make a cake?

Lesson Question

What can we change to affect the cake?
Materials

- 1 hot plate
- 1 metal pot
- 1 pair of tongs
- 2 empty (no water) disposable water bottles with lids
- 1 plastic ziploc bag
- Water

How could we use these materials to see what happens to air when it is heated?
Conducting the Investigation
### Investigation Observations: include drawings and words to explain your observations.

What do you observe happening?

What do you think might be causing the changes you observe?
What did you observe happening?

What do you think would be important to include in your drawings and words to show and tell a story about what happened?
Now that we have investigated what happens when we add heat, what other questions or investigations could we do next to learn more?
Unit 1
Matter and its Interactions
Lesson 11
What did you observe happening?

What do you think would be important to include in your drawings and words to show and tell a story about what happened?
We showed and told what we observe happening?

What might we need to add if we wanted to show and tell what we think *caused* the changes?
Developing a Model

What do you think **caused** the bag to get bigger when heated?

What would need need to add to our drawings and writing to show and tell what we think is **causing** the changes?

- What must we have on our to show and tell what we think is causing changes?
Developing a Class Consensus Model

What do we agree on about what is causing the changes?

What do we still wonder?

What are we unsure about?
Looking Forward

Many of us wondered, what would happen if we put the bag of air in cold water?
What happened when we put the bag and bottle into the hot water?

What do you predict will happen if we place the bag and bottle into cold water?
Learning Target

I can explain how materials respond when cooled.

Anchoring Phenomena

What happens when we make a cake?

Lesson Question

What happens to materials when we take away the heat?
Materials

- 1 hot plate
- 1 metal pot
- 1 pair of tongs
- 1 bucket
- 2 empty (no water) water bottles with lids
- 1 plastic ziploc bag
- Water
- Ice
Conducting the Investigation
Hot vs. Cold

What happened to the bag and bottle in the hot water compared to the bag and bottle in the cold water?

Lesson 11 Cold Air Student Observation Sheet

Lesson 11 Investigation Observations: include drawings and words to explain your observations.
Developing a Model

What do you think is causing the bag to get bigger when heated and smaller when cooled?

What would need need to add to our drawings and writing to show what is causing the changes?

What must we show and tell?

●
Developing a Model

Add to your ideas to show what you think is causing the changes. Use blank space on the left if you prefer to start fresh rather than add to what you have.

What must we show and tell?

●

Lesson 11 Cold Air Student Observation Sheet

Lesson 11 Investigation Observations: include drawings and words to explain your observations.
Silent Reflection
How might these investigation help us explain some of our cake observations?
Feedback Survey

Your feedback is valuable to us! We use it to provide follow-up support as well as inform choices about future professional learning opportunities.

Presenter 1: Other: Jesse Semeyn

Where this workshop took place: Charlotte, NC Grade 5

For Presenter 2 and Presenter 3:


14. Who was the Presenter #2?

There was only one presenter so there is no Presenter #2
Feedback Survey

Your feedback is valuable to us! We use it to provide follow-up support as well as inform choices about future professional learning opportunities.

Presenter 1: Other: **Kristen Moorhead**

Where this workshop took place: **Charlotte, NC Grade 5**

For Presenter 2 and Presenter 3:

Feedback Survey

Your feedback is valuable to us! We use it to provide follow-up support as well as inform choices about future professional learning opportunities.

Presenter 1: Other: **Cari Williams**

Where this workshop took place: **Charlotte, NC Grade 5**

For Presenter 2 and Presenter 3:

14. Who was the Presenter #2?
   - There was only one presenter so there is no Presenter #2

Lunch  12:00-1:00
Teacher “Hat” Reflecting

Alone Zone

During lesson 10 and 11, sometimes we focused on the question:
What do you see happening?

Other times we focused on:
What do you think is causing the change?

What did you notice was the effect of each of these questions on your thinking and figuring out?
Teacher “Hat” Reflecting

Small Group
During lesson 10 and 11, sometimes we focused on describing the phenomenon:
What do you see happening?

Other times we focused on:
Why did it happen?

What did you notice was the effect of each of these questions on your thinking and figuring out?
Scientists use models ... to represent their current understanding of a system (or parts of a system) under study, to aid in the development of questions and explanations, and to communicate ideas to others.
Creating scientific models (key features):

- **Components** (parts) needed to explain the phenomena.

- **Relationships** and/or **interactions** between the components.
  - What moves?
  - What changes?

- **Mechanisms** that account for relationships and/or interactions between components of the model (connections to science ideas).
Supporting Students in Developing Models

All-purpose *back-pocket* questions:

- What do you absolutely need to include model (parts/components) to explain the phenomenon?

- What is the *relationship* or interaction between *component [x]* and *component [y]*? How might you represent that?

- **How** or **why** are the components interacting (mechanism) in this way? How might you represent that?
Student Hat: Think like a student.

Student/Teacher Hat: Think like a student, but note teacher guidance.

Teacher “Hat”: Reflect on student experience and educator moves.
Learning Community Discourse Norms

● We use and build on other’s ideas.
● We use evidence to support our ideas, ask for evidence from others, and suggest ways to get additional evidence.
● We are open to changing our minds.
● We challenge ourselves to think in new ways.

From OpenSciEd Classroom Norms
## Segment 7: Constructing Explanations

<table>
<thead>
<tr>
<th>What to prep</th>
<th>Materials</th>
</tr>
</thead>
</table>
| ● Lesson 12-13 demo set up of lesson 12; use photos for lesson 13. | ● Completed data for lesson 12 and 13  
● Lesson 12 materials-sample set up with the foil.  
● Lesson 14 text and lesson 10-13 student sheets in packet  
● chart paper |
### Segment 7: Constructing Explanations

<table>
<thead>
<tr>
<th>Time</th>
<th>90 Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment Punchline</strong></td>
<td>Participants analyze data from lesson 12 and 13 to use evidence to make claims. We use text in lesson 14 to add to our science ideas.</td>
</tr>
<tr>
<td><strong>Learning Arc</strong></td>
<td>½ Hat</td>
</tr>
<tr>
<td></td>
<td>- We see the set up for lesson 12.</td>
</tr>
<tr>
<td></td>
<td>- We analyze the data from lessons 12 and 13.</td>
</tr>
<tr>
<td></td>
<td>- We use the data as evidence to support a claim</td>
</tr>
<tr>
<td></td>
<td>- We use the lesson 14 text to add to our science ideas.</td>
</tr>
<tr>
<td></td>
<td>- We wrap up the unit by adding to our concept map.</td>
</tr>
<tr>
<td></td>
<td>- We wrap up the unit by explaining what we can about the cake and identifying questions we still have and celebrating.</td>
</tr>
<tr>
<td><strong>Teacher Hat</strong></td>
<td>We reflect on coherence of the unit.</td>
</tr>
<tr>
<td><strong>Navigation</strong></td>
<td><strong>By the end of segment 7</strong>: We recognize that we prioritize evidence when answering our questions/making claims and science ideas can help us support or revise claims. We celebrate what we could explain about the cake. <strong>Where do we go next?</strong> We celebrate our new understandings about sensemaking and coherence.</td>
</tr>
<tr>
<td><strong>Artifacts</strong></td>
<td></td>
</tr>
</tbody>
</table>

Unit 1
Matter and its Interactions
Lesson 12
Learning Target
I can compare and record the amount of heat that transfers through different materials using the digital thermometer.

Anchoring Phenomena
What happens when we make a cake?

Lesson Question
How does the material of the pan affect the cake?
What are your notices and wonderings about the following pictures?
Notice and Wonderings
Materials

- 40 sheets of copy paper
- 2 pots
- Oven mitt
- Paper towels
- 4 digital thermometers
- 3 feet of aluminum foil
- 2 blocks of styrofoam
- Cardboard
- Water
- Hot plate
Conducting the Investigation

First Pair
- Paper
- Oven Mitt

Second Pair
- Foil
- Styrofoam
### Collecting the Data

**NAME** Sample Data (classroom data will vary.)

**Lesson 12 Materials Comparison - Heat**

**Initial Material Temperature (IMT)** - Temperature reading on the digital thermometer in the investigation setup before placing the pot of water on the material.

**Temperature Change (TC)** - Temperature difference between 3.0 minutes and the IMT.

<table>
<thead>
<tr>
<th>Materials</th>
<th>IMT 'F</th>
<th>30 sec 'F</th>
<th>1 min 'F</th>
<th>1 min 30 sec 'F</th>
<th>2 min 'F</th>
<th>2 min 30 sec 'F</th>
<th>3 min 'F</th>
<th>TC 'F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>74</td>
<td>81</td>
<td>91</td>
<td>99</td>
<td>105</td>
<td>109</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>Cloth Oven Mitt</td>
<td>77</td>
<td>81</td>
<td>90</td>
<td>100</td>
<td>106</td>
<td>112</td>
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<tr>
<td>Styrofoam</td>
<td>78</td>
<td>87</td>
<td>90</td>
<td>95</td>
<td>98</td>
<td>100</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>Aluminum Foil</td>
<td>78</td>
<td>150</td>
<td>158</td>
<td>160</td>
<td>161</td>
<td>163</td>
<td>163</td>
<td></td>
</tr>
</tbody>
</table>
Looking at the Data

- What changes took place?
- What caused the change?
- Did one material change more than the others?
Using the Data To Answer a Question

- What material do you think would be best for baking a cake the fastest?

- Claim:
  I think _____ would be the best material to bake a cake the fastest.
Using the Data To Answer a Question

Evidence: What can you point to in your data that supports your claim.

1. The temperature of ____ increased by ____ degrees F.
2. The temperature of ____ was the highest.
3.
STOP and JOT
<table>
<thead>
<tr>
<th>Lesson 12</th>
<th>What material do you think would be best for baking a cake the fastest?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Claim:</strong></td>
</tr>
<tr>
<td></td>
<td>Evidence:</td>
</tr>
<tr>
<td>Lesson 14</td>
<td>Reasoning:</td>
</tr>
</tbody>
</table>
Silent Reflection

How does the investigation help us understand what happens when we bake a cake?
Unit 1
Matter
and its
Interactions
Lesson 13
Learning Target

I can compare and record the amount of heat that remains in cups made of different materials using the digital thermometer.

Anchoring Phenomena

What happens when we make a cake?

Lesson Question

How does heat loss affect my cake?
Materials

- 4 buckets
- 3 -6 trays
- 3 Clear plastic cups
- 2 cups of liquid
- 1 tablespoon solid
- Paper towels for each tray
- Digital scale per tray
- Digital thermometer per tray
What were the types of changes we discussed?

What are the characteristics of those types of changes?

What makes them different from one another?
What do you think this jacket is doing for this student?
If we could put a jacket on a cake after we take it out of the oven, do you think it would help the cake cool down slower or quicker than without a jacket?
What types of materials do you think would be best to use to cool a cake down slowly?
Conducting the Investigation

Which do you think will keep water warmest longest?
Lesson 13 Materials Comparison - Heat

Initial Water Temperature (IWT): Temperature reading on the digital thermometer of the water in the pot before adding water to the cups.

Temperature Change (TC): Temperature difference between 4.0 minutes and the IWT.

<table>
<thead>
<tr>
<th>Materials</th>
<th>IWT °F</th>
<th>30 sec °F</th>
<th>1 min °F</th>
<th>2 min °F</th>
<th>3 min °F</th>
<th>4 min °F</th>
<th>TC °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water in the Metal Cup</td>
<td>210</td>
<td>161</td>
<td>143</td>
<td>125</td>
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<tr>
<td>Water in the Plastic Cup</td>
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<td>171</td>
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<tr>
<td>Water in the Paper Cup</td>
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<tr>
<td>Water in the Glass Cup</td>
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<td>164</td>
<td>155</td>
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<td>140</td>
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<td></td>
</tr>
</tbody>
</table>
Looking at the Data

- What changes took place?
- What caused the change?
- Did one material change more than the others?
Using the Data To Answer a Question

• What material would be best for cooling a cake as slowly as possible?

• Claim:
  I think _____ would be the best material for cooling a cake as slowly as possible.
Using the Data To Answer a Question

Evidence: What can you point to in your data that supports your claim.

1. The temperature of ____ increased by ____ degrees F.
2. The temperature of ____ was the highest.
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<th>Reasoning:</th>
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</table>
Silent Reflection

How does all the learning from today help us understand our Anchoring Phenomenon?

What happens when we make a cake?
Unit 1
Matter and its Interactions
Lesson 14
Learning Target
I can explain how materials are affected by heat.

Anchoring Phenomena
What happens when we make a cake?

Lesson Question
How do temperature and materials affect our cake?
Materials

- Heating and Cooling... What Happens to Matter? Student Text
- Add science ideas that support our claims and evidence.
What happens when we place a water bottle full of air into hot water? That’s right, it expanded! Was it the air inside the bottle or the bottle that expanded or was it both? In this case both the bottle and the air inside the bottle expanded. Sometimes we can see when this expansion happens and other times we can’t. In this case we may not have been able to see the plastic material of the bottle actually expand, but we could see the effects of the air inside the bottle expanding.

When we add energy to something, like heating it up, we’re giving it a push. Think of it like a game of bumper cars: the more energy we add, the faster the particles inside the material move. As they speed up, they start bumping into each other more often and with more force. This increased movement and collisions cause the particles to spread out, making the material expand. So, whether it’s metal or even air, when they get hot, they take up more space!

How can we use ideas to add to our models in lesson 11? What science ideas support our models?
Lesson 11 Cold Air Student Observation Sheet

**Lesson 11** Investigation Observations: include drawings and words to explain your observations.


Lesson 14 Information from the text that explains your observations from Lesson 11.
Now, let's think about what happens when we cool things down. When we take away energy, like cooling something down, it's like telling it to slow down. As the particles lose energy, they start to move slower. With fewer collisions and less movement, the particles occupy less space, causing the material to shrink or **contract**. So, whether it's metal cooling down after being heated or getting cold outside, when things lose energy, they shrink!

Understanding why things **expand** and **contract** is important for many reasons. For example, engineers need to know how materials behave when exposed to different temperatures to design structures that can withstand changes without breaking. Even in our everyday lives, knowing about expansion and contraction helps us work smarter and safer when cooking or fixing things at home.

How can we use these ideas to add to our models in lesson 11? What science ideas support our models?
Lesson 11 Cold Air Student Observation Sheet

Lesson 11 Investigation Observations: include drawings and words to explain your observations.

Lesson 14 Information from the text that explains your observations from Lesson 11.
Have you ever thought about why sand feels hot, but the water in a pool feels cool on a hot summer day? Or on a really hot summer day, a barefoot person usually walks across a cement driveway much faster than a grassy lawn. Why does the handle of a wooden spoon feel cooler to the touch than the handle of a metal spoon, even if both spoons are sticking out of the same pot of hot soup?

Conductors are materials that allow heat to transfer from one material to another faster. Metals like copper, aluminum, and iron are good conductors of heat. Insulators, on the other hand, are materials that slow down the transfer of heat from one material to another. Materials like wood, plastic, and rubber are good insulators.

The difference between conductors and insulators is important in many practical applications. For example, the handle of a cooking pot is often made of an insulating material to prevent heat from the stove from reaching your hand, while the pot itself is made of a conducting material to distribute the heat evenly to the food.

How can we use these ideas to support our claims in lessons 12 and 13? What science ideas tie our claims and evidence together?
<table>
<thead>
<tr>
<th>Lesson 12</th>
<th>What material do you think would be best for baking a cake the fastest?</th>
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</table>
Conductors or Insulators... What’s Your Thinking?
Expand:

Materials gain heat (heated) and the particles that make up the material increase in energy so they move more and take up more space.
Contract:

Material loses heat (cooling) causing the particles to move less, and take up less space.
Conductor:

Material that allows heat to pass through faster.
Insulator:

Material that causes heat to pass through more slowly.
Making Sense of Our Learning

Concept Connections
Add to our Concept Maps

What ideas can we add to our concept map from lessons 10-14?

What more can we now explain about the cake?

What questions do we still have?
Teacher “Hat” Reflecting

Alone Zone

The unit is designed to be coherent from the students’ perspective.

What are some strategies, questions, or activities you noticed helped us build science ideas piece by piece to be able to explain aspects of the our observations, the cake phenomenon and our related phenomenon?
Small Group

The unit is designed to be coherent from the students’ perspective.

What are some strategies, questions, or activities you noticed helped us build science ideas piece by piece to be able to explain aspects of the observations, the cake phenomenon and our related phenomenon?
Tomorrow is Big Brain End-of-Unit Assessment Day
You’ve Got This!!

<table>
<thead>
<tr>
<th>QUESTIONS</th>
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<tbody>
<tr>
<td>1- [ ] A [ ] B [ ] C [ ] D</td>
</tr>
<tr>
<td>2- [ ] A [ ] B [ ] C [ ] D</td>
</tr>
<tr>
<td>3- [ ] A [ ] B [ ] C [ ] D</td>
</tr>
<tr>
<td>4- [ ] A [ ] B [ ] C [ ] D</td>
</tr>
<tr>
<td>5- [ ] A [ ] B [ ] C [ ] D</td>
</tr>
<tr>
<td>6- [ ] A [ ] B [ ] C [ ] D</td>
</tr>
</tbody>
</table>
Celebrate Sensemaking

What else would you like to add to your poster to put the “icing on the cake” related to our question: What is sensemaking?

Be prepared to share a celebration about sensemaking.
Traditional View and Contemporary View

**Information Frame**

- Scientists and Teachers
- Knowledge of Science Disciplines
- Some Students

**Sensemaking Frame**

- Students as Scientists and Engineers
- Making Sense of Phenomena
- Teachers Facilitate
- All Students
CMS Professional Learning Attendance and Feedback Form

Please ensure you complete this form before leaving your PD each day.

bit.ly/CMSPD2425
Feedback Survey

Your feedback is valuable to us! We use it to provide follow-up support as well as inform choices about future professional learning opportunities.

Presenter 1: Other: Kristen Moorhead

Where this workshop took place: Charlotte, NC Grade 5

For Presenter 2 and Presenter 3:

14. Who was the Presenter #2?

There was only one presenter so there is no Presenter #2

END