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We ask that all attendees be mindful of their surroundings and of their fellow participants. All participants are expected to exercise consideration and respect in their speech and actions, and to refrain from demeaning, discriminatory, or harassing behavior and speech.

NSTA does not allow promotion of other products in our chats during web seminars. We ask that attendees keep the conversation on topic, use positive language and remain courteous of others throughout the event, and allow everyone time to participate in the chat.
Meet Today’s Presenters

Holly Hereau
NSTA Instructional Materials and Professional Learning Specialist
hhereau@nsta.org

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NSTA Standards Implementation Specialist
ksoriano@nsta.org
@katesor1027
Collection of Resources

Fall 2022 Topic Study: Assessing Three-Dimensional Learning Collection

Resources in “Fall 2022 Topic Study: Assessing Three-Dimensional Learning” Collection

<table>
<thead>
<tr>
<th>Title</th>
<th>Resource Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. NSTA Quick-Reference Guide to the NGSS</td>
<td>Web Page</td>
</tr>
</tbody>
</table>

https://my.nsta.org/collection/LLRd09oqGe0_E
Learning Community Norms for Discussion

- We come prepared to work toward a common goal.
- We share our own thinking to help us all learn.
- 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.
Meet Our Learning Community

1. Open the participant window

2. Hover the cursor over your name. Select **More** and choose **Rename**.

3. Rename yourself using the following scheme. You may only choose one grade band for *today*.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Naming Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-2</td>
<td>EE_Name</td>
</tr>
<tr>
<td>3-5</td>
<td>UE_Name</td>
</tr>
<tr>
<td>6-8</td>
<td>MS_Name</td>
</tr>
<tr>
<td>9-12</td>
<td>HS_Name</td>
</tr>
</tbody>
</table>
Meet Our Learning Community

On a scale of sheep, how do you feel today?

Share your number in the chat window and (if you’d like to) tell us why you chose that number.
Learning Targets

❏ Gain experience evaluating and revising assessment tasks for sensemaking and accessibility to the task.

❏ Recognize characteristics of questions that elicit student responses for targeted elements of the three dimensions.

❏ Identify multiple opportunities within a lesson, lesson set and unit to formatively assess students’ understanding (and skill) of the targeted elements of the three dimensions.

❏ Be able to use the experience, tools, and resources to create assessment tasks and/or leverage existing tasks to formatively assess student understanding (knowledge and skills).
A balanced assessment system is the strategic use of formative, interim (mid-unit), and summative measure of student performance to address immediate student need, inform ongoing instructional changes, and guide long-term educational improvement.
Purpose of Assessment

[T]here are at least three purposes for educational assessment:

1. **Formative assessment for use in the classroom to assist learning.** Such assessment is designed to provide diagnostic feedback to teachers and students during the course of instruction. Teachers need assessment information about their individual students to guide the instructional process.

2. **Summative assessment for use at the classroom, school, or district level** to determine student attainment levels. Such assessment includes tests, given at the end of a unit of a school year, that are designed to determine what individual students have achieved.

3. **Assessment for program evaluation,** used in making comparisons across classrooms, schools, districts, states, or nations. Such assessment often includes standardized tests designed to measure variation in the outcomes of different instructional programs.

*A Framework for K-12 Science Education* (p. 261)
Here are at least three purposes for educational assessment:

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*A Framework for K-12 Science Education* (p. 261)
Formative assessment refers to assessment *for* learning rather than assessment *of* learning, allowing teachers to use knowledge of student understandings to inform their ongoing instruction (Black, 1993).

Cited from *STEM Teaching Tool #16: The Informal Formative Assessment Cycle as a Model for Teacher Practice*
Multiple opportunities to formatively assess what students know and are able to do exist in high-quality (with respect to phenomenon-driven, three-dimensional learning) curriculums including:

- student handouts,
- home learning assignments,
- student models,
- progress trackers, and
- student discussions.
Lesson 12: Where are plants getting the matter to grow?

**Phenomenon:** After 20 weeks, plants in water (no soil) show visible growth - increase in size and number of leaves and roots - and a measurable increase in mass.

**Purpose:** Summative + Formative

---

### Lesson 12: Where are plants getting the matter to grow?

**Phenomenon:** After 20 weeks, plants in water (no soil) show visible growth - increase in size and number of leaves and roots - and a measurable increase in mass.

**Purpose:** Summative + Formative

---

#### Table: Weight of Plant Over Time

<table>
<thead>
<tr>
<th>Plant</th>
<th>Weight of Plant at Week 0</th>
<th>Weight of Plant at Week 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.5 kg</td>
<td>2.8 kg</td>
</tr>
</tbody>
</table>
Phenomenon: After 20 weeks, plants in water (no soil) show visible growth - increase in size and number of leaves and roots - and a measurable increase in mass.

Lesson-Level Performance Expectation: Develop a model to explain why the spider plants that had no soil, but had their roots (structure) in water and leaves (structure) were in the air (open system) gained weight and grew over time.
Performance Expectation: 5-LS1-1. Support an argument that plants get the materials (matter) they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]

Lesson-Level Performance Expectation: Develop a model to explain why the spider plants that had no soil, but had their roots (structure) in water and leaves (structure) were in the air (open system) gained weight and grew over time.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a model to explain a phenomena</td>
<td>Plants acquire their material for growth chiefly from air and water</td>
<td>Matter is transported into, out of, and within systems. A system can be described in terms of its components and their interactions.</td>
</tr>
</tbody>
</table>
Review the Plant Matter - Model Rubric found on Jamboard frame 3 (9-12 Jamboard go to frame 5).

Post your observations on the Jamboard (one noticing per sticky note).

Please post observations and not inferences from observations.
<table>
<thead>
<tr>
<th>Grade</th>
<th>Jamboard Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-2</td>
<td><a href="https://jamboard.google.com/d/1yl-VY8aK9UvuXihwRSEzgJ7-FTsVYID-J07t1BDzpso/edit?usp=sharing">https://jamboard.google.com/d/1yl-VY8aK9UvuXihwRSEzgJ7-FTsVYID-J07t1BDzpso/edit?usp=sharing</a></td>
</tr>
<tr>
<td>3-5</td>
<td><a href="https://jamboard.google.com/d/1XycRgl6hEnIN1yzA55tpp4VCljsjtUirW8JM5K82kteg/edit?usp=sharing">https://jamboard.google.com/d/1XycRgl6hEnIN1yzA55tpp4VCljsjtUirW8JM5K82kteg/edit?usp=sharing</a></td>
</tr>
<tr>
<td>6-8</td>
<td><a href="https://jamboard.google.com/d/1m7TTXsTuqo4EkQ6MnktvNzAb7s-gmhMhm3yJLgZpgY/edit?usp=sharing">https://jamboard.google.com/d/1m7TTXsTuqo4EkQ6MnktvNzAb7s-gmhMhm3yJLgZpgY/edit?usp=sharing</a></td>
</tr>
<tr>
<td>9-12</td>
<td><a href="https://jamboard.google.com/d/13ldqu-vOLTn1PgNNVXJEbcgA1q8W0Vu7Nu_2ZzeAZS8/edit?usp=sharing">https://jamboard.google.com/d/13ldqu-vOLTn1PgNNVXJEbcgA1q8W0Vu7Nu_2ZzeAZS8/edit?usp=sharing</a></td>
</tr>
</tbody>
</table>
Use the Plant Matter Rubric to evaluate **Student Model 2**.

Assign a score (1, 2, 3, or 4) for each of the three key features of a model:

- components
- relationships
- mechanisms
Formative Assessment - Student Models Example

<table>
<thead>
<tr>
<th>Relationships</th>
<th>Does not show how any of the components are related to each other within the system</th>
<th>Shows how one component is related to another component within the system</th>
<th>Shows how some of the components are related to other components within the system</th>
<th>Shows how all the components are related to each other within the system</th>
</tr>
</thead>
</table>

*Model includes none of the following relational aspects: arrows that clearly show plant growth, where the water particles enter the plant, and where the air particles enter the plant.*

*Model includes one of the following relational aspects: arrows that clearly show plant growth, where the water particles enter the plant, and where the air particles enter the plant.*

*Model includes two of the following relational aspects: arrows that clearly show plant growth, where the water particles enter the plant, and where the air particles enter the plant.*

*Model includes all of the following relational aspects: arrows that clearly show plant growth, where the water particles enter the plant, and where the air particles enter the plant.*
Evidence means you can point to, highlight, and/or quote specific text, images, tables, etc., in the student work.

Relationships: Model includes none, one, two or all all of the following relational aspects: arrows that clearly show plant growth, where the water particles enter the plant, and where the air particles enter the plant.
**Formative Assessment - Student Models Example**

*Evidence* means you can point to, highlight, and/or quote specific text, images, tables, etc., in the student work.

**Relationships:** Model includes **none, one, two or all** all of the following relational aspects: **arrows** that clearly show **plant growth**, where the **water particles** enter the plant, and where the **air particles** enter the plant.

- Student shows air going into the plant (arrows). However, no air particles are shown in the plant.
- Student does not communicate by any means (words, pictures and/or symbols) that the plant is growing or has grown.
- Student may understand that water is going into the plant - shows water particles inside and outside the plant - but not explicit.
Relationships: Model includes one of the following relational aspects: arrows that clearly show plant growth, where the water particles enter the plant, and where the air particles enter the plant. (Level 2)

Student shows air going into the plant (arrows). However, no air particles are shown in the plant.

Student does not communicate by any means (words, pictures and/or symbols) that the plant is growing or has grown.

Student may understand that water is going into the plant - shows water particles inside and outside the plant - but not explicit.
Partners or Trios

Use the Plant Matter Rubric to evaluate Student Model 2.

Assign a score (1, 2, 3, or 4) for each of the three key features of a model:

- components
- relationships
- mechanisms

Resource #36 (Evaluate Student Model #2)
Components: **Model** includes **none, one, two** or **all** of the following **components**: **water particles**, **air particles** and **the plant**.

- **none** = Level 1
- **one** = Level 2
- **two** = Level 3
- **all** = Level 4

*Evidence* means you can point to, highlight, and/or quote specific text, images, tables, etc., in the student work.
Mechanism:

- **Model does not explain** that plants use matter to grow nor that the matter is from air and water particles. (Level 1)
- **Model explains** that plants use matter to grow but does not state that the matter is from air and water particles. (Level 2)
- **Model explains** that plants use matter to grow and that the matter is from air or water particles. (Level 3)
- **Model explains** that plants use matter to grow and that the matter is from air and water particles. (Level 4)

*Evidence* means you can point to, highlight, and/or quote specific text, images, tables, etc., in the student work.
Formative Assessment - Student Models Example

Student includes all components that are conceptual aspects used to represent important features of the phenomenon: water particles, air particles, and the plant.

Student does not explain why the phenomenon occurs (plant growth is not shown on the model).

Student shows air going into the plant (arrows). However, no air particles are shown in the plant.

Student does not communicate by any means (words, pictures and/or symbols) that the plant is growing or has grown.

Student may understand that water is going into the plant - shows water particles inside and outside the plant - but not explicit.

<table>
<thead>
<tr>
<th>Components</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationships</td>
<td>Level 2</td>
</tr>
<tr>
<td>Mechanism</td>
<td>Level 1</td>
</tr>
</tbody>
</table>
Rubrics used to assess three-dimensional student learning should:

- clearly reflect the *elements* of each of the three dimensions targeted (what we want our students to demonstrate they know and are able to do).

- result in any science teacher familiar with the NGSS or other standards based on *A Framework for K-12 Science Education* identifying the same evidence of learning on the student artifact being evaluated (the score is independent of the “scorer”).
Formative Assessment - Providing Feedback

**Descriptive Feedback**

**Strengths:**
- The model includes all necessary components to explain why the plant kept growing.
- The arrows communicate the air is coming into contact with the plant.

**Weaknesses:**
- How might you communicate - words, pictures, symbols, etc. - what happens to the air (water) when it comes into contact with the plant?
- What is the relationship between the air (water) and plant growth? How might you represent the relationship?

Student includes all components that are conceptual aspects used to represent important features of the phenomenon: water particles, air particles, and the plant.

Student shows air going into the plant (arrows). However, no air particles are shown in the plant.

Student does not explain why the phenomenon occurs (plant growth is not shown on the model).

Student may understand that water is going into the plant - shows water particles inside and outside the plant - but not explicit.

Student does not communicate by any means (words, pictures and/or symbols) that the plant is growing or has grown.
Prescriptive Feedback

● How might you use text to help support communicate your ideas about what you think is happening when the air (water) comes into contact with the plant?

● We’ve used different ways to show change over time on our models in science class this year. Which way might you choose to communicate the plant is growing/getting bigger? Why?
[The] majority of teacher’s feedback practice is not aligned with the recommendations on effective feedback by researchers. Instead of providing descriptive and prescriptive information, teachers often offered to their students evaluative information either as quantity of work (e.g., “more examples”) or the general level of understanding (e.g., “wow”, “unclear!”, a smiling face, or a question mark) as 20.34% and 40.4%, respectively. Therefore it is not a surprise that due to the lack of information on what can be done next, few students were able to take advantage of teacher comments to modify their work. (Li et al. 2010)
<table>
<thead>
<tr>
<th>Lesson</th>
<th>Lesson-Level Performance Expectation(s)</th>
<th>Assessment Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 10</td>
<td>Analyze and interpret data using graphical displays and statistics to identify temporal relationships to provide evidence for how M’Kenna’s pattern of body growth and weight have changed over time compared with typical children her age. Obtain, evaluate, and communicate information to determine the central ideas in an article to help determine where fat (matter) goes when people lose weight. Plan and carry out an investigation to produce data to serve as the basis for evidence to answer the question, Where does matter go when people lose weight?</td>
<td>As a formative, pre-assessment for Lesson Set 2, use the Initial Ideas Discussion in the Navigation activity about what could be causing M’Kenna’s weight loss to see if students could connect to what was figured out in Lesson Set 1 when she could not get enough matter inside her body because her villi in her small intestine are damaged. If students do not make this connection, that’s OK. They will have the opportunity to do so later on. Analyzing and Interpreting Data: Stability and Change Students are introduced to using statistics in order to identify temporal relationships in M’Kenna’s growth chart. Look for students to identify that M’Kenna’s growth remained stable for about 11 years, and then began to slow down when she turned 13. If students don’t make this connection, you can pull them into small groups to do a more guided data analysis. Also, you might pull different student work samples of their WIS/WIM statements and have the whole class look at what classmates have written. Next, students examine DEXA scans of a human and/or a dog that has lost weight. Look for students to identify that fat was lost over time. This should prompt students to begin to think about where the fat goes when someone loses weight. If students are identifying this, you might ask a question like, “If the animal weighed 60 pounds in this photograph, but 45 pounds in the next photograph, what is the difference in weight? Let’s think about a 15-pound dumbbell you might lift at the gym—that’s quite heavy! Where do you think all that weight went?” Obtaining, Evaluating, and Communicating Information: Energy and Matter After the students read the article Children Need More Fat in Their Diets Compared to Adults for the second time, they answer questions with a partner and discuss those questions as a whole class. During that discussion, look for students thinking about one way people use fat is to “burn” it, but what does burning fat really mean? Students should be wondering where the matter really goes when fat is burned. If this idea does not come out, ask if they have ever heard people say that they are “burning calories” when they exercise, and what do they think that means? Planning and Carrying Out Investigations: Energy and Matter During part 3 of the investigation, students will be answering the “Making Sense” questions to start to think through what happens to the matter when fat is burned. Look for students being able to make connections from their understanding of chemical reactions from a previous unit with the data they collected during this experiment. For students who are having difficulty with the “Making Sense” questions in Part 3, you could ask additional questions, such as: “What do the changes in the substance color, odor, or state of matter indicate about what happened?” and “Where did the matter in the vegetable oil/animal fat go?”</td>
</tr>
</tbody>
</table>
Phenomenon: unexplained weight loss (M’Kenna)

Lesson-Level Performance Expectation: **Use data from an investigation to serve as the basis for evidence to explain where matter goes when people lose weight.**

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real-world phenomena, examples, or events.</td>
<td>Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, support growth, or release energy.</td>
<td>Matter is conserved because atoms are conserved in physical and chemical processes</td>
</tr>
</tbody>
</table>
Formative Assessment - Student Discussion Example

Performance Expectation: MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

Lesson-Level Performance Expectation: Use data from an investigation to serve as the basis for evidence to explain where matter goes when people lose weight.

<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td><strong>Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real-world phenomena, examples, or events.</strong></td>
<td>Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, support growth, or release energy.</td>
<td>Matter is conserved because atoms are conserved in physical and chemical processes</td>
</tr>
</tbody>
</table>
Lesson 10: What happens to fat when it burns?

- Students figure out that body fat decreases when someone loses weight.
- They wonder what “burning” fat really means and where this fat goes.
- They burn different foods and wood to collect data on the mass and properties before and after they burn.
Questions students are discussing (from their student handout):

- Based on the property changes you observed, what claim can you now make about what happened to the original substances in these containers beyond just saying “they burned”?

- Compare the masses of the substances in each container before and after they burned. If matter can’t disappear, how can you explain the patterns in your data?
Guidelines for Watching Videos of Teaching*

- These are real classrooms-teaching and the classrooms we will see are complex.

- Ground rules:
  - There is much we don’t know about the students and teacher and their history together.
  - Presume positive intentions and expertise on the part of the teacher.
  - Assume what the kids are saying makes sense to them.
  - Focus on how the classroom talk (teacher and students) is serving the learning goals of the lesson and the science and engineering practices involved.

Alone Zone
As you watch the video, look for and record evidence of students using the targeted elements of the three dimensions to explain the phenomenon (weight loss).

https://www.youtube.com/watch?v=XugZkS1px4
Alone Zone
Connect your noticings to specific lines in the transcripts.

Be ready to share your noticings with your small group.
Small Group (Breakout Rooms)

- Share your gathered evidence of students using the targeted elements of the three dimension.
- Reach consensus on what counts as evidence of three-dimensional learning.
- Do these students have ownership of the targeted elements of the three dimensions?

https://docs.google.com/document/d/1LaZmaJOa9cKRSh_nS-UX1DFeT-jWQUJIV_t5iDI2UEc/edit?usp=sharing
Designing Assessment for ALL Students

### Steps to Designing Three-Dimensional Assessments that Connect to Students’ Interests, Experiences, and Identities

This nine-step process is designed to help teams develop three-dimensional assessment tasks in science that connect to students’ interests, experiences, and identities. The process, if followed as outlined here, can be expected to take between 4 and 8 hours for a small team to develop a single extended task to be used as part of a unit test. Ideally, teams should begin the process with a basic understanding of the vision of A Framework for K-12 Science Education (National Research Council, 2012). However, the process can also be used to help orient educators to the Framework vision.

Three-dimensional assessment tasks allow you to make inferences about how students use their understanding of disciplinary core ideas, explanations, and engineering practices, and constructing concepts together to explain phenomena and solve problems. This process includes steps to ensure that your tasks are accessible and engaging to learners from non-dominant communities and to learners with identified learning differences.

Assessing three-dimensional standards means assessing more than just the “process” of science. It means assessing students’ proficiency through integrated use of all three dimensions to explain phenomena and solve design challenges. The guidance included here is based on the conclusions and recommendations included in the National Science Education Standards and the Framework for Science Education.

| Resource #27 |

### STEPS

<table>
<thead>
<tr>
<th>STEP 0: Before you begin, make sure you are familiar with qualities of three-dimensional assessment tasks (pg. 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1.</strong> Define what you will assess by analyzing relevant sections of A Framework for K-12 Science Education and crafting learning claims (pg. 4)</td>
</tr>
<tr>
<td><strong>Step 2:</strong> Analyze the facets of the claim to be assessed (pg. 5)</td>
</tr>
<tr>
<td><strong>Step 3:</strong> Choose a phenomenon or a design challenge for the task—framed through a compelling scenario (pg. 6)</td>
</tr>
<tr>
<td><strong>Step 4:</strong> Write a complete student explanation of the phenomenon or solution to the design challenge (pg. 7)</td>
</tr>
<tr>
<td><strong>Step 5:</strong> Use the Science and Engineering Practices and Crosscutting Concepts Tools to develop individual prompts (pg. 8)</td>
</tr>
<tr>
<td><strong>Step 6:</strong> Integrate questions to assess student interest and identification with science and engineering presented in the scenario (pg. 9)</td>
</tr>
<tr>
<td><strong>Step 7:</strong> Develop ideal student answers and a scoring guide or assessment rubric (pg. 10)</td>
</tr>
<tr>
<td><strong>Step 8:</strong> Review your task with peers for intelligibility, alignment, and accessibility (pg. 11)</td>
</tr>
<tr>
<td><strong>Step 9:</strong> Pilot and revise your assessment (pg. 12)</td>
</tr>
</tbody>
</table>
Sources of assessment tasks:

- Quality Examples of Science Lessons and Units
  - OpenSciEd Science Units
  - Next Generation Storylines
  - Create for STEM: Interactions

- Task Annotation Project in Science

- Stanford NGSS Assessment Project
Performance expectations simply clarify the expectations of what students will know and be able to do **by the end of the grade or grade band.**

Performance Expectations can support developing **learning claims**

**LS4.A:** The collection of fossils and their placement in chronological order is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth.

**MS-LS4-1.** Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. **[Clarification Statement: Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers. Assessment Boundary: Assessment does not include the names of individual species or geological eras in the fossil record.]**
K-12 Learning Progressions from NGSS Appendices
E - Disciplinary Core Ideas
F - Science and Engineering Practices
G - Crosscutting Concepts

Learning Progressions can also be found in NSTA Quick-Reference Guide to the NGSS (Resource #2)
STEP 3: Choose a phenomenon or a design challenge for the task—framed through a compelling scenario (pg. 6)

**Phenomenon/Problem Checklist for Assessment**

- Presents students with real world observations and based on at least on specific instances.
  - Evidence:
- Presented as puzzling and intriguing, and part of the scenario is a compelling question or observation that needs to be explained.
  - Evidence:
- If data is being used it is real or well crafted, grade appropriate data.
  - Evidence:
- The scenario uses as many words as needed to convey the phenomenon but excludes unnecessary words and effectively uses at least two modalities to present information.
  - Evidence:

**Task is explainable using the grade-appropriate disciplinary core ideas (DCIs), science and engineering practices (SEPs) and crosscutting concepts (CCCs).**

**Based on your reflection would you...**

- Use
  - Why would you use it? (based on checklist)
- Revise
  - How would you revise the task? (based on checklist)

---

**STEP 4: Write a complete student explanation of the phenomenon or solution to the design challenge (pg. 7)**

---

**PHOTO OF BROWN BEARS IN THE WINTER**

Each winter brown bears in North America spend an average of 5 months inside of dens in a low activity state known as hibernation. During this time, they experience drastic body changes. They also do not eat, drink, defecate (poop), or urinate (pee) during this time. It is a wonder that the bears can survive each winter in this state without performing these essential body functions!

---

**PHOTO OF SEALS IN THE ARCTIC**

Ruggish animals, called seals, carry oil across the oceans. Sometimes the oil in the seals spills into the oceans. Oil spills can spread out and harm plants and animals nearby.

---

**PHOTO OF OIL SPILL IN THE OCEAN**

Oil enters into the plant life and bird access in oil.

Dr. Warner designed an experiment with these steps:

1. Places water in a large plastic tub.
2. Pour oil into the water.
3. Push black magnetic powder on the oil.
4. Place a large magnet on the side of the plastic tub.

---

**CHART OF SEA TURTLE POPULATION**

With more and more female sea turtles around the world are in danger because both male and females are taken to nurseries and sex.
STEP 5: Use the Science and Engineering Practices and Crosscutting Concepts Tools to develop individual prompts (pg. 8)

Evaluating an Assessment Task Through the Lenses of Science and Engineering Practices and Crosscutting Concepts

<table>
<thead>
<tr>
<th>What to look for when evaluating a task through the lenses SEP and CCCs</th>
<th>Evidence from the Task</th>
<th>Meets Criterion (yes/no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade-appropriate SEP elements: What SEP elements are claimed by the task?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence of SEP: How does the task require students to demonstrate the claimed elements in use?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple Modalities: What modalities are used to present the task? What modalities will students use to engage in the task?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade-appropriate CCC elements: What CCC elements are claimed by the task?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence of CCC: How does the task require students to demonstrate the claimed elements in use?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valuing Student Ideas: The task provides students with choices about what counts as evidence, how to go about explaining a phenomenon or solving a problem, and/or provides real opportunities for students to figure out something that matters to them (or clearly matters to others).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Resource #31

Resource #21

Resource #22

Resource #32

Integrating Science Practices Into Assessment Tasks

The Next Generation Science Standards call for the integration of 3-Dimensional learning, which includes disciplinary core ideas to be integrated into tasks, which would be determined by the team designing the assessments.

Developing three-dimensional science assessments is challenging. Most current assessments focus on testing students' knowledge of science facts. If focus on having students apply their understanding of disciplinary core ideas in the context of engaging in a science or engineering practice. Fewer still connections to crosscutting concepts.

The "task format" templates included in this document tools to help teachers and district leaders create three-dimensional assessment tasks. They are...
Interest and identification with science can be gauged in the context of an assessment. Gathering evidence of students’ perceptions of the personal or community relevance of a scenario can help you monitor equity goals.

Assessments can help build relationships with students and help them see themselves in the science, even though they are not typically used for this purpose.
“Learning science depends not only on the accumulation of facts and concepts but also on the development of an identity as a competent learner of science with motivation and interest to learn more.”

— NRC Framework, p. 287
Using your model above, explain where all the mass went when it was “lost.”

- The bear’s mass wasn’t actually lost but went into the air around it.
- The bear had extra mass stored as fat.
- Since the bear was not eating, the bear used the stored fat for energy.
- Fat can be burned by the body. This means that the fat molecules were breathed in by the bear, and then, through chemical reactions...
- Since the bear used the fat for energy, the bear lost the weight.

4. In the last few years, scientists and citizens have noticed that bears in 400 pounds maximum, but recently scientists have found bears greatly.

Make a prediction about food availability in North Carolina in the last

- Prediction: There is more food available to bears in North Carolina...
- Model Supports: If a bear can eat more food, then more food is available, and they are using what they need right away for energy...

and the model. The stored fat is one reason bears are getting so big.

**Bears Assessment Modeling Rubric**

<table>
<thead>
<tr>
<th>Component</th>
<th>Category</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass of Food</td>
<td>Moving</td>
<td>Developing</td>
</tr>
<tr>
<td>Small Food Molecules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat Stores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Produced by cells in making energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lungs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Relationships**

Does not show how any of the components are related to each other within the system...

- Shows how one component is related to another component within the system...
- Shows how some of the components are related to each other within the system...
- Shows how all of the components are related to each other within the system...

**Mechanism**

Does not explain why the phenomenon occurs or articulates the cause...

- Model explains why the phenomenon occurs but does not fully articulate the cause...
- Model explains why the phenomenon occurs and articulates the cause...
- Model explains why the phenomenon occurs or articulates the cause...
- Model explains why the phenomenon occurs and articulates the cause...

<table>
<thead>
<tr>
<th>Components</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Includes none of the components that are conceptual aspects used to represent important features of a phenomenon.</td>
<td>Model includes one of the following components: water particles, air particles, and the plant.</td>
<td>Model includes one of the following components: water particles, air particles, and the plant.</td>
<td>Model includes one of the following components: water particles, air particles, and the plant.</td>
<td>Model includes all of the following components: water particles, air particles, and the plant.</td>
</tr>
</tbody>
</table>
STEP 8: Review your task with peers for intelligibility, alignment, and accessibility (pg. 11)

STEP 9: Pilot and revise your assessment (pg. 12)
Assessment Tasks on this database have **NOT been vetted using research-based tools** unless otherwise noted.
Capture a new or revised idea about assessing three-dimensional learning in one or two words and share with the group.

Mentimeter voting link
https://www.menti.com/al52e9dfky27

Presentation sharing link
https://www.mentimeter.com/app/presentation/albqzhd52hke1n9v3co6nc1eqh5qinyd
How and what we choose to assess signals to students what we value about science learning.
Web Seminar 5: How to Submit a Task for Peer-Feedback

Assessment Evaluation Submission Form

You will need to complete the 3D Assessment Task Evaluation (for Sensemaking and Access) for your assessment task and share the link. Follow the directions for naming and sharing the document provided below.

kates1027@gmail.com
Switch account

The name and photo associated with your Google account will be recorded when you upload files and submit this form. Your email is not part of your response.

* Required

Participant Name *

Your answer

Email address (we'll only contact you if we are unable to access your assessment task)

Your answer

Assessment Task Grade Band *

- K-2
- 3-5
- 6-8
- 9-12

https://docs.google.com/forms/d/e/1FAIpQLSeFfs_uvLUjUYrM PfGg63XJ8mO2ClmAdVJ7yXipOf-U76Q4vQ/viewform?usp=sf _link

Your assessment task or part of an assessment task
Web Seminar 5: How to Submit a Task for Peer-Feedback

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Your assessment task or part of an assessment task

https://docs.google.com/forms/d/e/1FAIpQLSeFs_uvLUjUyrMPfGg63XJ8mO2CImAdVJTyXipOF-U76Q4vQ/viewform?usp=sf_link

Everyone is invited to participate!

No registration required. No assessment task required.
NSTA Professional Learning Facilitators

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Assessment Question & Answer Padlet Boards

K-2 Assessment Questions
NSTA K-12 Assessment Topic Study Fall 2022

https://padlet.com/katesor1027/K_2Assess

6-8 Assessment Questions
NSTA K-12 Assessment Topic Study Fall 2022

https://padlet.com/katesor1027/6_8Assess

3-5 Assessment Questions
NSTA K-12 Assessment Topic Study Fall 2022

https://padlet.com/katesor1027/3_5Assess

9-12 Assessment Questions
NSTA K-12 Assessment Topic Study Fall 2022

https://padlet.com/katesor1027/9_12Assess
Thanks to Today’s Presenters…

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Thank You for Participating!

https://www.nsta.org
Post-program Survey – coming up!

We value your feedback!

The post-program survey link will be shared after the recording is stopped at the end of the program.

Your completed survey confirms your attendance which allows us to award you a certificate of participation and attendance.
Collection of Resources

This collection includes the slides (as PDF), handouts and other resources.

Link to the collection:
https://my.nsta.org/collection/LLRd09oqGe0_E
| **Science Update:** NOAA - Observing and Understanding Earth Systems |
| November 3, 7:00 PM ET |
| **Web Seminar:** Fall 2022: Developing a Competitive Application for Shell Teaching Awards |
| November 7, 7:00 PM ET |
| **Transforming Science Learning:** Leading the Implementation of High-Quality Instructional Materials to Enact Standards: Practical Guidance From the Field |
| November 7, 7:00 PM ET |
| **Web Seminar:** Exploration Generation: Sensemaking in Rocketry |
| November 9, 7:00 PM ET |
| **Web Seminar:** Case Studies from Connected Science Learning: Developing Critical Consciousness in Middle-School Science Through Engineering for Sustainable Communities |
| November 14, 7:00 PM ET |
| **Book Beat Live! Students’ Ideas Matter!** Linking Formative Assessment Probes to Instructional Sequence |
| November 16, 7:00 PM ET |

https://www.nsta.org/webseminars
This concludes today’s program.