

Lesson 1: Pretest and Expressing Ideas and Questions

Tab 1: Overview

In this lesson, students take a pretest and share their initial ideas about how things decay, identifying what decomposers need to grow and gain mass.

Download PDF of Lesson 1 Teacher's Guide

Guiding Question

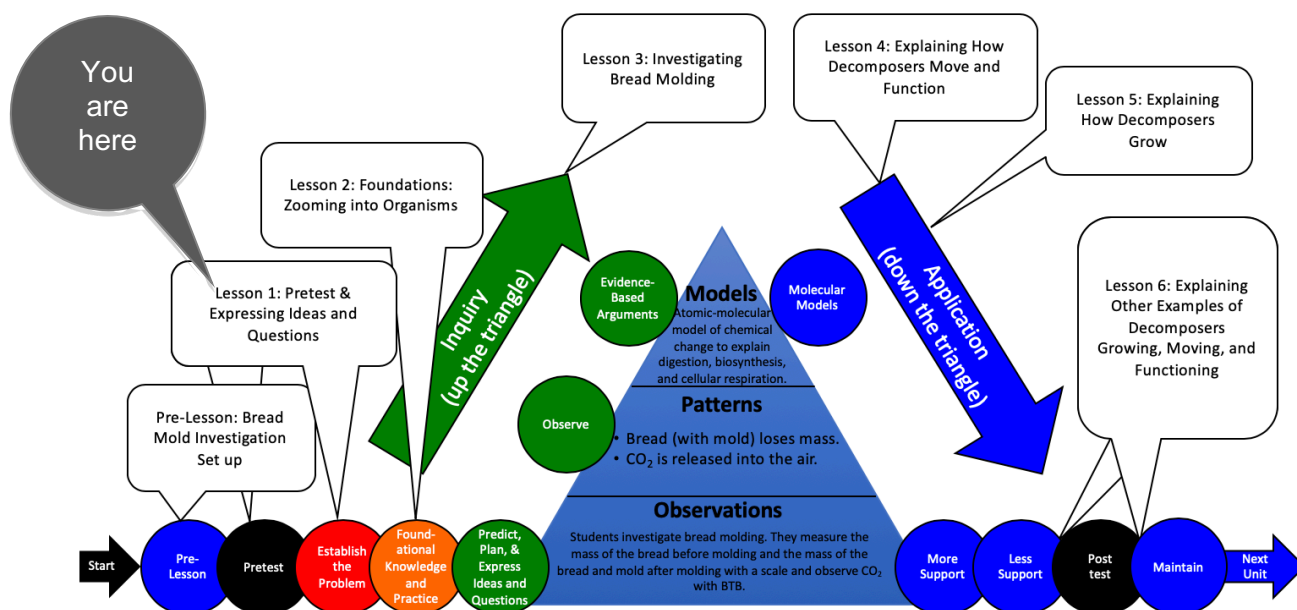
What happens when bread molds?

Activities in this Lesson

- Activity 1.1: Decomposers Unit Pretest (20 min)
- Activity 1.2: Expressing Ideas and Questions about Bread Molding (30 min)

Unit Map

The *Decomposers* Unit



Tab 2: Learning Goals

Target Performances

Activity	Target Performance
<i>Lesson 1 – Pretest and Expressing Ideas and Questions (students as questioners)</i>	
Activity 1.1: <i>Decomposers</i> Unit Pretest	Students show their initial proficiencies for the overall unit goal: Questioning, investigating, and

	explaining how decomposers move and change matter and energy as they live and grow.
Activity 1.2: Expressing Ideas and Questions about Bread Molding	Students ask and record specific questions about changes in matter and energy in response to the unit driving question: What happens when bread molds?

NGSS Performance Expectations

This lesson helps students start thinking about all of the unit NGSS Performance Expectations but does not feature a mastery of any of them.

Tab 3: Background Information

Three-dimensional Learning Progression (accordion)

The pretest and discussion in this lesson (a) help students to anticipate and begin thinking about the questions that they will answer in this lesson and (b) help you as a teacher see how your students' reason about how matter and energy are transformed when things decay (digestion, biosynthesis, and cellular respiration in decomposers). In the Application Activity Sequence, both Activity 1.1 and Activity 1.2 in this lesson serve as the "Establish the Problem" phase for all the activities in the *Decomposers* unit.

Key Ideas and Practices for Each Activity (accordion)

In Activity 1.1, the unit pretest is useful for two purposes. Your students' responses will help you decide how much detail you want to include during the unit, particularly details about chemical structures of materials. If your students are mostly at Level 2 in the carbon learning progression, you may want to focus on the main ideas (like the tracing of matter and energy and the Three Questions) rather than chemical structures. Your students' responses will also provide a starting point for discussions about the focus for this unit.

In Activity 1.2, through the discussion students will come to recognize that they have many different ideas about what happens when bread molds, as well as unanswered questions. We expect many students to express Level 2 or Level 3 ideas, for example, that decomposers grow because their cells divide, or that gas has no mass, or that decay is not related to decomposers.

Key Carbon-Transforming Processes: Digestion, Biosynthesis, and Cellular Respiration

Content Boundaries and Extensions (accordion)

Tab 4: Talk and Writing

At this stage in the unit, the students will be **Expressing Ideas and Questions**. The table below shows specific talk and writing goals for this phase of the unit.

Talk and Writing Goals for Expressing Ideas Phase	Teacher Talk Strategies that Support this Goal	Curriculum Components that Support this Goal
Treat this as brainstorming and elicitation.	Remember, there are no "right" answers at this point. We want to hear all ideas.	Unit Pretest My Students' Answers
Listen for ideas about what is happening to matter and energy at different scales .	Where did the energy come from? Where does the matter go next? Are you talking about matter or energy? What about the atomic-molecular scale?	Unit Pretest Expressing Ideas and Questions Process Tool

	What about the cellular scale?	
Listen for a wide range of student ideas. Press for more complete ideas.	Who can add to that? What do you mean by ____? Say more. So I think you said _____. Is that right?	
Have students compare, contrast, and document their ideas.	Who has a different idea? How are those ideas similar/different? Who can rephrase _____'s idea? Let's record our ideas so we can come back to them and see how our ideas change.	Sticky notes on the class poster Activity 1.2 PPT
Encourage students to provide evidence for their ideas.	How do you know that? What have you seen in the world that makes you think that?	Sticky notes on the class poster.

Activity 1.1: Decomposers Unit Pretest (20 min)

Tab 1: Overview and Preparation

Target Student Performance

Students show their initial proficiencies for the overall unit goal: Questioning, investigating, and explaining how decomposers move and change matter and energy as they live and grow.

Resources You Provide

- pencils (1 per student)

Resources Provided

- [1.1 Decomposers Unit Pretest](#) (1 per student)
- [1.1 Assessing the Decomposers Unit Pretest](#)

Setup

If you are using the paper version, print one copy of the [1.1 Decomposers Unit Pretest](#) for each student.

Tab 2: Directions (accordion for individual steps in directions)

1. Describe the unit pretest.

Explain the purpose of the unit pretest to students:

- It will help you as a teacher understand how students think about what happens when things decay.
- It will help them think about what they know and what questions they have.

2. Have students take the unit pretest.

Distribute copies of [1.1 Decomposers Unit Pretest](#) to be completed with a pencil.

Tab 3: Assessment

Use the [1.1 Decomposers Unit Pretest](#) to assess students' understanding of digestion, biosynthesis, and cellular respiration in terms of learning progression levels. You should not give your students grades on the pretest or expect your students to know the correct answers. The document [1.1 Assessing the Decomposers Unit Pretest](#) has assessment guidelines and identifies correct responses and explains how students' responses reveal their learning progression levels.

Tab 4: Differentiation & Extending the Learning

Differentiation (Accordion)

- Be sure that students are comfortable with the technology that they are using and provide assistance when necessary.
- If classroom includes English Language Learners or have other special needs and considerations, you may want to read questions aloud and discuss meaning of questions.

Modifications (Accordion)

Extending the Learning (Accordion)

Activity 1.2: Expressing Ideas and Questions About Bread Molding (30 min)

Tab 1: Overview and Preparation

Target Student Performance

Students ask and record specific questions about changes in matter and energy in response to the unit driving question: What happens when bread molds?

Resources You Provide

- sticky notes (1 per student)
- [Time Lapse Videos of Decomposition:
http://www.plantpath.cornell.edu/PhotoLab/timelapse.html](http://www.plantpath.cornell.edu/PhotoLab/timelapse.html)

Resources Provided

- [1.2 Expressing Ideas and Questions about Bread Molding PPT](#)
- [1.2 Expressing Ideas and Questions Tool for Bread Molding](#) (1 per students)
- [1.2 Assessing the Expressing Ideas and Questions Tool for Bread Molding](#)
- [1.2 Decomposers Storyline Reading: Learning from the Work of a Ph.D. in Forest Ecology](#) (1 per student)

Recurring Resources

- (Optional) [Big Idea Probe: Leaf Pack Experiment](#) (1 per student)
- (Optional) [Assessing the Big Idea Probe: Leaf Pack Experiment](#)
- [Questions, Connections, Questions Student Reading Strategy](#)
- [Learning Tracking Tool for Decomposers](#) (1 per student)
- [Assessing the Learning Tracking Tool for Decomposers](#)

Setup

Prepare your computer for showing the PPT as well as a time-lapse video of decomposition of various materials: <http://www.plantpath.cornell.edu/PhotoLab/timelapse.html>. Print one copy of the [1.2 Expressing Ideas and Questions Tool for Bread Molding](#), [Big Idea Probe: Leaf Pack Experiment](#) (optional), and [1.2 Decomposers Storyline Reading](#) for each student.

Tab 2: Directions (accordion for individual steps in directions)

1. Have students discuss the pretest.

Ask students to write down questions they have after taking the pretest (for instance, on the back of their [1.2 Expressing Ideas and Questions Tool for Bread Molding](#)). Explain that we will try to answer most of those during the *Decomposers Unit*.

2. (Optional) Have students complete the Big Idea Probe: Leaf Pack Experiment.

If you decide to use the [Big Idea Probe: Leaf Pack Experiment](#), have students complete it and share their ideas. See [Assessing the Big Idea Probe: Leaf Pack Experiment](#) and [Using Big Idea Probes](#) suggestions about how to use the Big Idea Probe.

3. Use the instructional model to show students where they are in the course of the unit.

Show slide 2 of the [1.2 Expressing Ideas and Questions about Bread Molding PPT](#).

4. Have students watch a time-lapse video of various materials decaying.

Use the link in slide 3 of the [1.2 Expressing Ideas and Questions about Bread Molding PPT](#) (or above) to have your students observe various things decaying.

- This website has 30 different videos that last about 30 seconds each. We recommend watching a few and saving the bagel video for last: it has a fun surprise ending.
<http://www.plantpath.cornell.edu/PhotoLab/timelapse.html>

5. Students complete the Expressing Ideas and Questions Tool on their own.

Show slide 4 of the [1.2 Expressing Ideas and Questions About Bread Molding PPT](#).

- Tell students that now they will take a few minutes to think and record their ideas and questions about what happens when things decay on their own.
- Give each student one copy of [1.2 Expressing Ideas and Questions Tool for Bread Molding](#).
- Give students about 5 minutes to complete the tool as individuals.
- Encourage students to think about things they have seen in the world or in the videos they just watched to help inform their ideas and questions.

6. Students compare their own ideas with the ideas of a partner.

Show slide 5 of the [1.2 Expressing Ideas and Questions About Bread Molding PPT](#).

- Tell students that now that they have had a chance to record their ideas and questions on their own, it is important to compare their ideas to their classmates to see how they are similar and different, and also so we know how many different ideas there are in the class.
- Divide students into pairs and have students compare their ideas on the [1.2 Expressing Ideas and Questions Tool for Bread Molding](#) with each other. As students are sharing, circulate through the groups. Consider asking questions such as *Do you agree with each other about XX? Where did you learn about that? What experiences have you had to help you with your explanation?*
- At this point, do not correct any wrong ideas, treat this as brainstorming.
- Pay attention to patterns in students' ideas or specific individual ideas that diverge from the patterns as both may be valuable to discuss as a whole class later.

7. Post ideas for class discussion.

Tell students that now that they have had a chance to write their ideas and questions as individuals and as pairs, it is important to look at the range of ideas in the class. Again, at this point, do not correct any wrong ideas. Treat this as brainstorming: all ideas are on the table.

- Show slide 6 of the [1.2 Expressing Ideas and Questions and Questions About Bread Molding PPT](#).
- Give each pair 2 sticky notes.
- Tell students to write their most important idea from their Expressing Ideas and Questions Tools on a sticky note and put it on the board under the "Your Ideas" column.
- Tell students to write their most important question from their Expressing Ideas and Questions Tool on a sticky note and put it on the board under the "Your Questions" column.

8. Have a class discussion.

Lead a whole class discussion to examine the variety of student ideas and questions on the poster. Draw out and press students to build on their ideas about what happens to the bread

that the mold is growing on and what the mold is doing with air. Use the talk and writing moves at the beginning of this lesson to help with facilitating the class discussion – see the Notes part of the slide.

- Show slide 7 of the [1.2 Expressing Ideas and Questions About Bread Molding PPT](#). Note that this slide is a duplicate of the previous one but with a new heading. Take this time to discuss students’ ideas, organize them according to patterns, etc.
- Later, you can use this duplicate slide as a record of class ideas for the future, either by saving the post-it notes or by taking a picture of them.

9. Students read the Decomposers Storyline Reading

Show slide 8 of the [1.2 Expressing Ideas and Questions About Bread Molding PPT](#). Have students partner-read the [1.2 Decomposers Storyline Reading](#) which explains the storyline of the unit and connects it to the work of Dr. Ellen Holste. Have students read using the [Questions, Connections, Questions Student Reading Strategy](#). See the [Questions, Connections, Questions Reading Strategy Educator Resource](#) document for information about how to engage students with this strategy.

- After pairs are finished reading, have students share with the class what they found interesting and any questions they have.

10. Save the Expressing Ideas and Questions Tools for later.

Show slide 9 of the [1.2 Expressing Ideas and Questions About Bread Molding PPT](#).

- Tell students that they will revisit these ideas and questions later in the unit to see how their thinking changes.
- The class can also return to shared ideas on Slide 6.

11. Have a discussion to complete the Learning Tracking Tool for this activity.

Show slide 10 of the [1.2 Expressing Ideas and Questions About Bread Molding PPT](#).

- Pass out a [Learning Tracking Tool for Decomposers](#) to each student.
- Have students write the activity chunk name in the first column, "Expressing Ideas and Questions" and their role as the "Questioner."
- Have a class discussion about what students did during the activity chunk. When you come to consensus as a class, have students record the answer in the second column of the tool.
- Have a class discussion about what students figured out during the activity chunk that will help them in answering the unit driving question. When you come to consensus as a class, have students record the answer in the third column of the tool.
- Have a class discussion about what students are wondering now that will help them move towards answering the unit driving question. Have students record the questions in the fourth column of the tool.
- Have students keep their Learning Tracking Tool for future activities.
- Example Learning Tracking Tool

Activity Chunk	What Did We Do?	What Did We Figure Out?	What Are We Asking Now?
Expressing Ideas and Questions Questioner	Take a pretest and share initial ideas on the Expressing Ideas and Questions Tool	We already have some ideas about what happens when bread molds. We also have lots of questions!	What makes up a decomposer’s food?

		about how bread molds, identifying what decomposers need to grow and gain mass.		
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Tab 3: Assessment

Use the student responses to the class discussions and also their ideas on the [1.2 Expressing Ideas and Questions Tool for Bread Molding](#), as well as the [1.2 Assessing the Expressing Ideas and Questions Tool for Bread Molding](#) to assess their thinking at the beginning of the unit. By the end of the unit, students should be able to explain what happens when decomposers grow, move, and function at macroscopic and atomic molecular scales. For now, listen to students' ideas, with attention to how they describe matter and energy. Some students may not use principles of conservation of matter to identify rotting materials as the source of mass for decomposers. Students may think that the rotting materials disappear as they decay and may not recognize that atoms are transferred from the material to the decomposer's body for growth.

Tips

If you are teaching this to multiple classes, you can save different versions of the PPT, with Slide 7 completed for each block. Alternatively, have all classes combine their answers and have students look for similarities and differences.

Tab 4: Differentiation & Extending the Learning

Differentiation (Accordion)

- Refer back to Expressing Ideas from Systems & Scale, Animals or Plants as a model
- Strategic grouping with strong speakers
- Provide sentence stems to aid individual writing and for discussion
- Insist on ideas and questions from all students
- Emphasize that there are no incorrect answers and check for misconceptions that may be cultural in nature

Modifications (Accordion)

Extending the Learning (Accordion)