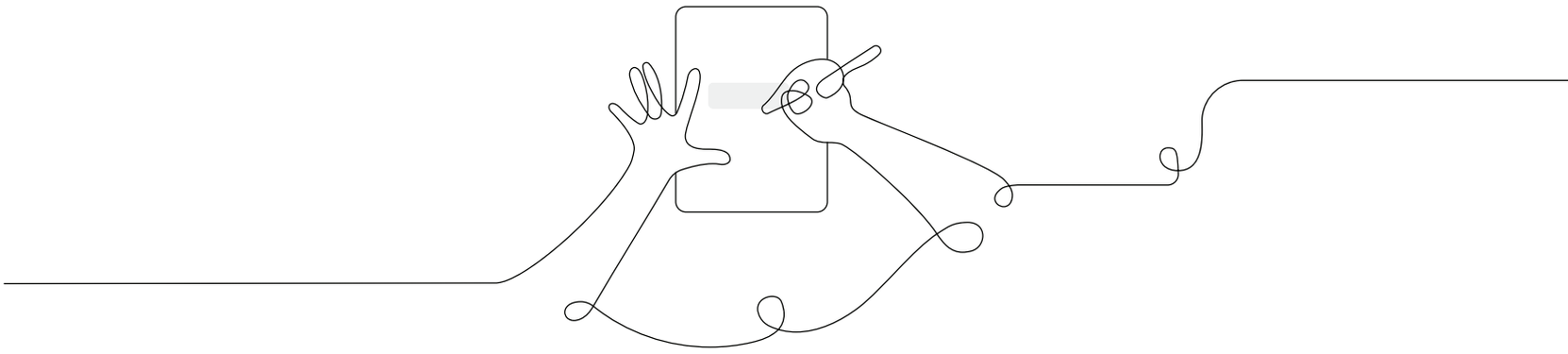
Amplify Science

Participant Notebook

Deep-dive and Strengthening Workshop
Properties of Materials

Grade 2



Welcome to the workshop

This Participant Notebook will serve as a resource during today's workshop.

Properties of Materials
Grade 2

Amplify Science

Unit-specific workshop agenda

Introductions

Framing the day

- Reflecting on our teaching
- Scenario challenge

Experiencing the unit

- Framing with a coherence lens
- Properties of Materials instructional sequence and embedded reflection

The story of the unit

- Key concepts and design arguments
- Progression of ideas
- Progress Build and End-of-Unit Assessment

Targeted small group work time:

- Deepening content understanding and addressing preconceptions
- Coherent instruction
- Formative assessment and differentiation
- Preparing to teach

Closing

- Questions
- Survey

Demo account for your workshop:

URL: **learning.amplify.com** (Log in with Amplify)

Temporary account: **_____@tryamplify.net**

Password: **AmplifyNumber1**

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Notes

Reflecting on Amplify Science implementation

1. What was a positive moment from teaching your first unit(s)? What was particularly effective in your classroom?

2. What was a challenge you experienced in your first unit(s)? What was an "aha" moment you had while planning or teaching that helped you overcome that challenge?

3. Amplify Science uses a multimodal approach — students **do**, **talk**, **read**, **write**, and **visualize** as they construct explanations of phenomena. Describe a time when the multimodal approach helped a particular student or students in your classroom.

Self-assessment: How comfortable are you teaching Amplify Science?

Directions:

After each group shares the solution to their scenario, rank your comfort level with the scenario's category using the statements along the top of the table.

Scenario	I am starting to understand this	I can do this (with a little help)	I've got this! I feel confident	I can teach this to a peer
Scenario 1 Using program resources to deepen content knowledge and find information to answer content questions				
Scenario 2 Using formative assessment to inform instruction				
Scenario 3 Analyzing student work on the End-of-Unit Assessment				
Scenario 4 Understanding the 3-D nature of standards in the unit				
Scenario 5 Understanding how ideas build across a chapter and unit				
Scenario 6 Preparing to teach a lesson				

Unit Map

How can we design a glue mixture that is better than what the school uses now?

As glue engineers, students are challenged to create a glue for use at their school that meets a set of design goals. Students present an evidence-based argument stating why their glue mixture would solve their school's need for a better glue.

Chapter 1: How can you make a sticky glue?

Students figure out: Glue is a mixture of several ingredients such as flour, water, and cornstarch, and depending on the properties of those ingredients and how they are combined, you can create different glues. Some glues might be stickier or stronger than others. By understanding materials and observing and testing different recipes, you can choose the ingredients that provide the properties you are seeking.

How they figure it out: To set context, students gather evidence about materials and their properties by reading a book about everyday things and what they are made of. They investigate the properties of two mystery glues and make scientific arguments about whether they are the same or different glues. The class goes on to observe and test possible glue ingredients for their sticky properties, graph test data, and search for information about ingredients in the unit's reference book. Using all the gathered evidence, students plan, make, and test their own glue recipes.

Chapter 2: Can heating a substance (and returning it to its original temperature) make a better glue?

Students figure out: When water is heated and returned to room temperature, the properties go back to the way they were, but the properties of some other materials change after heating and going back to room temperature. For example, when a mixture of cornstarch and water is heated and then returned to room temperature, it has different properties than it had before.

How they figure it out: Students investigate how heating a substance may help them make a better glue by conducting tests to determine the properties of possible glue ingredients before and after heating. This supports them in determining cause-and-effect relationships.

Chapter 3: What ingredients can be used to make a glue that is sticky and strong?

Students figure out: Sometimes, the properties of glue are a combination of the properties of the substances that make up that glue, such as a flour-water combination. Ingredients can be combined to create different glues that have different properties. For example, baking soda, which is smooth, and flour, which is sticky, can be combined to make smooth and sticky glue.

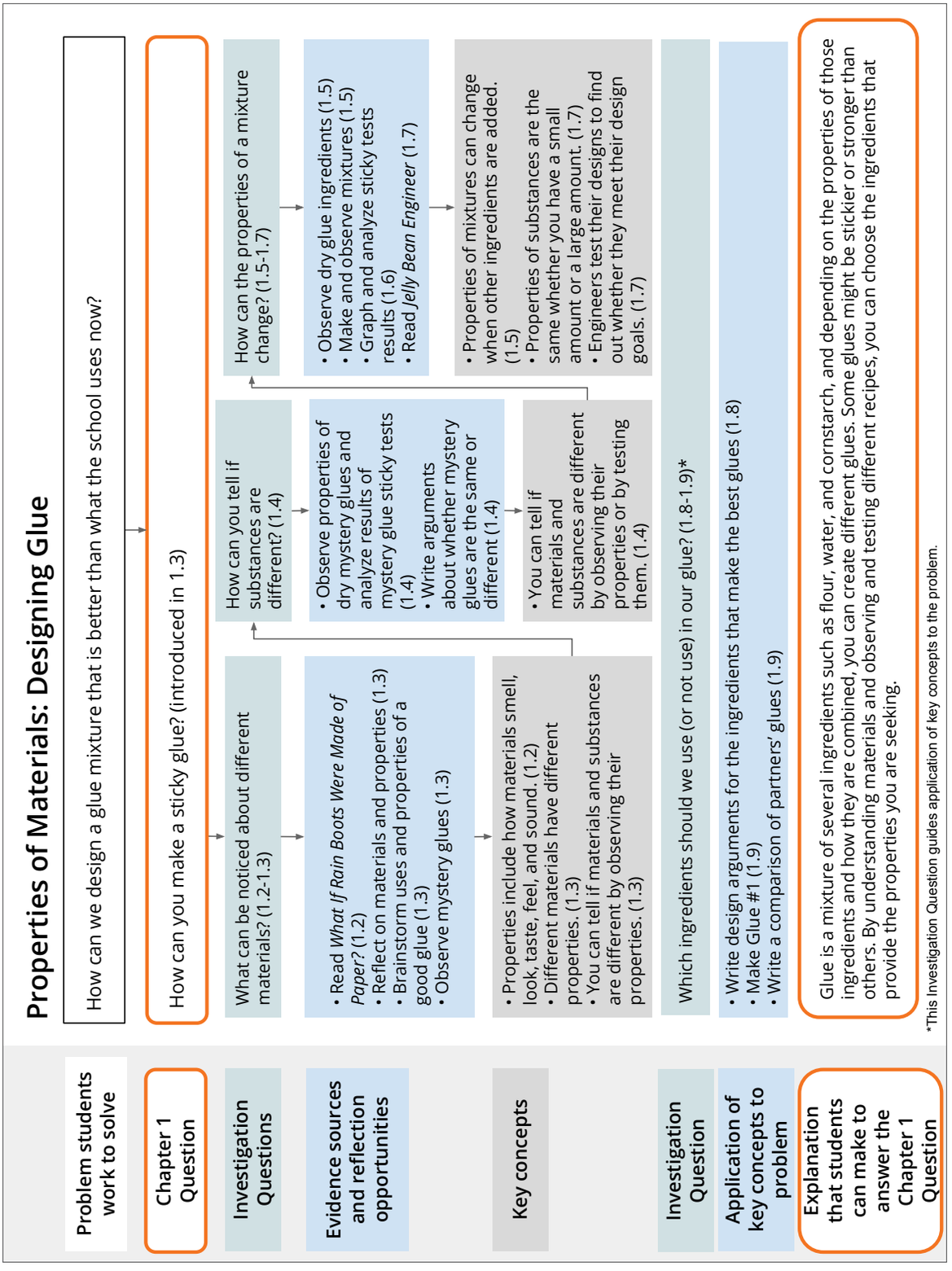
How they figure it out: Students are inspired by reading a book that shows the design process in action. They decide that the glue they create for the school should have an additional design criteria—the property of strength—a key and useful feature for its intended purpose at the school. Students set about testing evidence-based plans that include the best ingredients for a strong glue mixture. By the end of the chapter, student teams make and test a second glue recipe.

Chapter 4: What is the glue recipe that best meets our design goals?

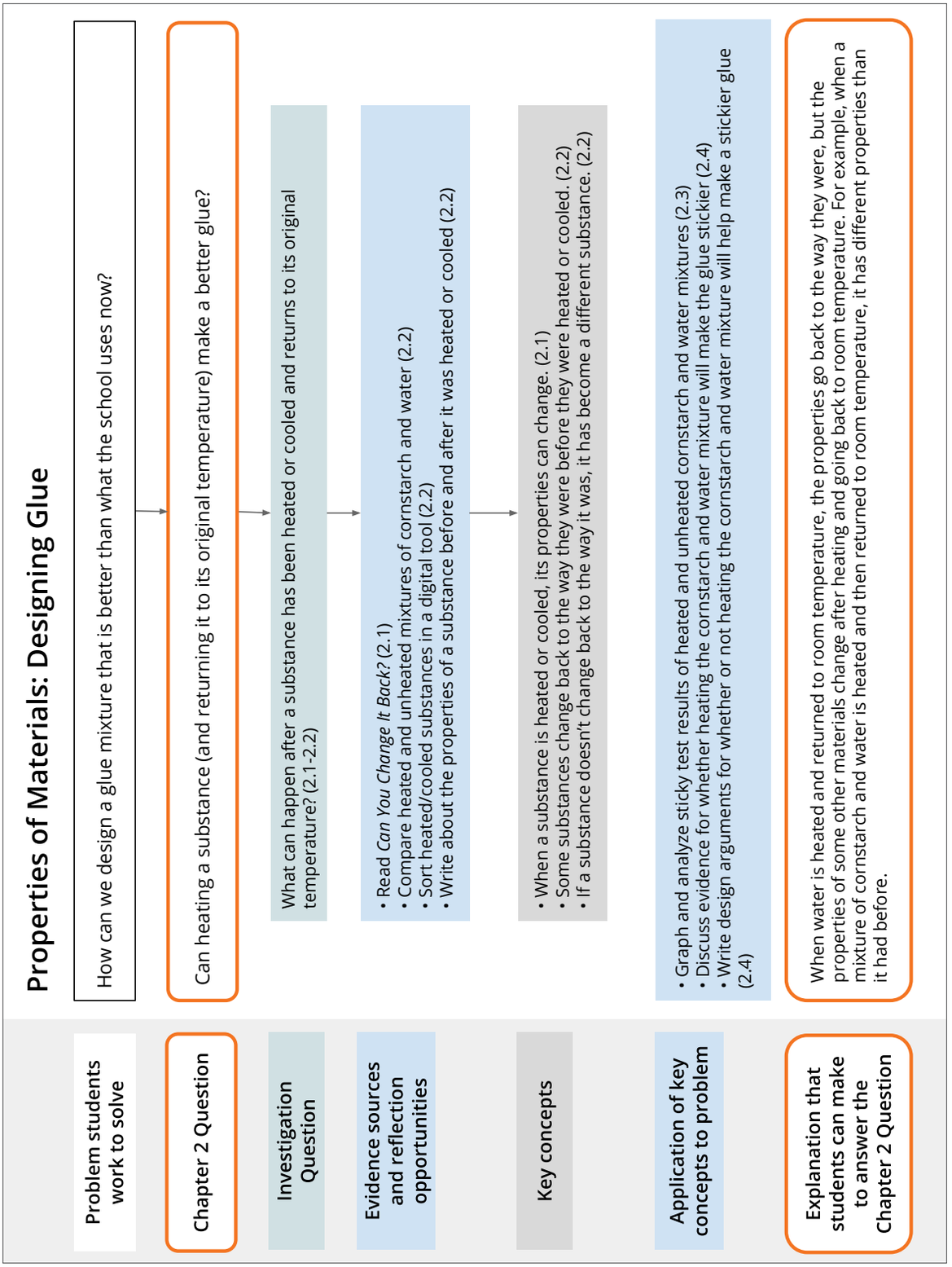
Students figure out: It will typically take multiple design cycles to find the exact glue recipe (mixture) that meets the design goals. By designing and testing mixtures that include ingredients with the desired properties, glue engineers can identify the best result and successfully meet their design goals. Students will have evidence to support each design goal, and that will inform their design arguments for the best recipe.

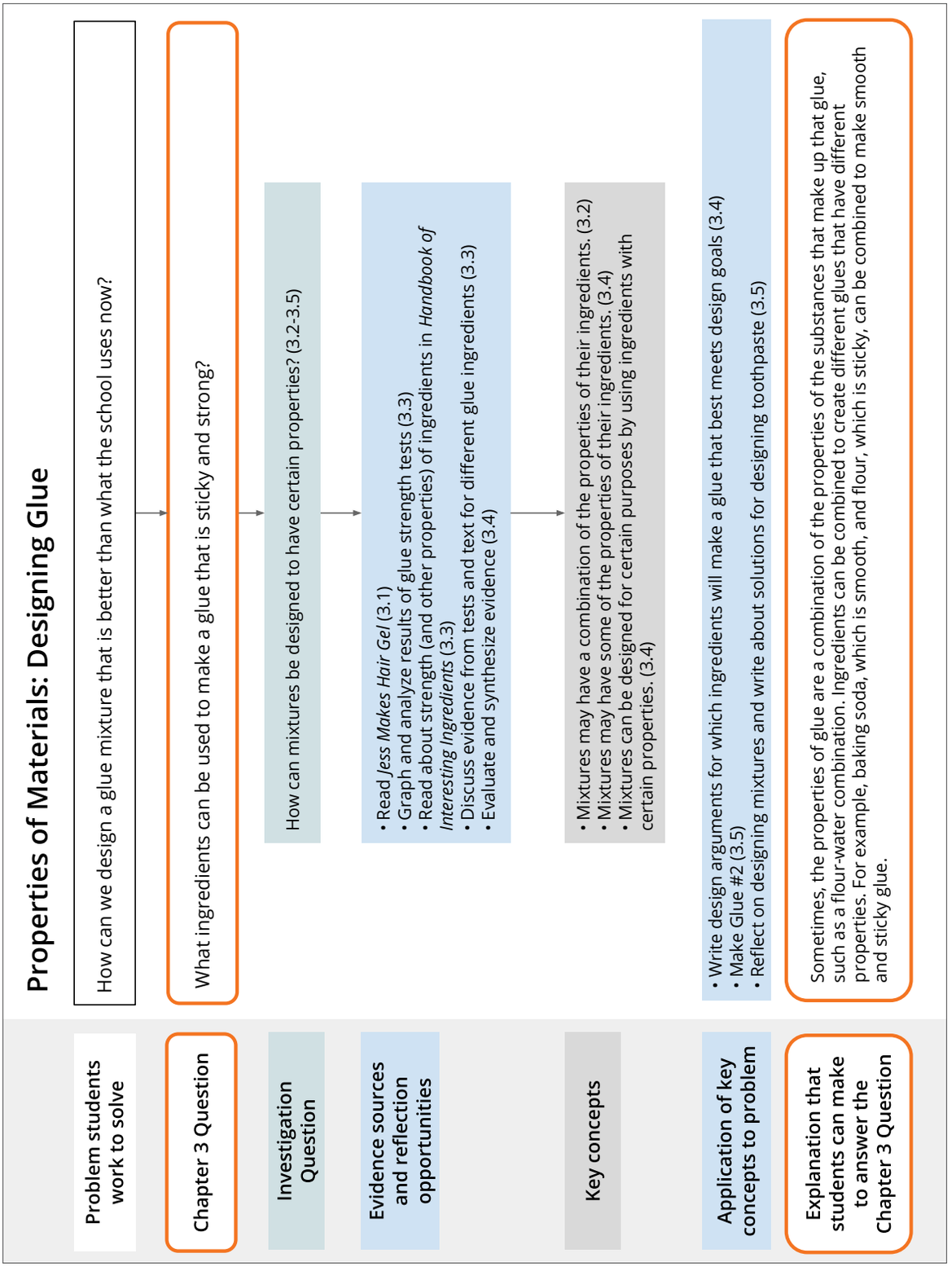
How they figure it out: After evaluating the second glue recipe, students plan, make, and iteratively test additional glue mixtures. By immediately analyzing their results and applying their understanding of the effects of specific glue ingredients, students are able to modify their designs. Students are able to speak knowledgeably about their choices and argue for how a particular glue mixture is best at meeting the design goals by the end of the unit.

Properties of Materials Coherence Flowchart

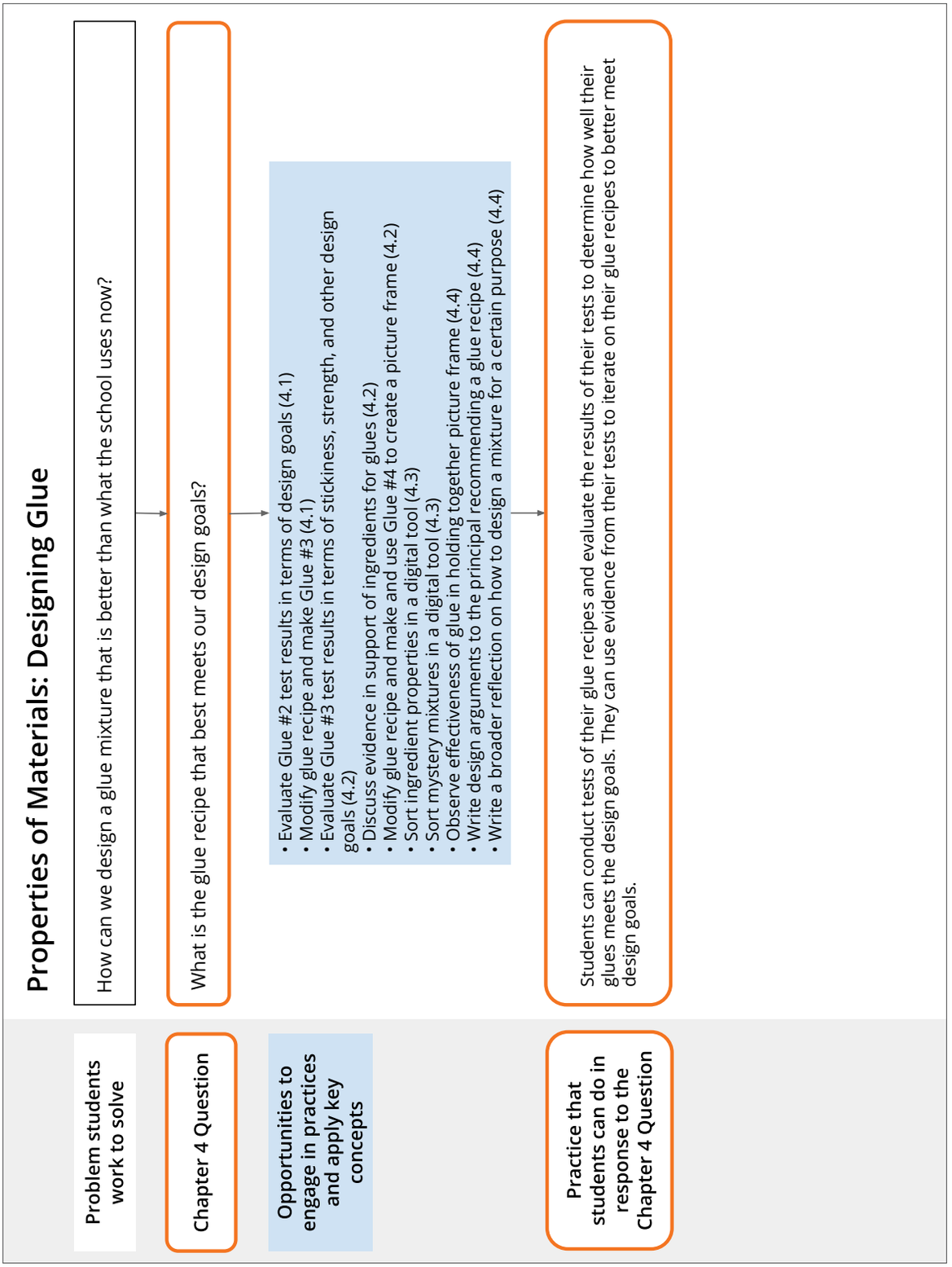


Properties of Materials Coherence Flowchart cont.





Properties of Materials Coherence Flowchart cont.



Name: _____ Date: _____

Pre-Unit Writing: Observations and Ideas About Properties and Mixtures

My Notes on Materials

Directions:

1. Carefully look at each material and feel it through the bag.
2. For each material, write what you notice under **It looks** and **It feels**.
3. If you think you know what a material is, write your idea under **I think it is**.

Material	It looks	It feels	I think it is
A			
B			
C			
D			

Name: _____ Date: _____

Pre-Unit Writing: Observations and Ideas About Properties and Mixtures (continued)

Mystery Mixture

Directions:

1. Carefully look at and feel the Mystery Mixture through the bag.
2. Write what it looks and feels like on the lines.
3. Circle the materials you think were used to make the mixture.

It looks _____

_____.

It feels _____

_____.

What materials were used to make the mixture? Circle the letters of those materials.

A B C D

Pre-Unit Assessment Questions

The Lesson 1.1 Pre-Unit Assessment Questions are a formative assessment tool designed to be administered as students observe materials, discuss their thoughts in groups, and complete the two written activities on the Pre-Unit Writing: Observations and Ideas About Properties and Mixtures student sheet—My Notes on Materials and Mystery Mixture. These questions allow you to do fairly quick, talk-based checks on how students are thinking about materials, mixtures, and their properties prior to instruction. (Since second graders are still learning to read and write, talk can often be the best way to get a sense of their ideas.) The questions are grounded in the conceptual understanding laid out in the Progress Build for this unit. The information you gather from students' explanations will help you draw connections to students' experiences and watch for alternate conceptions that might get in the way of students' understanding as they move forward through the unit. Insights from this assessment may also serve as a baseline from which to gauge students' progress over the course of the unit. Refer to the Assessment Guide: Interpreting Students' Pre-Unit Explanations About Properties of Substances and Mixtures for specific guidance on the student experiences that are most relevant to this unit and the common preconceptions to look out for.

This oral assessment tool consists of three parts. Each aligns with a different student activity.

Part 1: Materials

Students observe four materials: cinnamon, salt, flour, and cornstarch, and they record observation notes on the My Notes on Materials activity (on the Pre-Unit Writing: Observations and Ideas About Properties and Mixtures student sheet). The teacher asks individuals to describe the properties of each material.

Part 2: Mixtures

Students consider the following question and discuss it with their group: *If you were to mix two of the materials, what might the mixture look and feel like?* As groups discuss, the teacher circulates and asks individual students to describe the properties of their imagined mixture.

Part 3: Mystery Mixture

Students observe a mystery mixture (comprised of salt and cinnamon) and try to determine which two materials were combined to create it. They complete the Mystery Mixture activity (on the Pre-Unit Writing: Observations and Ideas About Properties and Mixtures student sheet). As they work, the teacher circulates and asks individuals to identify what the mixture consists of and to explain why they think that.

Each part of the assessment tool includes two or three questions followed by a space in which to record notes on students' ideas. Teachers should feel free to take the notes that make the most sense for their own students and class context. Depending on class size, it may not be possible to check in with each student on every part of this Pre-Unit Assessment tool, but we recommend that teachers try to check in with each student at least once during the class.

Part 1: Materials Circulate among groups of four as students observe bags containing cinnamon (bag A), salt (bag B), flour (bag C), and cornstarch (bag D) and record notes on the My Notes on Materials section of the Pre-Unit Writing: Observations and Ideas About Properties and Mixtures student sheet. Ask individual students to describe the properties of each material. Use the following questions as a guide:

Questions:

A. What do you notice about _____? (Teacher indicates one of the materials.)
B. If I needed to know if another sample was the same thing as this (teacher indicates the same material as in question A), what should I look for?
C. Do you think these materials are four different things? Or could they all be the same thing?

Student	Notes
	A. B. C.
	A. B. C.
	A. B. C.
	A. B. C.

Part 2: Mixtures Ask groups of students to consider and discuss the following question: *If you were to mix two of the materials, what might the mixture look and feel like?* As groups discuss the question, circulate from group to group and ask individual students to describe the properties of their imagined mixture. Use the following questions as a guide:

Questions:

A. Which materials would you mix?
B. What would the mixture look like and feel like?
C. Why do you think it would look and feel like that?

Student	Notes
	A. B. C.
	A. B. C.
	A. B. C.
	A. B. C.

Part 3: Mystery Mixture Distribute the mystery mixture (in bag M). Have students observe the mixture and determine which two materials were combined to create it. As they observe the mixture and complete the Mystery Mixture section of the Pre-Unit Writing: Observations and Ideas About Properties and Mixtures student sheet, circulate and ask these questions:

Questions:

A. Which two materials do you think were mixed together to make up the mystery mixture?
B. Why do you think the mixture is made from those two materials?

Student	Notes
	A. B.
	A. B.
	A. B.
	A. B.
	A. B.
	A. B.

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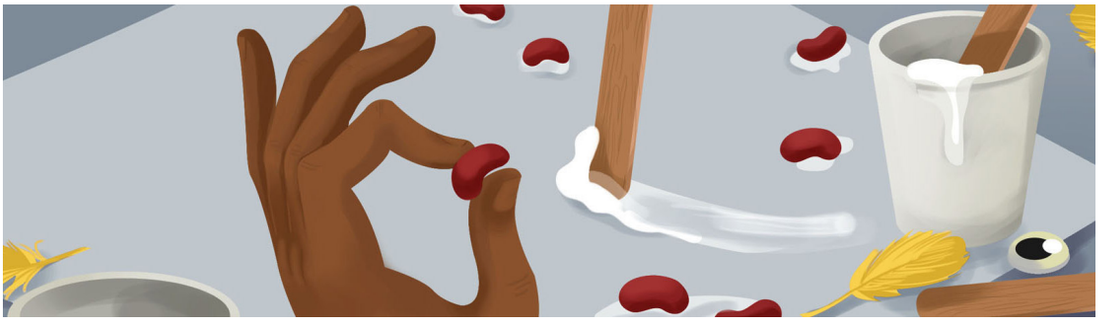


Properties of Materials:

Designing Glue

Investigation Notebook

Name: _____ Date: _____

Getting Ready to Read:
What If Rain Boots Were Made of Paper?

Directions:

1. Before reading the book *What If Rain Boots Were Made of Paper?*, read each sentence below.
2. If you agree with the sentence, write an "A" on the line before the sentence.
3. If you disagree with the sentence, write a "D" on the line before the sentence.
4. After you read the book, see if your ideas have changed. Be ready to explain your thinking.

_____ Most rain boots are made of paper.

_____ If pans were made of rubber, they would melt.

_____ Cloth makes good bottles.

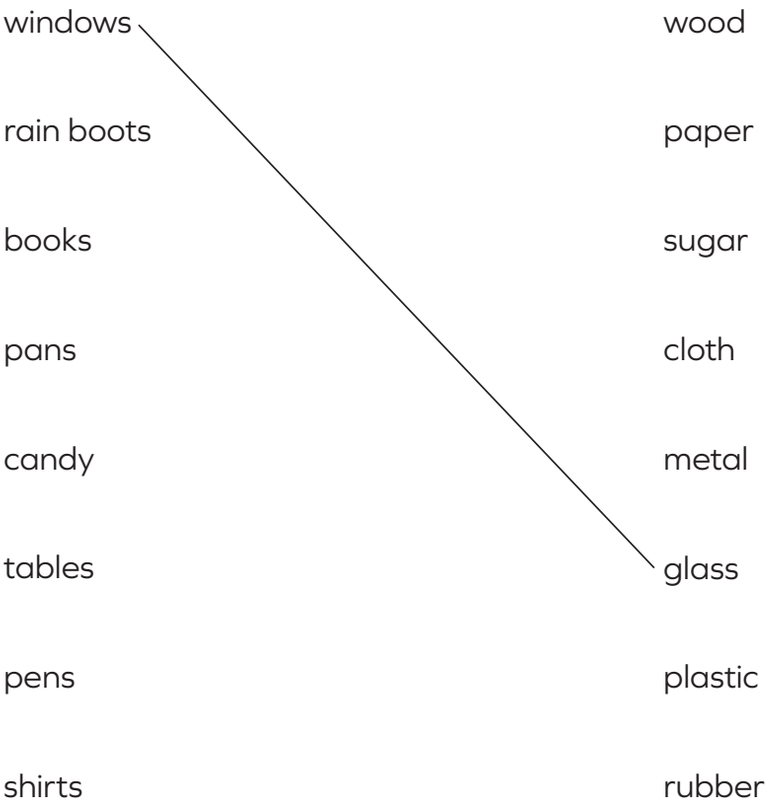
_____ Gum used to be made of rubber.

_____ One property of something is its smell.

Name: _____ Date: _____

Reading Reflection:
What If Rain Boots Were Made of Paper?

Match each item with the material from which it is made.



Name: _____ Date: _____

Reading Reflection:
What If Rain Boots Were Made of Paper? (continued)

If you were going to make the following things, what materials would you use? What materials would you **not** use?

Thing	Materials I would use	Materials I would not use
socks	cotton cloth yarn	milk metal rubber
chair		
telephone		
hammer		
cup		

Name: _____ Date: _____

Multiple Meaning Words

Directions:
Some words can mean more than one thing. For each word in the chart:

1. Read the sentence from the book *What If Rain Boots Were Made of Paper?* that uses the word.
2. Read the two meanings the word can have.
3. Decide which meaning the word has in the sentence from the book and circle that meaning in the table.

Word	Sentence from the book	Meaning 1	Meaning 2
material	Rubber is a great **material** for making rain boots.	fabric that clothes are made of	substances used to make things
design	When you **design** something, it's important to pick a material that will work.	to plan how to make something	something you draw
property	Hardness is a **property** of most kinds of metal.	a piece of land	something about a substance you see, hear, smell, taste, or feel

Name: _____ Date: _____

Observing the Wet Mystery Glues

Directions:

1. Use your senses to observe each mystery glue.
2. Write the properties of each mystery glue in the table below.

Properties of Mystery Glue A	Properties of Mystery Glue B

Name: _____ Date: _____

Providing Evidence: Mystery Glues A and B

Directions:
1. Read the question below.
2. Then, circle a claim.
3. Record your evidence on the lines.

Question

Is Glue A the same substance as Glue B?

Claim (Circle one.)

Yes, Glue A and Glue B are the same substance.

No, Glue A and Glue B are different substances.

How do you know? What is your evidence?

_____

_____

_____

_____

_____

_____

_____

_____

_____

Connecting key concepts to chapter explanations

Properties of Materials

Directions:

1. For each chapter, read the key concepts, then the explanation.
2. With a partner, discuss how the key concepts connect to the explanation.
3. Make annotations about the connections.

Ch	Key concepts	Design argument
1	Properties include how materials smell, look, taste, feel, and sound. (1.2) Different materials have different properties. (1.3) You can tell if materials and substances are different by observing their properties or by testing them. (1.4) Properties of mixtures can change when other ingredients are added. (1.5) Properties of substances are the same whether you have a small amount or a large amount. (1.7)	The design goal is to make a glue that is sticky. The ingredients that will best meet the design goal for my glue are flour, cornstarch, and water. I know this because the mixture of flour and water did best on the sticky test. The most beans stayed stuck to the paper. The mixture of cornstarch and water did second best on the sticky test. That is how I know that flour, cornstarch, and water are the ingredients that would best meet the design goal of making sticky glue.
2	When a substance is heated or cooled, its properties can change. (2.1) Some substances change back to the way they were before they were heated or cooled. (2.2) If a substance doesn't change back to the way it was, it has become a different substance. (2.2)	The design goal is to make a glue that is sticky. We should heat the mixture. I know that we should heat the mixture because I observed that when it is heated, it becomes a new, stickier substance than before it was heated. I also observed that the heated cornstarch and water mixture did better on the sticky tests than the mixture that wasn't heated. I read in the *Handbook of Interesting Ingredients* that cornstarch becomes thick when heated and gets sticky when it starts to dry out. This is why I think we should heat it.
3	Mixtures may have a combination of the properties of their ingredients. (3.2) Mixtures may have some of the properties of their ingredients. (3.4) Mixtures can be designed for certain purposes by using ingredients with certain properties. (3.4)	My design goals are to make a glue that is sticky, strong, and thick. Heated gelatin and water and heated cornstarch and water will make glue that is sticky, strong, and thick. I know this because the heated gelatin mixture and the heated cornstarch mixture did the best on the strength test. Each of those mixtures held 22+ washers. I also read that heated gelatin and water makes a mixture thick, and cornstarch can become sticky with hot water. This is why I think it would be good to use these ingredients in my glue.

Reflecting on the progression of ideas

Directions:

Part 1: Reflecting on the progression

1. Using the key concepts and explanations, reflect on how ideas build throughout the unit.
2. With your group, discuss the following questions:
   - Which ideas are revisited over multiple chapters?
   - What new ideas are added in each chapter?
3. Make notes about the progression of ideas in the space below.

Part 2: Creating a visual

1. With your group, use the provided materials to create a visual to represent your ideas. You can use words or pictures, or a mix of both. The following questions may help you plan your visual:
   - How can you represent the new information that is added throughout the progression?
   - How can you represent foundational ideas that are revisited throughout the unit?

Progress Build

A Progress Build describes the way in which students' explanations of the central phenomenon should develop and deepen over the course of a unit. It is an important tool in understanding the design of the unit and in supporting students' learning. A Progress Build organizes the sequence of instruction, defines the focus of the assessments, and grounds inferences about students' understanding of the content, specifically at each of the Critical Juncture assessments found throughout the unit. A Critical Juncture is the differentiated instruction designed to address specific gaps in students' understanding. This document will serve as an overview of the *Properties of Materials* Progress Build. Since the Progress Build is an increasingly complex yet integrated explanation, we represent it below by including the new ideas for each level in bold.

In the *Properties of Materials* unit, students will learn to design a mixture with desired properties for a specific purpose.

Prior knowledge (preconceptions): It is expected that students will have a basic familiarity with the idea that stuff is made from other stuff (chocolate milk is made from milk and chocolate sauce; a desk is made of wood and metal; a toy is made of metal and plastic).

Progress Build Level 1: Different materials have different properties.

Materials are the stuff that makes up everything. Materials have properties. These properties are observable things such as color, texture, smell, and taste. Different materials have different properties.

Progress Build Level 2: Mixtures have different properties, depending on their ingredients.

Materials are the stuff that makes up everything. Materials have properties. These properties are observable things such as color, texture, smell, and taste. Different materials have different properties. **Sometimes a material is made of a combination of other materials; we call this combination a mixture, and we call the materials that make it up substances. Some mixtures have different properties, depending on their ingredients.**

Progress Build Level 3: Heating or cooling a substance can change it to a new substance.

Materials are the stuff that makes up everything. Materials have properties. These properties are observable things such as color, texture, smell, and taste. Different materials have different properties. Sometimes a material is made of a combination of other materials; we call this combination a mixture, and we call the materials that make it up substances. Some mixtures have different properties, depending on their ingredients. **Properties of substances can change when they are heated or cooled. Some substances change into a different substance when they are heated or cooled, so they have different properties when they return to their original temperature. Other substances remain the same, so they have the same properties when they return to their original temperature.**

Progress Build Level 4: A mixture may have a combination of the properties of its ingredients.

Materials are the stuff that makes up everything. Materials have properties. These properties are observable things such as color, texture, smell, and taste. Different materials have different properties. Sometimes a material is made of a combination of other materials; we call this combination a mixture, and we call the materials that make it up substances. Some mixtures have different properties, depending on their ingredients. Properties of substances can change when they are heated or cooled. Some substances change into a different substance when they are heated or cooled, so they have different properties when they return to their original temperature. Other substances remain the

same, so they have the same properties when they return to their original temperature. **The properties of a mixture may be a combination of the properties of the ingredients. Therefore, by combining certain substances, the resulting mixture will have certain properties.**

Progress Build and End-of-Unit Assessment

Properties of Materials

Directions:

1. Review the sample student response to the End-of-Unit Writing below. This response reflects a Level 4 understanding of the Progress Build.
2. Analyze the response to find evidence of understanding of each level of the Progress Build.
3. Record your ideas for each level in the table below.
4. If you have extra time, consider what students at Levels 1, 2, and 3 might write on this assessment.

Name: _____ Date: _____

End-of-Unit Writing: Arguing About a Final Glue Design

Directions:
Complete the sentences in the letter to the principal and in the table below.

Dear Principal Smith,

As you know, my class has been working to create a better glue for our school. First, we chose the properties we wanted our glue to have and decided on our design goals. These are my design goals:

1. sticky
2. strong
3. thick
4. spreadable

Then, we observed and tested many ingredients. The table below shows the final glue ingredients I have chosen and their properties.

Ingredient	Properties
heated gelatin and water	strong, jiggly, smells funny
heated cornstarch and water	smooth, feels like gel, thick, spreadable, see-though
flour and water	lumpy, very sticky, not very strong

Name: _____ Date: _____

End-of-Unit Writing: Arguing About a Final Glue Design (continued)

I chose these ingredients because _____

_____

_____.

The properties of my final glue are _____

_____

_____.

I know that my glue meets each design goal because _____

_____

_____

_____

_____.

I hope you will use my glue recipe for our school's new glue!

Sincerely,

_____

Summary of Progress Build level*	Evidence of understanding of this Progress Build level
1: Different materials have different properties.	
2: Mixtures have different properties, depending on their ingredients.	
3: Heating or cooling a substance can change it to a new substance.	
4: A mixture may have a combination of the properties of its ingredients.	

*For a more detailed description of each Progress Build level, refer to the Properties of Materials Progress Build in your Participant Notebook, or digitally in the Unit Guide.

Self-inventory: Choosing an area of focus

Directions:

Use the statements to help guide your areas of strength and support.

Statements		I don't	I try	I do
i. Understanding of content	1) I can identify my own gaps in content knowledge before teaching a unit.			
	2) I can explain what students will learn and how they will learn throughout the unit.			
	3) I can explain how students will demonstrate understanding of science content along the Progress Build.			
ii. Coherence	4) I can identify the variety of modalities students engage in to collect evidence from multiple sources.			
	5) I support students in my class, through my instruction and classroom setup, to understand how the activities they engage in help them answer questions and solve the unit problem.			
	6) I can pace activities to move students towards meeting the goal(s) of the lesson.			
iii. Formative assessment and differentiation	7) I use Amplify Science assessments to monitor students' progress along the Progress Build.			
	8) I utilize differentiation information in the Lesson Brief to plan for lesson modifications.			
	9) I adjust instruction in response to learners' needs, styles, and interests.			
iv. Preparing to teach a lesson	10) I use the Materials and Preparation tab in the Lesson Brief as I am planning and preparing for my lessons.			
	11) I know how to access student-facing resources to plan my lessons and how to display them for students during instruction (Investigation Notebook pages; additional copymasters, digital resources).			
	12) I can identify common student challenges and prepare to address those challenges.			

Targeted small group work time

i. Deepening content understanding and addressing preconceptions
ii. Coherent instruction
iii. Formative assessment and differentiation
iv. Preparing to teach

Deepening content understanding and addressing preconceptions

Goal: Deepen understanding of unit content as it relates to student alternative conceptions. Plan to leverage your deep content understanding to address student preconceptions during the unit.

Step 1: Getting ready

Self-reflection: You've engaged with your unit's content deeply during today's workshop. Use the space below to record any new science concepts you learned today, and to list any questions you still have related to the concepts you've worked with today.

Anticipating student need: Thinking about the concepts students will learn in this unit, reflect on what you think will be particularly challenging or confusing for students. Consider what preconceptions or alternate conceptions you think students might have related to this content, and ideas you think are particularly abstract or complex. Use the space below to record your ideas.

Step 2: Deepening understanding of unit content

Why develop content understanding?

Teachers who have a deep understanding of the content they're teaching are more effective at addressing student preconceptions and alternate conceptions, and effectively support student learning with accurate explanations and precise language (Brown & Borko, 1992; Cohen, 1988; Roth, Anderson, & Smith, 1986).

Directions:

1. Locate the Science Background document in your unit's Unit Guide.
2. Read the document. If you'd like, you can assign different sections to different members of the group, and have group members summarize their section to the group.
3. Use the space below to make notes.

Step 3: Reflecting on student alternate conceptions

How do I find information about preconceptions and alternate conceptions?*

The Assessment Guide that accompanies the Pre-Unit Assessment lists common student preconceptions related to your unit's content. This information was gathered through review of academic literature, cognitive labs with students, and field tests of the units. Note in the Amplify Science program, "preconceptions" and "alternate conceptions" are used interchangeably.

*In some units, there is also information about preconceptions in the Science Background document.

Directions:

1. Navigate to your unit's Pre-Unit Assessment lesson (Lesson 1.1).
2. Download the Assessment Guide from Digital Resources. Read this document.
3. Focus on the "Common preconceptions, contrasted with accepted science understandings" section at the end of the document. Reflect on which preconceptions seem most relevant to you and your students.
4. List 2-3 of these preconceptions in Table 1 below. Then, go back to the Science Background document. Use the space in the table to record ideas from the science background that address the preconceptions you chose.

Table 1: Reflecting on student alternate conceptions

Preconception (from Assessment Guide)	Information from science background that addresses the preconception

Step 4: Planning to teach

Now what do I do?

Having a strong content understanding is an important first step to tackling preconceptions and alternate conceptions in your students. Planning for moments in the unit where students might get confused is a helpful next step.

Directions:

1. Select one of the preconceptions you listed on Table 1 to focus more deeply on.
2. Use your unit's Coherence Flowchart to find an activity in the unit where student learning seems to relate to the preconception.
   Tip: Investigation Questions and key concepts may help you locate an activity.
3. In the Teacher's Guide, navigate to this activity's lesson. Read the lesson.
4. Use the space below to make notes about what you'll listen for during the lesson, and how you might support students holding that preconception to gather evidence that refines their understanding.
5. If you have extra time, find another lesson related to the preconception you chose, and complete the next row of Table 2.

Table 2: Planning to teach

Preconception:		
Lesson	**What you'll listen for**	**How you might support students**

Coherent instruction

Goal: Gain confidence in using a Coherence Flowchart as a tool to see how ideas build across a chapter.

1. **As a group, use the Coherence Flowchart for Chapter __ to:**
    a. **Discuss the Chapter __ Question.** How does it connect to the unit problem and to what students figure out in Chapter __?

    b. **Discuss the first Investigation Question.** How does this question help students answer the Chapter Question?

2. **Individually, use the Coherence Flowchart and Teacher's Guide to:**
    a. **Consider evidence sources and reflection opportunities:**
        - **Each group member, choose an activity from the first evidence source/reflection opportunity box in the Coherence Flowchart.** It is okay if some group members choose the same activity, but make sure that there are a variety of activities chosen. Place a star next to the activity you chose on your Coherence Flowchart.
        - **In the Teacher's Guide, navigate to the lesson listed next to your chosen activity and read the Lesson Overview.** What is the purpose of the activity you chose to consider?

        - **Navigate to the activity and then read the steps.** What do students do in the activity? How does this activity help students figure out or reflect upon the Investigation Question?

        - **Check the Teacher Support notes (if applicable).** Do any of the notes help you further understand the purpose of the activity? Are there suggestions for deepening students' experience with the activity or providing more support?

Coherent instruction cont.

3. **As a group, refer to responses in step 2 and to the Coherence Flowchart for Chapter __ to:**
   a. **Discuss evidence sources and reflection opportunities.**
      - Each group member, share a brief description of the activity you considered and its purpose.
      - How do the activities you discussed build on each other and fit together?
      - How do the activities support the students in answering the Investigation Question?

   b. **Discuss the transition to the next question:**
      - Based on what students figured out, what will they be motivated to wonder next?
      - How does this connect to the next question (Investigation Question or Chapter Question) they work with?

Coherent instruction cont.

Goal: Gain confidence in using a Coherence Flowchart as a tool to see how ideas build across a chapter.

1. **As a group, use the Coherence Flowchart for Chapter __ to:**
    a. **Discuss the Chapter __ Question.** How does it connect to the unit problem and to what students figure out in Chapter __?

    b. **Discuss the first Investigation Question.** How does this question help students answer the Chapter Question?

2. **Individually, use the Coherence Flowchart and Teacher's Guide to:**
    a. **Consider evidence sources and reflection opportunities:**
        - **Each group member, choose an activity from the first evidence source/reflection opportunity box in the Coherence Flowchart.** It is okay if some group members choose the same activity, but make sure that there are a variety of activities chosen. Place a star next to the activity you chose on your Coherence Flowchart.
        - **In the Teacher's Guide, navigate to the lesson listed next to your chosen activity and read the Lesson Overview.** What is the purpose of the activity you chose to consider?

        - **Navigate to the activity and then read the steps.** What do students do in the activity? How does this activity help students figure out or reflect upon the Investigation Question?

        - **Check the Teacher Support notes (if applicable).** Do any of the notes help you further understand the purpose of the activity? Are there suggestions for deepening students' experience with the activity or providing more support?

Coherent instruction cont.

3. **As a group, refer to responses in step 2 and to the Coherence Flowchart for Chapter __ to:**

   a. **Discuss evidence sources and reflection opportunities.**

   - Each group member, share a brief description of the activity you considered and its purpose.
   - How do the activities you discussed build on each other and fit together?
   - How do the activities support the students in answering the Investigation Question?

   b. **Discuss the transition to the next question:**

   - Based on what students figured out, what will they be motivated to wonder next?
   - How does this connect to the next question (Investigation Question or Chapter Question) they work with?

Formative assessment and differentiation

Properties of Materials

Goal: Examine embedded formative assessment opportunities in order to plan for differentiated instruction.

Step 1: How do we assess learning?

In Amplify Science, students can demonstrate what they've learned through embedded formative assessments (e.g., On-the-Fly Assessments, Critical Juncture Assessments, Student Self-Assessments). These assessments represent the most opportune moments for a glimpse into students' developing conceptual understanding and their facility with the practices.

First, let's analyze an embedded assessment opportunity we experienced earlier in the day. During our Properties of Materials deep dive sequence, you gathered evidence by reading *What If Rain Boots Were Made of Paper?* You used the strategy of making predictions to make meaning of the text..

- Navigate to Properties of Materials → Chapter 1 → Lesson 1.2 → Activity 3
- Select Embedded Formative Assessment
- Select On-the-Fly Assessment 1: Making Predictions While Reading
- Read the Look for and Now what? sections and then complete the table below.

Properties of Materials Lesson 1.2, Activity 3	
Which disciplinary core ideas, science and engineering practices, and/or crosscutting concepts are being assessed?	
What data can be collected from this assessment opportunity?	
How could you collect data?	
What will this formative assessment opportunity tell you about student understanding?	

Step 2: Reflecting on differentiated instruction

Based on student responses to embedded formative assessments, you may need to differentiate instruction in the next activity or lesson. Differentiated instruction is a powerful classroom practice that recognizes that students bring a wide variety of skills, talents, and needs to their daily learning. When you differentiate instruction, it enables you to address varying degrees of proficiency and skill while also meeting identifiable differences in learning styles and interests. There are various ways to differentiate instruction—what you teach, how you teach, and/or how students demonstrate their learning.

How do you currently respond to students' needs, styles, or interests in your classroom?

Step 3a: Determine strategies to differentiate instruction

First, let's read about the variety of differentiation strategies which are embedded in the Amplify Science curriculum. Follow the steps below to access the Program Guide:

- Navigate to the Science Program Guide using the Global Navigation Bar.
- Select Access and Equity.
- Choose Differentiation Strategies.
- Explore the description and associated strategies for the student groups listed.
- Use the space below to record strategies you could use to differentiate instruction for each group of students.

Student population	Strategies for support
English learners	
Students with disabilities	
Standard English learners	
Girls and young women	
Advanced learners and gifted learners	
Students living in poverty, foster children and youth, and migrant students	

Step 3b: Review Lesson Brief

Navigate to the 1.2 Lesson Brief and select the drop-down arrow to expand the Differentiation section. Read the Embedded Supports for Diverse Learners. Are there any additional strategies noted in this brief that you would like to capture in the table above?

Step 4: Preparing to differentiate

Now it's time to draft a plan to implement differentiated instruction.

What is one strategy you just reviewed and/or recorded which you feel most comfortable implementing after the next embedded formative assessment opportunity?

How will you prepare your students for the implementation of this new strategy?
(Ex: Expected student behavior for group work, step-by-step directions)

How will you prepare your classroom for the implementation of this new strategy?
(Ex: Classroom arrangement, organizing materials)

Preparing to teach

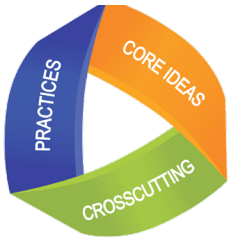
Directions:

1. Navigate to the Chapter 1 landing page in the Teacher's Guide and read the Chapter Overview.
2. Navigate to Lesson 1.1 and use the table below to guide your planning.

Consider	Read
Lesson Purpose • What is the purpose of the lesson? • How do the activities in this lesson fit together to support students in achieving this purpose?	**Lesson Brief:** • Overview • Standards
Preparing • What materials do you need to prepare? • Is there anything you will need to project? • Will students need digital devices? • Are there partner or grouping structures you need to plan for? • Are there activities you need to practice before showing students? • Are there space considerations to think about (e.g., outside observation, projections, whole-group floor space)? • Are there documents in Digital Resources that you need to review (e.g., Assessment Guide)?	**Lesson Brief:** • Materials and Preparation • Unplugged • Digital Resources
Timing • How will teaching this lesson fit into your class schedule? • Will you need to break the lesson into activities over several days? **Teaching the Lesson** • Are there specific steps you have questions about? • What challenges might you encounter in teaching this lesson, and how might you address these challenges?	**Lesson Brief:** • Lesson at a Glance **Instructional Guide:** • Step-by-Step tab • Teacher Support tab
Supports and Challenges • What might be challenging for your students? • What additional supports can you plan for individual students?	**Lesson Brief:** • Differentiation **Instructional Guide:** • Teacher Support tab

**If you have additional time, continue planning with Lesson 1.2.*

Three dimensions of NYSSLS reference



3-D learning engages students in using scientific and engineering practices and applying crosscutting concepts as tools to develop understanding of and solve challenging problems related to disciplinary core ideas.

Science and Engineering Practices

1. **Asking Questions and Defining Problems**
2. **Developing and Using Models**
3. **Planning and Carrying Out Investigations**
4. **Analyzing and Interpreting Data**
5. **Using Mathematics and Computational Thinking**
6. **Constructing Explanations and Designing Solutions**
7. **Engaging in Argument from Evidence**
8. **Obtaining, Evaluating, and Communicating Information**

Disciplinary Core Ideas

Earth and Space Sciences:
ESS1: Earth's Place in the Universe
ESS2: Earth's Systems
ESS3: Earth and Human Activity

Life Sciences:
LS1: From Molecules to Organisms
LS2: Ecosystems
LS3: Heredity
LS4: Biological Evolution

Physical Sciences:
PS1: Matter and its Interactions
PS2: Motion and Stability
PS3: Energy
PS4: Waves and their Applications

Engineering, Technology and the Applications of Science:
ETS1: Engineering Design
ETS2: Links among Engineering Technology, Science and Society

Crosscutting Concepts

1. **Patterns**
2. **Cause and Effect**
3. **Scale, Proportion, and Quantity**
4. **Systems and System Models**
5. **Energy and Matter**
6. **Structure and Function**
7. **Stability and Change**

Amplify Support

Program Guide

Glean additional insight into the program's structure, intent, philosophies, supports, and flexibility.
my.amplify.com/programguide

Amplify Help

Find lots of advice and answers from the Amplify team.
my.amplify.com/help

Customer care

Seek information specific to enrollment and rosters, technical support, materials and kits, and teaching support, weekdays 7AM-7PM EST.

800-823-1969

scihelp@amplify.com

Amplify Chat

When contacting customer care, be sure to:

- Identify yourself as an Amplify Science user.
- Note the unit you are teaching.
- Note the type of device you are using (Chromebook, iPad, Windows laptop, etc.).
- Note the web browser you are using (Chrome or Safari).
- Include a screenshot of the problem, if possible.
- Cc: your district or site IT contact.

Notes

Notes