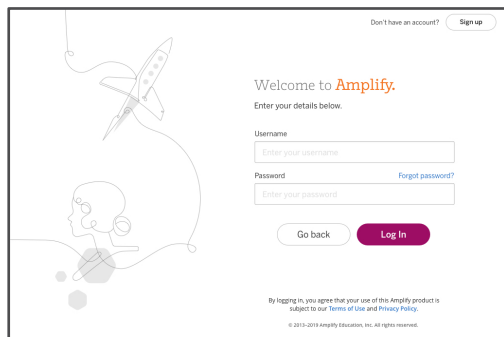
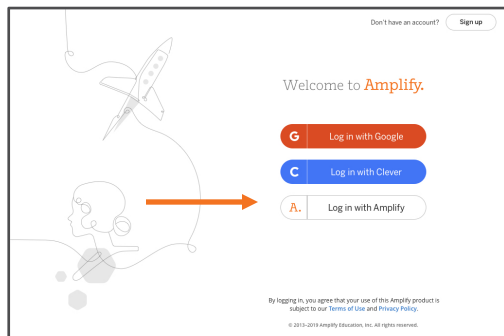


Welcome to Amplify Science!

Do now: Name tent and login



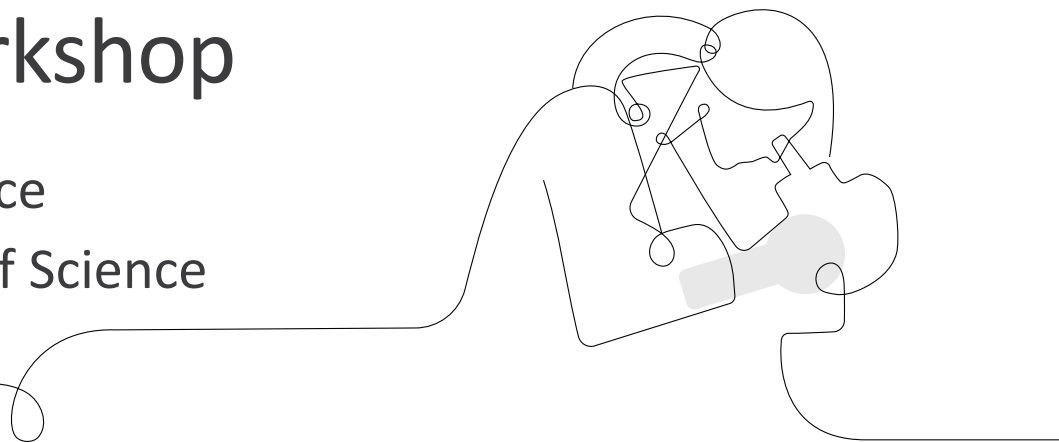
1. Make a name tent
2. Go to learning.amplify.com
3. Select **Log in with Amplify**
4. Enter teacher demo account credentials
 - XXXX@tryamplify.net
 - Password: AmplifyNumber1
5. Explore as we wait to begin

Amplify Science

Properties of Materials Implementation workshop

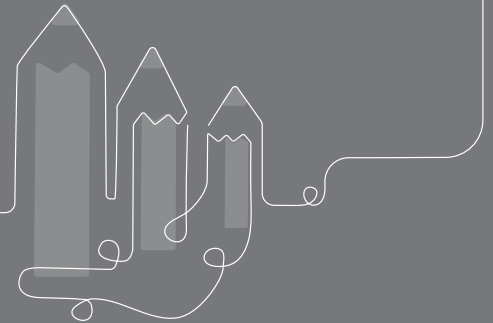
A professional learning experience
designed by the Lawrence Hall of Science

NYC DOE
November 5, 2019
Presented by Your Name



Workshop goal

- Prepare teachers to implement Properties of Materials in their classrooms



An illustration of a brown hand holding a red kidney bean between the thumb and index finger. The hand is positioned over a light blue tray. On the tray, there are several other red kidney beans, some with white cream or milk splatters. A wooden stick is also visible, with a white cream or milk splash around its base. In the background, there are some yellow and pink decorative elements.

Properties of Materials

Plan for the day

- Framing and reflection
- Experiencing the unit
- The story of the unit

- Planning to teach
- Closing

An illustration of a brown hand holding a red bean between the thumb and index finger. The hand is positioned over a light blue tray. On the tray, there are several other red beans, some with white cream or milk splatters. A wooden stick is also visible, with a white substance dripping from it. In the background, there are some yellow and pink decorative elements.

Properties of Materials

Plan for the day

- Framing and reflection
- Experiencing the unit
- The story of the unit

- Planning to teach
- Closing

Framing and reflection

The purpose of this part of the day is for you to:

- Share your experience implementing Amplify Science.
- Refresh your understanding of key program resources and Amplify's approach.
- Identify successes and areas of need in your classroom, which will frame your work throughout the day.

Reflection roles

- Facilitator: Asks questions to ensure that there is equity of voice
- Timekeeper: Keeps team on time/task
- Recorder: Captures the information on paper as each person is presenting
- Summarizer: Shares highlights and summaries to the larger group

Scenario 1

Ms. Lambertsen needs to refresh her content knowledge of her next unit. She has a few questions about the science content in the unit, and wants to be ready when her students ask questions, too.

To deepen her understanding of the science ideas in the unit, what resources would you recommend she use?

Scenario 2

Mr. Garcia wants to plan what data he can collect on his students during an upcoming lesson and how he can then use the data to inform instruction to best support his students. He's also looking for some strategies to support students in his classroom that need more challenge.

What can he look at in the Teacher's Guide to support his planning?

Scenario 3

To prepare to administer the End-of-Unit Assessment, Ms. Lucey wants to familiarize herself with how students with different levels of understanding might respond to the assessment. She's also looking for some insight into how to evaluate their responses.

Where can she look for information to support her preparation to administer the assessment?

Scenario 4

Mr. Moore needs to identify the standards in his upcoming unit for his principal. Specifically, his principal wants to know how students engage with the three dimensions of NGSS to figure out the unit phenomenon/problem.

Where would Mr. Moore find out the answer to his principal's question? How do students engage in three-dimensional learning in this unit?

Scenario 5

At back to school night, Mr. Patel is going to tell his students' families about the next unit his class will work with. He wants to describe how students develop ideas through Chapter 1.

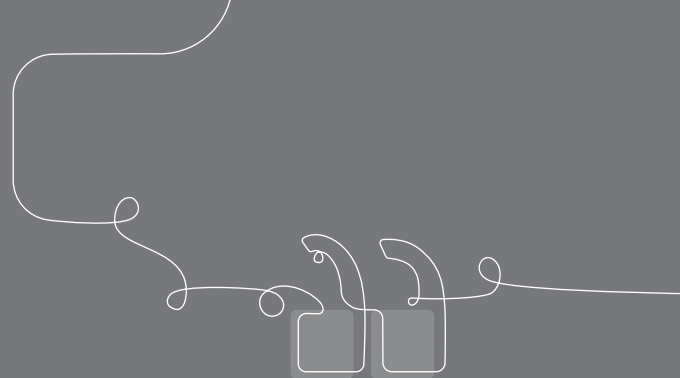
How do you think he could explain this to his students' families? Where might he look to find information that will help him plan what to say?

Scenario 6

Mrs. Doolittle is starting a new unit next week (the same one you are diving into today!). She's familiar with what students learn throughout the unit, but she's not sure where to start preparing to teach the first lesson.

What do you suggest she refer to as she prepares for her first lesson? What should she do or read first, and what should she do after that?

Questions?





Properties of Materials

Plan for the day

- Framing and reflection
- Experiencing the unit
- The story of the unit
- Planning to teach
- Closing

Experiencing the unit

The purpose of this part of the day is for you to:

- Understand how a phenomenon motivates student learning.
- Understand what students learn in a chapter of Properties of Materials, and how they learn it.
- Reflect on the instructional design in the Amplify Science program.
- Describe the content focus and coherence of the unit.

Elementary school course curriculum structure

Grade K

- Needs of Plants and Animals
- Pushes and Pulls
- Sunlight and Weather

Grade 1

- Animal and Plant Defenses
- Light and Sound
- Spinning Earth

Grade 2

- Plant and Animal Relationships
- Properties of Materials
- Changing Landforms

Grade 3

- Balancing Forces
- Inheritance and Traits
- Environments and Survival
- Weather and Climate

Grade 4

- Energy Conversions
- Vision and Light
- Earth's Features
- Waves, Energy, and Information

Grade 5

- Patterns of Earth and Sky
- Modeling Matter
- The Earth System
- Ecosystem Restoration

AmplifyScience

authored by






THE LAWRENCE
HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

All curriculum materials ©2016 The Regents of the University of California.
© 2018 Amplify Education, Inc. All trademarks and copyrights are the property of Amplify or its licensors.

Planning your year

Overview: Amplify Science K-5 course structure

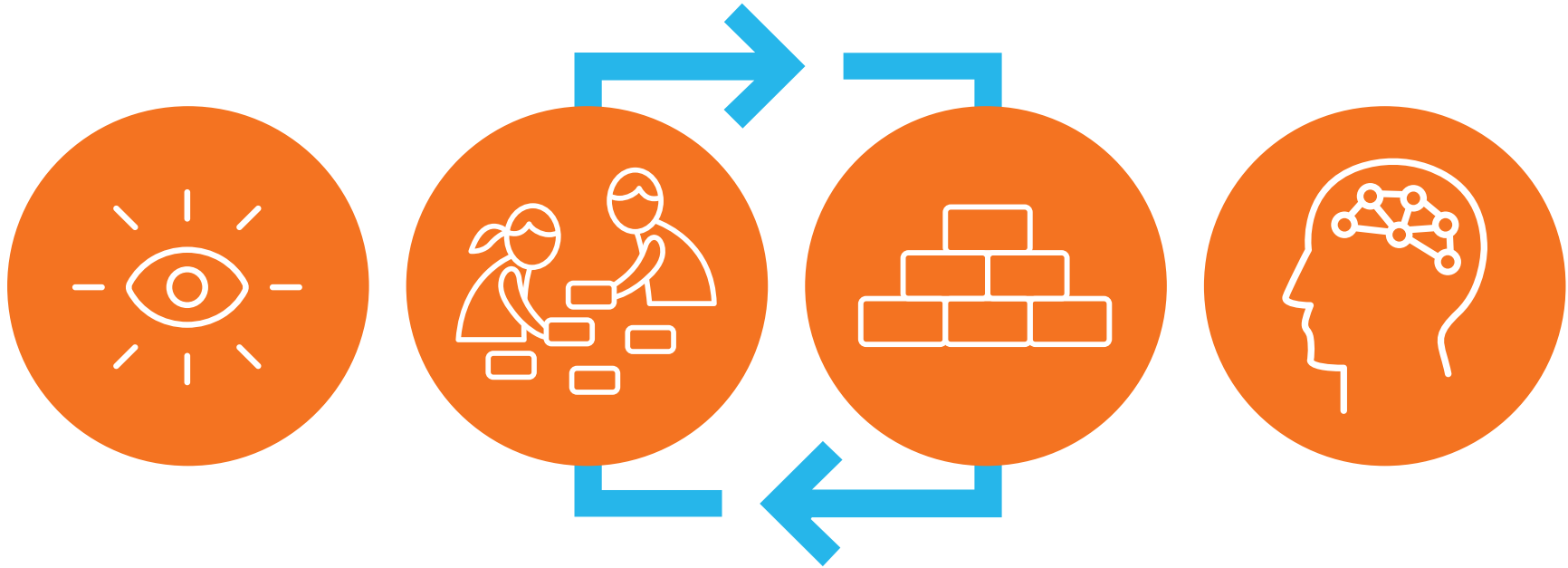
	 PRIMARILY LIFE SCIENCE			 PRIMARILY PHYSICAL SCIENCE			 PRIMARILY EARTH SCIENCE				
All units have 22 lessons except Grade 5: The Earth System, which has 26 lessons.											
	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Minutes per lesson
K	Needs of Plants and Animals			Pushes and Pulls			Sunlight and Weather			45	
1	Animal and Plant Defenses			Light and Sound			Spinning Earth			45	
2	Plant and Animal Relationships			Properties of Materials			Changing Landforms			60	
3	Balancing Forces		Inheritance and Traits		Environments and Survival		Weather and Climate			60	
4	Energy Conversions		Vision and Light		Earth's Features		Waves, Energy and Information			60	
5	Patterns of Earth and Sky		Modeling Matter		The Earth System (26 lessons)			Ecosystem Restoration		60	

Problem-based deep dives

Students inhabit the role of scientists and engineers to explain or predict phenomena. They use what they figure out to solve real-world problems.



Amplify Science approach

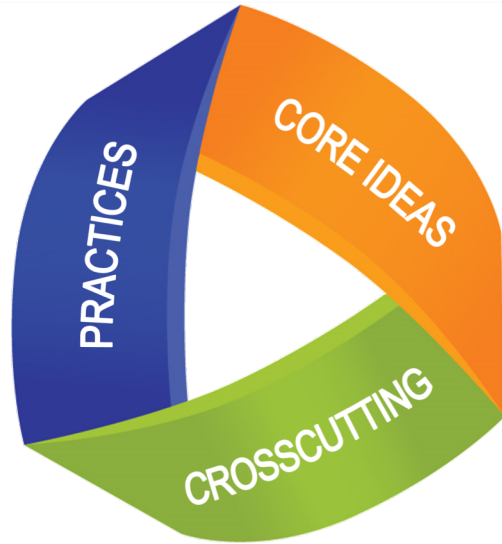


Introduce a phenomenon
and a related problem

Collect evidence from
multiple sources

Build increasingly
complex explanations

Apply knowledge
to a different context



Standards as three-dimensional performance expectations that integrate **disciplinary core ideas**, **science and engineering practices**, and **crosscutting concepts**

Unit Level 3-D Statement

Key

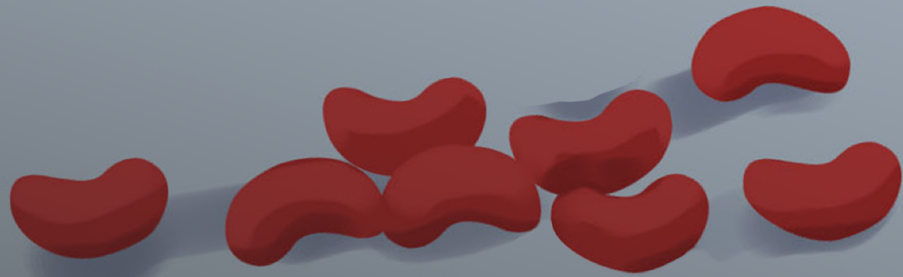
Practices

Disciplinary Core Ideas

Crosscutting Concepts

Unit Level

Students **investigate** and then **analyze and interpret data** to determine **different properties of materials** (**patterns, cause and effect**). This informs the **design** of a **glue mixture with a combination of desired properties** that make it best suited for classroom use.



Grade 2 | Properties of Materials

Instructional Sequence





Unit Question

How can you design a mixture for a certain purpose?

The principal heard that we're starting the *Properties of Materials* unit and thinks we can **help the school** with a **problem**.

I'll read a letter that the principal wrote us. As I read, think about **what the problem is** and **what we will send the principal** at the end of the unit.



Dear Second Grade Students,

Teachers have told me they are worried about some of the supplies at our school. One of the supplies we need to improve is our glue. I talked with a few teachers, and we decided that your second grade class will take on the challenge of designing a new glue for our school.

For the next few weeks, you will become glue engineers. You will make a new glue that can be shared with other classrooms. You will need to learn about glue and the ingredients needed to make glue. You will create your own glue recipes and test them. After that, you will use the evidence from your tests to make your glue even better.

Once you have a final recipe, you will share the recipe with your teacher and me. Thank you so much for your help!

Sincerely,

Your Principal

An **engineer** is a person who uses science knowledge to design something in order to **solve a problem.**

The problem we need to solve is **how to make a glue for our school.** We will take on the role of **glue engineers** as we design the glue.

Unit Map

Properties of Materials

Planning for the Unit

Unit Map



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.

Properties of Materials design argument

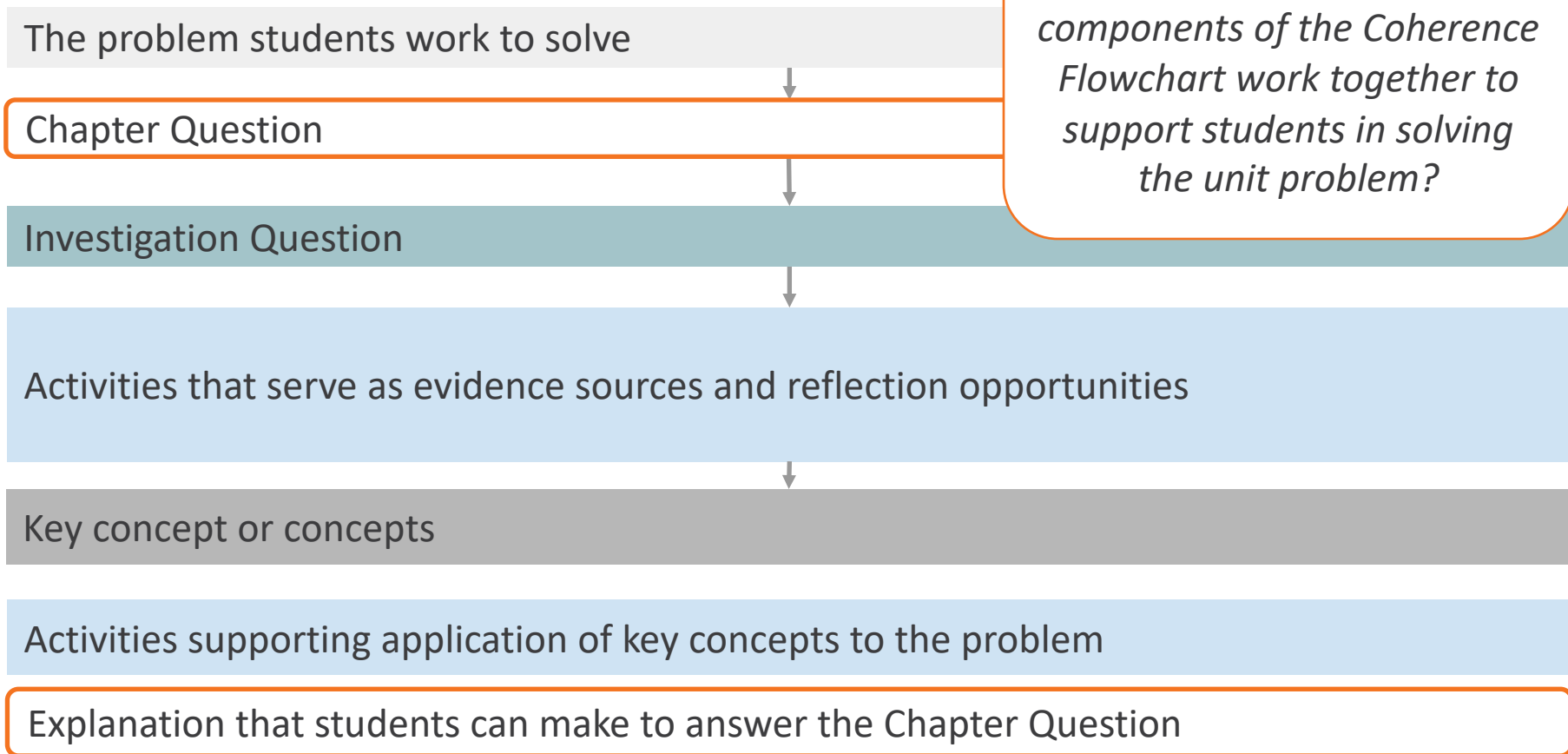


To design a strong, smooth, and sticky glue, my recipe includes cornstarch and water, which has been heated and cooled, and flour. When you mix cornstarch and water, heat it, and let it cool, the mixture is sticky and smooth. Flour and water makes a mixture that is sticky and strong. Since I want my glue to have those properties (strong, smooth, and sticky), I will mix flour and heated cornstarch and water together for my glue.

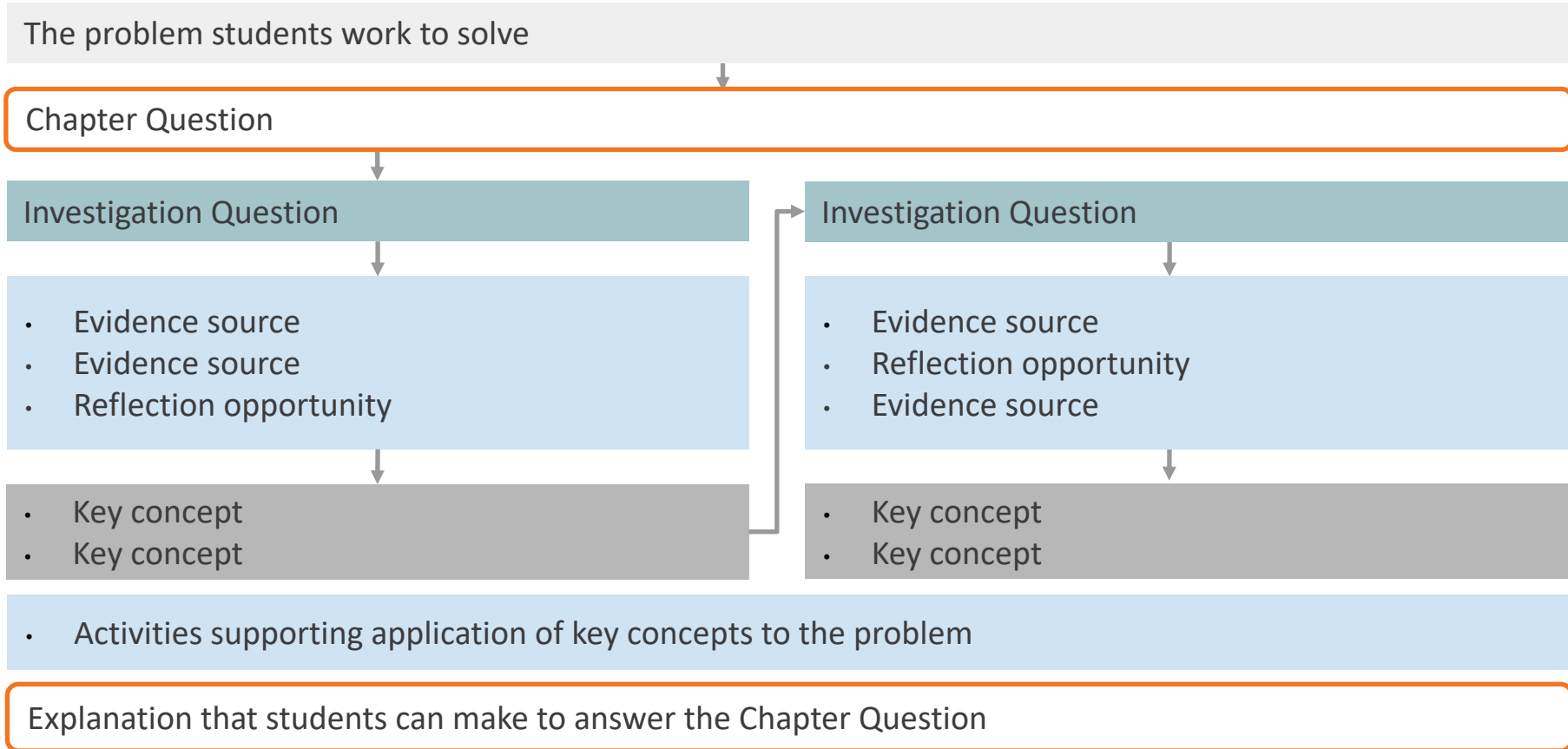
Coherence as a design principle

- Supports students in building a rich network of concepts
- Allows for increasingly complex explanations
- Supports students in integrating ideas
- Provides motivation to look more deeply at the phenomenon

Coherence Flowchart structure



Coherence Flowchart structure



Chapter 1: How can you make a sticky glue?

☑ JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

Lesson 1.2:
What If Rain Boots
Were Made of Paper?

Lesson 1.3:
Observing Properties
of Glue

Lesson 1.4:
Supporting Claims
with Evidence

Lesson 1.5:
Observing and
Testing Ingredients

Lesson 1.6:
Evaluating Sticky
Test Evidence

Lesson 1.7:
Jelly Bean Engineer

Lesson 1.8:
Using Evidence to
Plan Glues

Lesson 1.9:
Making Our First
Glue



Inside each of these bags is a **material**. We'll see what we can notice about each material.

We'll use the letters on the bags to name the materials.

Chapter 1: How can you make a sticky glue?

☑ JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

Lesson 1.2:
What If Rain Boots
Were Made of Paper?

Lesson 1.3:
Observing Properties
of Glue

Lesson 1.4:
Supporting Claims
with Evidence

Lesson 1.5:
Observing and
Testing Ingredients

Lesson 1.6:
Evaluating Sticky
Test Evidence

Lesson 1.7:
Jelly Bean Engineer

Lesson 1.8:
Using Evidence to
Plan Glues

Lesson 1.9:
Making Our First
Glue

We will investigate this question over the next few lessons:

What can be noticed about different materials?

In this lesson, we will be **reading** about **different materials**.

Readers often use a **strategy** called **predicting** to help them understand what they are about to read. Predicting is a strategy that you probably use a lot.

Vocabulary



predict

to use what you already know to decide
what you think might happen

AmplifyScience

What If Rain Boots Were Made of Paper?

by Kevin Beals and P. David Pearson
illustrated by Tim Haggerty



Before we read this book, let's practice **predicting** what the book will be about or what we'll learn.

We can use the **title**, **pictures**, **text**, **format**, and **story elements**.

What if rain boots were made of paper?

Would they rip when we put them on?

Would they fall apart in the rain?

Would our feet get wet?



I'll read page 3 out loud.

As I read, I'll think about ways I might change my prediction.



Paper rain boots would be a problem. That's why rain boots are made of **rubber**.

- Rubber bends, so it's easy to slip rain boots on our feet.
- Rubber is strong, so it lasts a long time.
- Rubber keeps out water, so our feet stay dry.

Rubber is a great **material** for making rain boots. Maybe we should make everything out of rubber!

Now I'll read page 4.

Let's think about what we are learning as we read and make a new prediction.

Predicting helps readers understand new ideas and think about what they are going to learn or what might happen next.

Readers don't just predict before they read. They continue to **make and adjust their predictions** as they go along.

Partner Reading Guidelines

1. Sit next to your partner and place the book between you.
2. Take turns reading.
3. Read in a quiet voice.
4. Be respectful and polite to your partner.
5. Ask your partner for help if you need it. Work together to make sure you both understand what you read.

Properties of Materials: Designing Glue

Problem students work to solve

Chapter 1 Question

Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Investigation Question

Application of key concepts to problem

Explanation that students can make to answer the Chapter 1 Question

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

How can you make a sticky glue? (introduced in 1.3)

What can be noticed about different materials? (1.2-1.3)

- Read *What If Rain Boots Were Made of Paper?* (1.2)
- Reflect on materials and properties (1.3)
- Brainstorm uses and properties of a good glue (1.3)
- Observe mystery glues (1.3)

- 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. (1.3)

How can you tell if substances are

What are students figuring out?

- You can tell if materials and substances are different by observing their properties or by testing them. (1.4)

How can the properties of a mixture change? (1.5-1.7)

- Observe dry glue ingredients (1.5)
- Make and observe mixtures (1.5)
- Graph and analyze sticky tests results (1.6)
- Read *Jelly Bean Engineer* (1.7)

- 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)
- Engineers test their designs to find out whether they meet their design goals. (1.7)

Which ingredients should we use (or not use) in our glue? (1.8-1.9)*

- Write design arguments for the ingredients that make the best glues (1.8)
- Make Glue #1 (1.9)
- Write a comparison of partners' glues (1.9)

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.

*This Investigation Question guides application of key concepts to the problem.

Chapter 1: How can you make a sticky glue?

☑ JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

Lesson 1.2:
What If Rain Boots
Were Made of Paper?

Lesson 1.3:
Observing Properties
of Glue

Lesson 1.4:
Supporting Claims
with Evidence

Lesson 1.5:
Observing and
Testing Ingredients

Lesson 1.6:
Evaluating Sticky
Test Evidence

Lesson 1.7:
Jelly Bean Engineer

Lesson 1.8:
Using Evidence to
Plan Glues

Lesson 1.9:
Making Our First
Glue

We're going to solve some **Materials Riddles**.

I will **think of a material** used in our classroom and **describe its properties** without saying what it is.

You'll think about the properties I list and try to figure out what material I'm describing.

Now I'll give you some Materials Riddles.



Put your thumb up if you know the material I am thinking of.

Keep your answers to yourselves so your classmates have a chance to solve the riddle.

Key Concept

Different materials have different properties.



Chapter 1 Question

How can you make a sticky glue?

Design Goals

Possible *Glue Uses*

Possible *Glue Properties*

Goals for *Our Glue*

Before designing a solution, it's important to **understand the problem.**

We'll use this poster throughout the unit to **help us plan.**



What kinds of things is glue used for?

Design Goals

Possible *Glue* Uses

Possible *Glue* Properties



Goals for Our *Glue*



What **properties** do you think our glue should have?

There can be **different types of the same material**. For example, wood, metal, and paper are materials, but there are different kinds of wood, different kinds of metal, and different kinds of paper.

Substance is a word that scientists use to talk about a **specific kind of material**.

Vocabulary



substance

a specific kind of material



Glue is a material, but not all glue is the same.

Each of these glues is a substance. They are all glues, but they are different glues. They are **different substances.**



You'll observe Mystery Glues to figure out if they're the same substance.



How might you **observe the properties** of each glue?

What teacher moves/routines could be added to support/encourage ALL students to engage with the discussion questions you see displayed on the student screen? What has worked in your classroom?



As you **observe** the Mystery Glues, make sure you smell substances in the **special way that scientists do.**

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

Properties of Materials—Lesson 1.3

7

© 2018 The Regents of the University of California. All rights reserved. Permission granted to photocopy for classroom use.

Turn to page xx in your notebooks.

The notes you take here will help you decide whether the Mystery Glues are **the same or different substances.**

Design Goals

Possible *Glue Uses*

Possible *Glue Properties*



Goals for Our *Glue*

Let's discuss the glues before saying whether we think they are the same.



What are some of the **properties of the glues** that you observed?



Thumbs up if you think the two glues are the **same substance**. What did you **observe** that makes you think they are the same?

Thumbs down if you think the two glues are **different substances**. What did you observe that makes you think they are different?

Key Concept

You can tell if materials or substances are different by observing their properties.

Properties of Materials: Designing Glue

Problem students work to solve

Chapter 1 Question

Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Investigation Question

Application of key concepts to problem

Explanation that students can make to answer the Chapter 1 Question

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

How can you make a sticky glue? (introduced in 1.3)

What can be noticed about different materials? (1.2-1.3)

- Read *What If Rain Boots Were Made of Paper?* (1.2)
- Reflect on materials and properties (1.3)
- Brainstorm uses and properties of a good glue (1.3)
- Observe mystery glues (1.3)

- 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. (1.3)

Which ingredients should we use (or not use) in our glue?

- Write design arguments for the ingredients that make the best glues (1.8)
- Make Glue #1 (1.9)
- Write a comparison of partners' glues (1.9)

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.

*This Investigation Question guides application of key concepts to the problem.

What are students figuring out?

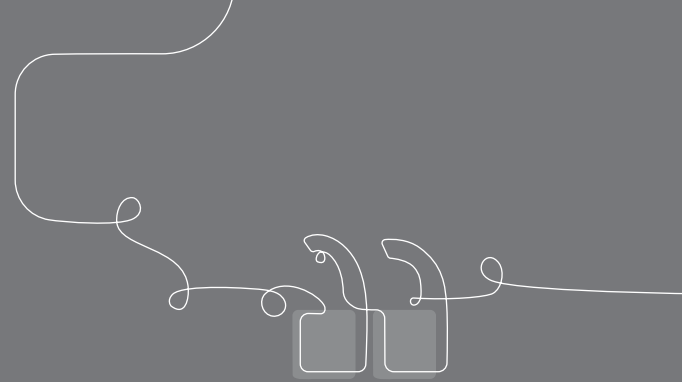
Why post this key concept now?

How can you tell if substances are

How can the properties of a mixture change? (1.5-1.7)

- Observe dry glue ingredients (1.5)
- Make and observe mixtures (1.5)
- Graph and analyze sticky tests results (1.6)
- Read *Jelly Bean Engineer* (1.7)

- 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)
- Engineers test their designs to find out whether they meet their design goals. (1.7)



Turn and talk:

- Why do you think the key concept was posted at this point in the chapter?

Engaging with ideas over multiple activities

- Supports all learners
- Supports making connections
- Provides different, related pieces of evidence
- Models what scientists do
- Situates concepts in a variety of contexts

Chapter 1: How can you make a sticky glue?

☑ JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

Lesson 1.2:
What If Rain Boots
Were Made of Paper?

Lesson 1.3:
Observing Properties
of Glue

Lesson 1.4:
Supporting Claims
with Evidence

Lesson 1.5:
Observing and
Testing Ingredients

Lesson 1.6:
Evaluating Sticky
Test Evidence

Lesson 1.7:
Jelly Bean Engineer

Lesson 1.8:
Using Evidence to
Plan Glues

Lesson 1.9:
Making Our First
Glue

Let's look at the various ways we said that glue is used.



What is the **most important property** for a glue to have in order to be used in these ways?

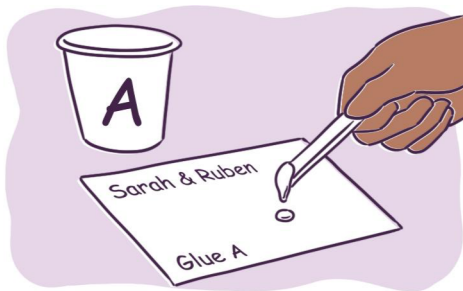
Vocabulary



test

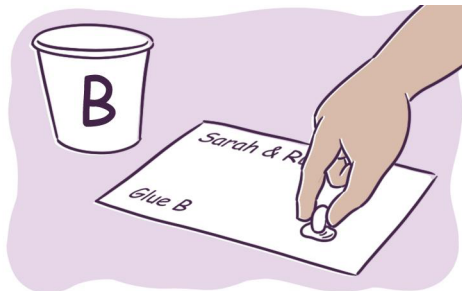
to try something and find out what happens

Mystery Glue Sticky Test



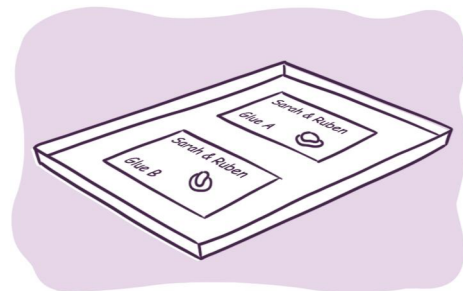
Step 1

Write your names and Glue A or Glue B on the cards. Put a **small amount of glue** on each card.



Step 2

Put a bean in the middle of each circle of glue.



Step 3

Leave the cards flat on the tray to dry overnight.

Chapter 1: How can you make a sticky glue?

☑ JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

Lesson 1.2:
What If Rain Boots
Were Made of Paper?

Lesson 1.3:
Observing Properties
of Glue

Lesson 1.4:
Supporting Claims
with Evidence

Lesson 1.5:
Observing and
Testing Ingredients

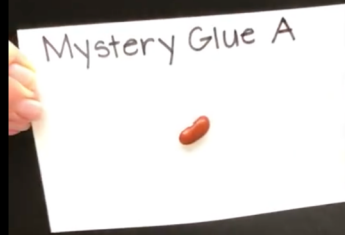
Lesson 1.6:
Evaluating Sticky
Test Evidence

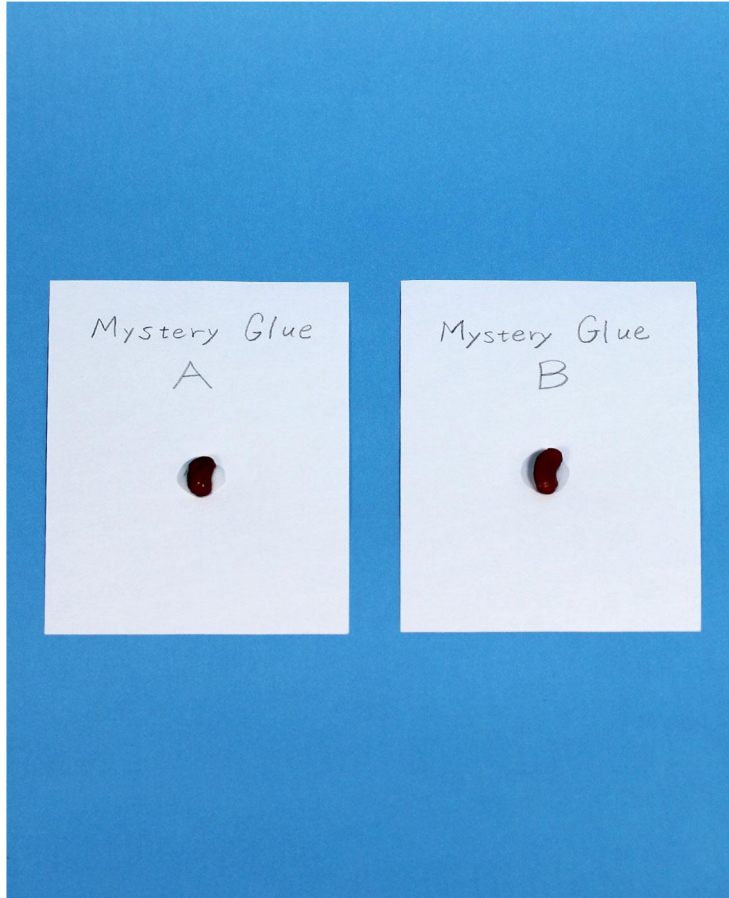
Lesson 1.7:
Jelly Bean Engineer

Lesson 1.8:
Using Evidence to
Plan Glues

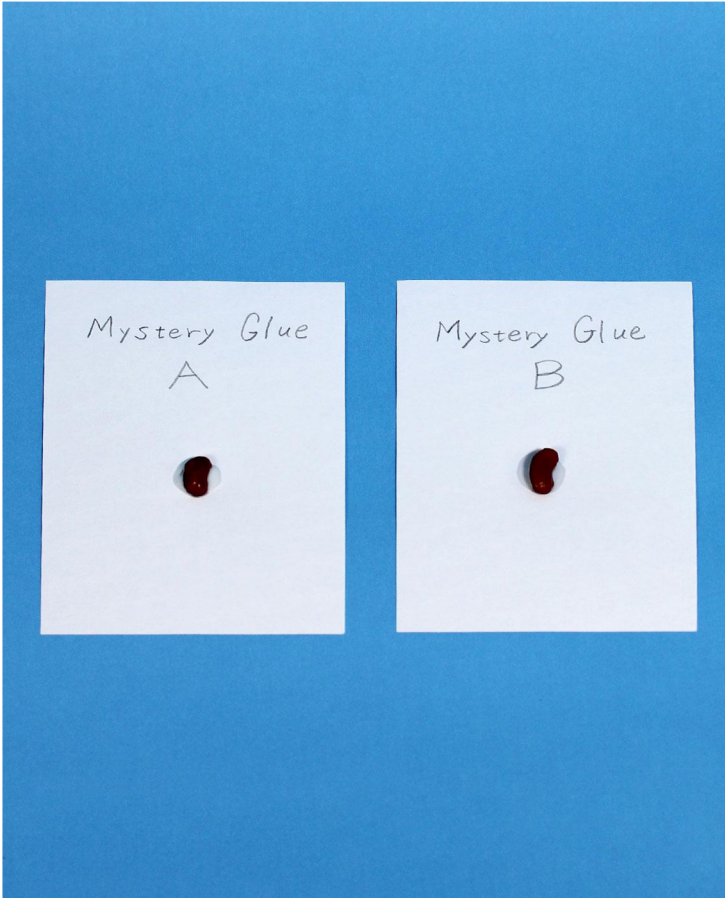
Lesson 1.9:
Making Our First
Glue

Grade 2 Properties of Materials: Sticky Test Results



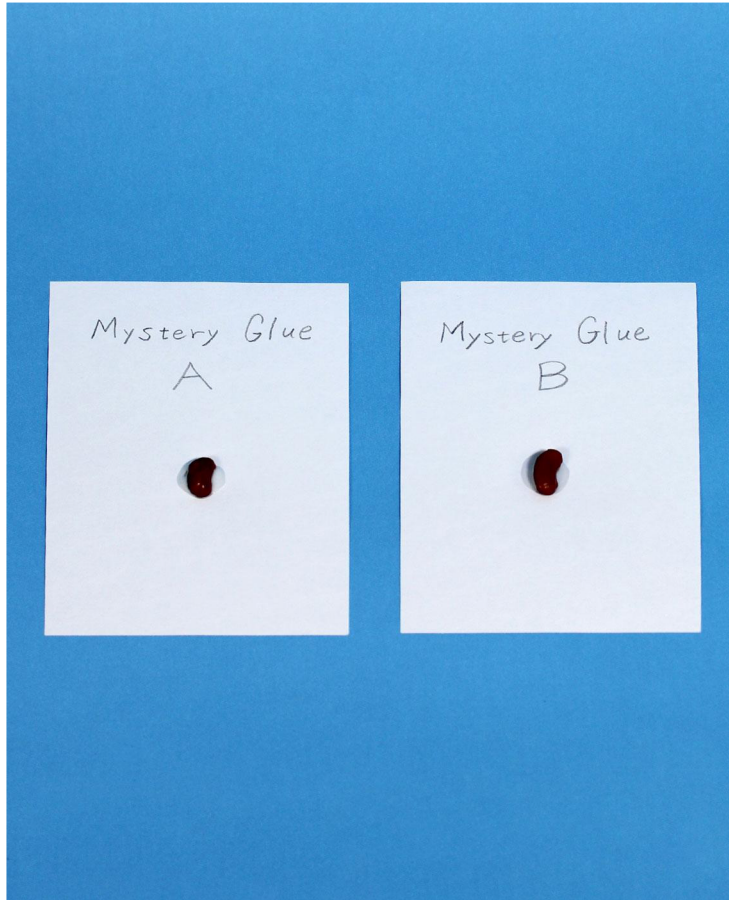


What **new properties** of these glues do you observe now?



Were the **sticky test results** the same for both Mystery Glues?

Did both glues show the **same amount of stickiness?**



Do the glues **look the same** when they are dry?

Today, we are going to investigate this question:

How can you tell if materials and substances are different?

Key Concept

You can tell if materials and substances are different by observing their properties or by testing them.

When **scientists and engineers communicate** what they know or what they are thinking, they use **certain types of words**.

They also **use evidence to support** what they are saying.

Providing Evidence

Question

Is a paper clip made from the same material as a toothpick?

Claim (Circle one.)

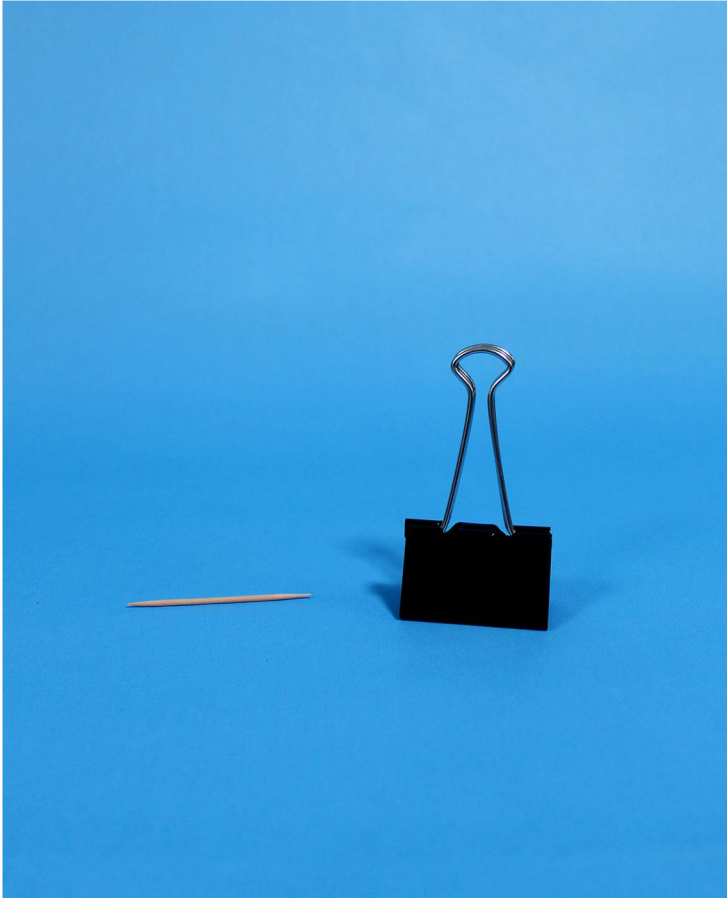
Yes, a paper clip is made from the same material as a toothpick.

No, a paper clip is made from a different material than a toothpick.

How do you know? What is your evidence?

This is a **writing tool** that you can use to answer different **science questions**.

Let's use it to try to answer this question.



Who thinks a paper clip is made of a **different material** than a toothpick?

Who thinks they're made of the **same material**?

Providing Evidence

Question

Is a paper clip made from the same material as a toothpick?

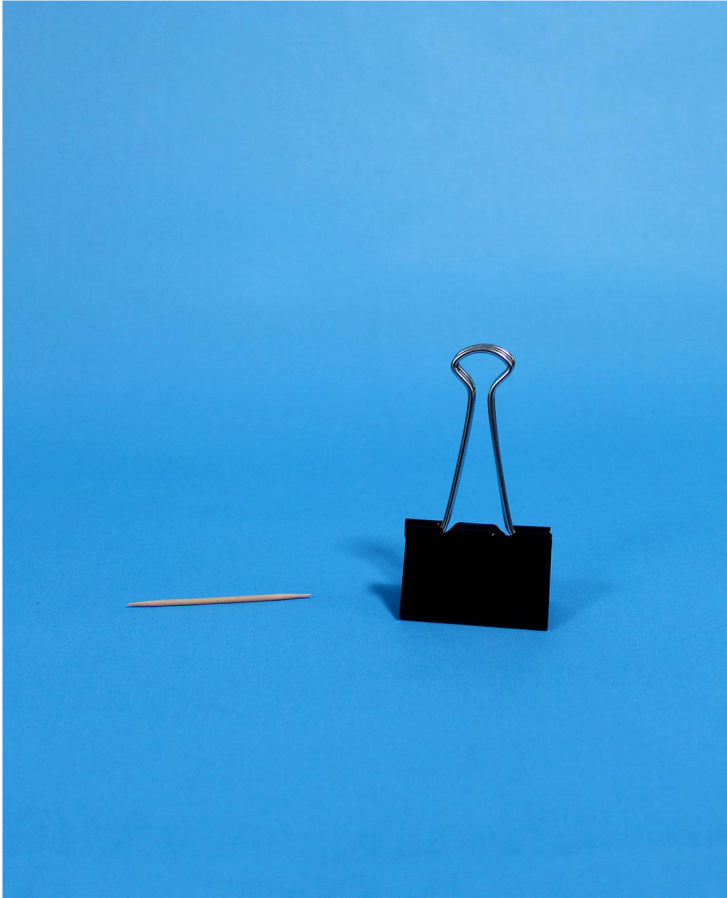
Claim (Circle one.)

Yes, a paper clip is made from the same material as a toothpick.

No, a paper clip is made from a different material than a toothpick.

How do you know? What is your evidence?

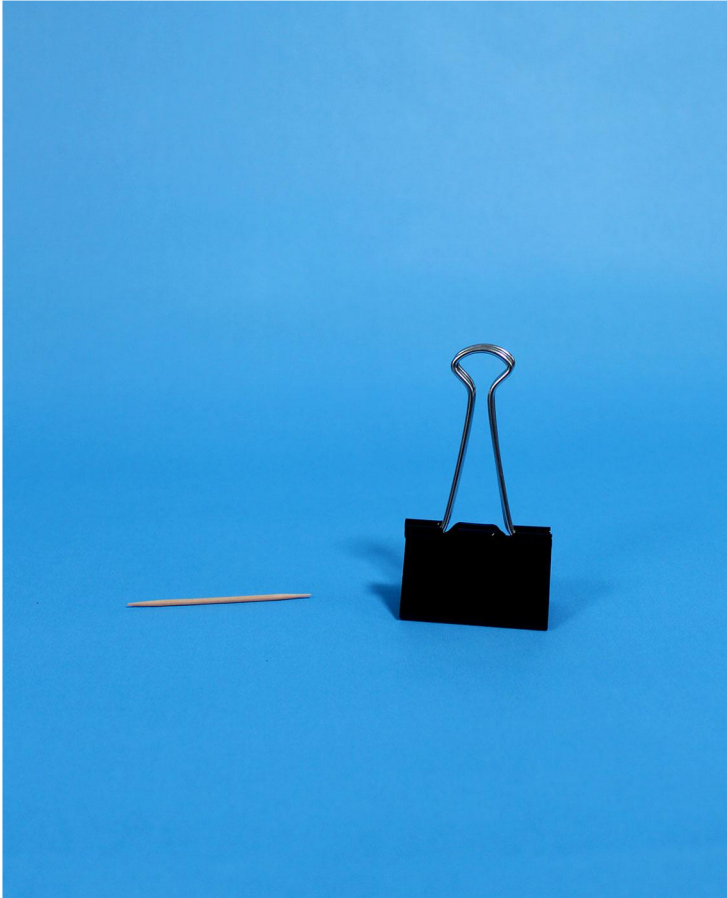
Okay, I think I will circle this answer.



Now that I have made a claim, I need to include evidence to support my claim.



How can we tell if materials or substances are different?



Let's refer to the key concept we posted.



What evidence do we have that a paper clip is made from a different material than a toothpick?

Providing Evidence

Question

Is a paper clip made from the same material as a toothpick?

Claim (Circle one.)

Yes, a paper clip is made from the same material as a toothpick.

No, a paper clip is made from a different material than a toothpick.

How do you know? What is your evidence?

I observed that a paper clip and a toothpick have different properties.

We know that a paper clip and a toothpick are different because they have different properties. Our **evidence** is the **properties of the materials** that they are made of.

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?

Turn to **page xx** in your notebooks.

You will **make a claim**
and **provide evidence**
to support it, just like
we did with the paper
clip and the toothpick.

Properties of Materials: Designing Glue

Problem students work to solve

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

Chapter 1 Question

How can you make a sticky glue? (introduced in 1.3)

Investigation Questions

What can be noticed about different materials? (1.2-1.3)

How can you tell if substances are different? (1.4)

How can the properties of a mixture change? (1.5-1.7)

Evidence sources and reflection opportunities

- Read *What If Rain Boots Were Made of Paper?* (1.2)
- Reflect on materials and properties (1.3)
- Brainstorm uses and properties of a good glue (1.3)
- Observe mystery glues (1.3)

- Observe properties of dry mystery glues and analyze results of mystery glue sticky tests (1.4)
- Write arguments about whether mystery glues are the same or different (1.4)

- Observe dry glue ingredients (1.5)
- Make and observe mixtures (1.5)
- Graph and analyze sticky tests results (1.6)
- Read *Jelly Bean Engineer* (1.7)

Key concepts

- 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. (1.3)

- You can tell if materials and substances are different by observing their properties or by testing them. (1.4)

How does this activity support students?

Investigation Question

Which ingredients should we use (or not use) in our glue? (1.8-1.9)*

Application of key concepts to problem

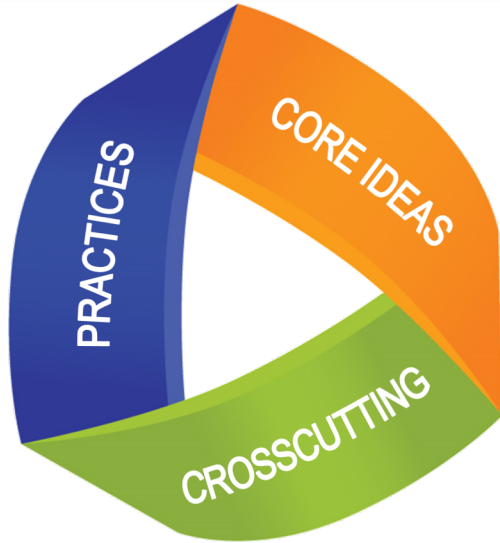
- Write design arguments for the ingredients that make the best glues (1.8)
- Make Glue #1 (1.9)
- Write a comparison of partners' glues (1.9)

Explanation that students can make to answer the Chapter 1 Question

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.

*This Investigation Question guides application of key concepts to the problem.

Thinking three dimensionally



Disciplinary Core Ideas

- Refer to the key concepts

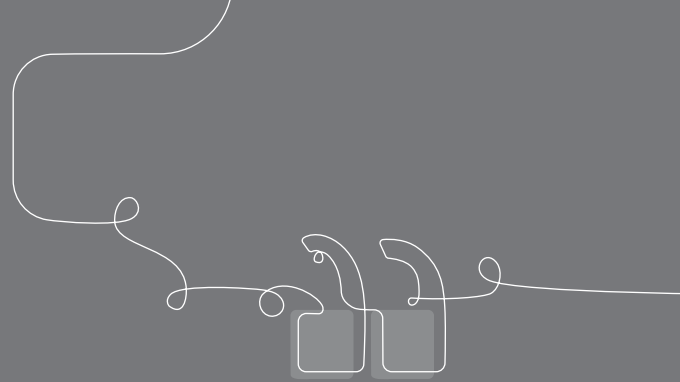
Science and Engineering Practices

- Which practices did you use to figure out these ideas?

Crosscutting Concepts

- Which crosscutting concepts were useful to make sense of what you figured out?

Questions?



Stop and Jot on your way to lunch

Rate your comfort with the following statement from 1-4

(4 being very comfortable):

I understand how activities within a lesson support students with building complex explanations.

3!

I am wondering about...

Please also note any needs or wonderings for the afternoon!



Properties of Materials

Plan for the day

- Framing and reflection
- Experiencing the unit
- **The story of the unit**
- Planning to teach
- Closing

The story of the unit

The purpose of this part of the day is for you to:

- Understand how students build and apply science knowledge throughout Properties of Materials.
- Apply this understanding to the End-of-Unit Assessment.
- Leverage the progress builds to gauge student understanding throughout the unit.



Chapter 1: How can you make a sticky glue?

9 Lessons



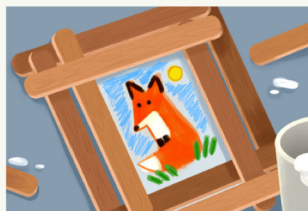
Chapter 2: Can heating an ingredient make a better glue?

4 Lessons



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

5 Lessons



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

4 Lessons

Chapter 1 key concepts and design argument

How can you make a sticky glue?

Pg.
XX

Ch	Key concepts	Design argument
1	<p>Properties include how materials smell, look, taste, feel, and sound. (1.2)</p> <p>Different materials have different properties. (1.3)</p> <p>You can tell if materials and substances are different by observing their properties or by testing them. (1.4)</p> <p>Properties of mixtures can change when other ingredients are added. (1.5)</p> <p>Properties of substances are the same whether you have a small amount or a large amount. (1.7)</p>	<p>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 sticky test. That is how I know that flour, and water are the ingredients that would design goal of making sticky glue.</p>

The observable property of our glue is stickiness

Chapter 1 key concepts and design argument

How can you make a sticky glue?

Pg.
XX

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)

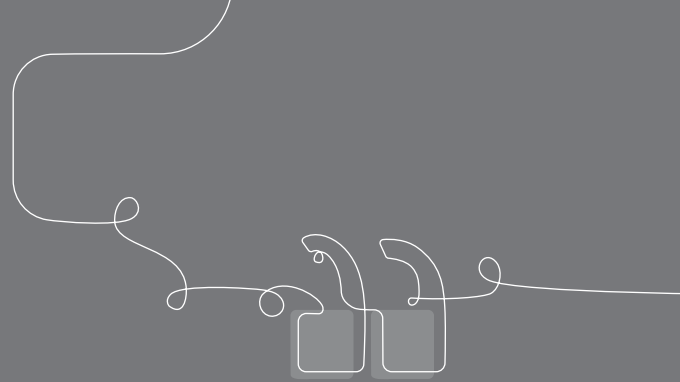
You can tell if materials and substances are different by observing their properties or by testing them. (1.4)

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.

Mixtures have different properties depending on their ingredients



Turn and talk:

- How does formalizing conceptual understanding by posting key concepts support students in solving the unit problem?

Ch	Key concepts	Design argument
1	<p>Properties include how materials smell, look, taste, feel, and sound. (1.2)</p> <p>Different materials have different properties. (1.3)</p> <p>You can tell if materials and substances are different by observing their properties or by testing them. (1.4)</p> <p>Properties of mixtures can change when other ingredients are added. (1.5)</p> <p>Properties of substances are the same whether you have a small amount or a large amount. (1.7)</p>	<p>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.</p>
2	<p>When a substance is heated or cooled, its properties can change. (2.1)</p> <p>Some substances change back to the way they were before they were heated or cooled. (2.2)</p> <p>If a substance doesn't change back to the way it was, it has become a different substance. (2.2)</p>	<p>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 <i>Handbook of Interesting Ingredients</i> that cornstarch becomes thick when heated and gets sticky when it starts to dry out. This is why I think we should heat it.</p>

Progress Build: A unit-specific learning progression

Deep, causal
understanding



Prior
knowledge



In your group take turns sharing...

- Which ideas are revisited over multiple chapters? (started as foundational but built upon throughout your model?)
- What new ideas are added in each level of your build? (how did you represent new ideas in your model?)

Listening group:

-Listen for what is the same or different about the other group's visual to your own.

Properties of Materials Progress Build

Deep, causal
understanding



Prior knowledge

A mixture may have a combination of the properties of its ingredients.

Heating or cooling a substance can change it to a new substance.

Mixtures have different properties, depending on their ingredients.

Different materials have different properties.

Pg.
XX

End-of-Unit Assessment



Anticipatory turn and talk

Reflect on the End-of-Unit Assessment in your last unit

- What kind of data did you gather from the End-of-Unit Assessment?
- What did you like about the End-of-Unit Assessment?
- What did you find challenging about the End-of-Unit Assessment?

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, jiggy, smells funny
heated cornstarch and water	smooth, feels like gel, thick, spreadable, see-through
flour and water	lumpy, very sticky, not very strong

Progress Build and End-of-Unit Assessment cont.

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,

Pgs. XX-
XX

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 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:

- _____ sticky _____
- _____ strong _____
- _____ thick _____
- _____ spreadable _____

Next, 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-through
flour and water	lumpy, very sticky, not very strong

Opportunities to monitor progress

What other embedded assessment opportunities can you use to help monitor progress up the Progress Build before students get to the End-of-Unit Assessment?

- Find the Critical Juncture opportunities and add these to your visual.
- Next, locate at least one On-the-Fly Assessment that can be used to progress monitor students' developing conceptual understanding leading up to each Critical Juncture.

Reflective turn and talk

Revisit these ideas

- What kind of data can you gather from End-of-Unit Assessments?
- What do you like about End-of-Unit Assessments?
- What do you find challenging about End-of-Unit Assessments?



Properties of Materials

Plan for the day

- Framing and reflection
- Experiencing the unit
- The story of the unit
- Planning to teach
- Closing

Planning to teach

The purpose of this part of the day is for you to:

- Reflect on implementing Amplify Science in your classroom to select an area of growth.
- Engage in targeted small group practice in your area of growth.

Targeted small group work focus areas

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

Choosing a focus area

- While thinking about what to focus on, ask yourself:
 - For which category (1,2, or 3) did I mark myself as “least comfortable”?
 - Did that change over the course of today’s workshop?
 - Is there a newly illuminated challenge area that I would rather focus on?
 - What would be most helpful to examine collaboratively in this space?

Setting up your targeted group work

- *With your group determine your focus or goal for the work time. Be prepared to share what you focused on, what you learned, and any remaining questions for the presenter.*

Focus area reflection

- Based on your work in your focus area, what will you keep in mind as you plan to teach your next unit?

An illustration of a brown hand holding a red bean between the thumb and index finger. The hand is positioned over a light blue tray. On the tray, there are several other red beans, some with white cream or milk splatters. A wooden stick is also visible, with a white substance dripping from it. In the background, there are some yellow and pink decorative elements.

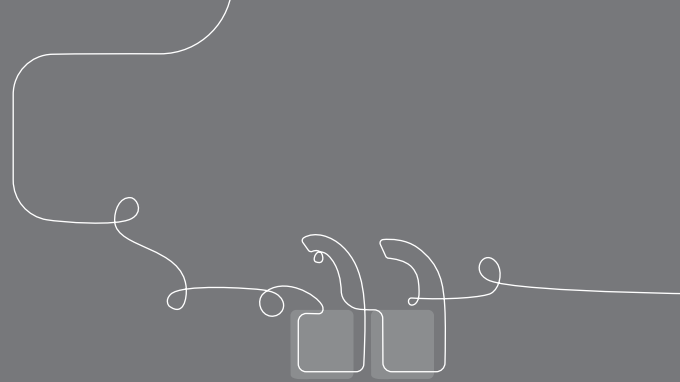
Properties of Materials

Plan for the day

- Framing and reflection
- Experiencing the unit
- The story of the unit

- Planning to teach
- **Closing**

Questions?



NYC Resource Site

<https://www.amplify.com/amplify-science-nyc-doe-resources/>

Amplify.

Introduction

Getting started resources

Planning and implementation resources

Admin resources

Parent resources

Professional learning resources

Questions



Missing Materials

- Contact the Core Curriculum Service Center Monday-Friday 8am-5pm

Email: curriculum@schools.nyc.gov

Phone: (718) 935-3334

Thank you for your feedback!

Presenter Name:
Workshop Title:

