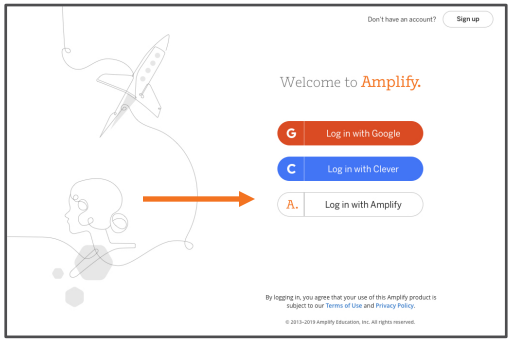
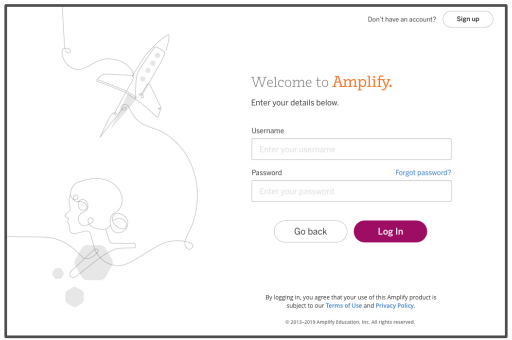
Welcome to Amplify Science!

Do now: Name tent and login





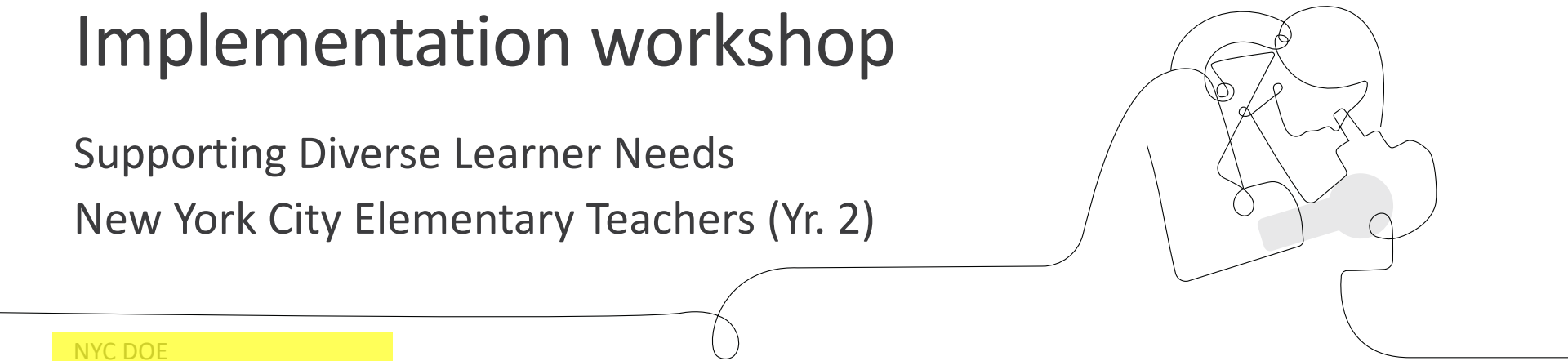
1. Make a name tent
2. Go to learning.amplify.com
3. Select Log in with Amplify
4. Enter teacher demo account credentials
   - XXXX@tryamplify.net
   - Password: AmplifyNumber1
5. Explore as we wait to begin

Amplify Science

Grade 5: Modeling Matter Implementation workshop

Supporting Diverse Learner Needs

New York City Elementary Teachers (Yr. 2)



NYC DOE
November 5, 2019
Presented by Your Name

Reflecting on Unit 1:
Where are you on the implementation continuum?

- Reflect on the overall implementation of unit 1 and determine where you would rate your implementation on the continuum.
- On a sticky note, write why you chose that location on the continuum.
- Place your sticky note on the continuum chart.

Implementation Not Yet Started

Effective Implementation

Sharing Ideals and Solutions

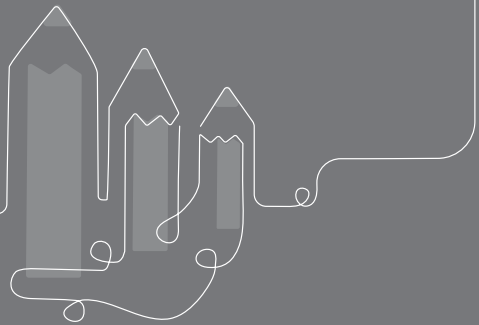
- Move to right side if you feel confident in the implementation area.
- Move to the left side if you feel less confident in the implementation area.
- On cue, form groups of two (confident / less confident ratings) to discuss the implementation area.
- Each rotation will be 1 minute.

Implementation Areas:

- Tips for Navigating platform and locating digital materials
- Tips for Multi-modal Instruction
- Tips for Managing print materials, kits and/or devices
- Tips for Utilizing Formative and/or Summative Assessments
- Tips for Planning and Pacing

Workshop goal

- Prepare teachers to implement Modeling Matter in their classrooms



Modeling Matter

Plan for the day

- Reflections and Framing the Day
- Defining Diverse Learners
- Understanding Opportunities for Supporting Diverse Learners
- Analyzing Formative Assessment Data and Embedded Differentiation strategies
- Planning to Teach
- Closing

Modeling Matter

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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

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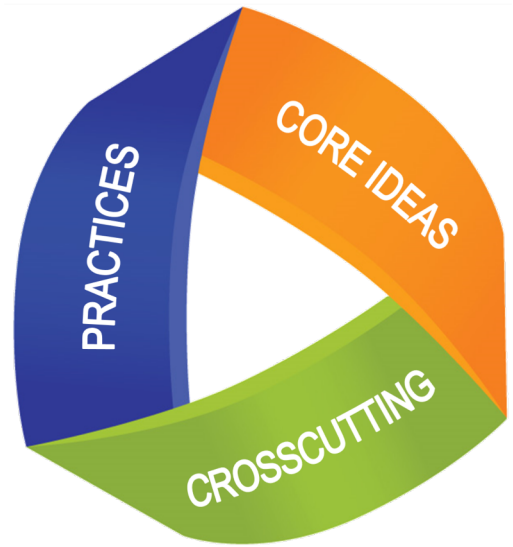
Problem-based deep dives

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

Thinking three dimensionally



Disciplinary Core Ideas

- Refer to the key concepts

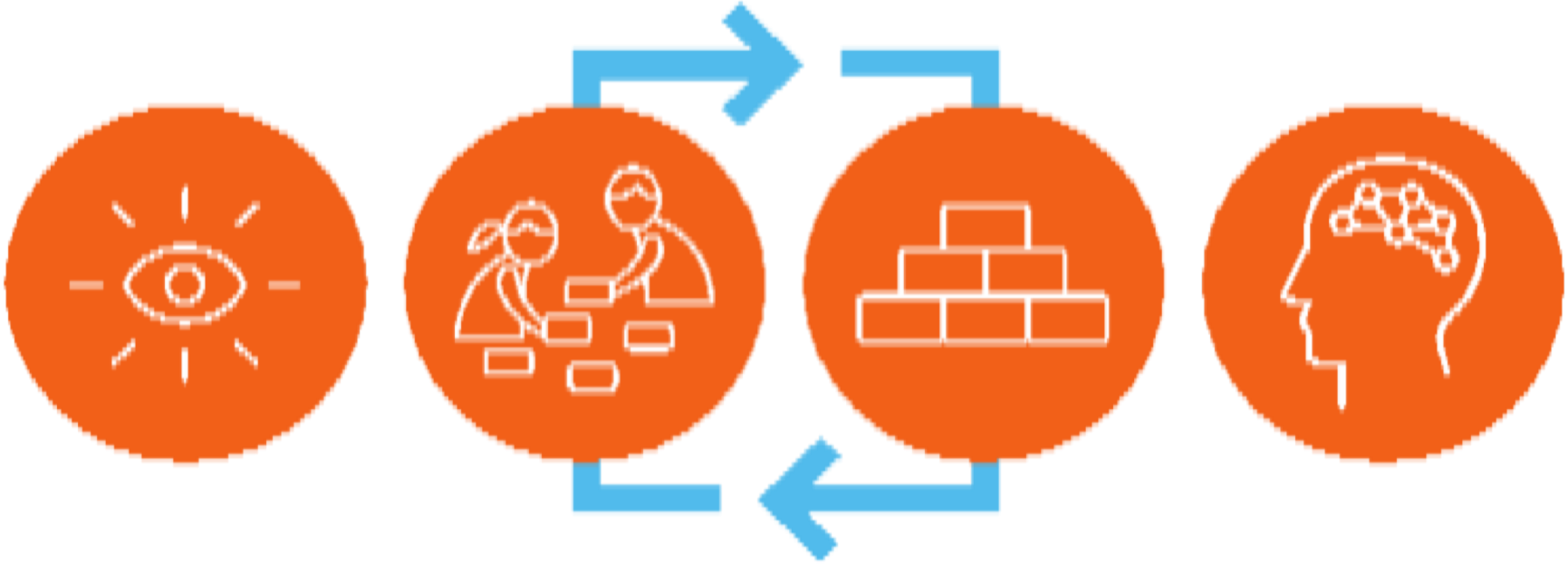
Science and Engineering Practices

- 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?

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

Amplify Science approach

Workshop Title: Supporting Diverse Learner Needs

By the end of this session, K-5 participants will be able to...

Which of these outcomes are you most interested in learning more about? Why?

- Identify embedded opportunities that support diverse learner needs within the unit of study
- Understand how to utilize the embedded multimodal curricular supports (do, talk, read, write, visualize) to help all students gather sources of evidence and argue like scientists
- Articulate the critical role that language and literacy play in developing scientific understanding
- Apply the End of Unit assessment rubric to understand student expectations
- Apply strategies that support diverse learner needs when planning instructional sequences

Modeling Matter

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Who are our Diverse Learners?

"Diverse learning is not based on race or dependent on a deficit model. Students who are considered gifted are also diverse learners. All students are diverse and unique, in their own right. Let's agree that diverse learning recognizes that all students have unique learning needs and we educators must be prepared to provide multiple entry points for all learners to access the rigor of the goals and standards."

Anonymous Educator

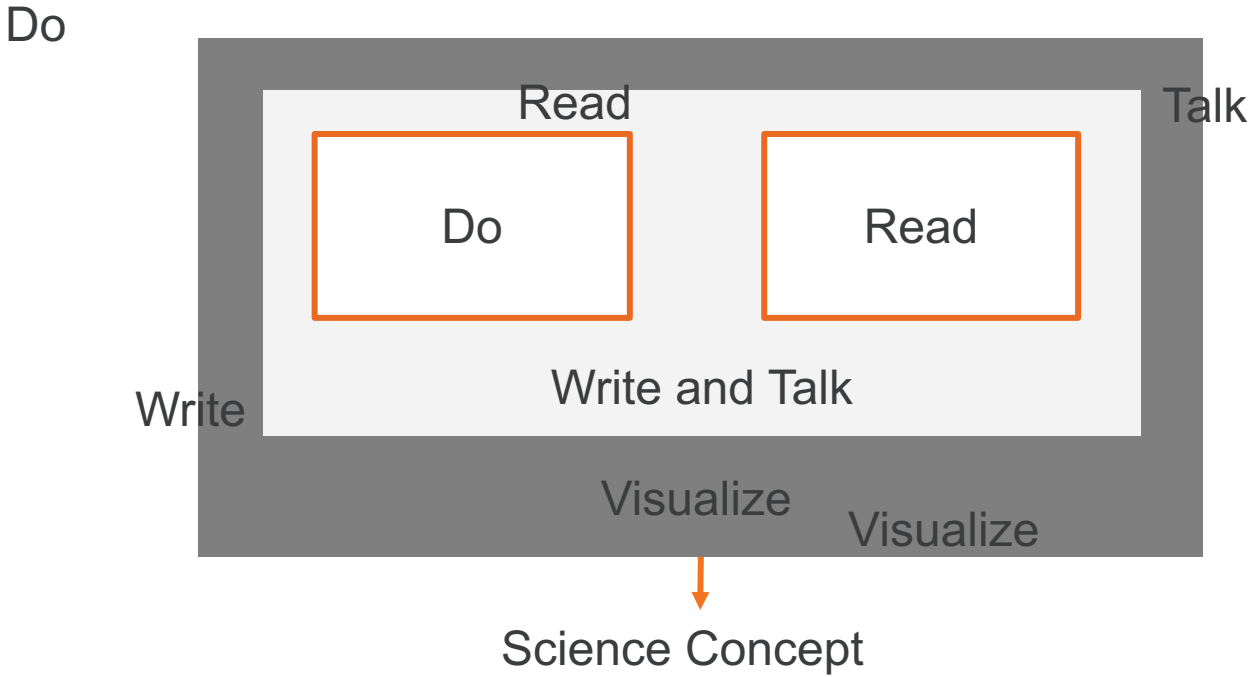
Charting Ideas from **your own** Teacher Toolkit?

What intuitive teacher strategies would you add to this list?

Modalities	Strategies (Solo or Collaboratively)
• **Doing** and completing tasks	
• **Talking** and adding ideas	
• **Reading** for information	
• **Writing** to convey understanding	
• **Visualizing** ideas	

Multimodal instruction

Do, Talk, Read, Write, Visualize

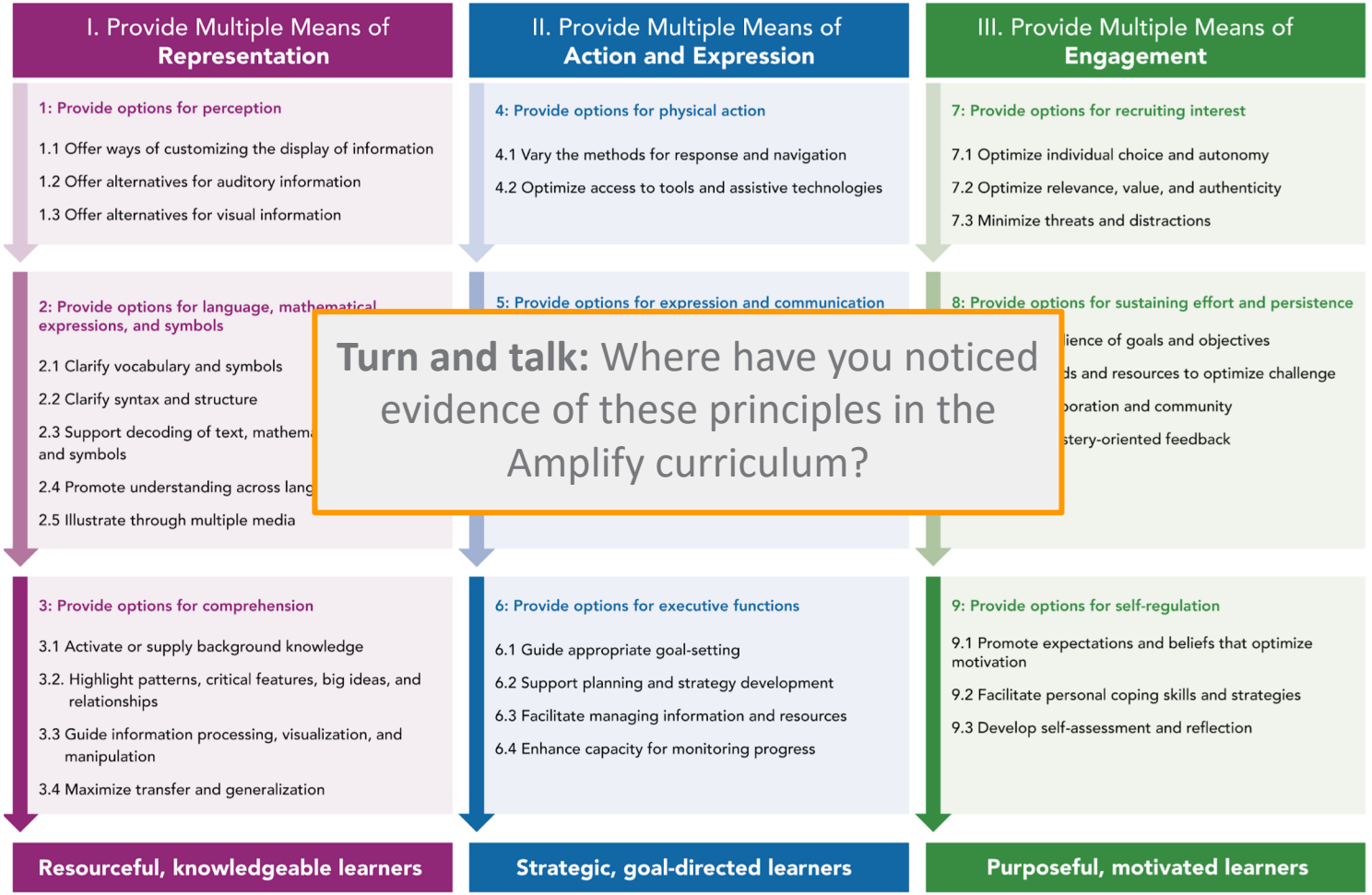


The Amplify Science Curriculum was developed with Supporting Diverse Learning Needs In Mind.

Universal Design for Learning

Universal Design for Learning (UDL) is a **research-based framework** for improving student learning experiences and outcomes by **focusing on careful instructional planning to meet the varied needs of students.** UDL is **NOT a special-education initiative**. Through the UDL framework, the **needs of ALL learners are considered** and planned for at the point of first teaching, thereby **reducing the need to reteach concepts.**

Universal Design for Learning Guidelines



Turn and talk: Where have you noticed evidence of these principles in the Amplify curriculum?

Culturally and linguistically responsive teaching

Culturally and linguistically responsive teaching (CLRT) principles **emphasize validating and valuing students' cultural and linguistic heritage** and **creating positive and nurturing learning environments** so that learning is more effective.

Access and Equity

Culturally and linguistically responsive teaching

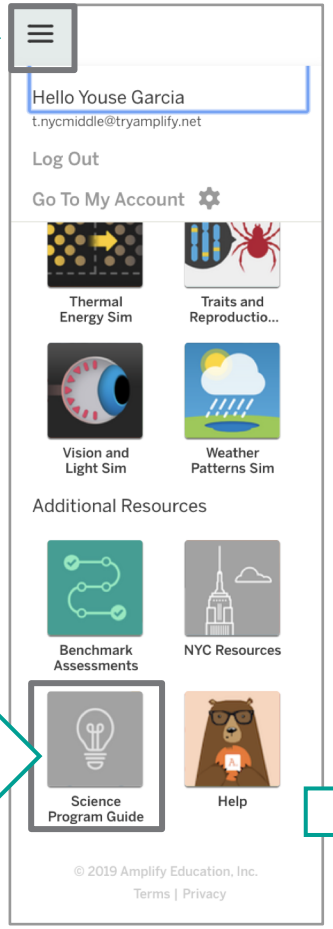
Turn and talk: Where have you noticed evidence of these principles in the Amplify curriculum?

CULTURALLY AND LINGUISTICALLY RESPONSIVE TEACHING PRINCIPLES

- Promote a positive disposition toward diversity: +
- Leverage students' cultural and experiential backgrounds: +
- Value language diversity and multilingualism: +
- Cultivate students' development of the language of science: +

Differentiation Strategies

1



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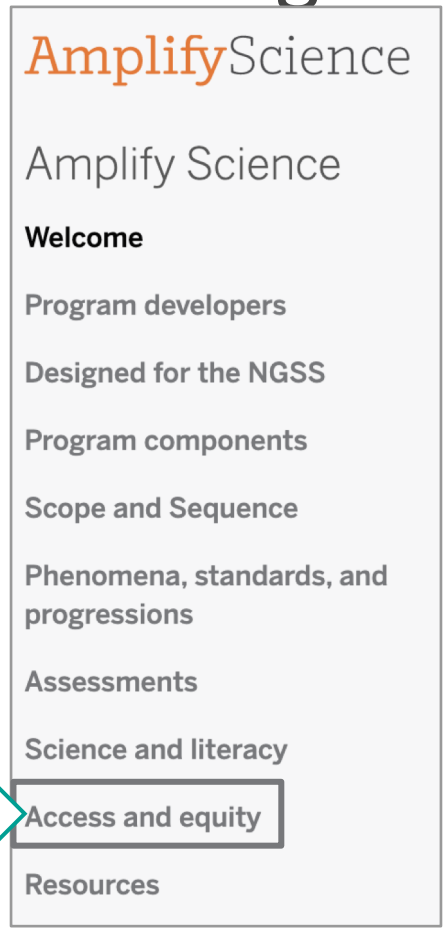

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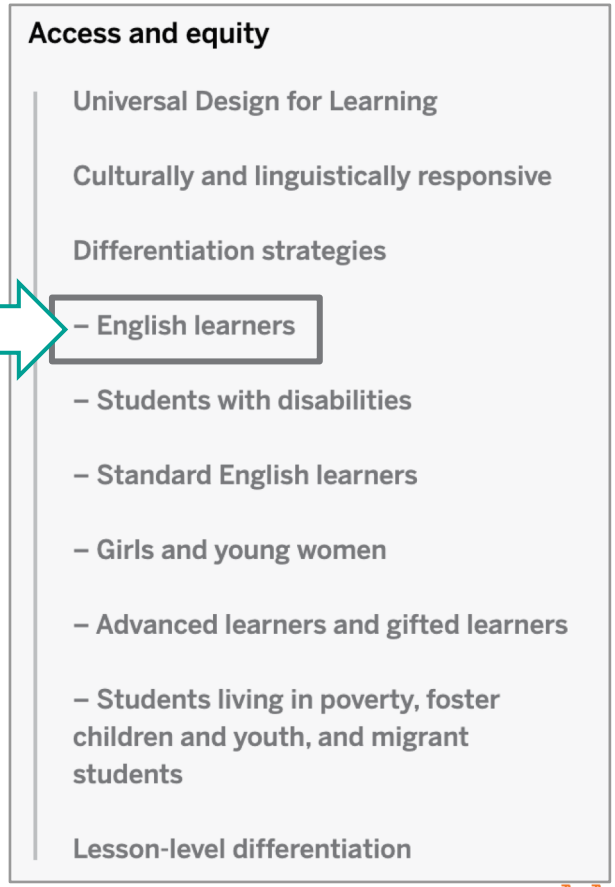

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English Learners

- Principle 1: Leverage and build students' informational background knowledge.
- Principle 2: Capitalize on students' knowledge of language.
- Principle 3: Provide explicit instruction about the language of science.
- Principle 4: Provide opportunities for scaffolded practice.
- Principle 5: Provide multimodal means of accessing science content and expressing science knowledge.

Language supports for English Learners in Amplify

Embedded instructional design: Many **scaffolds are embedded** within the instructional plan and are presented to teachers through the digital teacher materials and to all students as activities within the unit. Throughout the process of designing the curriculum, these scaffolds and supports were **planned, tested, and refined** to provide **rigorous yet accessible science instruction.**

Additional support: **Additional activities** and **specific methods for supporting English learners** are provided for use **as needed**, especially in the **Teacher Support notes within the lessons.**

English Learners jigsaw

- Principle 1: Leverage and build students' informational background knowledge.
- Principle 2: Capitalize on students' knowledge of language.
- Principle 3: Provide explicit instruction about the language of science.
- Principle 4: Provide opportunities for scaffolded practice.
- Principle 5: Provide multimodal means of accessing science content and expressing science knowledge.

DIRECTIONS

- Read your assigned principle
- Be ready to **share out how your principle appears in the Amplify curriculum**.

Students with disabilities meet the criteria under one of the following categories:

- Autism
- Deafness
- Deaf-blindness
- Emotional disturbance
- Hearing impairment
- Intellectual disability
- Multiple disabilities
- Orthopedic impairment
- Other health impairment
- Specific learning disability
- Speech or language impairment
- Traumatic brain injury
- Visual impairment (including blindness)

Standard English learners

Students who are Standard English Learners (SELs) are **ethnic minority students** and **primary English speakers who speak a dialect of English** in their home communities that is different from the “standard” dialect of English used in schools. **The goal for SELs** is to become bidialectal by **maintaining their home dialect of English while mastering standard English (SE) across the disciples**, including science.

Girls and young women

Historically, girls and young women have had **fewer opportunities** to participate in and benefit from **deep science and engineering learning**. To help combat this issue, Amplify Science aids teachers in **positioning girls and young women as powerful science and engineering learners**.

Advanced learners and gifted learners

Advanced learners and gifted learners, who **may be formally or informally identified,** show the **capacity for performance that is significantly higher than their age peers**. This group of students require their teachers to **focus on adding depth and complexity** in the science topics under study (as opposed to merely adding more work, additional topics, or skipping content or grade levels).

Students living in poverty, foster children and youth, and migrant students

Children and youth who experience **disruptions to their education** or are **living in potentially stressful situations lack equal access to quality science and engineering learning experiences**, and are **disproportionately negatively impacted in science academic outcomes**.

Modeling Matter

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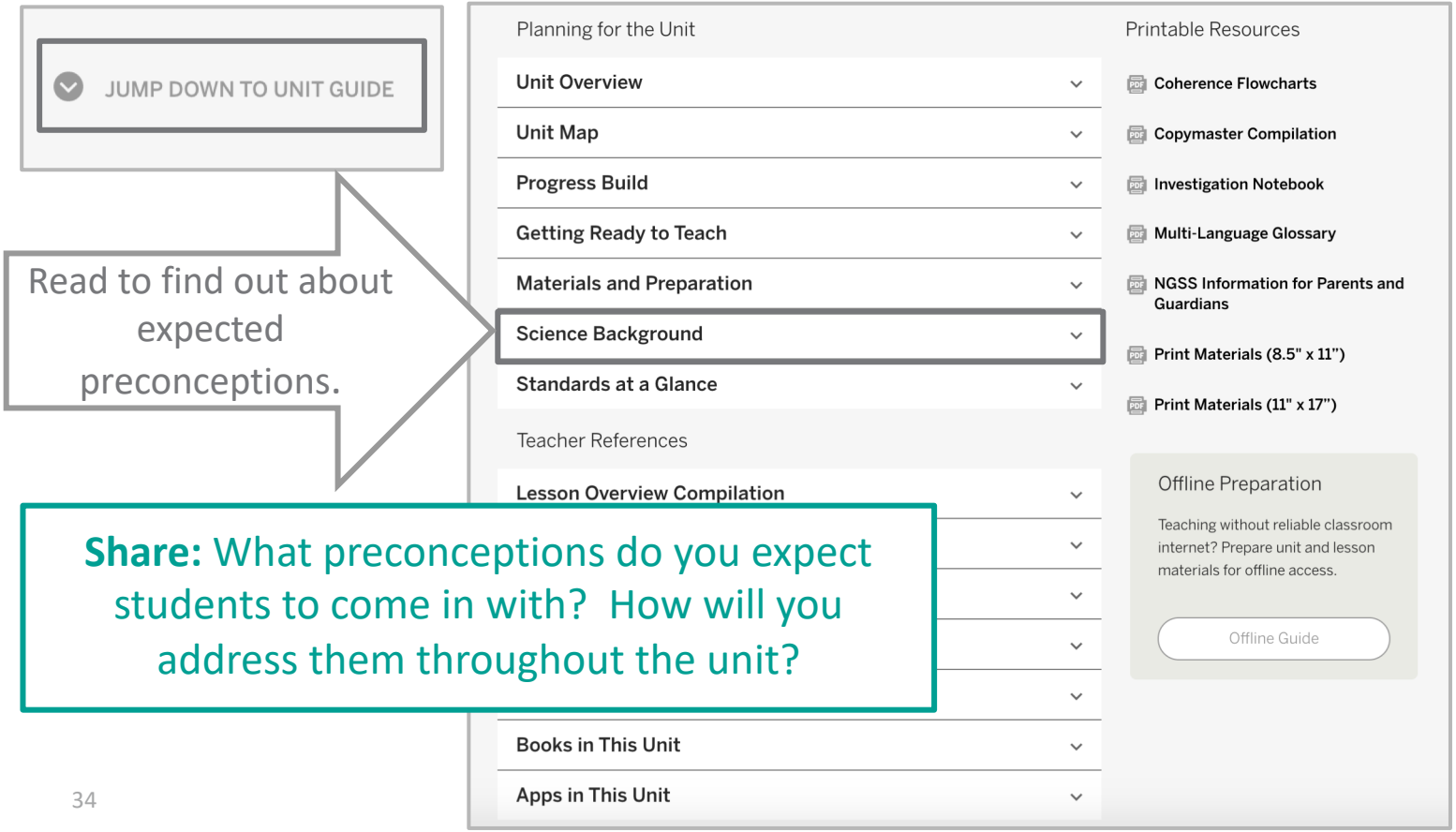
Grade 5: Modeling Matter

Anchor Phenomena: Chromatography is a process for separating mixtures. Some solids dissolve in a salad dressing while others do not. Oil and vinegar appear to separate when mixed in a salad dressing.

Role of the Student: In the role of food scientists working for Good Food Production, Inc., students are introduced to the ideas that all matter is made of particles too small to see and that each different substance is made of particles (molecules) that are unique. Students are then challenged to solve two problems: One problem requires them to separate a mixture, and the other problem requires them to make unmixable substances mix. Students are challenged to use the particulate model of matter to explain their work to the president of the company. In so doing, students figure out that the properties of materials are related to the properties of the nanoparticles that make up those materials.

Student preconceptions in this unit



Share: What preconceptions do you expect students to come in with? How will you address them throughout the unit?

Unit Level 3-D Statement

Key

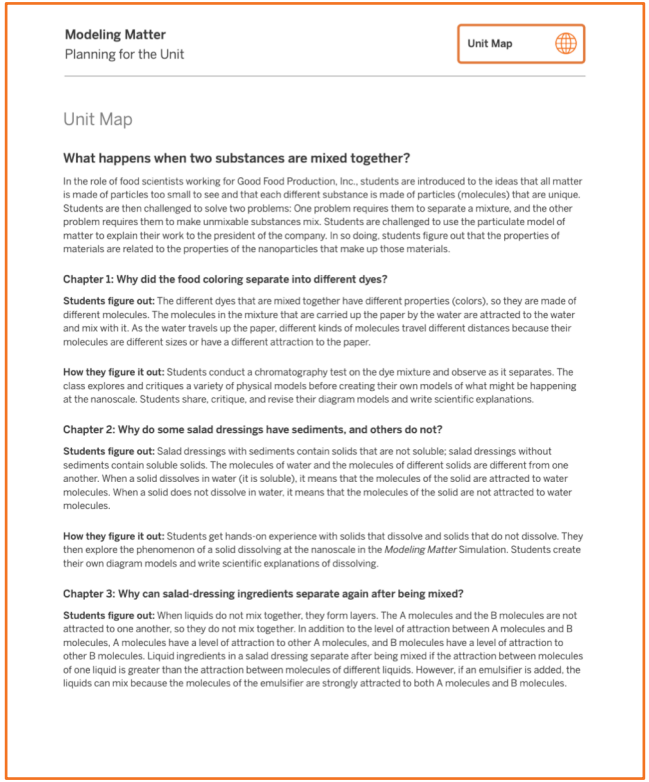
Practices **Disciplinary Core Ideas** **Crosscutting Concepts**

Unit Level

Students are introduced to the particulate model of matter (energy and matter) and apply it in their role as food scientists as they explain how to separate a food-coloring mixture and how to create a stable salad dressing (stability and change). They do this by making firsthand observations of a variety of macroscale phenomena involved in separating and creating mixtures and then by creating diagram models and using physical and digital models to visualize what might be happening at the nanoscale (scale, proportion, and quantity).

Unit Map

Pg. xx



Modeling Matter
Planning for the Unit

Unit Map

Unit Map

What happens when two substances are mixed together?

In the role of food scientists working for Good Food Production, Inc., students are introduced to the ideas that all matter is made of particles too small to see and that each different substance is made of particles (molecules) that are unique. Students are then challenged to solve two problems: One problem requires them to separate a mixture, and the other problem requires them to make unmixable substances mix. Students are challenged to use the particulate model of matter to explain their work to the president of the company. In so doing, students figure out that the properties of materials are related to the properties of the nanoparticles that make up those materials.

Chapter 1: Why did the food coloring separate into different dyes?

Students figure out: The different dyes that are mixed together have different properties (colors), so they are made of different molecules. The molecules in the mixture that are carried up the paper by the water are attracted to the water and mix with it. As the water travels up the paper, different kinds of molecules travel different distances because their molecules are different sizes or have a different attraction to the paper.

How they figure it out: Students conduct a chromatography test on the dye mixture and observe as it separates. The class explores and critiques a variety of physical models before creating their own models of what might be happening at the nanoscale. Students share, critique, and revise their diagram models and write scientific explanations.

Chapter 2: Why do some salad dressings have sediments, and others do not?

Students figure out: Salad dressings with sediments contain solids that are not soluble; salad dressings without sediments contain soluble solids. The molecules of water and the molecules of different solids are different from one another. When a solid dissolves in water (it is soluble), it means that the molecules of the solid are attracted to water molecules. When a solid does not dissolve in water, it means that the molecules of the solid are not attracted to water molecules.

How they figure it out: Students get hands-on experience with solids that dissolve and solids that do not dissolve. They then explore the phenomenon of a solid dissolving at the nanoscale in the *Modeling Matter* Simulation. Students create their own diagram models and write scientific explanations of dissolving.

Chapter 3: Why can salad-dressing ingredients separate again after being mixed?

Students figure out: When liquids do not mix together, they form layers. The A molecules and the B molecules are not attracted to one another, so they do not mix together. In addition to the level of attraction between A molecules and B molecules, A molecules have a level of attraction to other A molecules, and B molecules have a level of attraction to other B molecules. Liquid ingredients in a salad dressing separate after being mixed if the attraction between molecules of one liquid is greater than the attraction between molecules of different liquids. However, if an emulsifier is added, the liquids can mix because the molecules of the emulsifier are strongly attracted to both A molecules and B molecules.

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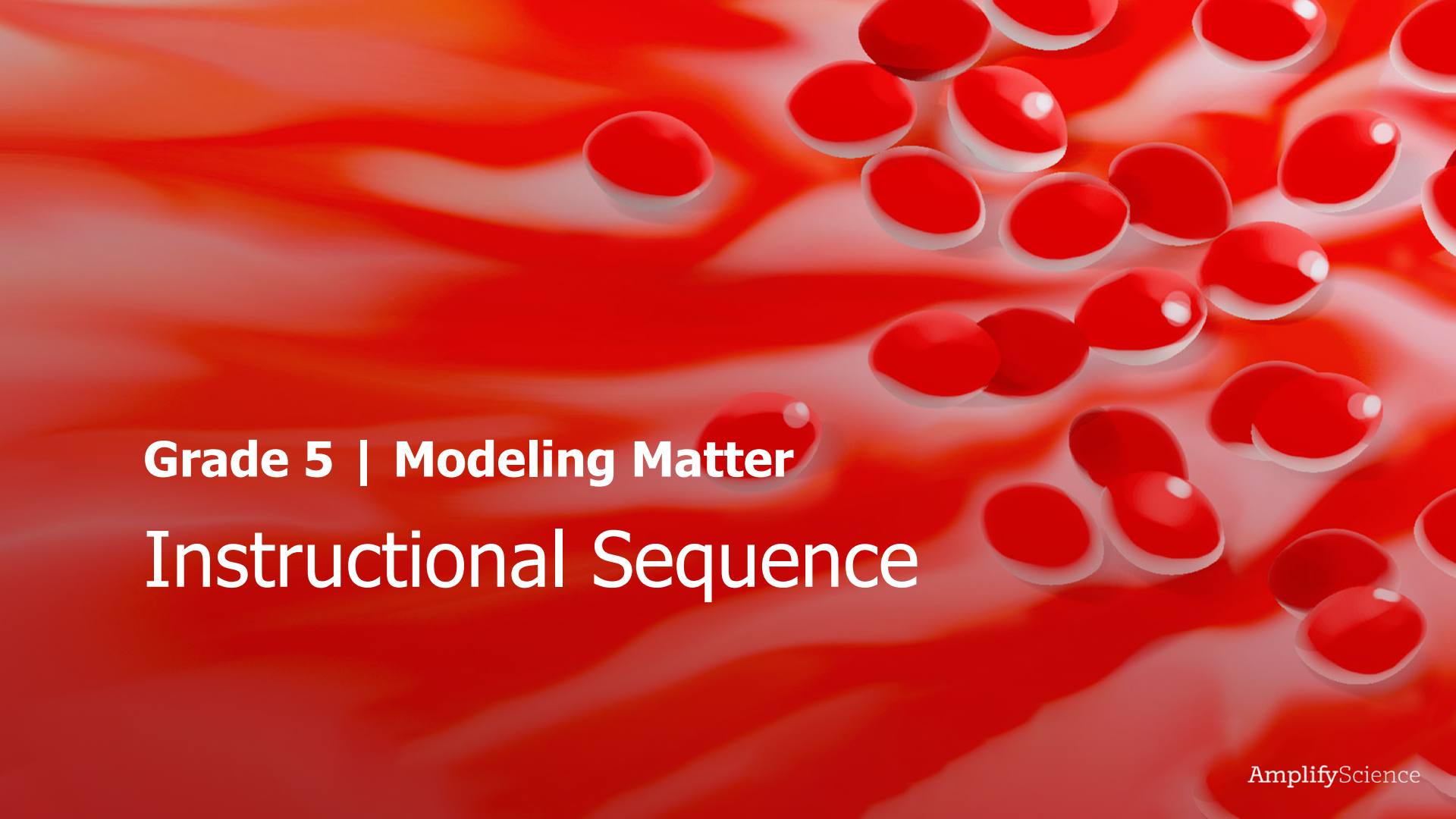


Grade 5 | Modeling Matter

Instructional Sequence

AmplifyScience

Take a moment to look at these pictures of food scientists.

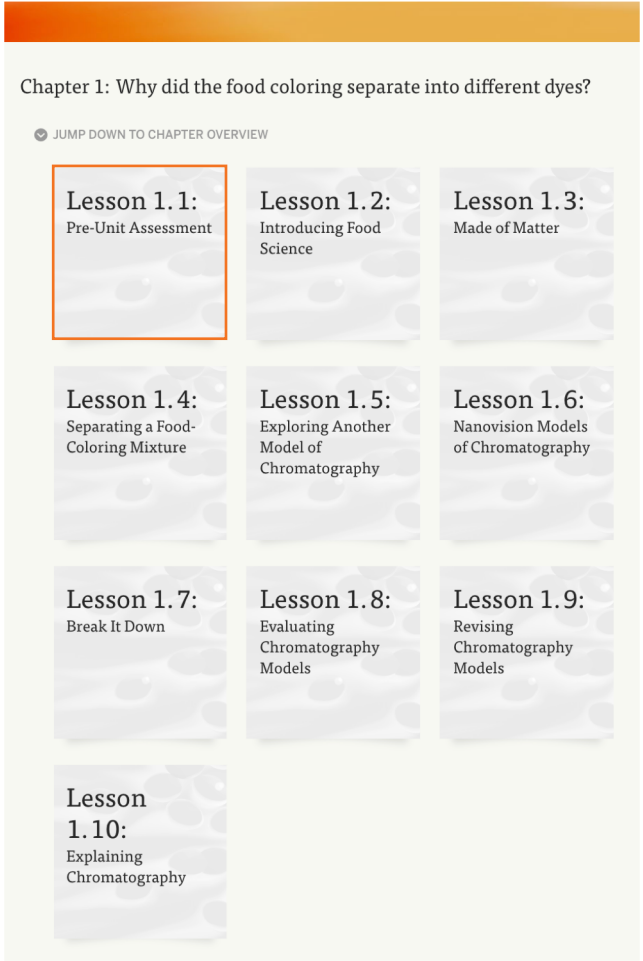
Where do you think a food scientist **works**?

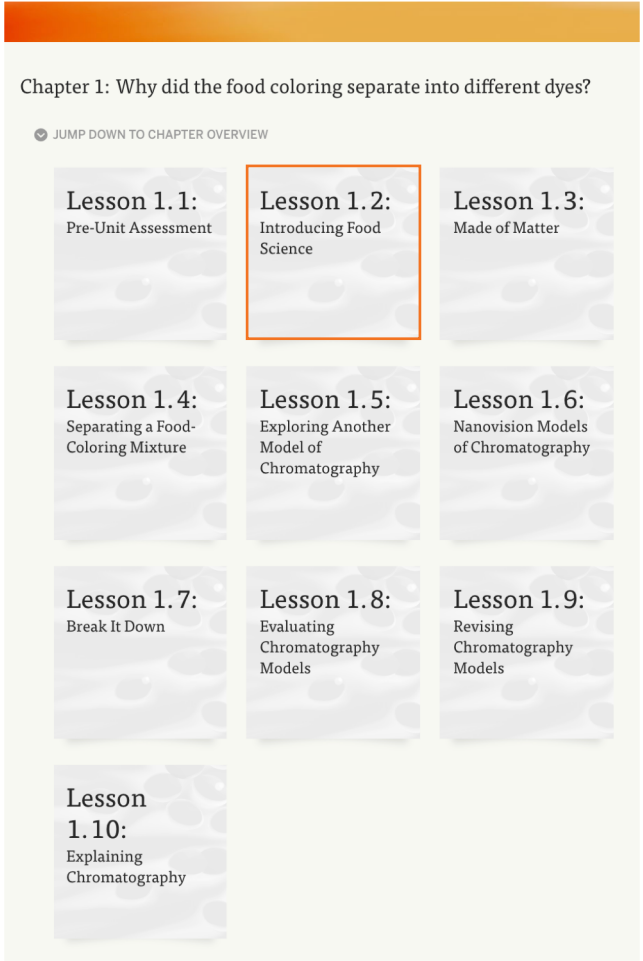
Take a moment to look at these pictures.

What do you think food scientists **want to find out** about the food they study?

Good Food Production, Inc.

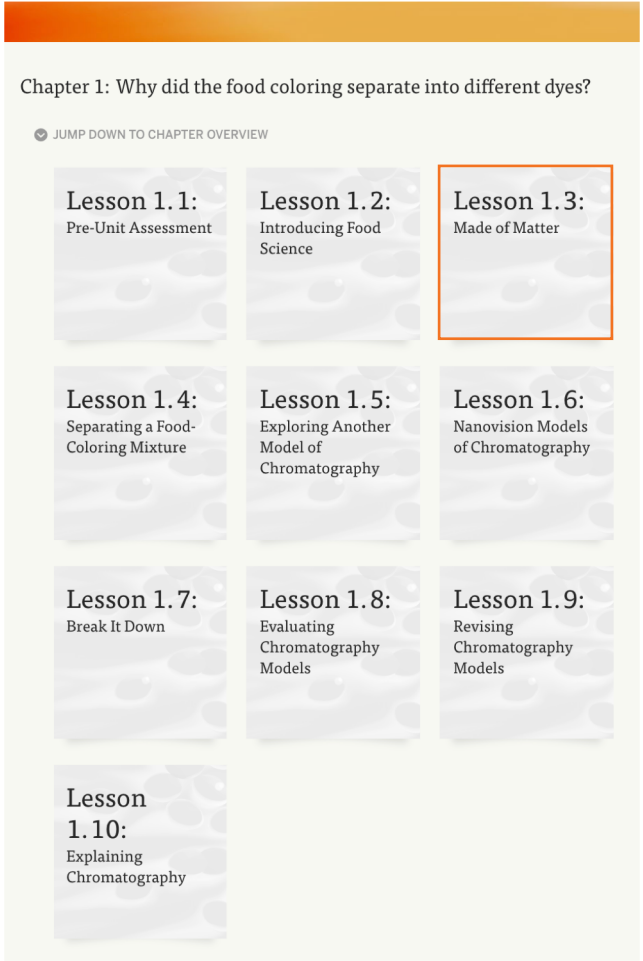
For the next few weeks, we are going to take on the role of **food scientists** for a company called Good Food Production, Inc.





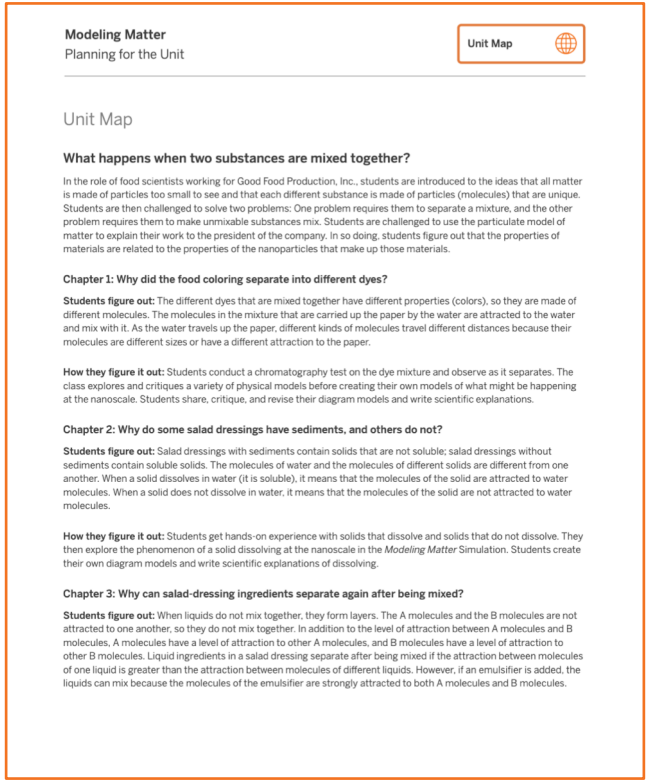
Unit Question

What happens when two substances are mixed together?



Unit Map

Pg. xx



Modeling Matter
Planning for the Unit

Unit Map

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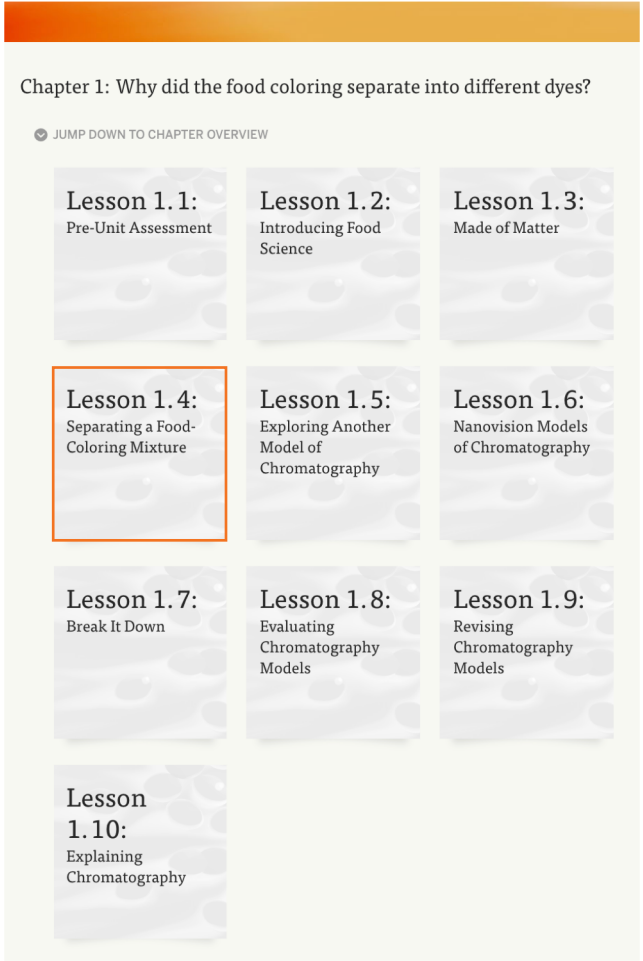
Coherence as a design principle

- 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

We are going to investigate these questions:

How are different kinds of molecules different? How are molecules similar?



To: Food Science Lab
From: Lauren Harold, President, Good Food Production, Inc.
Subject: Test for Harmful Food Dye

Good Food Production, Inc.

Dear Food Scientists,

Customers are concerned about food products that contain Red Dye #75. Some people believe that Red Dye #75 causes health problems in children. Good Food Production, Inc. wants to make sure our customers are safe!

We need to test the food coloring that's used in many of our products to see if it might contain red food dye, so we know if we need to submit it for further testing. Please determine whether our food coloring is a pure substance or whether it is a mixture. If it is a mixture, please determine whether red dye is part of the mixture.

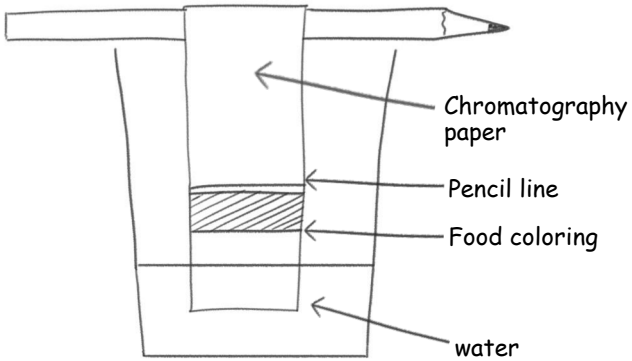
Sincerely,
Lauren Harold, President
Good Food Production, Inc.

This is the food dye that might be harmful, Red Dye #75.

This is the **food coloring** that Good Food Production, Inc. uses in many of its products.

We will **test** to find out if it is a mixture that could contain Red Dye #75.

Chromatography Diagram



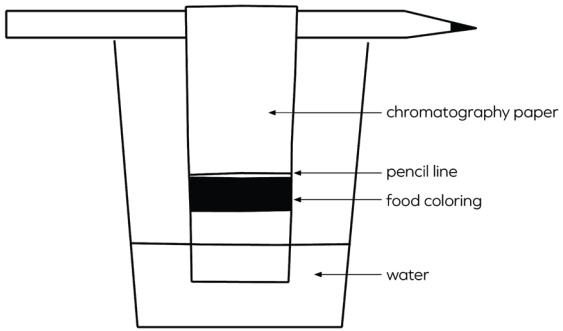
You will hang the paper strip so the bottom touches the water.

What do you **predict** will happen?

Name: _____ Date: _____

Using Chromatography to Separate a Mixture

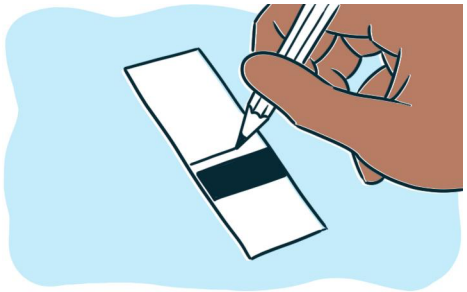
1. **Draw a pencil line.** On the paper strip, draw a pencil line along the top edge of the food coloring.
2. **Attach the paper strip so it hangs in the water, but the food coloring is still above the water.** Tape the top of the paper strip to a pencil. The bottom of the paper strip should just touch the water in the cup, and the food coloring should remain above the water.
3. **Start the chromatography test by hanging the paper strip in the water.** Place the pencil across the top of the cup.



Turn to page x in your notebooks.

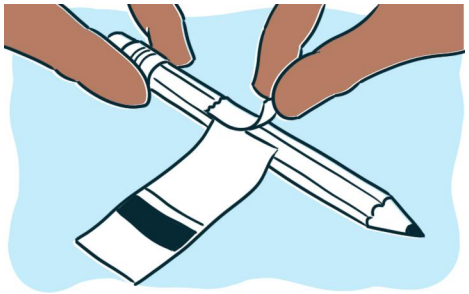
Let's review the directions.

Chromatography Test



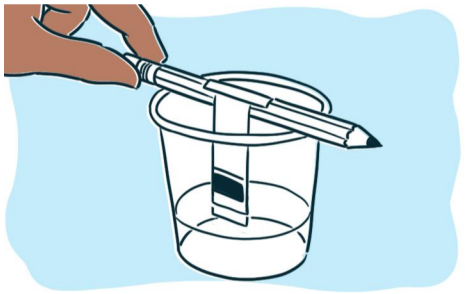
Step 1

Draw a pencil line.



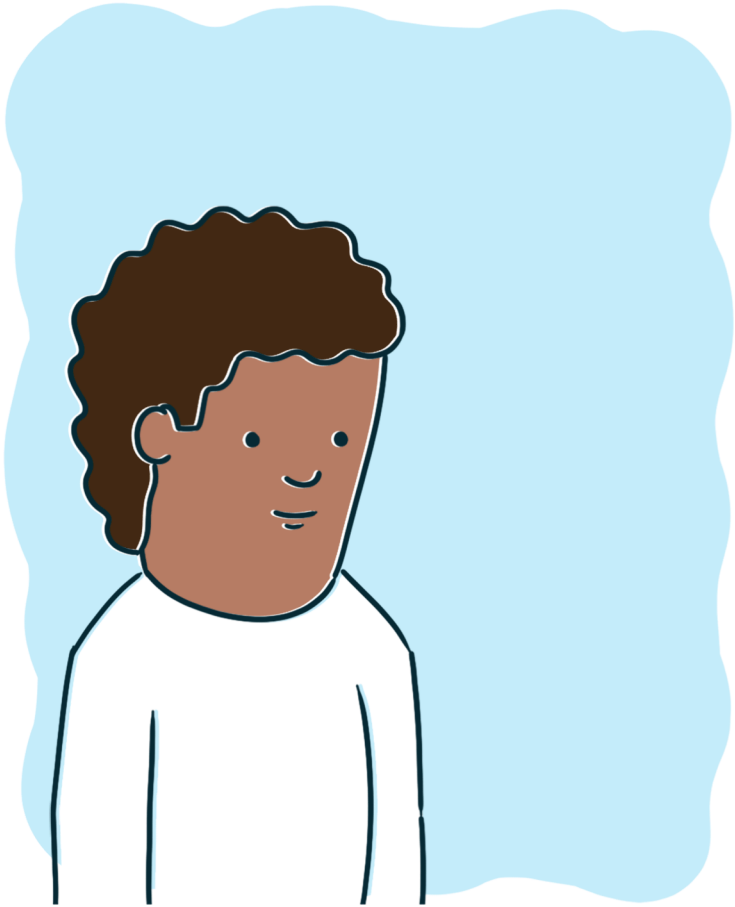
Step 2

Tape the top of the paper strip to a pencil so that the paper strip will hang in the water, with the food coloring still above the water.



Step 3

Place the pencil across the top of the cup to begin the test.



Today you will pretend to have nanovision goggles.

Put on your imaginary **nanovision goggles** to make things look billions of times larger than they really are.

In this model, each piece of pasta represents a molecule.

What do you notice about the **molecules**?

Let's think about the substances in our model one substance at a time.

Are the molecules of this substance **the same or different**?

Key Concept

All molecules of one substance are exactly the same, and they are different from molecules of any other substance.

Remember that we are investigating these questions:

How are different kinds of molecules different? How are molecules similar?

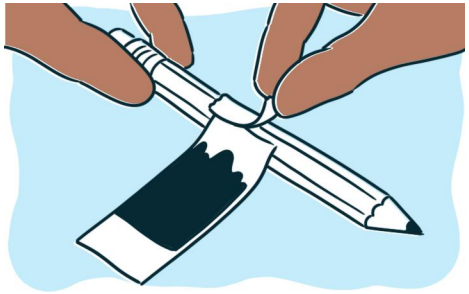
How could we **separate the mixture** in our model back into three separate substances?

What was it about the **molecules** in the pasta mixture that allowed the mixture to **separate** when the container was shaken?

Finishing the Chromatography Tests

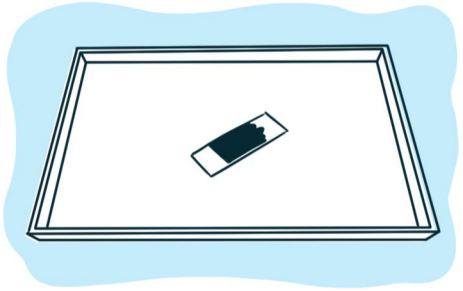
Step 1

Lift the paper strip out of the cup.



Step 2

Carefully **remove the tape** holding the paper to the pencil.



Step 3

Let the strip dry by leaving it on your tray.

What **colors** of dye do you see in your chromatography strip?

Based on these observations, was the food coloring a **substance or a mixture**?

Is it possible that the harmful Red Dye #75 is in the food coloring mixture?

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?

Modeling Matter: The Chemistry of Food

The problem students work to solve

How can we help Good Food Production, Inc. solve problems with their products—figuring out if their food coloring includes a harmful dye and creating an appealing salad dressing?

Pg. xx

Chapter 1 Question

Why did the food coloring separate into different dyes? (introduced in 1.5)

Investigation Questions

How are different substances different? (1.2)

How are different kinds of molecules different? How are molecules similar? (1.3-1.4)

How do differences in molecules cause substances to separate? (1.5-1.7)

Evidence sources and reflection opportunities

Observe and record properties of food mixtures (1.2)

- Observe digital Scale Tool to view nanoscale objects (1.3)
- Read *Made of Matter* (1.3)
- Use chromatography to separate food coloring mixture (1.4)
- Observe the Pasta Model and discuss in relation to chromatography (1.4)
- Write about how molecules can be similar and different (1.4)

- Use and discuss the Fan Model of chromatography (1.5)
- …vision models of chromatography first …gital
- …nalyze how scientists focus on …o separate mixtures (1.8)
- …sion models of chromatography (1.8)

What are students figuring out?

Key concepts

- All molecules of one substance are exactly the same, and they are different from molecules of any other substance. (1.4)

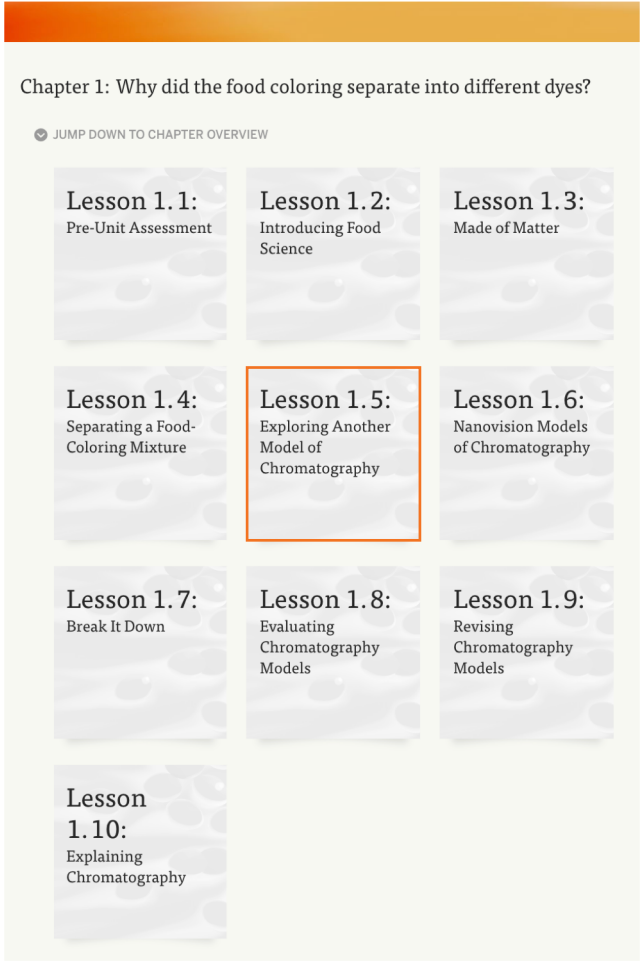
- Different molecules have different properties. (1.5)
- The properties of a substance are determined by the properties of its molecules. (1.8)

Application of key concepts to the problem

- Revise nanovision models (1.9)
- Write explanations to answer the Chapter 1 Question (1.10)

Explanation that students can make to answer the Chapter 1 Question

The different dyes that are mixed together have different properties (colors), so they are made of different molecules. The molecules in the mixture that are carried up the paper by the water are attracted to the water and mix with it. As the water travels up the paper, different kinds of molecules travel different distances because their molecules are different sizes or have a different attraction to the paper.



To: Food Science Lab
From: Lauren Harold, President, Good Food Production, Inc.
Subject: Results of Chromatography Test

Good Food Production, Inc.

Dear Food Scientists,

Thank you for your work, but that's too bad that you found red dye in our food-coloring mixture. If it turns out to be Red Dye #75, replacing the food coloring in our food products will be quite expensive. When I send the food coloring out for further testing, I will need to explain what happened in your tests that led you to find the red dye. How does chromatography work? Are you certain that your test worked? Please provide a detailed scientific explanation.

Sincerely,
Lauren Harold, President
Good Food Production, Inc.

Chapter 1 Question

Why did the food coloring separate into different dyes?

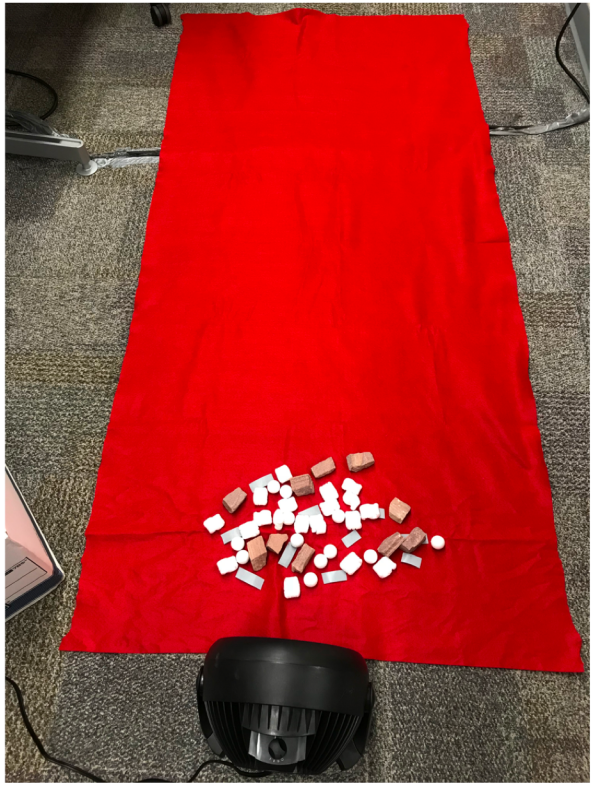
First, we are going to investigate this question:

How do differences in molecules cause substances to separate?

Shared Listening

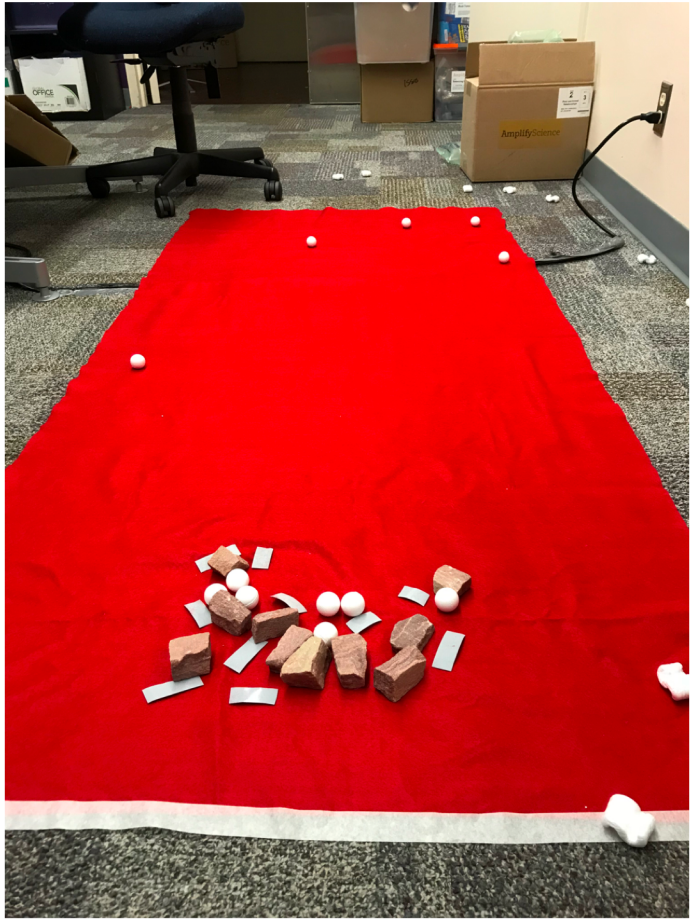
Take a moment to independently reflect on these questions:

1. What might have made the dyes travel up the paper?
2. Why do you think the food coloring separated?



Key Concept

Different molecules have different properties.



Vocabulary

attract

to pull on an object, even without touching it

Modeling Matter: The Chemistry of Food

The problem students work to solve

How can we help Good Food Production, Inc. solve problems with their products—figuring out if their food coloring includes a harmful dye and creating an appealing salad dressing?

Pg. xx

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How do differences in molecules cause substances to separate? (1.5-1.7)

Evidence sources and reflection opportunities

Observe and record properties of food mixtures (1.2)

- Observe digital S… objects (1.3)
- Read *Made of M…*
- Use chromatogra… coloring mixture…
- Observe the Past… relation to chron…
- Write about how … different (1.4)

- Use and discuss the Fan Model of chromatography (1.5)
- Make and evaluate nanovision models of chromatography first by drawing, then with digital tool (1.6)
- Read *Break it Down* (1.7)
- Revisit *Break it Down* to analyze how scientists focus on properties of molecules to separate mixtures (1.8)
- Evaluate example nanovision models of chromatography (1.8)

What are students figuring out?

Why post this key concept now?

Key concepts

- All molecules of o… same, and they ar… any other substan…

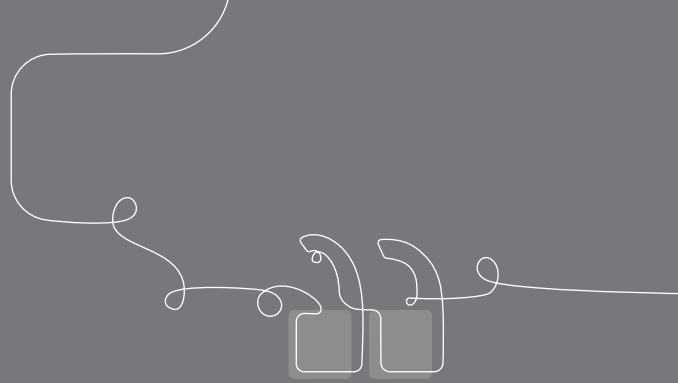
- Different molecules have different properties. (1.5)
- The properties of a substance are determined by the properties of its molecules. (1.8)

Application of key concepts to the problem

- Revise nanovision models (1.9)
- Write explanations to answer the Chapter 1 Question (1.10)

Explanation that students can make to answer the Chapter 1 Question

The different dyes that are mixed together have different properties (colors), so they are made of different molecules. The molecules in the mixture that are carried up the paper by the water are attracted to the water and mix with it. As the water travels up the paper, different kinds of molecules travel different distances because their molecules are different sizes or have a different attraction to the paper.



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: Why did the food coloring separate into different dyes?

JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

Lesson 1.2:
Introducing Food Science

Lesson 1.3:
Made of Matter

Lesson 1.4:
Separating a Food-Coloring Mixture

Lesson 1.5:
Exploring Another Model of Chromatography

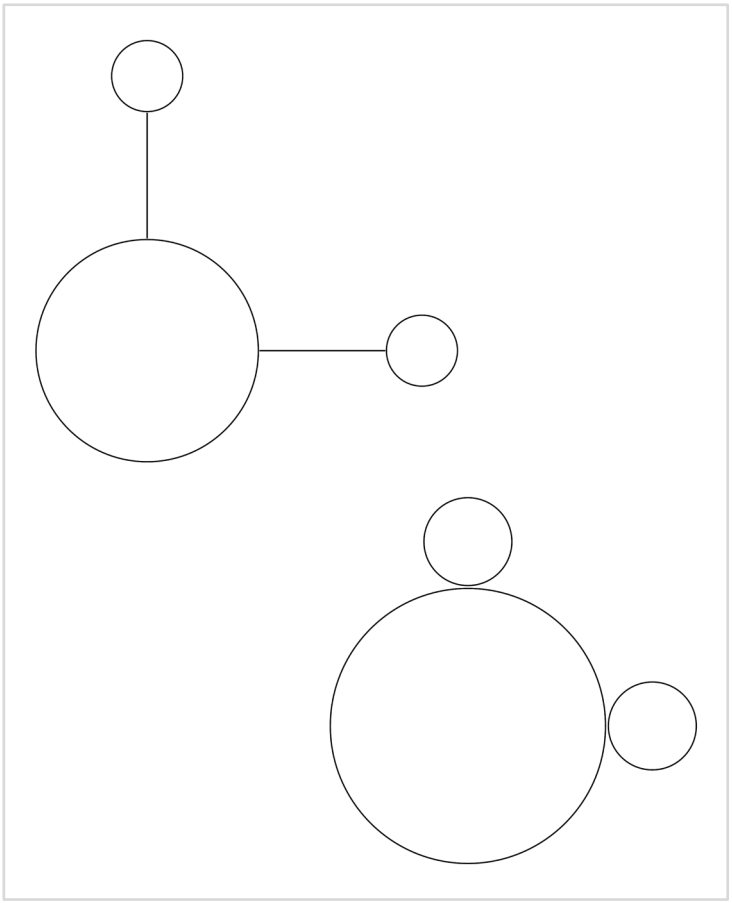
Lesson 1.6:
Nanovision Models of Chromatography

Lesson 1.7:
Break It Down

Lesson 1.8:
Evaluating Chromatography Models

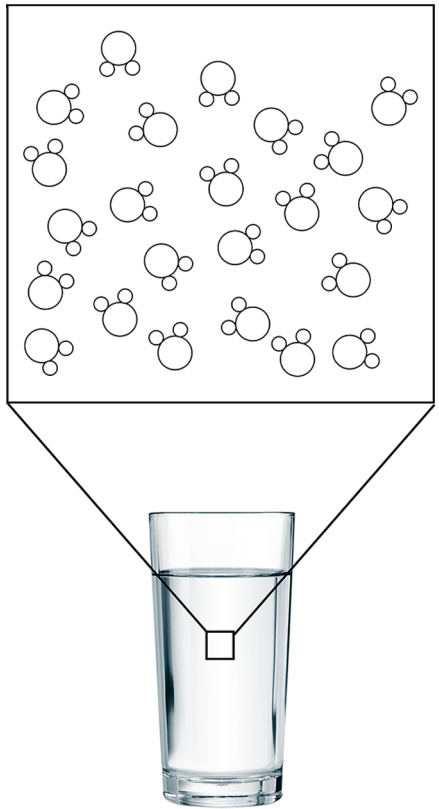
Lesson 1.9:
Revising Chromatography Models

Lesson 1.10:
Explaining Chromatography

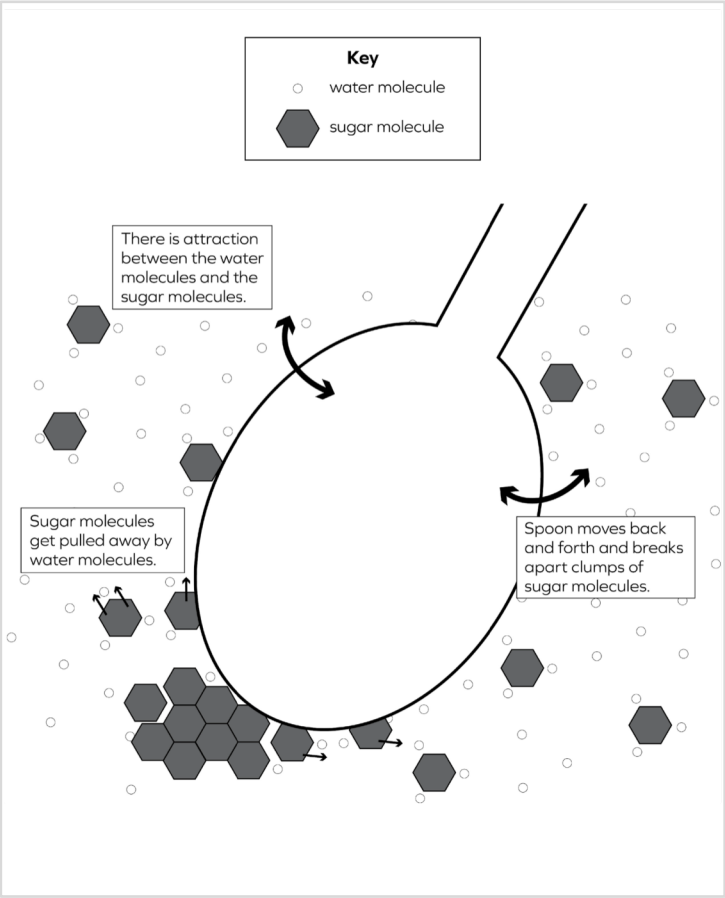


These are other models of water molecules that a scientist could draw.

Both drawings show the **same number and kinds of atoms**.



This model doesn't show exactly what water molecules might look like, but it could help a scientist show the idea that **all water molecules are the same.**



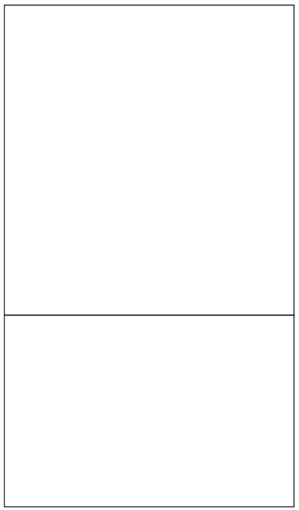
This model shows what happens when sugar is mixed into water.

How is this model **different** from other models we have been looking at?

Name: _____ Date: _____

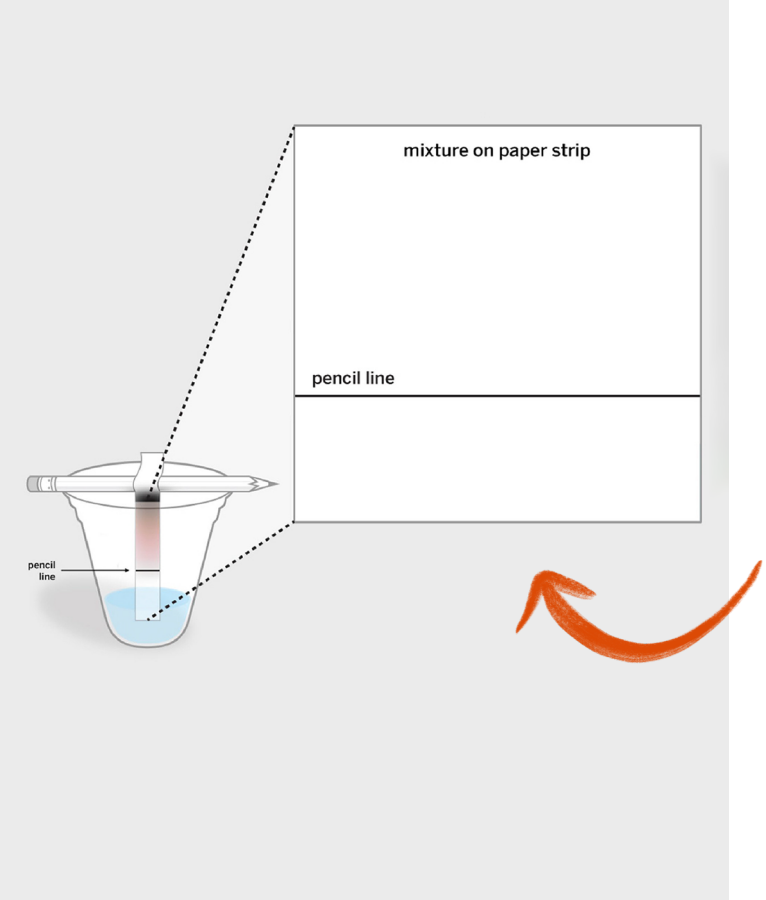
Nanovision Model of Chromatography

1. Draw what you think happened with the water molecules and the molecules in the food-coloring dyes during chromatography.
2. Include a key that will help another scientist understand your model.
3. Label the parts of your model.
4. Use arrows if needed.



Turn to page xx in your notebooks.

You'll draw your first ideas about what happened with the molecules when the food coloring separated.

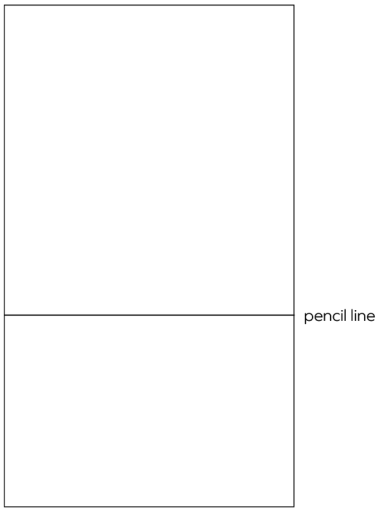


The white box on page xx of the notebook is a close-up of the strip of chromatography paper, like this.

Name: _____ Date: _____

Nanovision Model of Chromatography

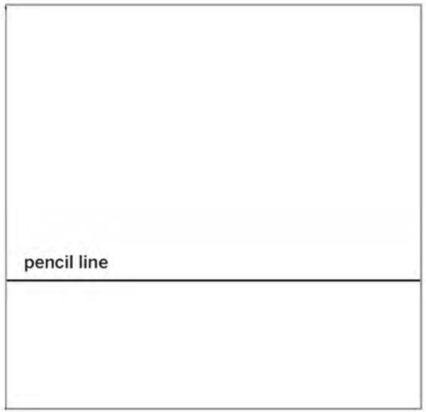
1. Draw what you think happened with the water molecules and the molecules in the food-coloring dyes during chromatography.
2. Include a key that will help another scientist understand your model.
3. Label the parts of your model.
4. Use arrows if needed.



Scientists **review each other's work** to improve on their models.

You will exchange notebooks to review a partner's model and give feedback.

Nanovision Model of Chromatography Checklist

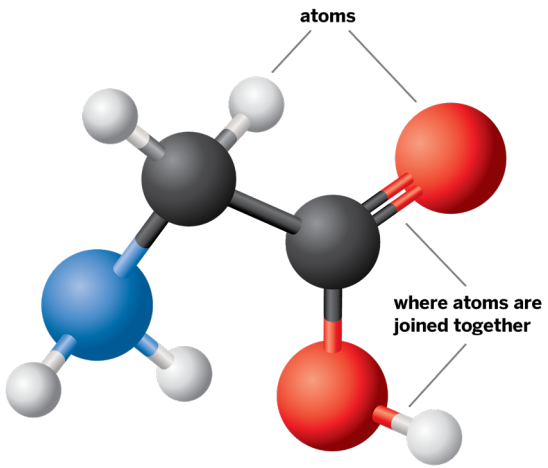


Does the model show:

- water molecules?
- how the water traveled up the paper?
- how the different dyes traveled up the paper?
- why some dyes traveled farther than others?

Also, check if the model includes the following:

- a key
- labels
- arrows



This is a model of a molecule. Each ball in the model stands for one atom, and the sticks show where the atoms are joined together.

9

Remember, we looked carefully at the diagrams in *Made of Matter*.

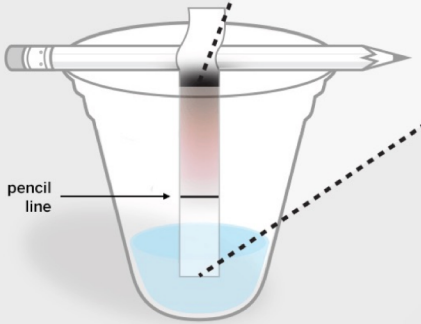
What **features** do **diagrams** have?

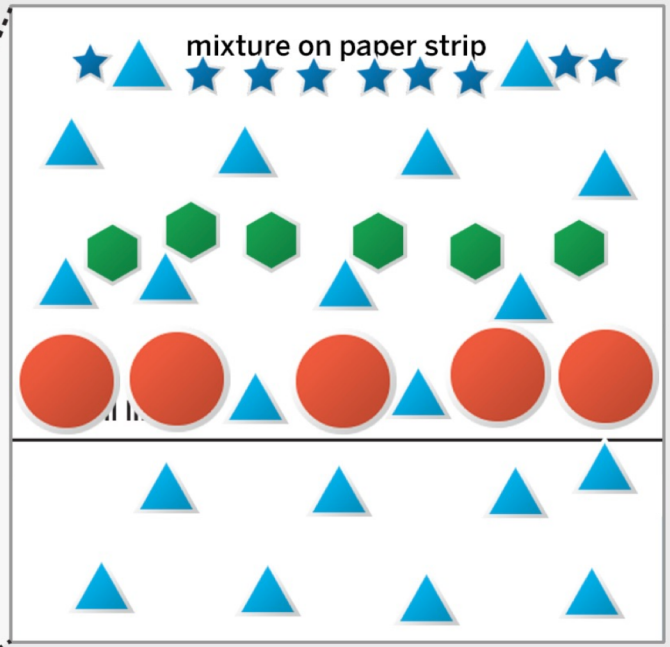
How can those features make a diagram clearer?

Chromatography Model

Directions

1. Choose one shape to represent each kind of molecule and drag each shape to the Key.
2. On the enlarged strip of chromatography paper, create a nanovision model of the separating dyes. From the bottom of the screen, drag the shapes you chose to the mixture on the paper strip.





Key

- Dye 1 molecule
- Dye 2 molecule
- Dye 3 molecule
- water molecule

Unpack and Analyze the Embedded Formative Assessment Data

What do you notice about each diverse learner needs?

What connections can you make to each learner's profile?

How would you use the **Now What** strategies to support each learner?

Amplify Science

[On-The- Fly Status of the Class Data Organization Tool]

Teacher: Mr. Saturn **Grade Level** : 5 **Date:** 8 /2018
Unit Name: Modeling Matter **Chapter:** 1 **Lesson:** 1.6, Act. 2

A.) Determine the "Look For's" for the On the Fly Assessment
On-the-Fly Assessment 5: Modeling Nanoscale Object

B.) Rate the Look -Fors
'3' if student demonstrates a strong understanding
'2' if student demonstrates some understanding
'1' if student demonstrates no understanding

Look Fors	Learner A	Learner B	Learner C	Learner D
Look For #1: Student constructs model to answer a question about how nanoscale interactions result in observable effects (You're going to draw what you think happened with the water and dye molecules when the food coloring separated.)	3	1	2	3
Look For #2: Student is able to explain why the dyes are different colors and why the dyes traveled different distances. (Shows the molecules of different dyes as different from one another.)	2	1	2	2
Look For #3: Students is able to explain why you can see the molecules in their models but not on the actual chromatography paper. [The molecules are too small to actually see individually, but a lot of them together make an observable color.]	2	2	2	1
Look For #4: Student uses unit vocabulary appropriately (atom, attract, property, matter, mixture, model, molecule, observe, substance)	3	1	1	2
Look For #5: Student partipants in model swap discourse routine, discussing each of the questions on the checklist with the partner. **NOTE:** Look for from 1.6, Act.3 - Student to Student Discussion	3	2	2	1

C.) After data are collected for the OTF, analyze the student needs and refer to the **NOW WHAT** section for ideas on how to respond to your students' needs.

Sample Classroom Profile

Learner A: Enjoys science and math. Loves to tell stories about her many travels and enjoys figuring out phenomena presented. While she finds verbal explanations to be sufficient, she does not find it necessary to elaborate on her ideas through written explanation or written argument. She often shuts down when pushed to provide supporting details in writing.

Learner B: Enjoys reading and writing. When provided a written assignment, he is anxious to provide lengthy written and verbal explanations. Although, this learner enjoys reading, writing and speaking he is challenged by sentence structure, spelling and staying on topic.

Learner C: This new student enjoys expressing himself through art and drawings. He is not a strong reader, yet, as English is his second language. This student has strong comprehension skills and has adapted to using the classroom artifacts to help him construct written explanations.

Learner D: Enjoys solving critical thinking problems and has rich science vocabulary. She works best when provided independent tasks and does not work well in collaborative group settings. She relies on step by step teacher validation and is not likely to complete a task without making sure her answer affirmed by an adult in the room.

Let’s see what students will need to know and be able to do in the upcoming lesson?

Chapter 1: Why did the food coloring separate into different dyes?

JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

Lesson 1.2:
Introducing Food Science

Lesson 1.3:
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Lesson 1.4:
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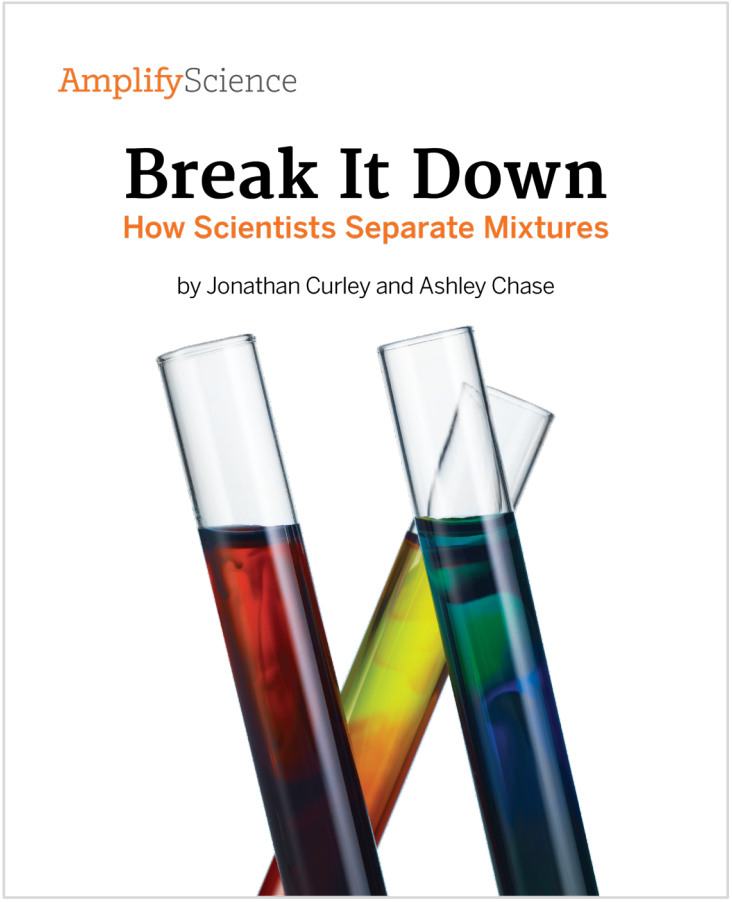
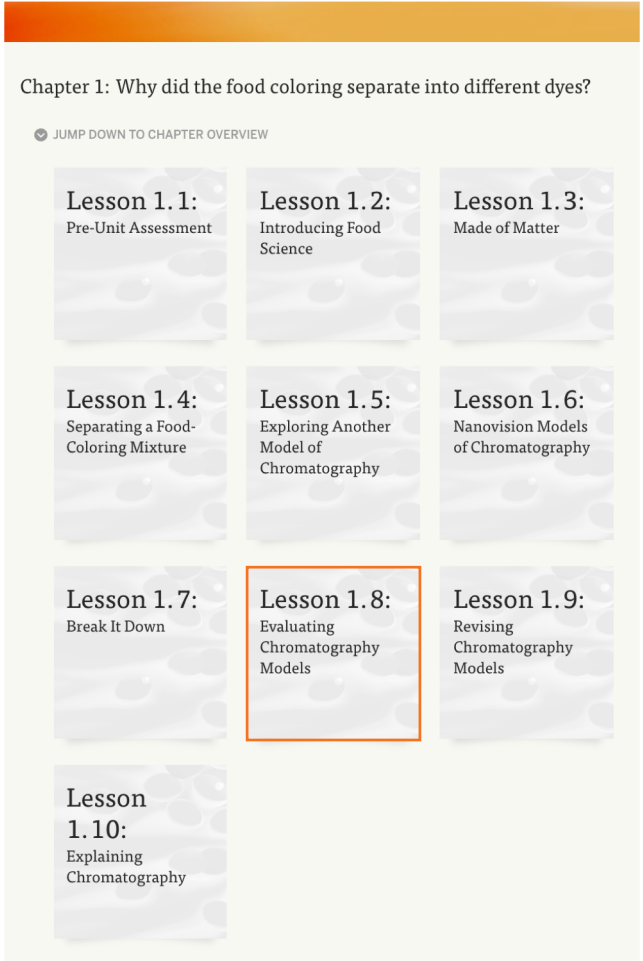


This book is about scientists who separate mixtures in their work.

As we read, we will **make inferences** to understand the work the scientists are doing.

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.



Reading “Break it Down”

Each pair should read about separating one of these mixtures:

- Ocean water: pages 10-11
- Blood: pages 12-15
- Ancient food: pages 12-16

Key Concept

The properties of a substance are determined by the properties of its molecules.

Name: _____ Date: _____

Evaluating Chromatography Models

1. Evaluate the three models on pages 22–27.
2. In the table for each model, circle **Yes** or **No** to indicate if the model explains or does not explain what you observed in chromatography and what you know about molecules.

Everything we know about molecules:

Statement A: All molecules of one substance are exactly the same, and they are different from molecules of any other substance.

Statement B: The properties of the molecules of a substance do not change.

Color-Changing Model

1. Does the model explain how the water traveled up the paper?	Yes	No
2. Does the model explain how the colors moved up the paper?	Yes	No
3. Does the model explain why some colors went higher?	Yes	No
4. Does the model fit with everything we know about molecules? If not, with which statement(s) does it conflict? Statement _____	Yes	No

Turn to page xx in your notebooks.

Let's discuss **what we know about molecules**.

Then, we'll evaluate the first model together.

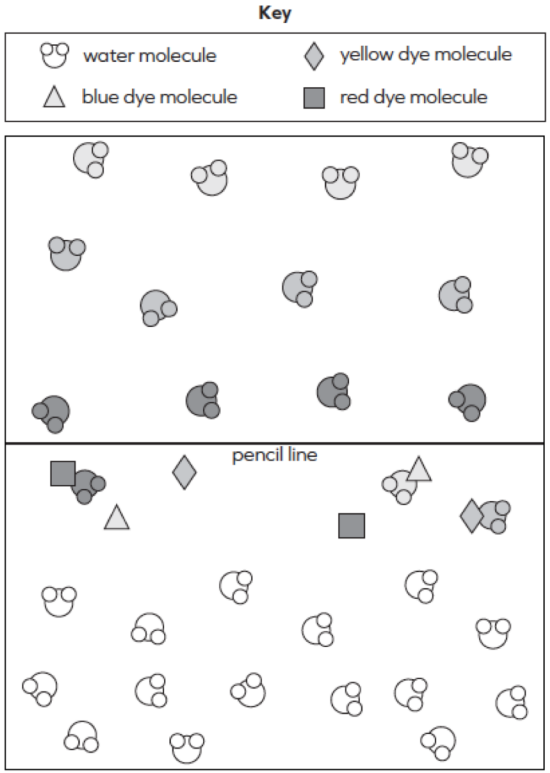
Color-Changing Model

What happened to the dye and water molecules during chromatography?

The water molecules were attracted to the paper molecules, so the water molecules climbed up the paper.

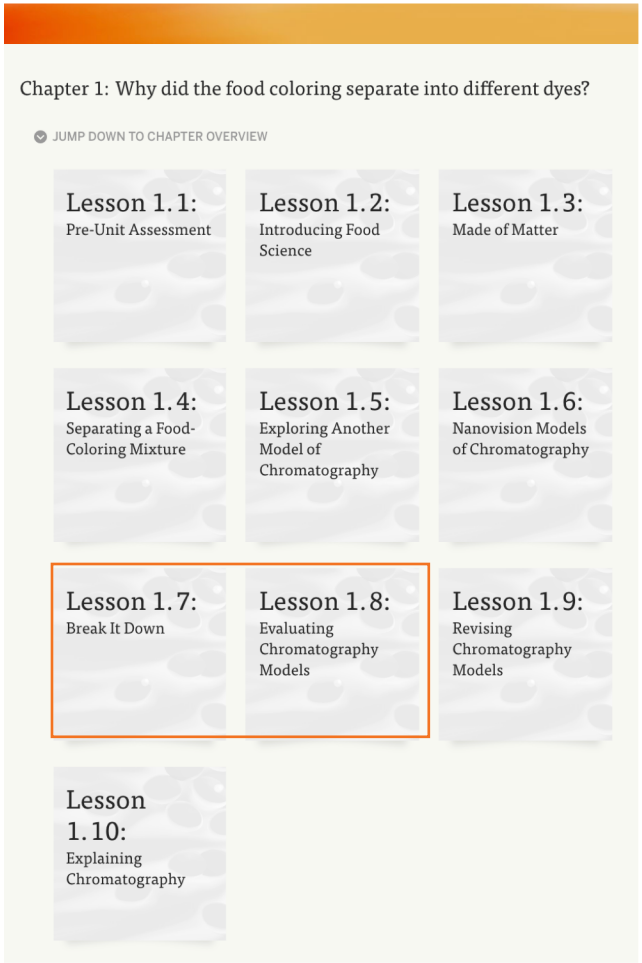
As they passed through the food-coloring mixture, the water molecules bumped into the dye molecules, and the water molecules changed to the same colors as the dye molecules. The colored-water molecules kept traveling up the paper.

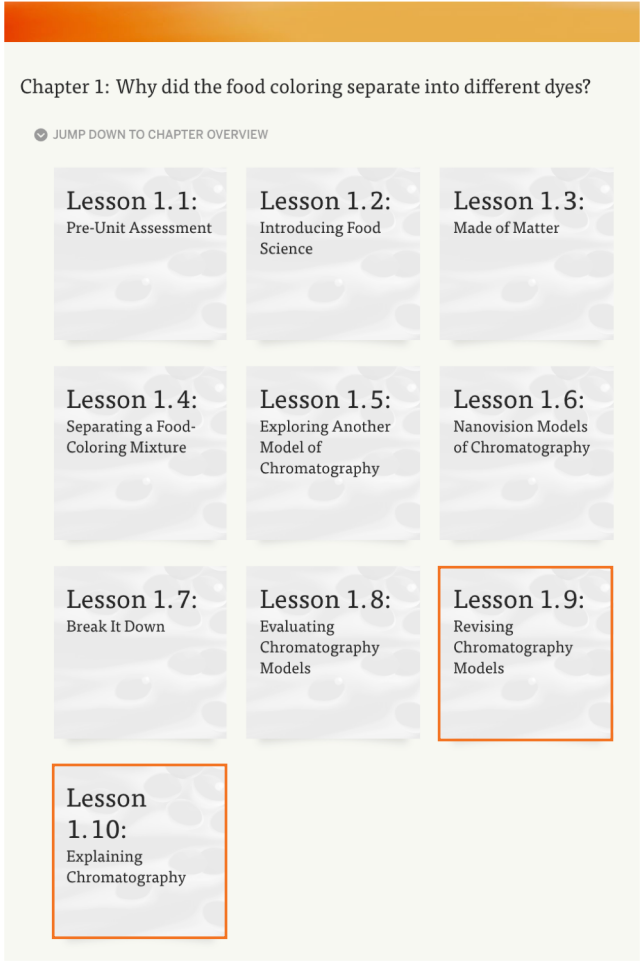
The blue water molecules are the lightest, so they went the farthest. The red water molecules are the heaviest, so they did not go as far.



Turn and Talk

If the preconceptions, misconceptions and/or academic behaviors are not addressed, what challenges might the teacher anticipate the following lesson?





Modeling Matter: The Chemistry of Food

The problem students work to solve

How can we help Good Food Production, Inc. solve problems with their products—figuring out if their food coloring includes a harmful dye and creating an appealing salad dressing?

Pg. xx

Chapter 1 Question

Why did the food coloring separate into different dyes? (introduced in 1.5)

Investigation Questions

How are different substances different? (1.2)

How are different kinds of molecules different? How are molecules similar? (1.3-1.4)

How do differences in molecules cause substances to separate? (1.5-1.7)

Evidence sources and reflection opportunities

Observe and record properties of food mixtures (1.2)

- Observe digital Scale Tool to view nanoscale objects (1.3)
- Read *Made of M*
- Use chromatogra coloring mixture
- Observe the Past relation to chron
- Write about how molecules can be similar and different (1.4)

What are students figuring out?

- Use and discuss the Fan Model of chromatography (1.5)
- Make and evaluate nanovision models of chromatography first by drawing, then with digital tool (1.6)
- Read *Break it Down* (1.7)
- Revisit *Break it Down* to analyze how scientists focus on properties of molecules to separate mixtures (1.8)
- Evaluate example nanovision models of chromatography (1.8)

Key concepts

- All molecules of o same, and they ar any other substan

What can we explain with these ideas?

- Different molecules have different properties. (1.5)
- The properties of a substance are determined by the properties of its molecules. (1.8)

Application of key concepts to the problem

- Revise nanovision models (1.9)
- Write explanations to answer the Chapter 1 Question (1.10)

Explanation that students can make to answer the Chapter 1 Question

The different dyes that are mixed together have different properties (colors), so they are made of different molecules. The molecules in the mixture that are carried up the paper by the water are attracted to the water and mix with it. As the water travels up the paper, different kinds of molecules travel different distances because their molecules are different sizes or have a different attraction to the paper.

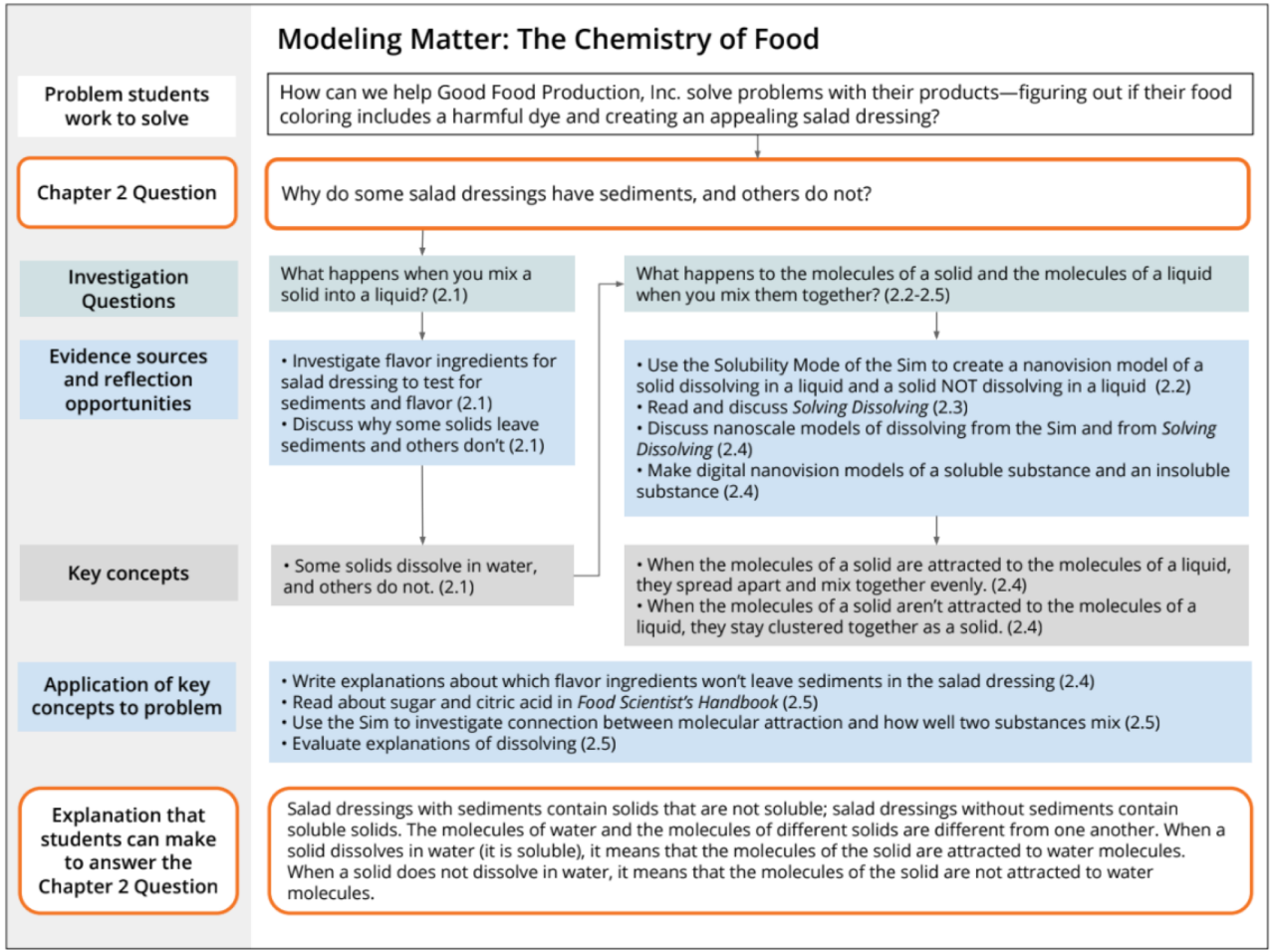
Coherence FlowCharts

Reviewing coherence (5 mins):

- Review the Coherence Flowcharts for Chapter 2 . CFs can be found on page __ of the Participant Notebook.
    - Determine who will be Partner A & Partner B
- Partners will make connections between the application of key concepts section and the differentiation Brief for their chapter. Each partner will jot down key strategies for supporting Diverse Learners.

Pair share (5 mins):

- Partner A will take up to 1 minute to share connections for Ch. 2. Then Partner B will paraphrase what he/she heard the partner share.
- Then, Partner B will take up to 1 minute to share connections for Ch. 2. Then Partner A will paraphrase what he/she heard the partner share.


Modeling Matter: The Chemistry of Food
Problem students work to solve
How can we help Good Food Production, Inc. solve problems with their products—figuring out if their food coloring includes a harmful dye and creating an appealing salad dressing?
Chapter 2 Question
Why do some salad dressings have sediments, and others do not?
Investigation Questions
What happens when you mix a solid into a liquid? (2.1)
What happens to the molecules of a solid and the molecules of a liquid when you mix them together? (2.2-2.5)
Evidence sources and reflection opportunities
• Investigate flavor ingredients for salad dressing to test for sediments and flavor (2.1)
• Discuss why some solids leave sediments and others don't (2.1)
• Use the Solubility Mode of the Sim to create a nanovision model of a solid dissolving in a liquid and a solid NOT dissolving in a liquid (2.2)
• Read and discuss Solving Dissolving (2.3)
• Discuss nanoscale models of dissolving from the Sim and from Solving Dissolving (2.4)
• Make digital nanovision models of a soluble substance and an insoluble substance (2.4)
Key concepts
• Some solids dissolve in water, and others do not. (2.1)
• When the molecules of a solid are attracted to the molecules of a liquid, they spread apart and mix together evenly. (2.4)
• When the molecules of a solid aren't attracted to the molecules of a liquid, they stay clustered together as a solid. (2.4)
Application of key concepts to problem
• Write explanations about which flavor ingredients won't leave sediments in the salad dressing (2.4)
• Read about sugar and citric acid in Food Scientist's Handbook (2.5)
• Use the Sim to investigate connection between molecular attraction and how well two substances mix (2.5)
• Evaluate explanations of dissolving (2.5)
Explanation that students can make to answer the Chapter 2 Question
Salad dressings with sediments contain solids that are not soluble; salad dressings without sediments contain soluble solids. The molecules of water and the molecules of different solids are different from one another. When a solid dissolves in water (it is soluble), it means that the molecules of the solid are attracted to water molecules. When a solid does not dissolve in water, it means that the molecules of the solid are not attracted to water molecules.

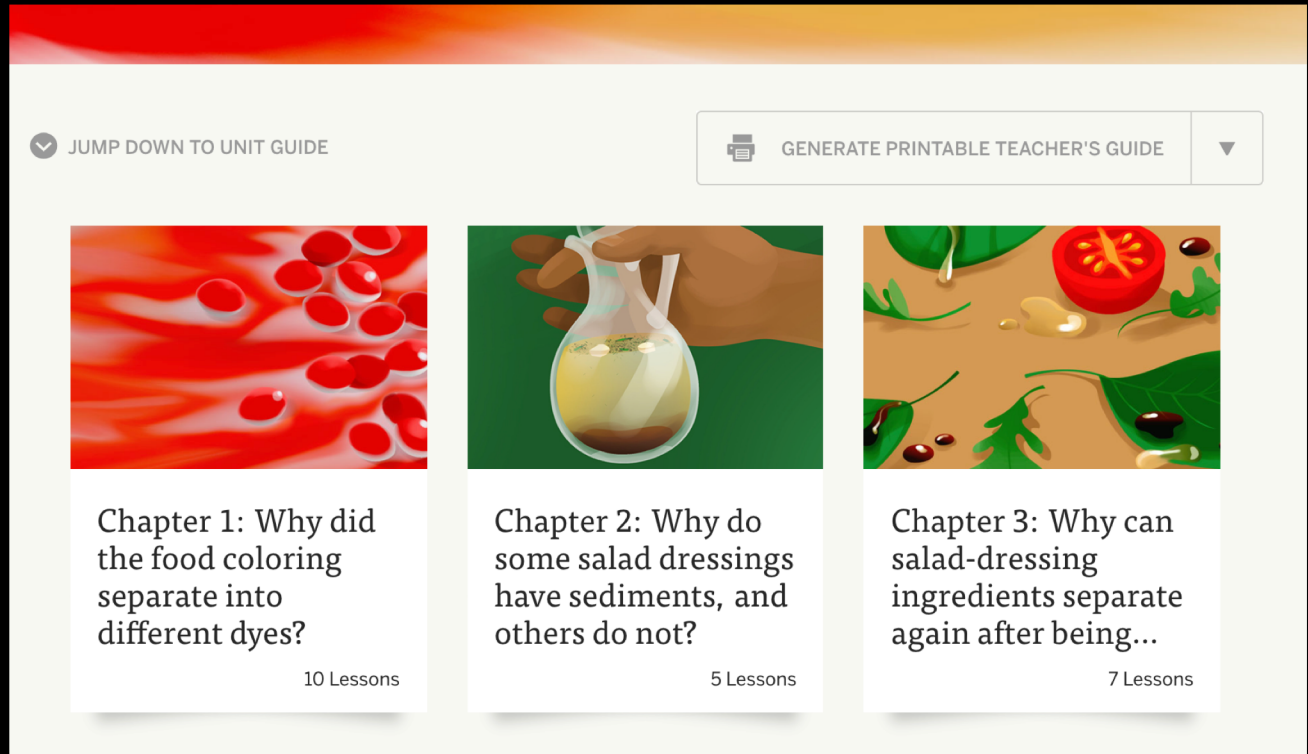
Engaging with ideas over multiple activities

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

A Model Lesson Experience

Grade 5 | Modeling Matter

Model Lesson 2.5



Walk and Talk:

- Which learner profile would you like to focus on during the model lesson?
- What types of modifications do you think would be beneficial to this learner's needs?

Learner A: Enjoys science and math. Loves to tell stories about her many travels and enjoys figuring out phenomena presented. While she finds verbal explanations to be sufficient, she does not find it necessary to elaborate on her ideas through written explanation or written argument. She often shuts down when pushed to provide supporting details in writing.

Learner B: Enjoys reading and writing. When provided a written assignment, he is anxious to provide lengthy written and verbal explanations. Although, this learner enjoys reading, writing and speaking he is challenged by sentence structure, spelling and staying on topic.

Learner C: This new student enjoys expressing himself through art and drawings. He is not a strong reader, yet, as English is his second language. This student has strong comprehension skills and has adapted to using the classroom artifacts to help him construct written explanations.

Learner D: Enjoys solving critical thinking problems and has rich science vocabulary. She works best when provided independent tasks and does not work well in collaborative group settings. She relies on step by step teacher validation and is not likely to complete a task without making sure her answer affirmed by an adult in the room.

As you experience the Lesson...

A. Stay in the role of the student

A. Jot down thoughts or questions on the “Keeping Diverse Learner Needs in Mind” note-catcher

   (you will have time to add more thoughts to this document after experiencing the lesson)

Add Classroom Slides Here:

- **Grade K**- Model Lesson: 5.2
- **Grade 1** - Model Lesson 4.2
- **Grade 2** - Model Lesson 3.5
- **Grade 3**- Model Lesson 3.5
- **Grade 4**- Model Lesson 4.4
- **Grade 5**- Model Lesson: 2.5

It’s Lunch Time

1 Hour

Reflection Part 1

Solo Time (5 minutes)

- Navigate to the model lesson:
  Chapter __X__ Lesson __X__
- Review the differentiation brief and jot down notes on the note-catcher "Keeping Diverse Learner Needs in Mind" to describe the supports you think would would best support your diverse learner

Keeping Diverse Learner Needs in Mind
Reflection Tool

Unit Name: _____ Chapter #: _____ Lesson #: _____

Cirlce the Selected Learner Profile: A B C D

Directions: Reflect on each lesson activity and jot down strategies to support the student you selected from the Learner Profile.

Lesson Activity	My Student May be **Challenged by...**	Suggestions from the **Differentiation Brief**	Suggestions from my own **Teacher Toolkit**
1			
2			
3			
4			
5			

Take a Moment: How will this activity influence your planning practices?

Keeping Diverse Learner Needs in Mind
Reflection Tool

Unit Name: _____ Chapter #: _____ Lesson #: _____

Circle the Selected Learner Profile: A B C D

Directions: Reflect on each lesson activity and jot down strategies to support the student you selected from the Learner Profile.

Lesson Activity	My Student May be **Challenged by...**	Suggestions from the **Differentiation Brief**	Suggestions from my own **Teacher Toolkit**
1			
2			
3			
4			
5			

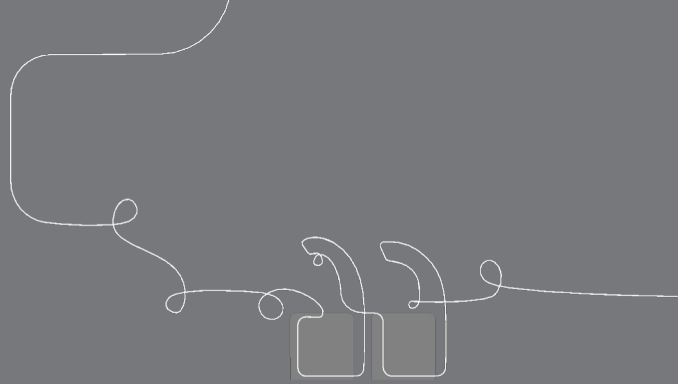
Take a Moment: How will this activity influence your planning practices?

Reflection Part 2

Collaborative Group (20 minutes)

- Form Groups A - D to represent each learner profile
- Share and synthesize your reflections on chart paper
- Choose 1 person from your group to synthesize your groups thinking

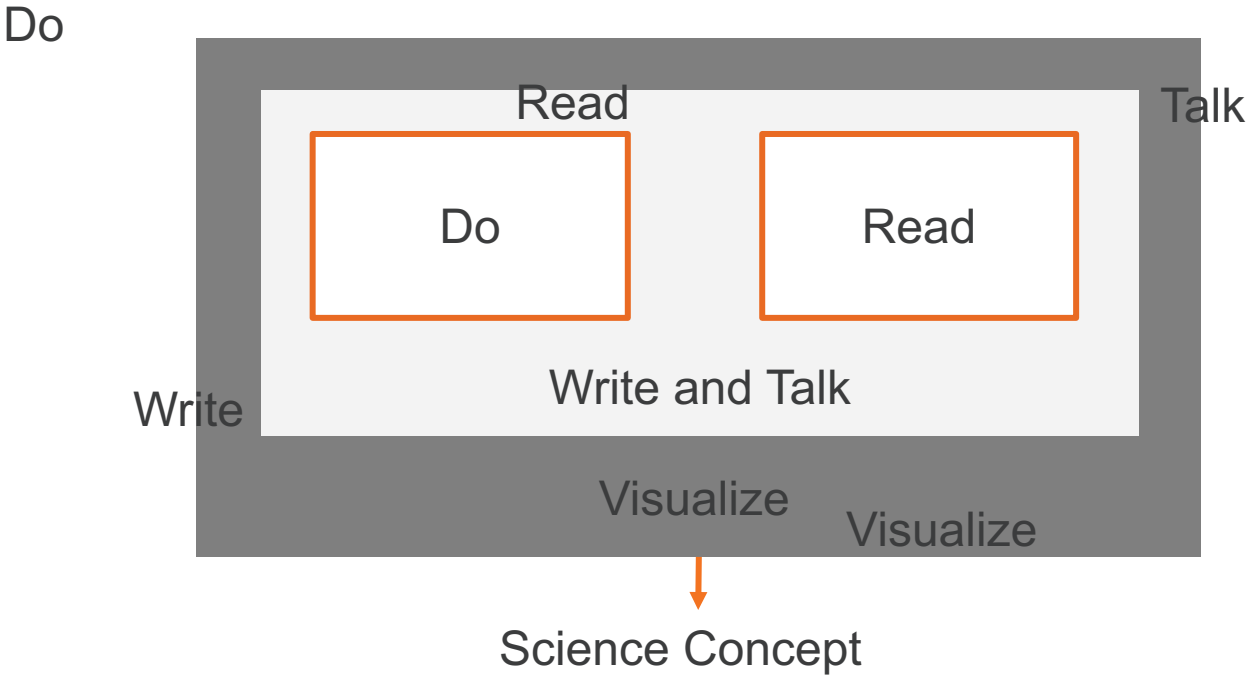
Questions?

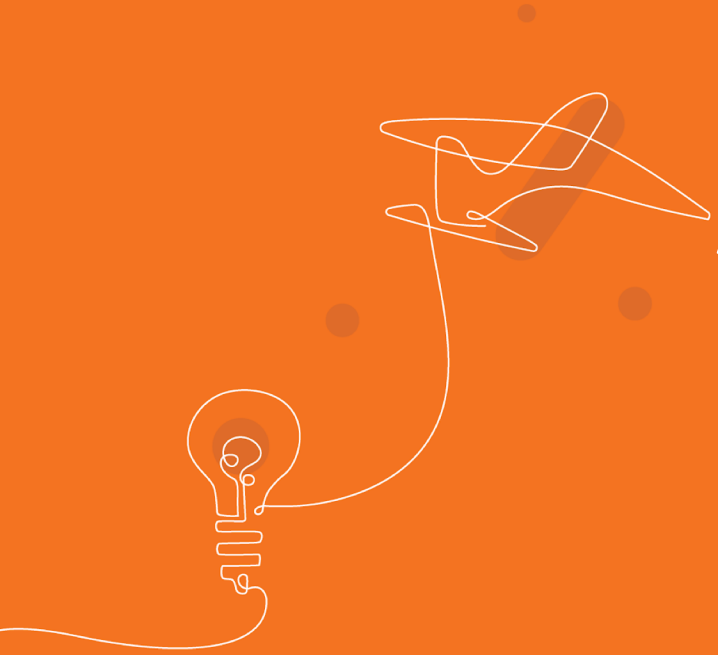


Multimodal instruction

What role does language and literacy play in developing scientific understanding?

Do, Talk, Read, Write, Visualize





Building Complex Explanations Across the Unit

Coherence and Progress Builds

Progress Build: A unit-specific learning progression

Pg. xx

Modeling Matter Progress Build

Pg. xx

Deep, causal understanding

Prior knowledge

Separation is a result of the attraction between molecules of the same substance.

Mixing is a result of attraction between molecules of different substances.

Observable properties result from molecular properties.

Chapter 1 key concepts and explanation

Pg. xx

How did the food coloring separate into different dyes?

Ch	Key concepts	Explanation
1	All molecules of one substance are exactly the same, and they are different from molecules of any other substance. (1.4) Different molecules have different properties. (1.5) The properties of a substance are determined by the properties of its molecules. (1.8)	The different dyes that are mixed together have different properties (colors), so they are made of different molecules. The molecules in the mixture that are carried up the paper by the water are attracted to the water and mix with it. As the water travels up the paper, different kinds of molecules travel different distances because their molecules are different sizes or have a different attraction to the paper.

The dyes are different substances.

Chapter 1 key concepts and explanation

Pg. xx

How did the food coloring separate into different dyes?

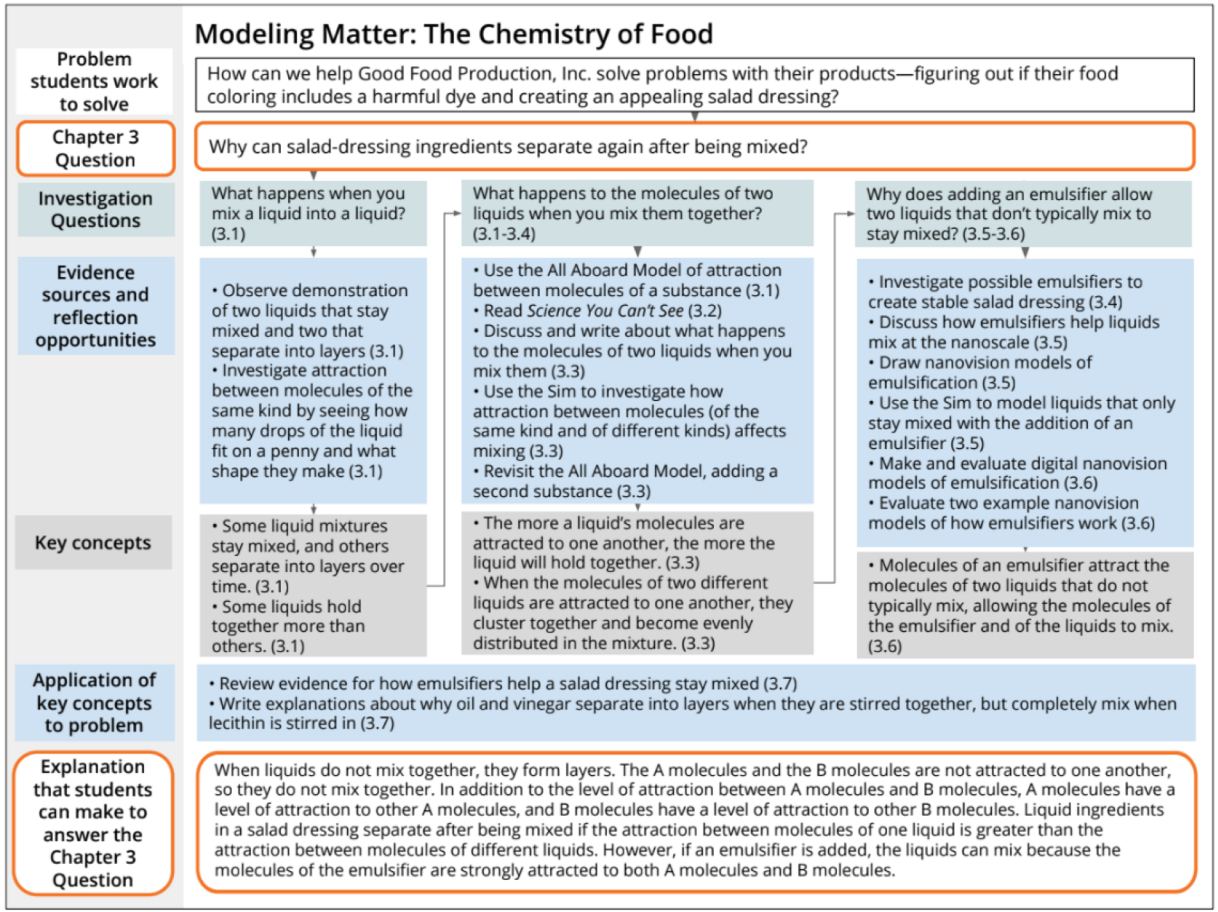
Ch	Key concepts	Explanation
1	All molecules of one substance are exactly the same, and they are different from molecules of any other substance. (1.4) Different molecules have different properties. (1.5) The properties of a substance are determined by the properties of its molecules. (1.8)	The different dyes that are mixed together have different properties (colors), so they are made of different molecules. The molecules in the mixture that are carried up the paper by the water are attracted to the water and mix with it. As the water travels up the paper, different kinds of molecules travel different distances because their molecules are different sizes or have a different attraction to the paper.

Molecules in dyes have different properties.

Pg. xx

Ch	Key concepts	Explanation
1	All molecules of one substance are exactly the same, and they are different from molecules of any other substance. (1.4) Different molecules have different properties. (1.5) The properties of a substance are determined by the properties of its molecules. (1.8)	The different dyes that are mixed together have different properties (colors), so they are made of different molecules. The molecules in the mixture that are carried up the paper by the water are attracted to the water and mix with it. As the water travels up the paper, different kinds of molecules travel different distances because their molecules are different sizes or have a different attraction to the paper.
2	Some solids dissolve in water, and others do not. (2.1) When the molecules of a solid are attracted to the molecules of a liquid, they spread apart and mix together evenly. (2.4) When the molecules of a solid aren't attracted to the molecules of a liquid, they stay clustered together as a solid. (2.4)	Salad dressings with sediments contain solids that are not soluble; salad dressings without sediments contain soluble solids. The molecules of water and the molecules of different solids are different from one another. When a solid dissolves in water (it is soluble), it means that the molecules of the solid are attracted to water molecules. When a solid does not dissolve in water, it means that the molecules of the solid are not attracted to water molecules.

End-of-Unit Assessment


Modeling Matter: The Chemistry of Food
Problem students work to solve
How can we help Good Food Production, Inc. solve problems with their products—figuring out if their food coloring includes a harmful dye and creating an appealing salad dressing?
Chapter 3 Question
Why can salad-dressing ingredients separate again after being mixed?
Investigation Questions
What happens when you mix a liquid into a liquid? (3.1)
What happens to the molecules of two liquids when you mix them together? (3.1-3.4)
Why does adding an emulsifier allow two liquids that don't typically mix to stay mixed? (3.5-3.6)
Evidence sources and reflection opportunities
• Observe demonstration of two liquids that stay mixed and two that separate into layers (3.1)
• Investigate attraction between molecules of the same kind by seeing how many drops of the liquid fit on a penny and what shape they make (3.1)
• Use the All Aboard Model of attraction between molecules of a substance (3.1)
• Read Science You Can't See (3.2)
• Discuss and write about what happens to the molecules of two liquids when you mix them (3.3)
• Use the Sim to investigate how attraction between molecules (of the same kind and of different kinds) affects mixing (3.3)
• Revisit the All Aboard Model, adding a second substance (3.3)
• Investigate possible emulsifiers to create stable salad dressing (3.4)
• Discuss how emulsifiers help liquids mix at the nanoscale (3.5)
• Draw nanovision models of emulsification (3.5)
• Use the Sim to model liquids that only stay mixed with the addition of an emulsifier (3.5)
• Make and evaluate digital nanovision models of emulsification (3.6)
• Evaluate two example nanovision models of how emulsifiers work (3.6)
Key concepts
• Some liquid mixtures stay mixed, and others separate into layers over time. (3.1)
• Some liquids hold together more than others. (3.1)
• The more a liquid's molecules are attracted to one another, the more the liquid will hold together. (3.3)
• When the molecules of two different liquids are attracted to one another, they cluster together and become evenly distributed in the mixture. (3.3)
• Molecules of an emulsifier attract the molecules of two liquids that do not typically mix, allowing the molecules of the emulsifier and of the liquids to mix. (3.6)
Application of key concepts to problem
• Review evidence for how emulsifiers help a salad dressing stay mixed (3.7)
• Write explanations about why oil and vinegar separate into layers when they are stirred together, but completely mix when lecithin is stirred in (3.7)
Explanation that students can make to answer the Chapter 3 Question
When liquids do not mix together, they form layers. The A molecules and the B molecules are not attracted to one another, so they do not mix together. In addition to the level of attraction between A molecules and B molecules, A molecules have a level of attraction to other A molecules, and B molecules have a level of attraction to other B molecules. Liquid ingredients in a salad dressing separate after being mixed if the attraction between molecules of one liquid is greater than the attraction between molecules of different liquids. However, if an emulsifier is added, the liquids can mix because the molecules of the emulsifier are strongly attracted to both A molecules and B molecules.

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Progress Build and End-of-Unit Assessment

Modeling Matter

Directions:

1. Read through the End-of-Unit Assessment.
2. Use the table on the next page to describe your ideas about what a student at each level of the Progress Build would write as their final explanation (seen below) on this assessment.

Name: _____ Date: _____

End-of-Unit Writing:
Explaining Emulsifiers in Salad Dressing

1. Write a scientific explanation that answers the question below.
2. Your explanation should include:
   - a **topic sentence** that answers the question.
   - supporting sentences that tell **what happens** and **why**.
3. Your audience is the president of Good Food Production, Inc.

Question: Why do the oil and vinegar separate into layers when they stirred together, but completely mix when lecithin is stirred in?

Name: _____ Date: _____

End-of-Unit Writing:
Explaining Emulsifiers in Salad Dressing (continued)

Name: _____ Date: _____

End-of-Unit Writing:
Explaining Emulsifiers in Salad Dressing (continued)

Make a diagram if it helps you explain your thinking. Label your diagram.

Analyzing the End of Unit Assessment

- Annotate the End of Unit Assessment (3 minutes)

  Circle **vocabulary**
  Considering the diverse learners in your classroom , **underline potential challenges**
  Ask questions in the left margin
  Write DCI to represent a Disciplinary Core Idea
  Write SEP to represent a Science and Engineering Practice
  Write CCC to represent a Crosscutting concept

- What kind of data could you gather from this EOU Assessment?
- What connections can you make between this EOU Assessment and the Coherence Flowcharts?
- What connections can you make between this EOU Assessment and to the unit's progress build?

Analyzing the End of Unit Assessment

- Complete the End of Unit Assessment by providing the best possible solution (3 minutes)
- Use the 3-part rubric to score and revise your work (7 minutes)

Turn and Talk to a Partner and discuss how you used the rubric to score and revise your work.

Modeling Matter

Plan for the day

- Reflections and Framing the Day
- Defining Diverse Learners
- Understanding Opportunities for Supporting Diverse Learners
- Analyzing Formative Assessment Data and Embedded Differentiation strategies
- **Planning to Teach**
- Closing

Planning to teach

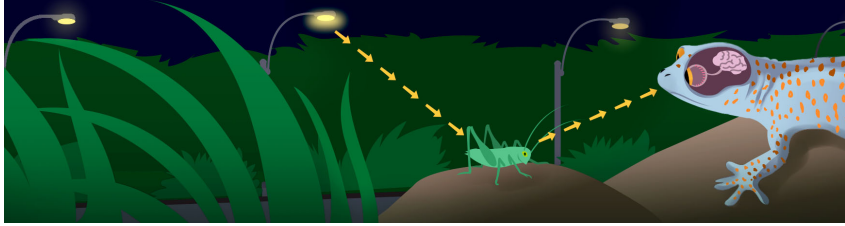
The purpose of this part of the day is for you to:

- Reflect on implementing Amplify Science in your classroom to select an area of growth.
- Apply learning from the session.

Planning to Teach

Teacher's Choice (20 mins)

Option # 1 Anticipating Preconceptions	**Option # 2** Organizing Formative Assessment Data	**Option #3** Classroom Artifacts	**Option #4** Student Facing Rubrics	**Option #5** End of Unit Assessment Analysis for Unit 1
Download the classroom slides for the upcoming lesson and include strategies from the Differentiation brief or your own teacher toolkit to address possible diverse learners needs.	Organize the look-fors for the the upcoming formative assessment using the Formative Assessment template (K-1, use the clipboard assessment for support)	Devise a strategy to enhance the classroom wall experience that supports diverse learner needs	Devise a **student facing rubric** combining the 3-dimensional rubrics from the Assessment Guide for unit 1 or 2	Devise teacher and student facing rubrics combining the 3-dimensional rubrics from the Assessment Guide



Reflecting on your plans (10 mins)

- *With your group, share which option you chose.*
- *Be prepared to share what you focused on, what you learned, and any remaining questions for the presenter.*

Modeling Matter

Plan for the day

- Reflections and Framing the Day
- Defining Diverse Learners
- Understanding Opportunities for Supporting Diverse Learners
- Analyzing Formative Assessment Data and Embedded Differentiation strategies
- Planning to Teach
- **Closing**

Workshop Title: Supporting Diverse Learner Needs

By the end of this session, K-5 participants will be able to...

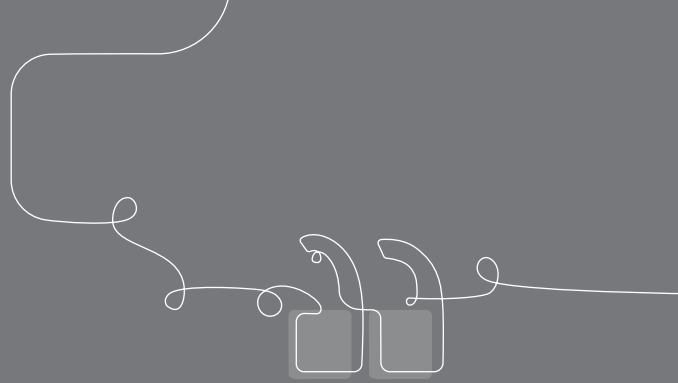
Did we meet the outcomes of this session?

- Identify embedded opportunities that support diverse learner needs within the unit of study
- Understand how to utilize the embedded multimodal curricular supports (do, talk, read, write, visualize) to help all students gather sources of evidence and argue like scientists
- Articulate the critical role that language and literacy play in developing scientific understanding
- Apply the End of Unit assessment rubric to understand student expectations
- Apply strategies that support diverse learner needs when planning instructional sequences

Closing

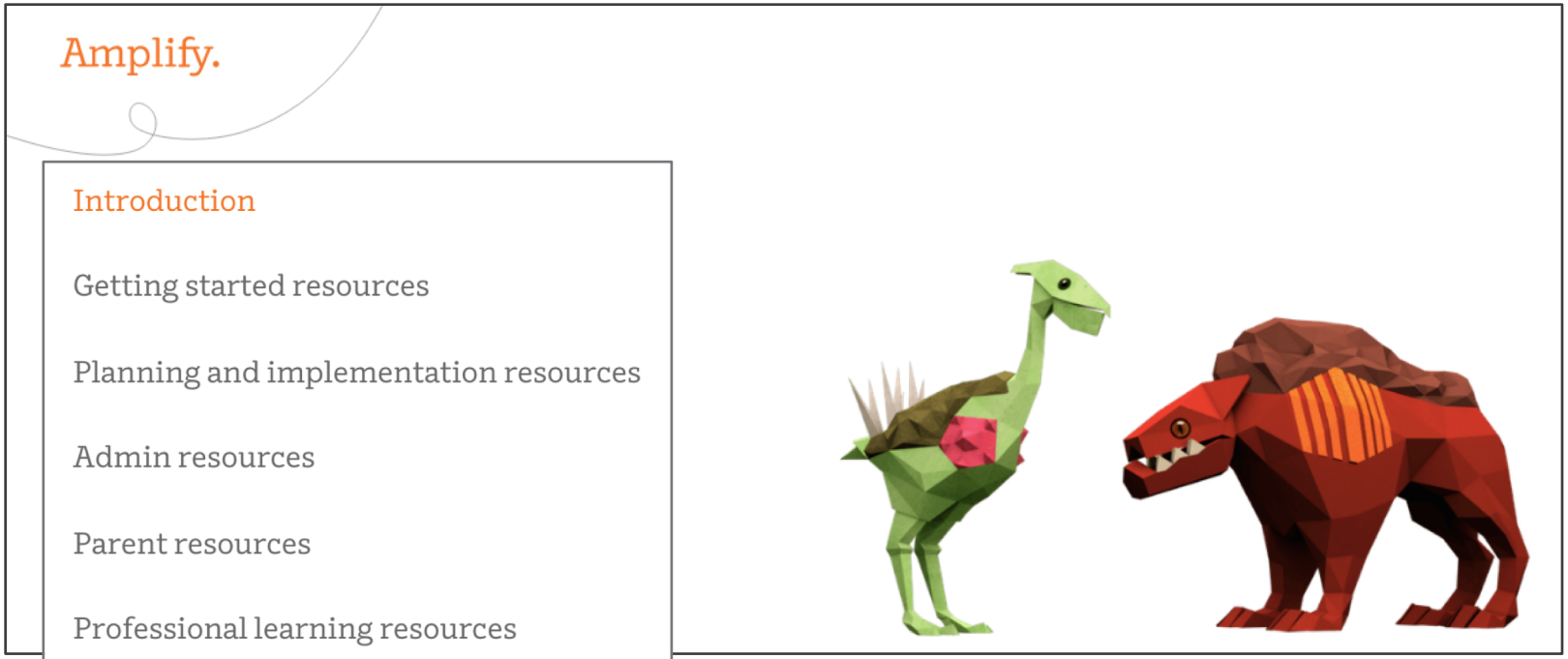
- ❑ Share 1 thing, from this session, that is “Sticking with You”. (I can apply)
- ❑ Share 1 thing, from this session, you are “Stuck On”. (I still need more support before I can apply)

Questions?



NYC Resource Site

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



Missing Materials

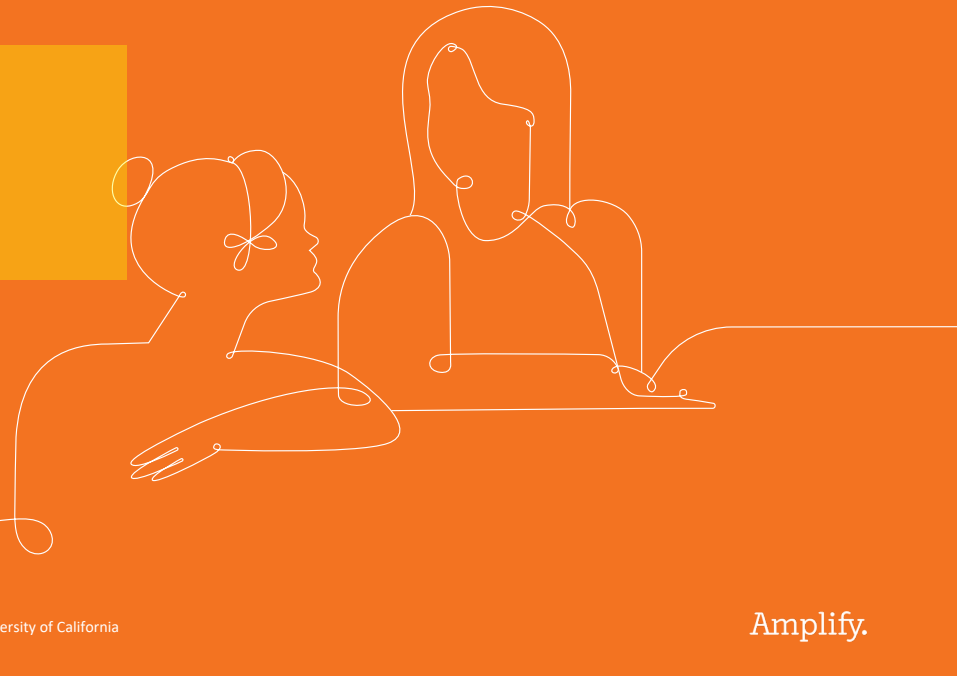
- Contact the Core Curriculum Service Center Monday-Friday 8am-5pm

Email: curriculum@schools.nyc.gov

Phone: (718) 935-3334

Thank you for your feedback!

Presenter Name:
Workshop Title:



Amplify.