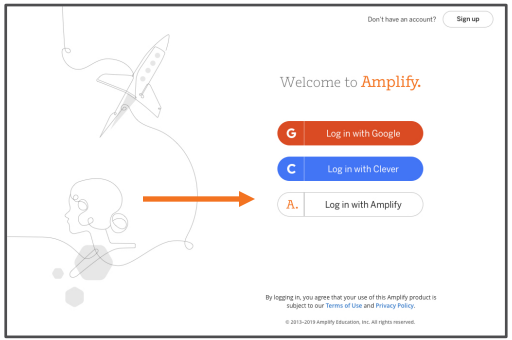
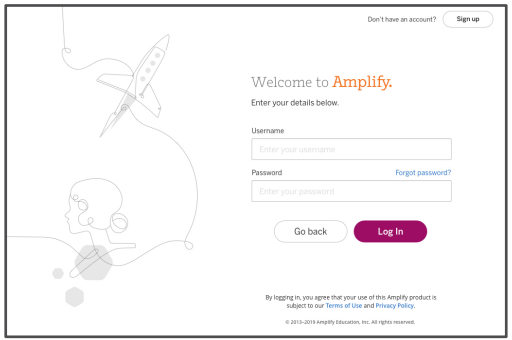
Welcome to Amplify Science!

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

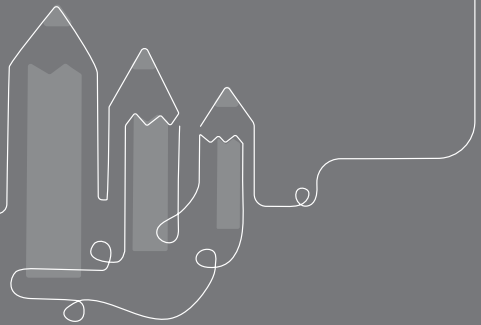
Modeling Matter
Implementation workshop

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 Modeling Matter in their classrooms



Modeling Matter

Plan for the day

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

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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

Pg. xx

- 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.

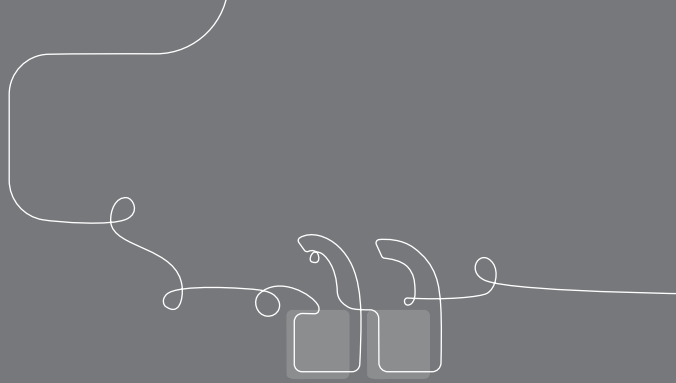
How do you think he could explain this to his students' families? Where might he look to find information that will help him plan what to say?

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?



Modeling Matter

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 Modeling Matter, and how they learn it.
- Reflect on the instructional design in the Amplify Science program.

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

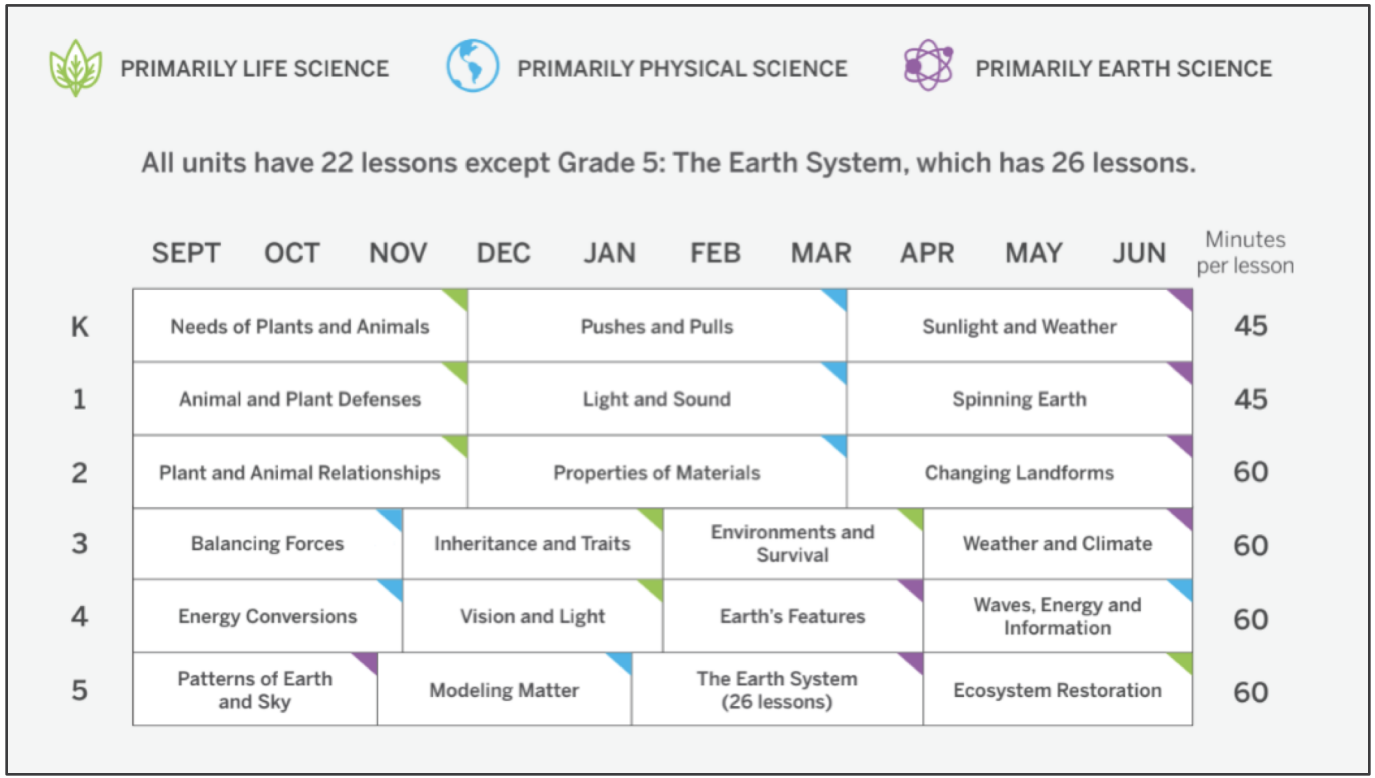
AmplifyScience

authored by THE LAWRENCE HALL OF SCIENCE UNIVERSITY OF CALIFORNIA, BERKELEY

Amplify.

Planning your year

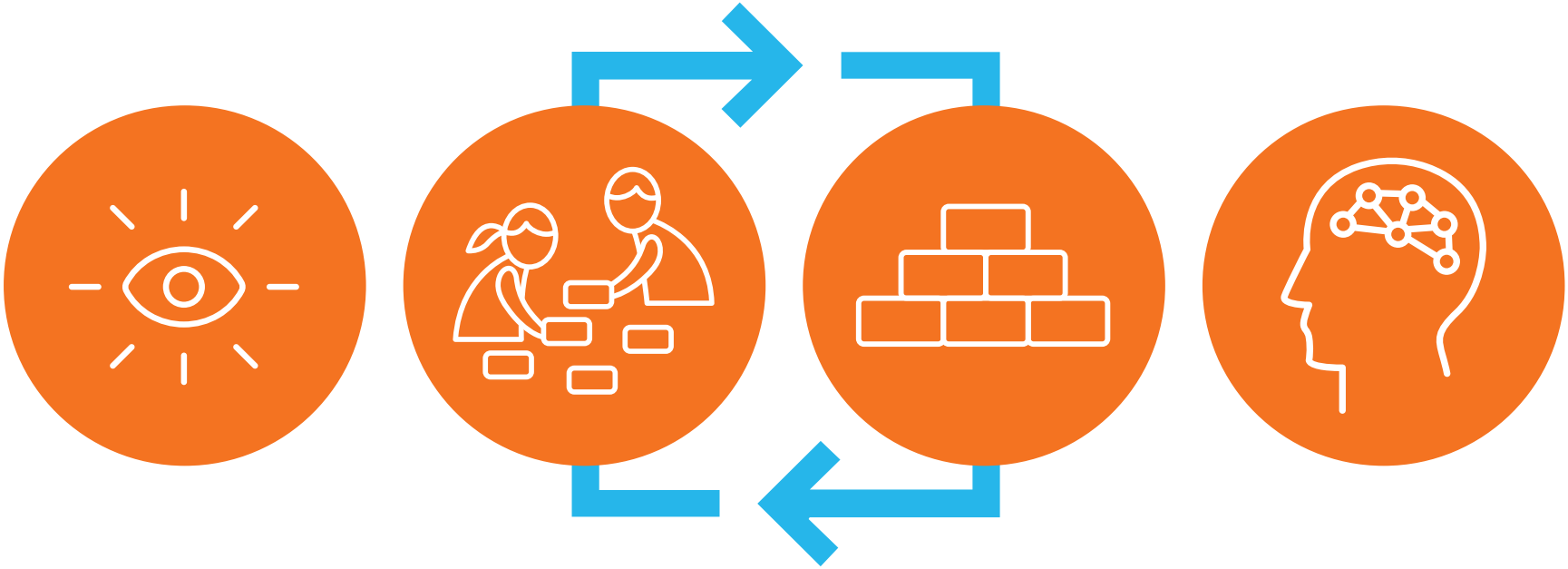
Overview: Amplify Science K-5 course structure



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



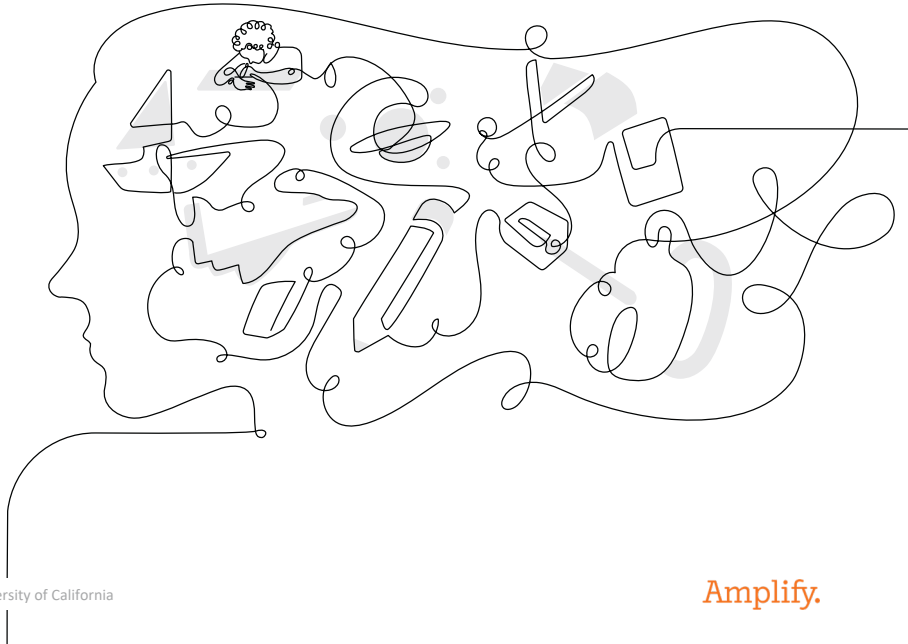
Introduce a phenomenon and a related problem

Collect evidence from multiple sources

Build increasingly complex explanations

Apply knowledge to a different context

Figure out, not learn about



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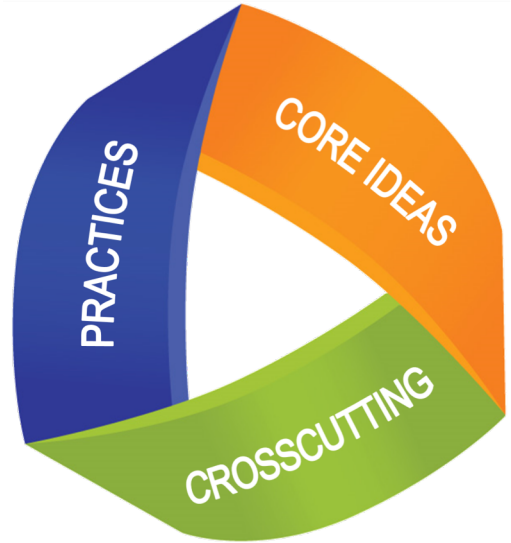


Standards as three-dimensional performance expectations that integrate disciplinary core ideas, science and engineering practices, and crosscutting concepts

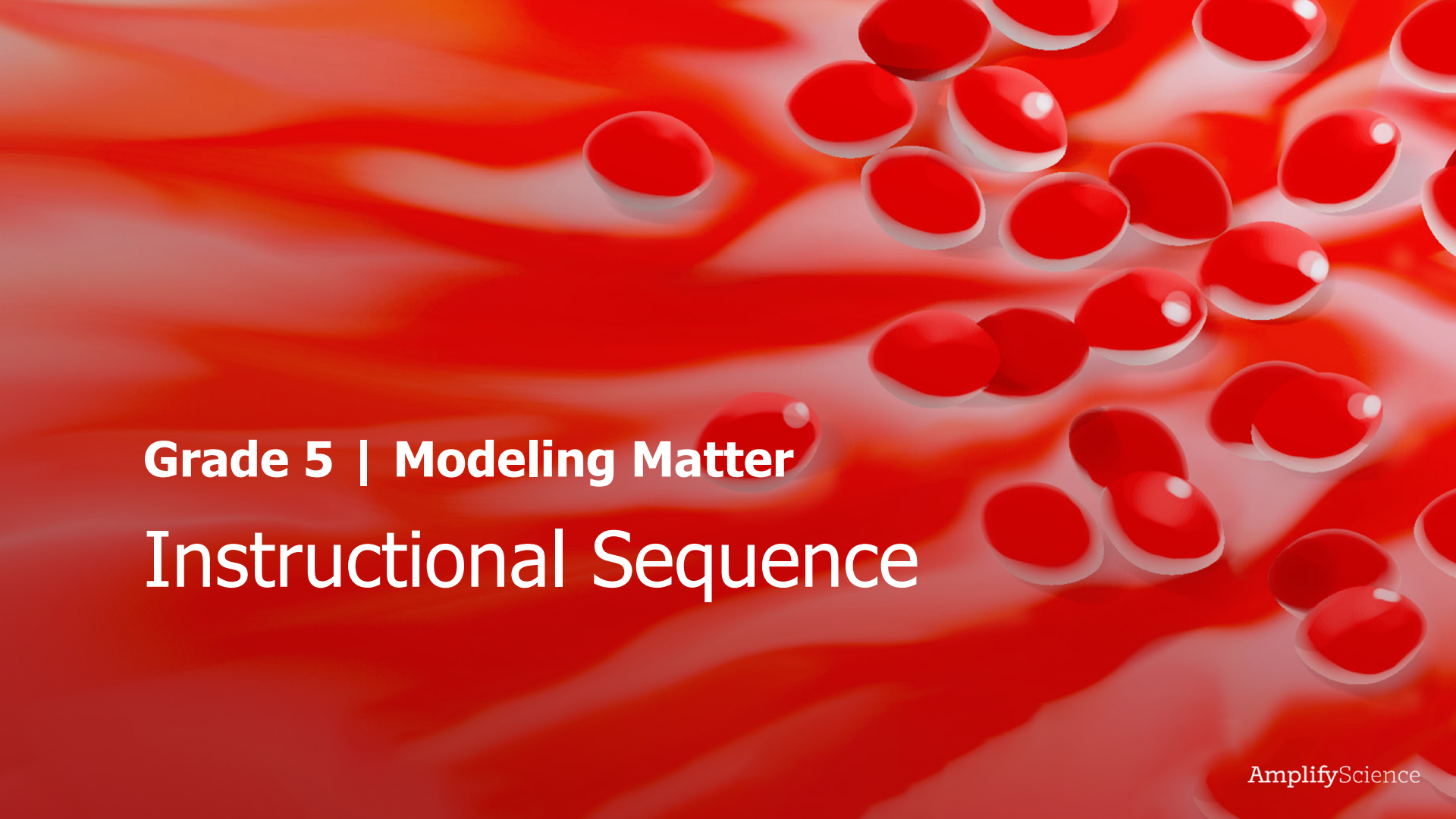
Unit Level 3-D Statement

Key

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

Unit Level

Students 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).



Grade 5 | Modeling Matter

Instructional Sequence

AmplifyScience

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

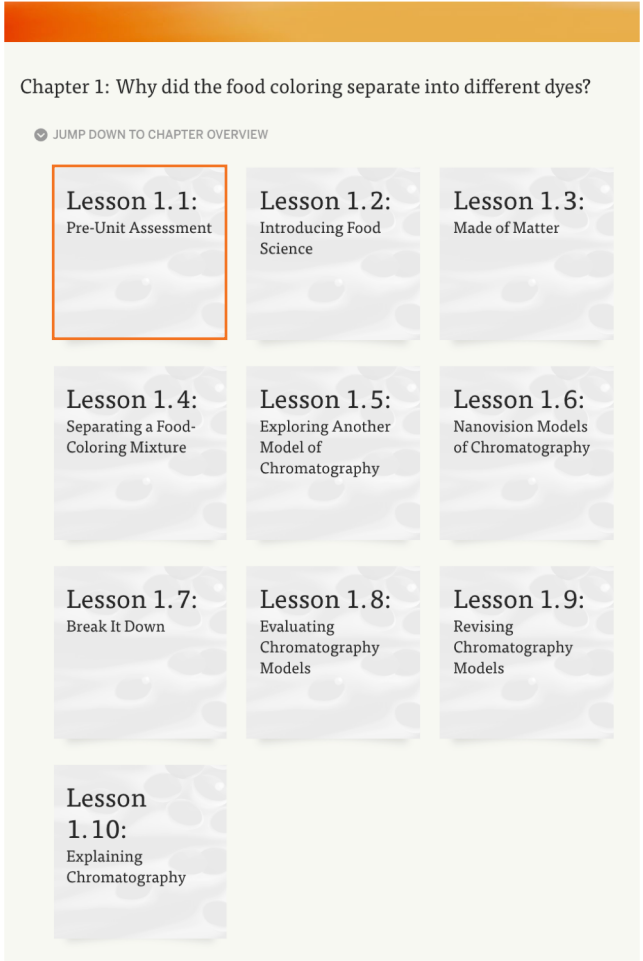
Where do you think a food scientist **works**?

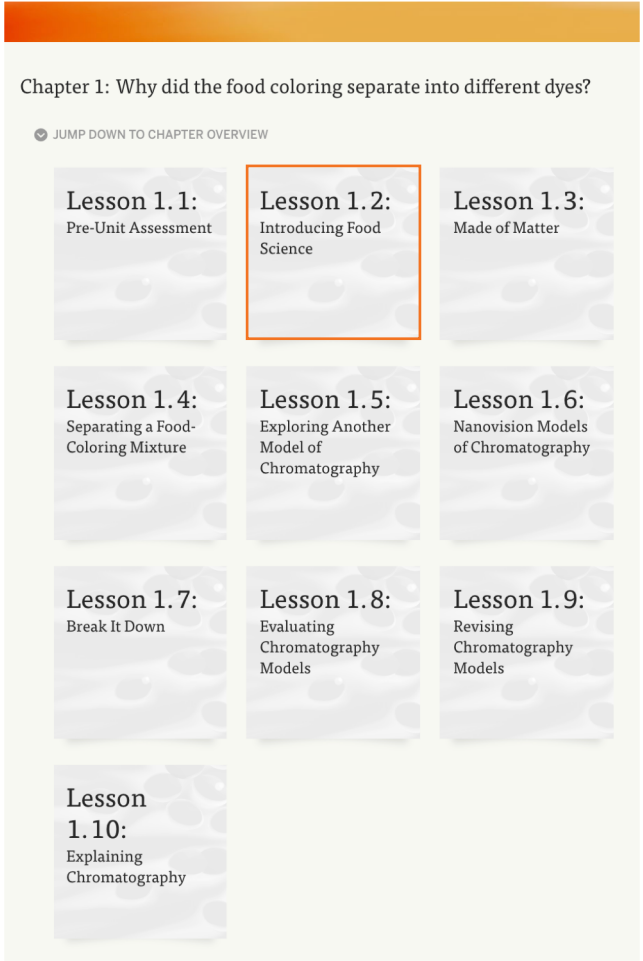
Take a moment to look at these pictures.

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

Good Food Production, Inc.

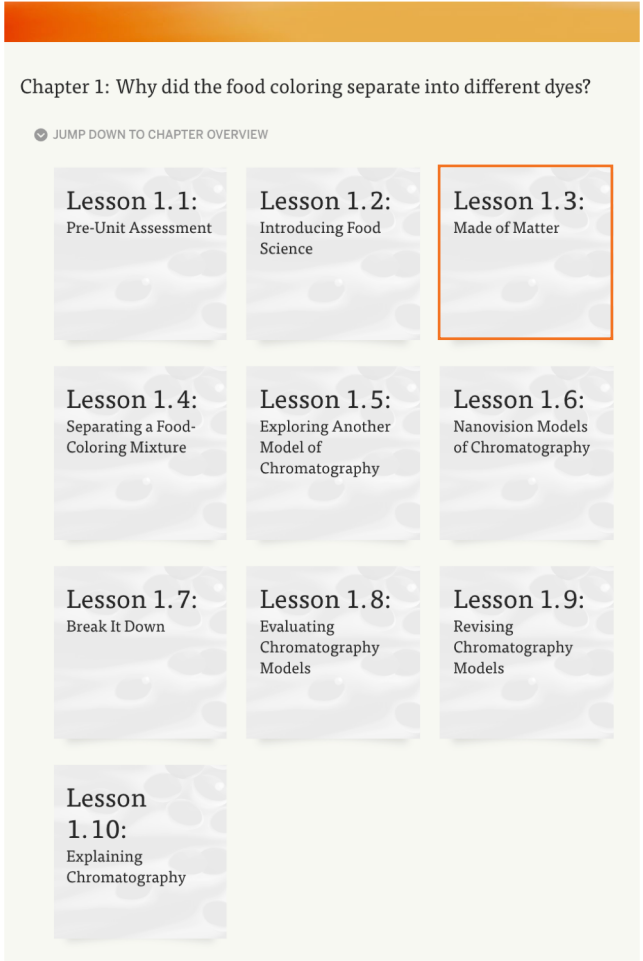
For the next few weeks, we are going to take on the role of **food scientists** for a company called Good Food Production, Inc.





Unit Question

What happens when two substances are mixed together?



Unit Map

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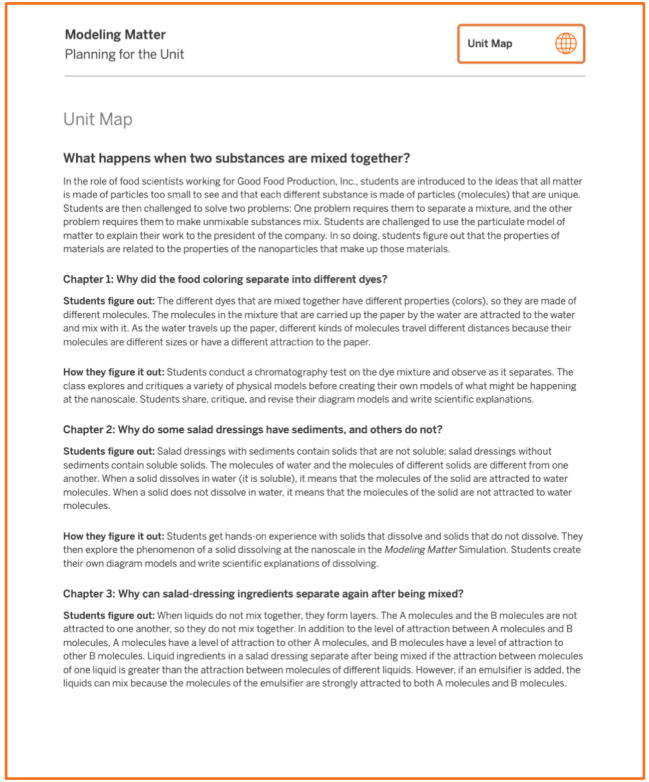


Modeling Matter
Planning for the Unit

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?

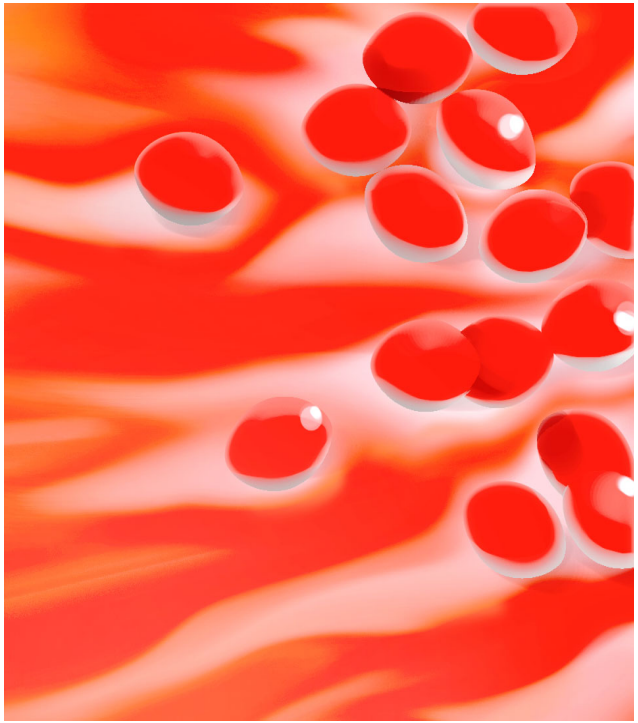
Students figure out: Salad dressings with sediments contain solids that are not soluble; salad dressings without sediments contain soluble solids. The molecules of water and the molecules of different solids are different from one another. When a solid dissolves in water (it is soluble), it means that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

End-of-unit explanation

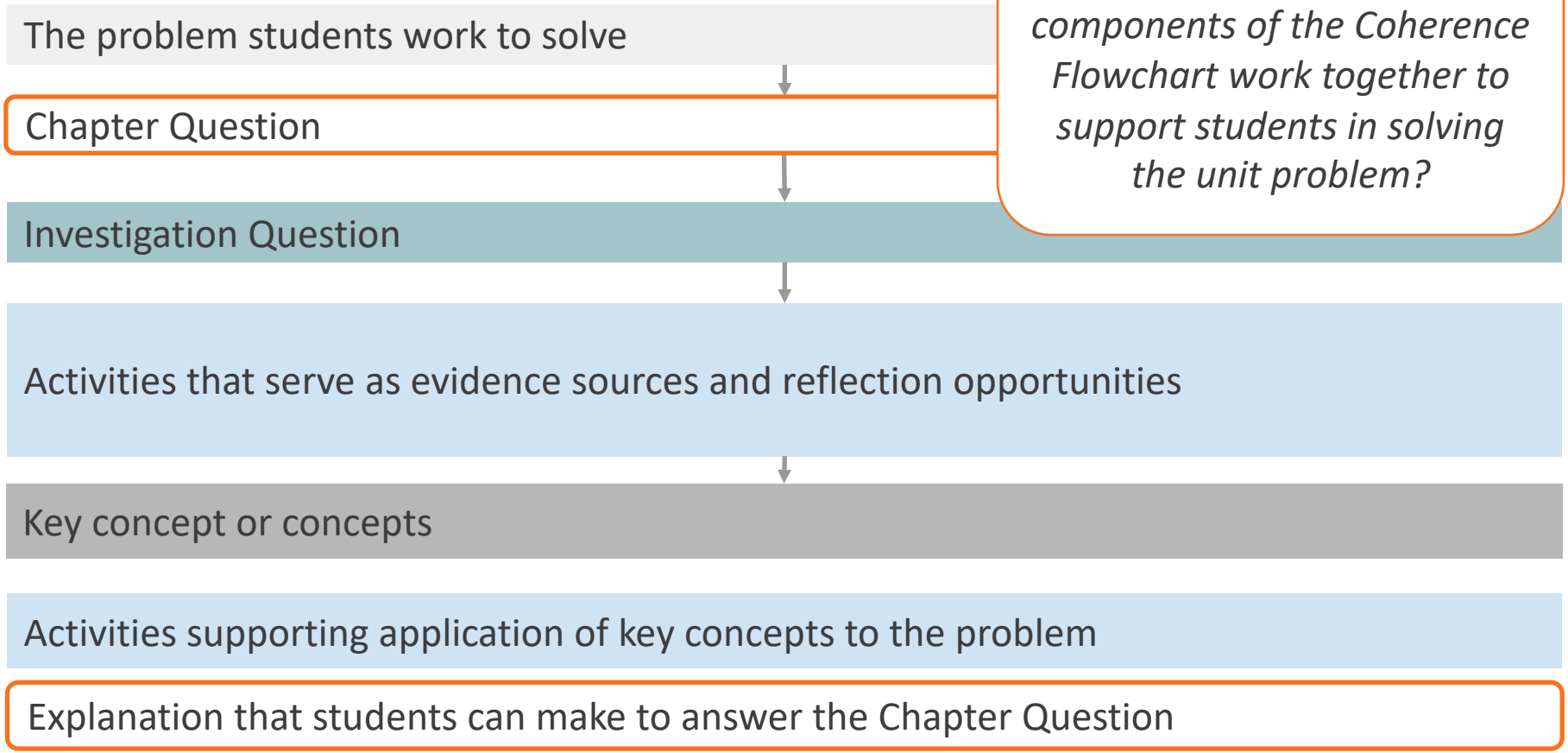


- To avoid sediment, Good Food Production, Inc., needs to use only soluble solids in its salad dressing.
- Salad dressing mixtures separate when the molecules in one liquid ingredient are more strongly attracted to one another than to molecules in the other liquid ingredient.
- Adding an emulsifier will keep the ingredients mixed.

Coherence as a design principle

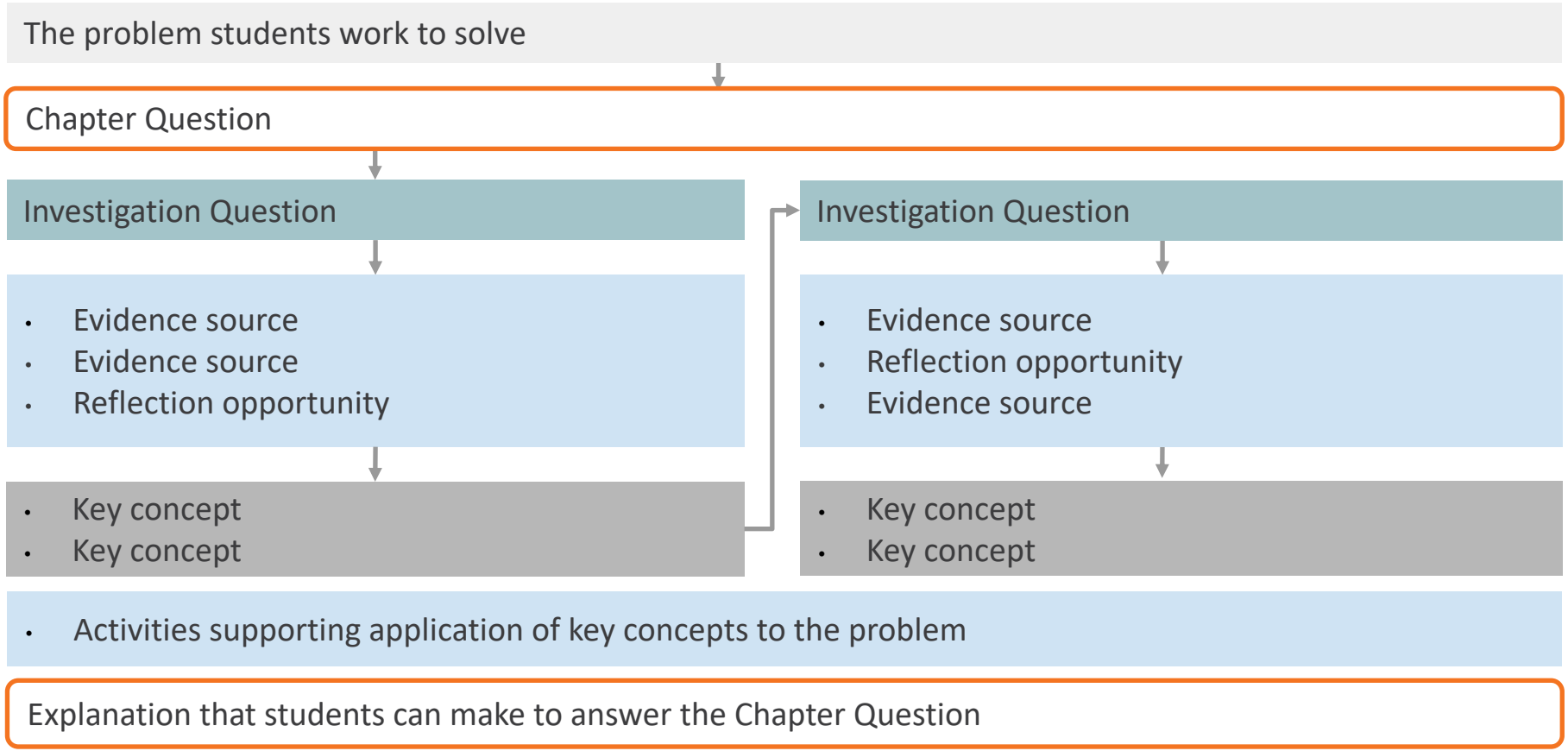
- Supports students in building a rich network of concepts
- Allows for increasingly complex explanations
- Supports students in integrating ideas
- Provides motivation to look more deeply at the phenomenon

Coherence Flowchart structure



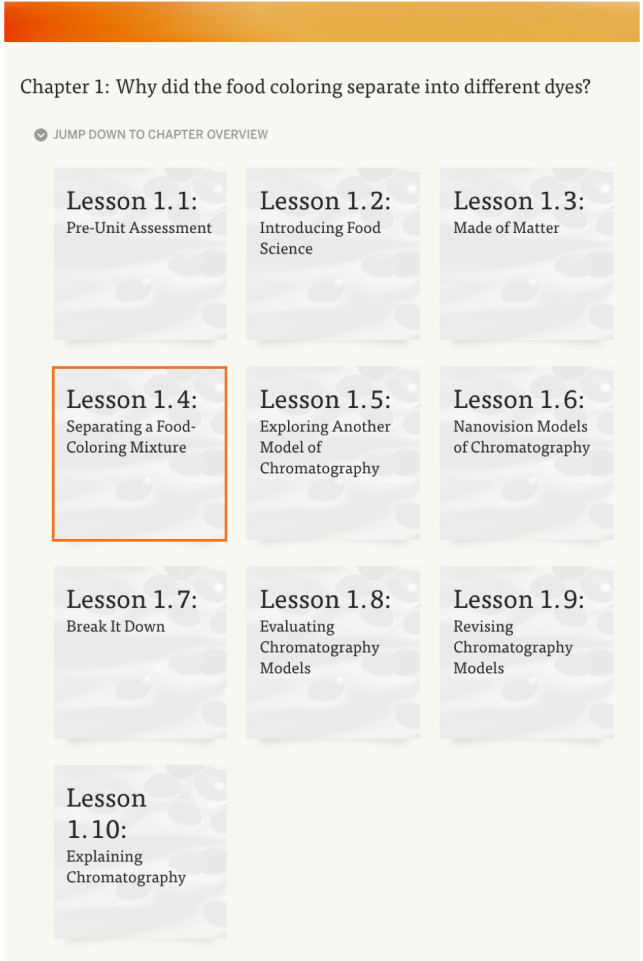
How do the specific components of the Coherence Flowchart work together to support students in solving the unit problem?

Coherence Flowchart structure



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.

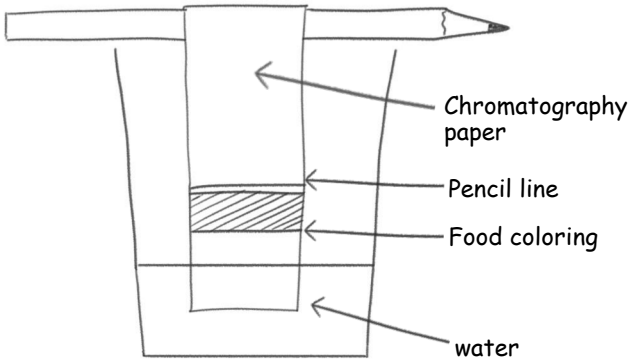
Sincerely,
Lauren Harold, President
Good Food Production, Inc.

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



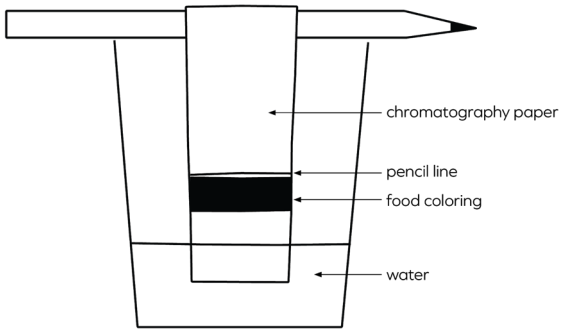
You will hang the paper strip so the bottom touches the water.

What do you **predict** will happen?

Name: _____ Date: _____

Using Chromatography to Separate a Mixture

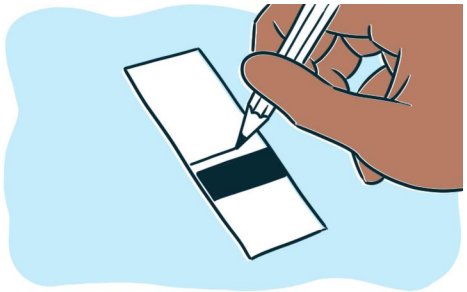
1. **Draw a pencil line.** On the paper strip, draw a pencil line along the top edge of the food coloring.
2. **Attach the paper strip so it hangs in the water, but the food coloring is still above the water.** Tape the top of the paper strip to a pencil. The bottom of the paper strip should just touch 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.

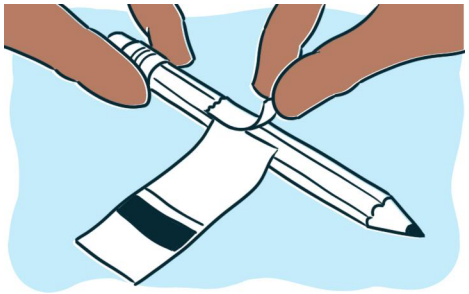
Let's review the directions.

Chromatography Test



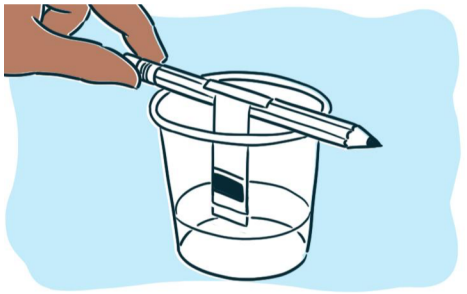
Step 1

Draw a pencil line.



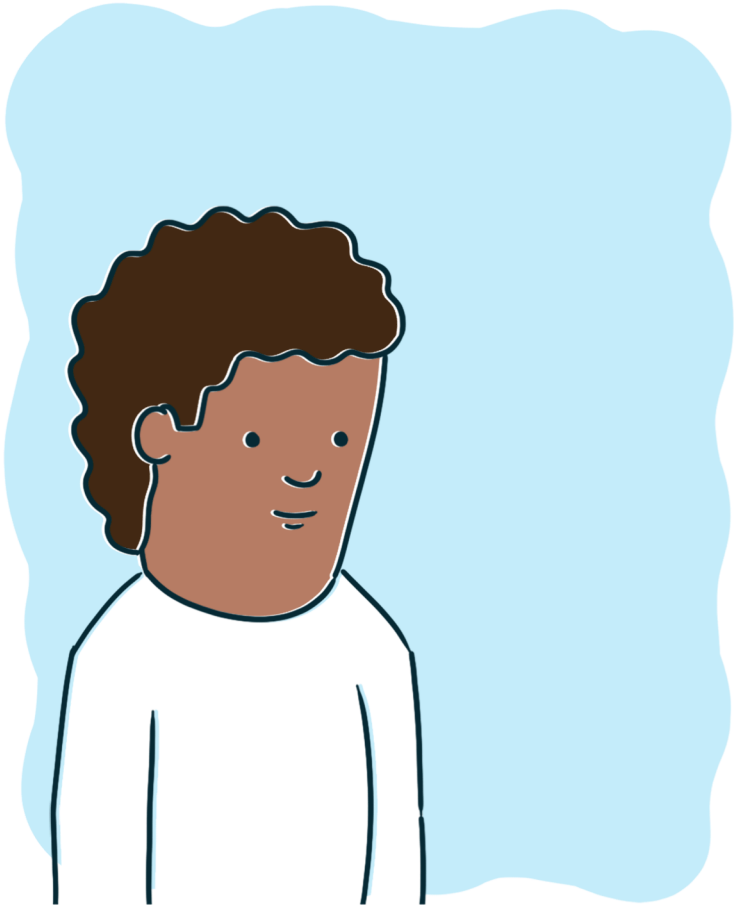
Step 2

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?

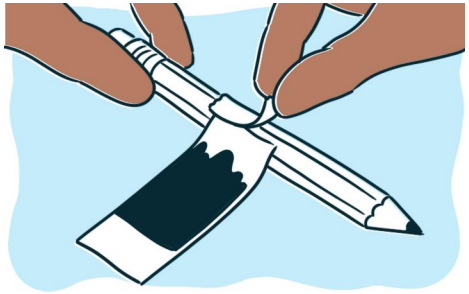
How could we **separate the mixture** in our model back into three separate substances?

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

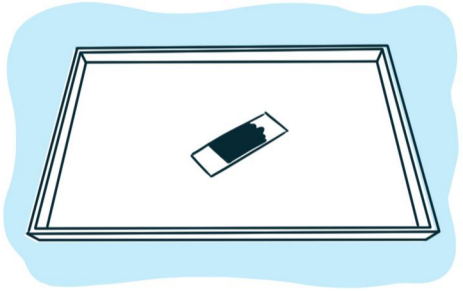
Step 1

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)

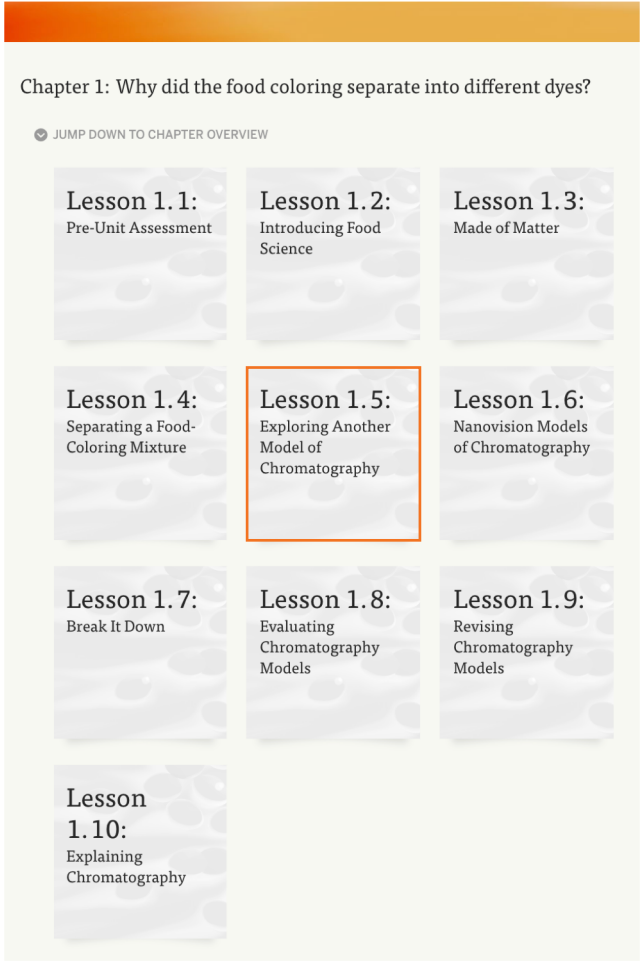
- Different molecules have different properties. (1.5)
- The properties of a substance are determined by the properties of its molecules. (1.8)

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?

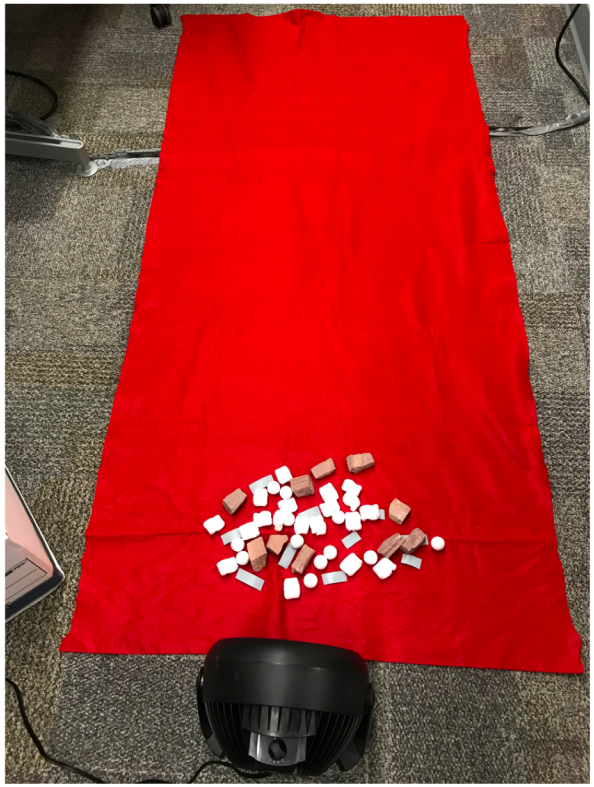
First, we are going to investigate this question:

How do differences in molecules cause substances to separate?

Shared Listening

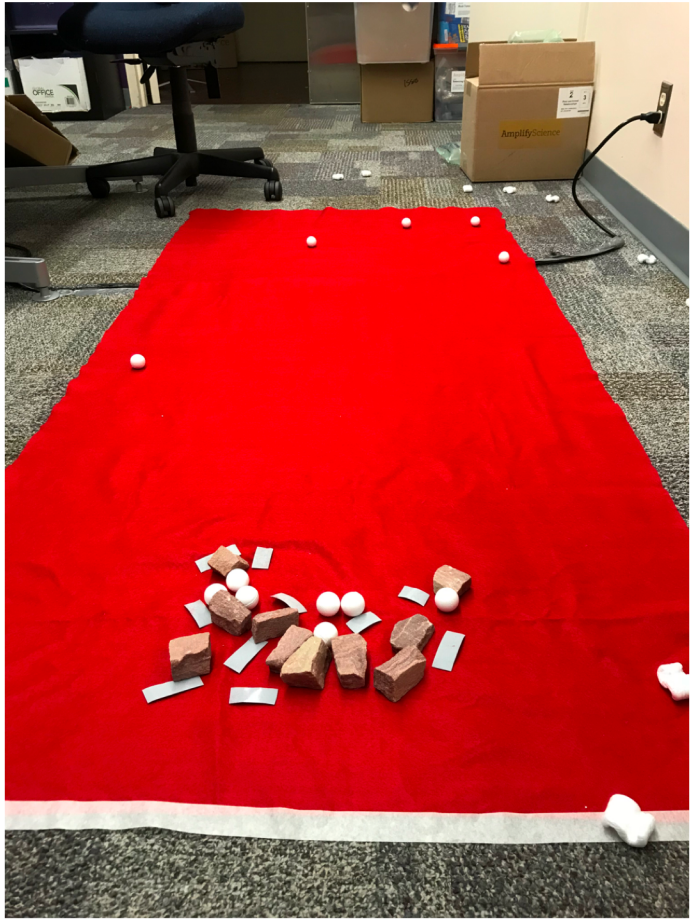
Take a moment to independently reflect on these questions:

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

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 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

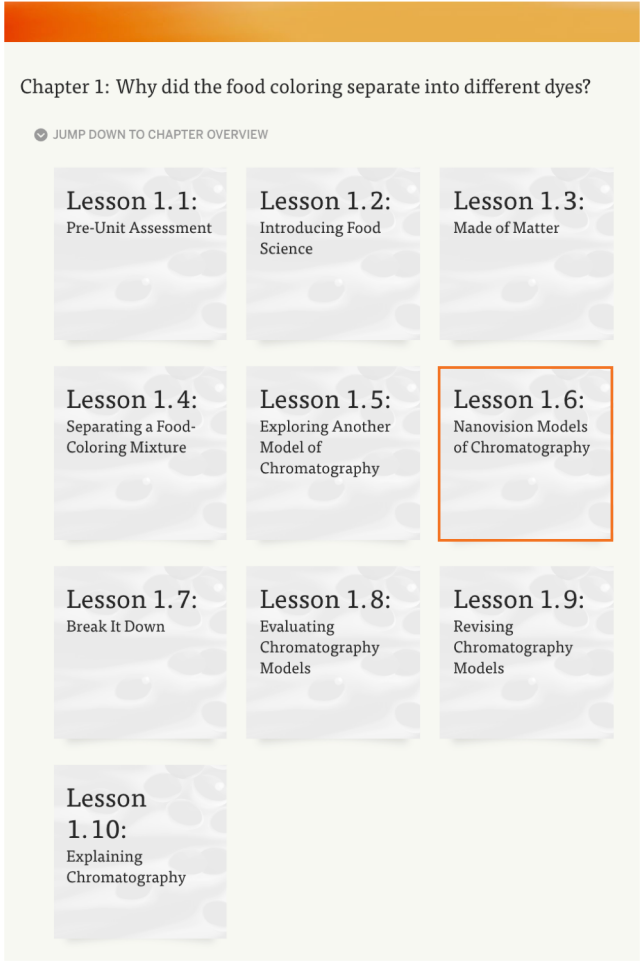
The different dyes that are mixed together have different properties (colors), so they are made of different molecules. The molecules in the mixture that are carried up the paper by the water are attracted to the water and mix with it. As the water travels up the paper, different kinds of molecules travel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

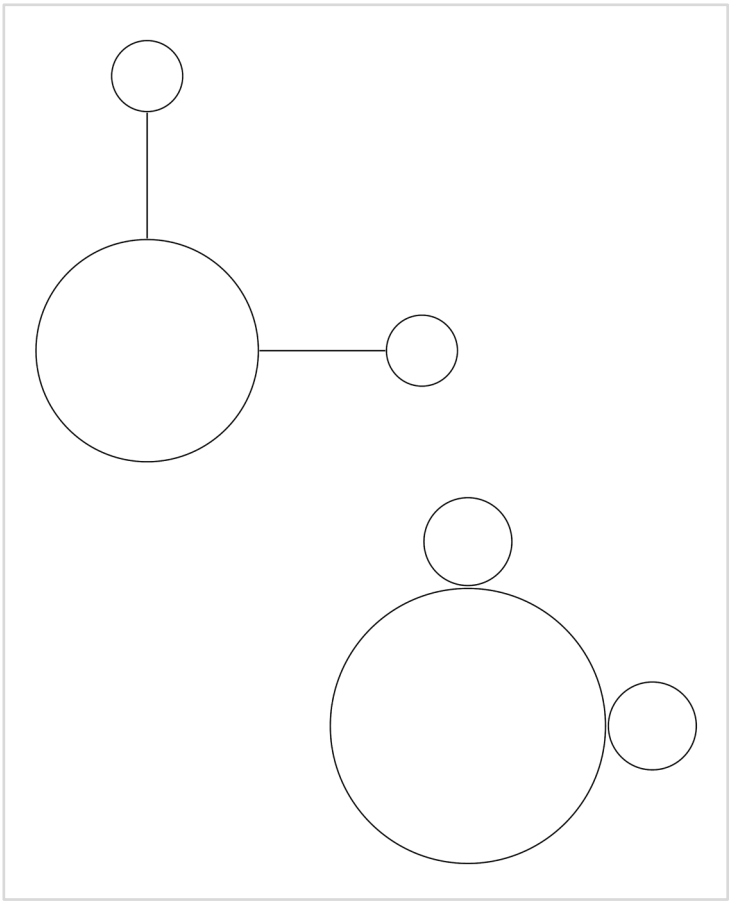
Turn and talk:

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

Engaging with ideas over multiple activities

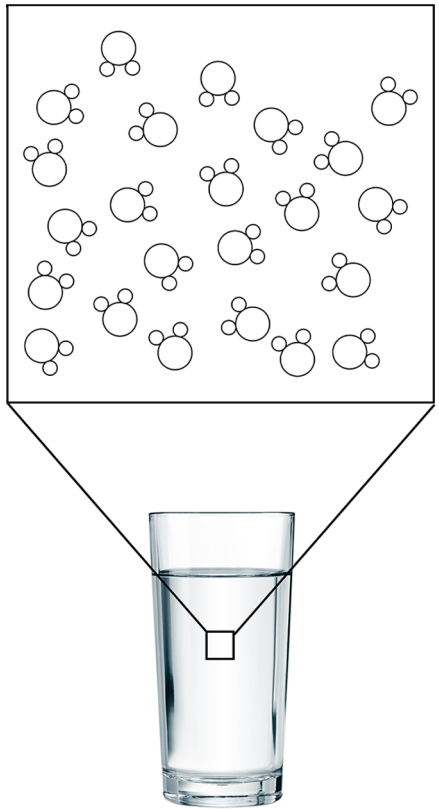
- Supports all learners
- Supports making connections
- Provides different, related pieces of evidence
- Models what scientists do
- Situates concepts in a variety of contexts



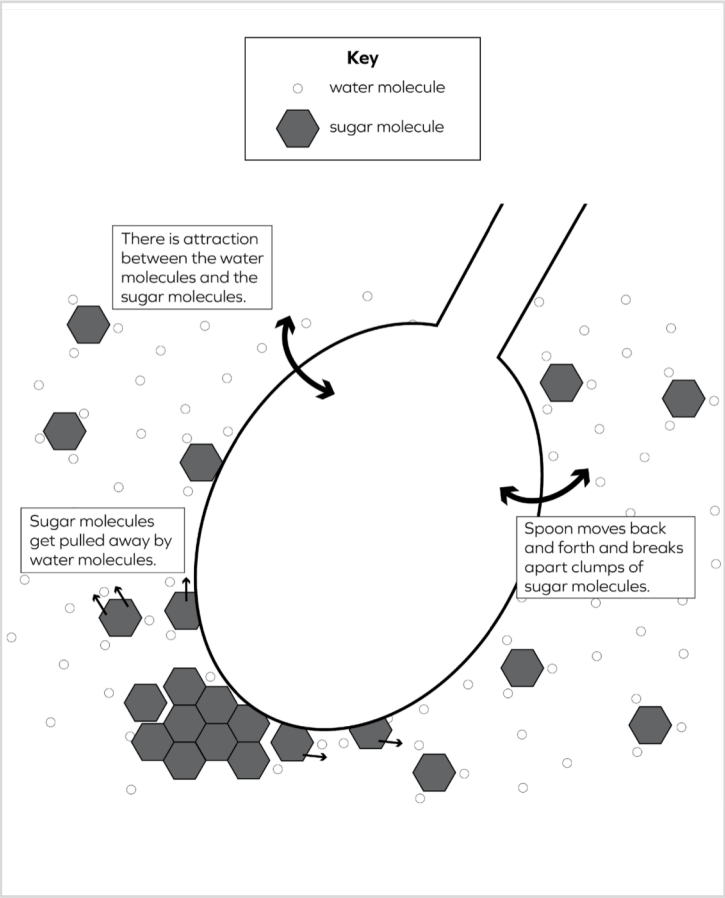


These are other models of water molecules that a scientist could draw.

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.**



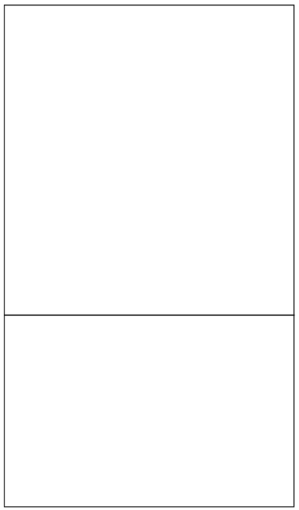
This model shows what happens when sugar is mixed into water.

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

Name: _____ Date: _____

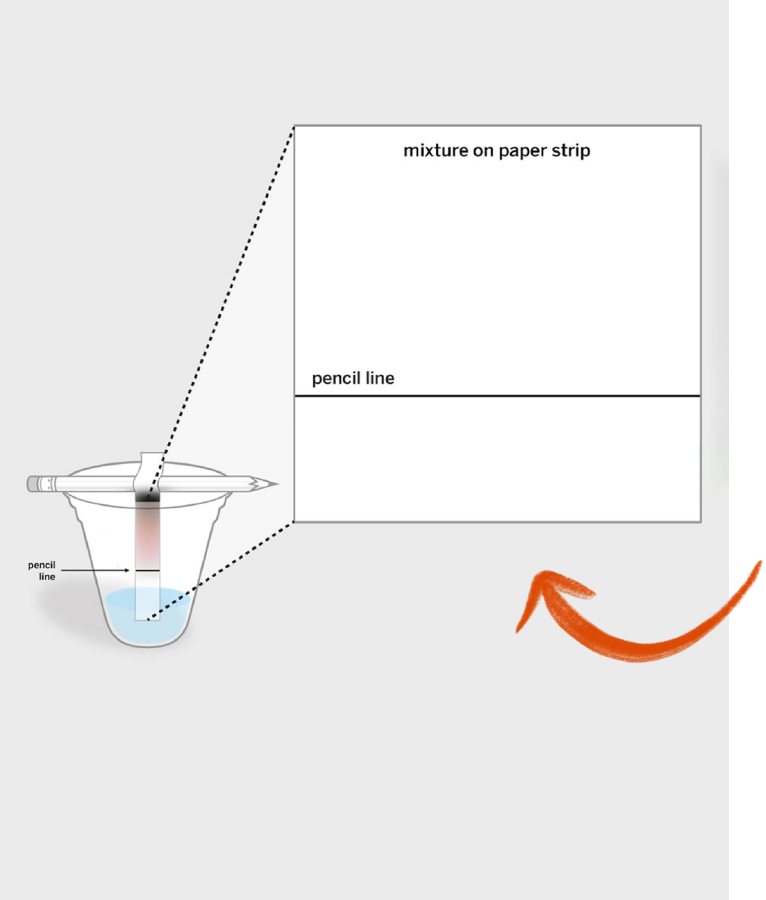
Nanovision Model of Chromatography

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.

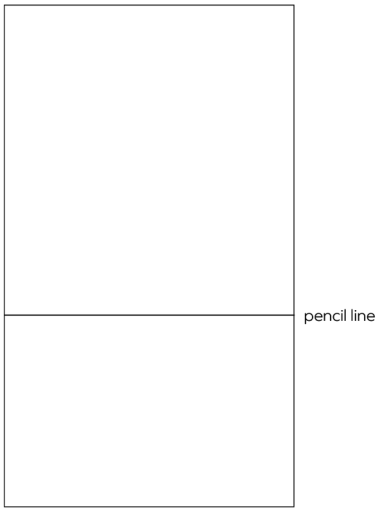


The white box on page xx of the notebook is a close-up of the strip of chromatography paper, like this.

Name: _____ Date: _____

Nanovision Model of Chromatography

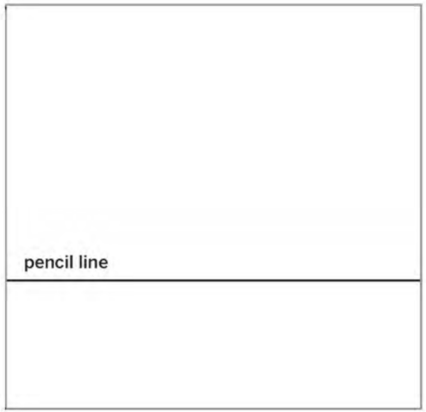
1. Draw what you think happened with the water molecules and the molecules in the food-coloring dyes during chromatography.
2. Include a key that will help another scientist understand your model.
3. Label the parts of your model.
4. Use arrows if needed.



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

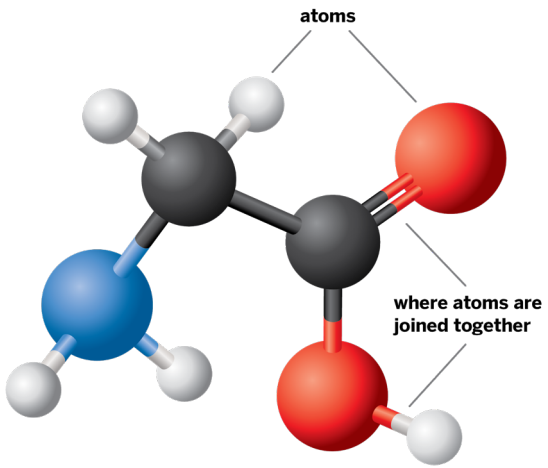


Does the model show:

- 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*.

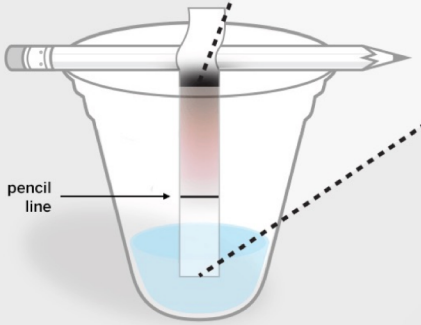
What **features** do **diagrams** have?

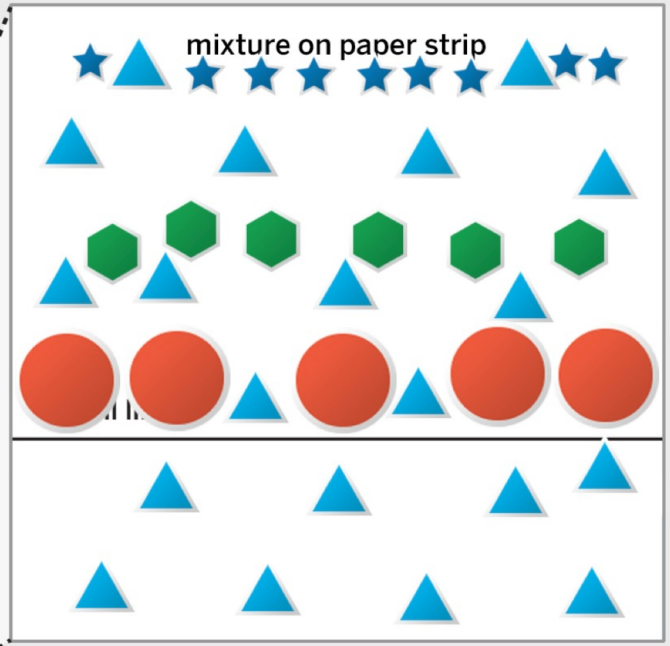
How can those features make a diagram clearer?

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.





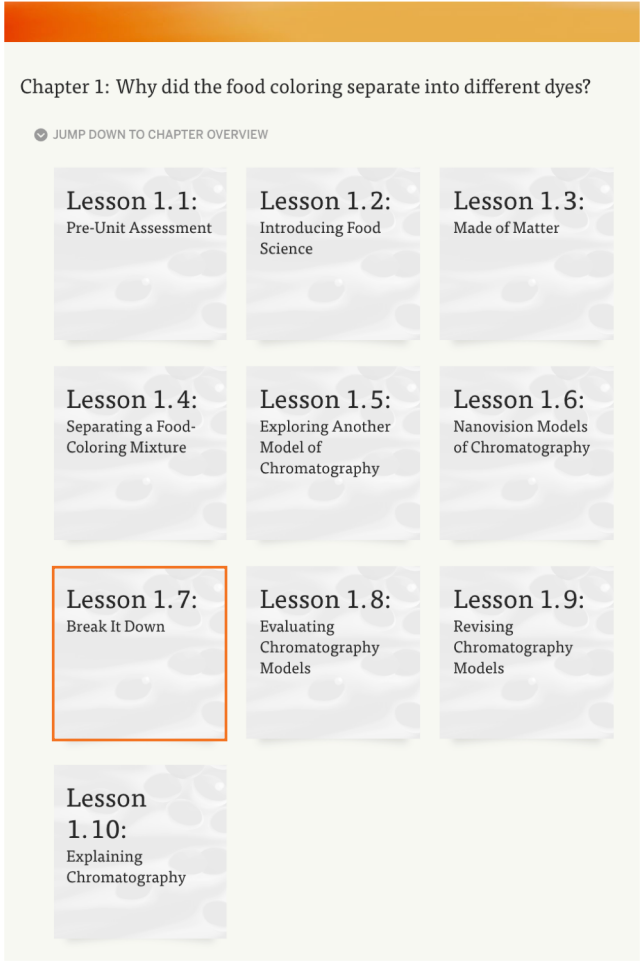
Key

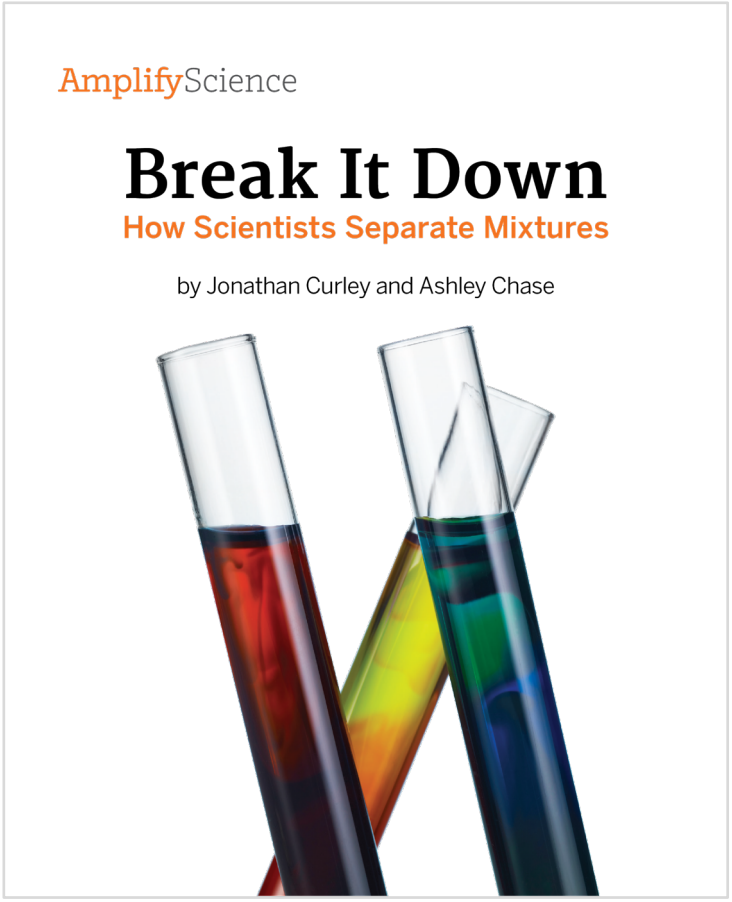

Dye 1 molecule


Dye 2 molecule


Dye 3 molecule


water molecule



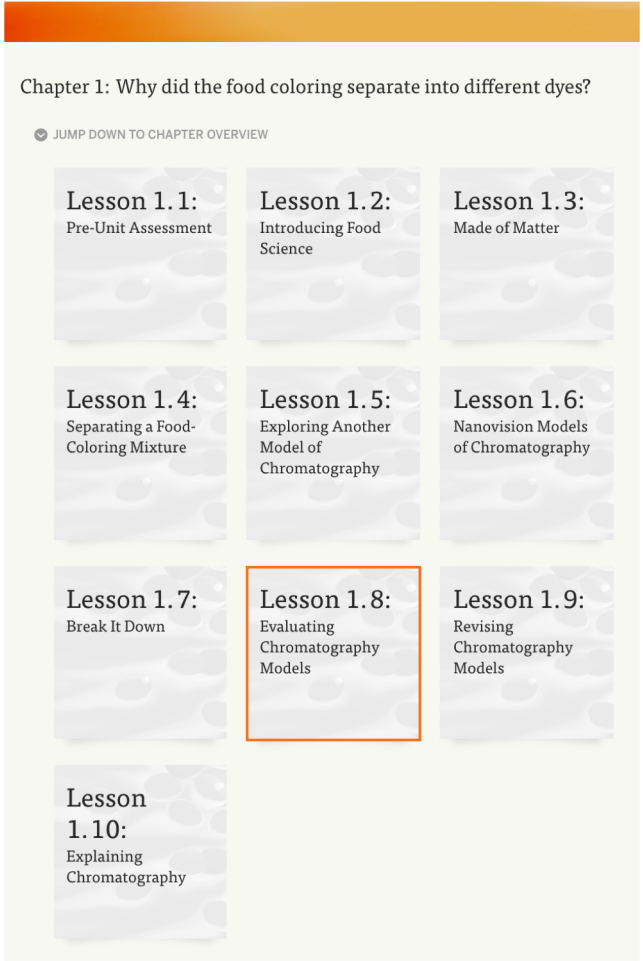


This book is about scientists who separate mixtures in their work.

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.

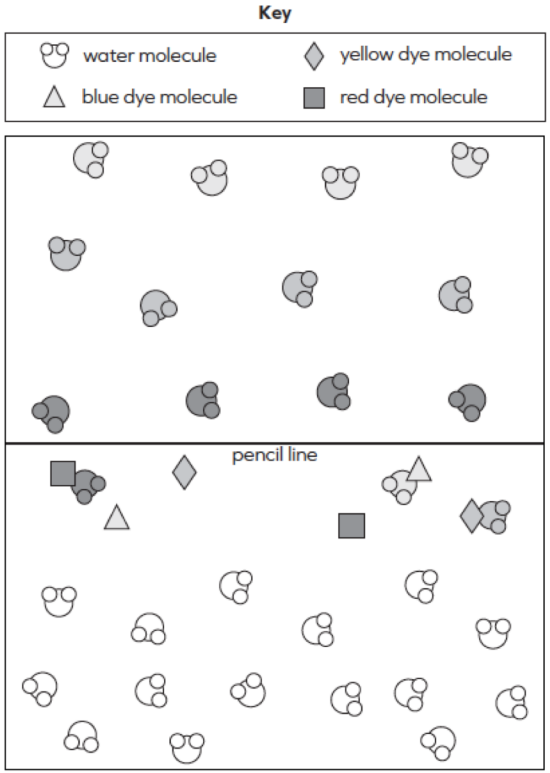
Color-Changing Model

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.



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?

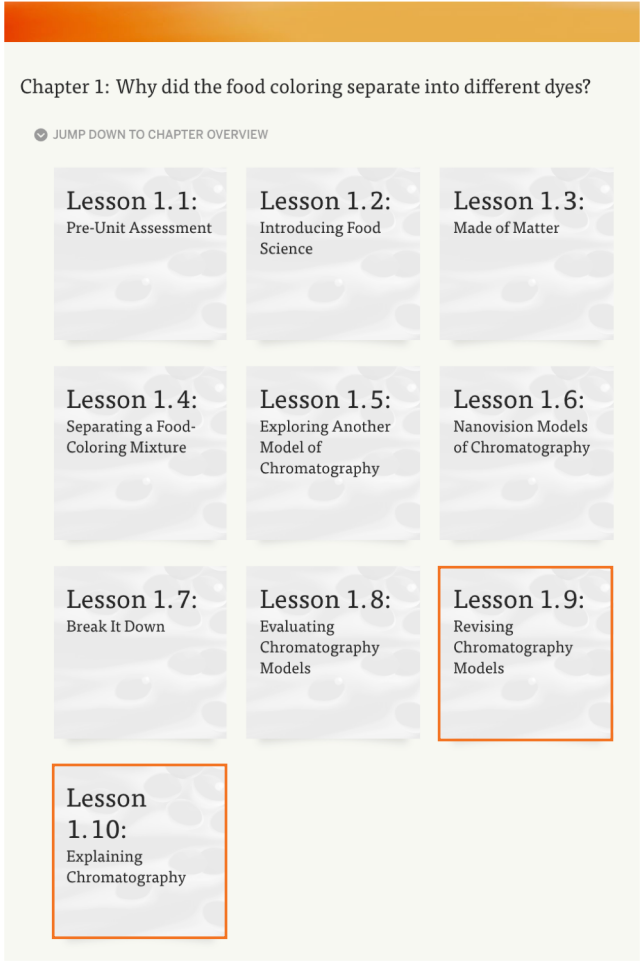
- Different molecules have different properties. (1.5)
- The properties of a substance are determined by the properties of its molecules. (1.8)

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.



Chapter 1 explanation

Why did the food coloring separate into different dyes?

The dyes moved up the paper because as the dye molecules moved up the paper, they were attracted to the water molecules. The dyes separated because their molecules were different sizes and weights. The molecules of the blue dye were the largest, so they had the hardest time moving up the paper, and they didn't go very far.

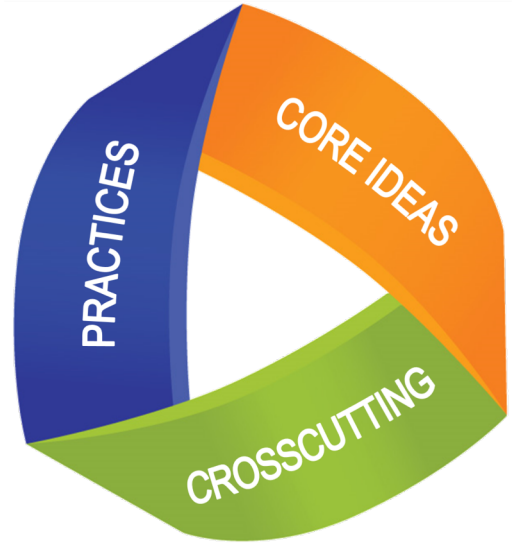
Chapter 1 explanation cont.

Why did the food coloring separate into different dyes?

The molecules of the yellow dye were medium size, and it was somewhat easy for them to move with the water, so they went farther on the paper. The molecules of the red dye were small, so it was easiest for them to move with the water, and they went the farthest on the paper. So, the dyes separated because the different properties of dye molecules interacted with the water and paper molecules in different ways.

Thinking three dimensionally

Pg. xx



Disciplinary Core Ideas

- Refer to the key concepts

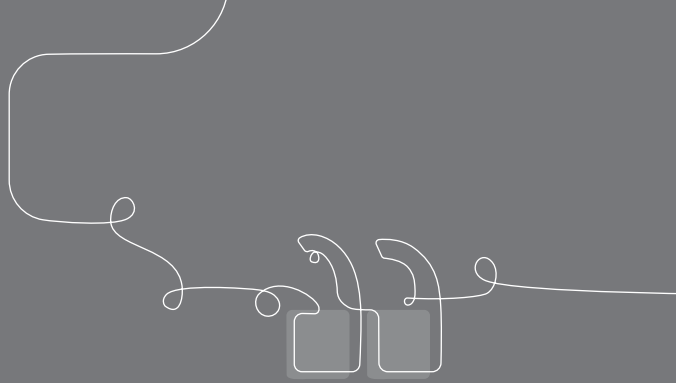
Science and Engineering Practices

- 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.

Please also note any needs or wonderings for the afternoon!

Modeling Matter

Plan for the day

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

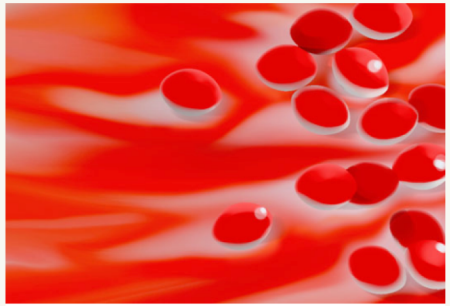
The story of the unit

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

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

JUMP DOWN TO UNIT GUIDE

GENERATE PRINTABLE TEACHER'S GUIDE



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

10 Lessons

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

5 Lessons

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

7 Lessons

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.

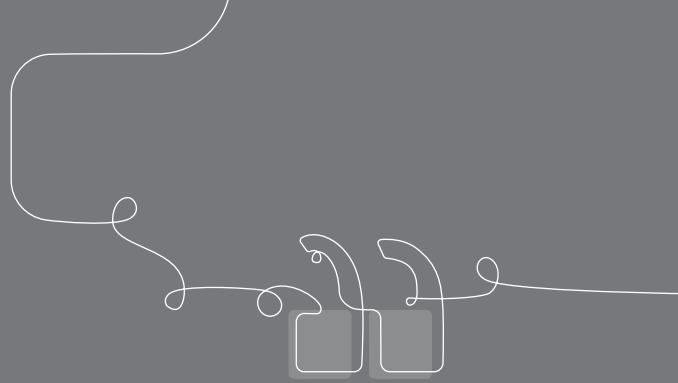
Chapter 1 key concepts and explanation

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.



Turn and talk:

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

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.

Progress Build: A unit-specific learning progression

Pg. xx

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.

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.

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?

Pg. xx

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 are stirred together, but completely mix when lecithin is stirred in?

Pg. xx

Progress Build Level 1:
All matter is made up of particles too small to see—atoms connected together to form molecules. If two pure substances have different observable properties (in the same conditions), they are made of different molecules.

Summary of Progress Build level*	Describe how a student would answer the question
1: Observable properties result from molecular properties.	• Explain that the vinegar, oil and lecithin are all made up of molecules that are different from one another and that the interactions of those individual molecules could account for the separating or mixing of ingredients. • Explain that oil and vinegar are observably different from one another because they are made of different molecules, whose properties are different on the nanoscale. • Explain that lecithin is a different substance, so its molecules are different than those of oil and of vinegar. • Not be able to fully explain why the oil and vinegar separate into layers. • Not be able to explain why the substances mix together when lecithin is added.

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 the End-of-Unit Assessments?
- What do you find challenging about End-of-Unit Assessments?

Modeling Matter

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
- Exploring the Modeling Matter Simulation
- Preparing to teach

Pg. xx

Choosing a focus area

Pg. xx

- 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

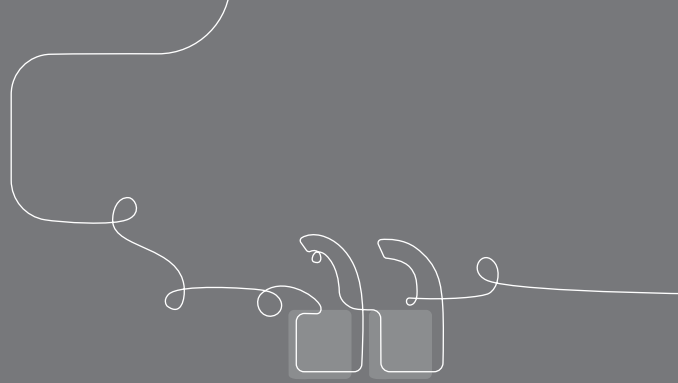
- Based on your work in your focus area, what will you keep in mind as you plan to teach your next unit?

Modeling Matter

Plan for the day

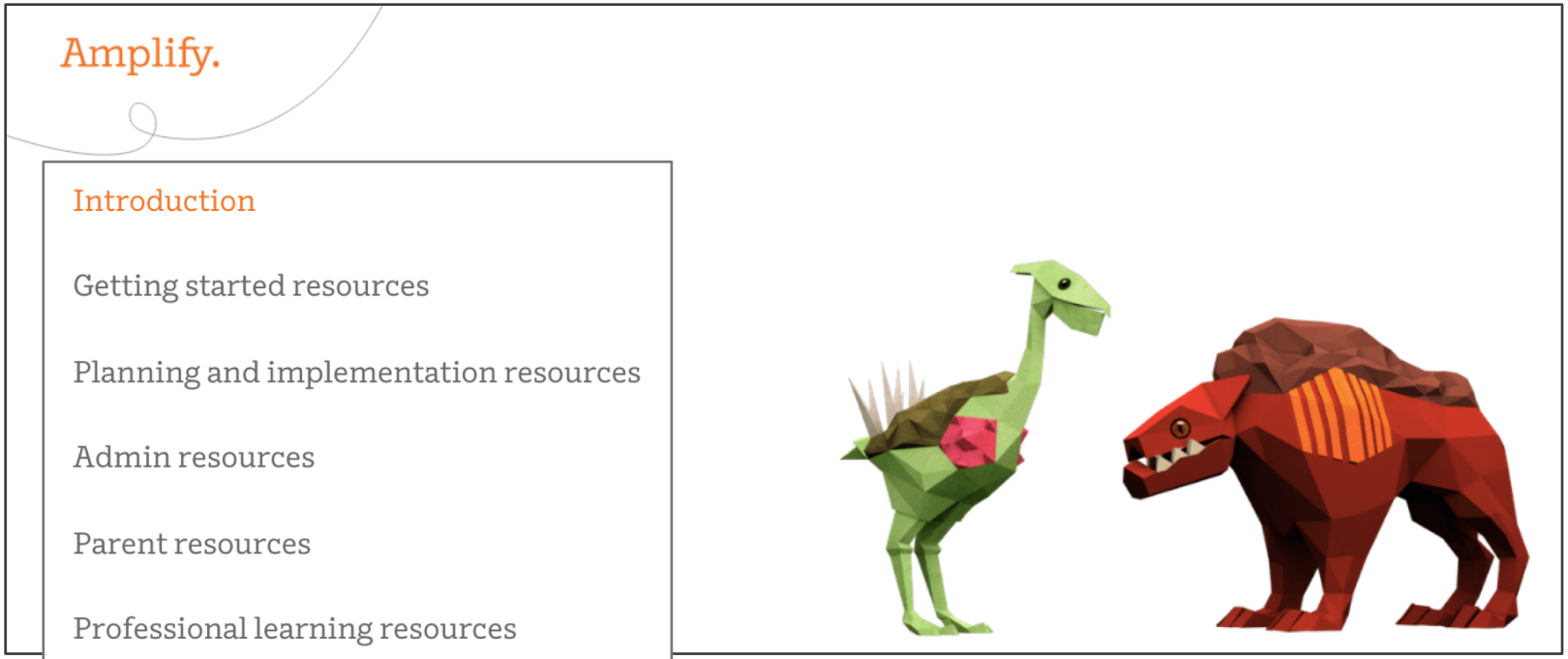
- Framing and reflection
- Experiencing the unit
- The story of the unit
- Planning to teach
- Closing

Questions?



NYC Resource Site

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



Missing Materials

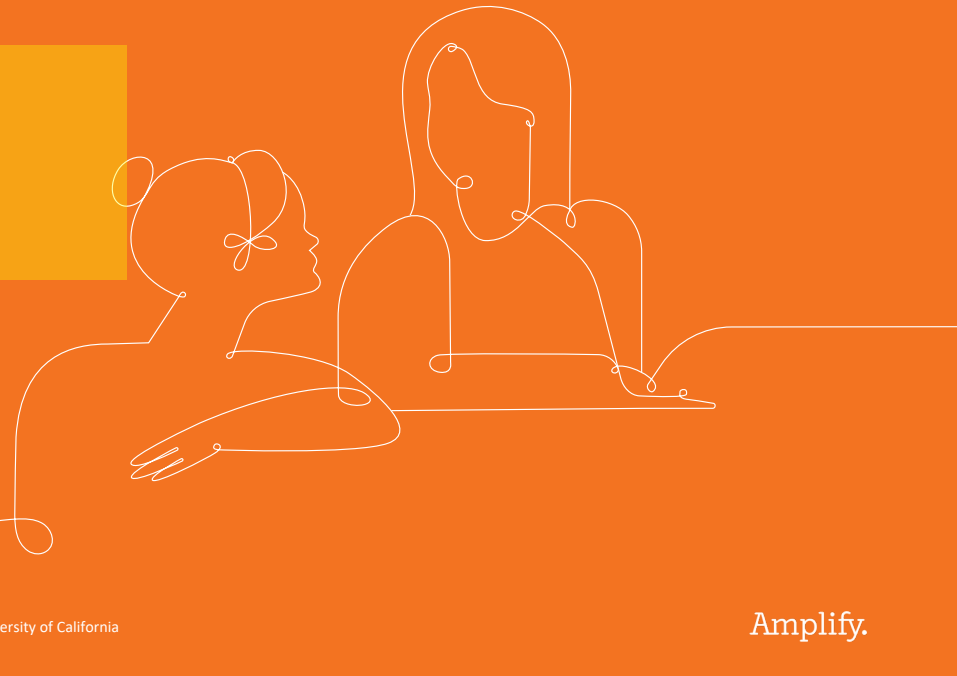
- Contact the Core Curriculum Service Center Monday-Friday 8am-5pm

Email: curriculum@schools.nyc.gov

Phone: (718) 935-3334

Thank you for your feedback!

Presenter Name:
Workshop Title:



Amplify.