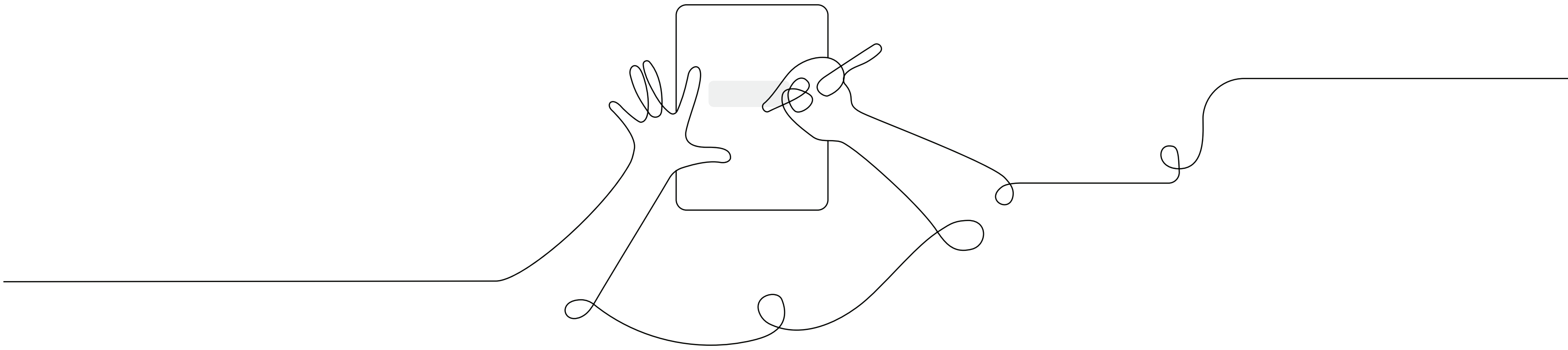
Amplify Science

Participant Notebook

Supporting Diverse Learner Needs
Grade 5: Modeling Matter

New York City Schools



Supporting Diverse Learners
Unit-specific workshop agenda

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

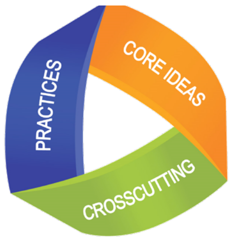
Demo account for your workshop:

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

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

Password: **AmplifyNumber1**

Three dimensions of NYSSLS reference



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

Science and Engineering Practices

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

Disciplinary Core Ideas

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

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

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

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

Crosscutting Concepts

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

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.

How they figure it out: Students observe real liquids that don't mix, and then they use the Simulation to figure out what the phenomenon might look like at the nanoscale. Students create their own models of mixing and non-mixing liquids and write scientific explanations about the phenomenon. In order to try to get liquids to mix, students then experiment with food additives that act as emulsifiers, and some that do not. The Simulation enables them to explore and observe how emulsifiers work at the nanoscale and create their own models that explain how emulsifiers work.

Modeling Matter Coherence Flowchart

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 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) • 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 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 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.		

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.	

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.		

AmplifyScience

Modeling Matter:

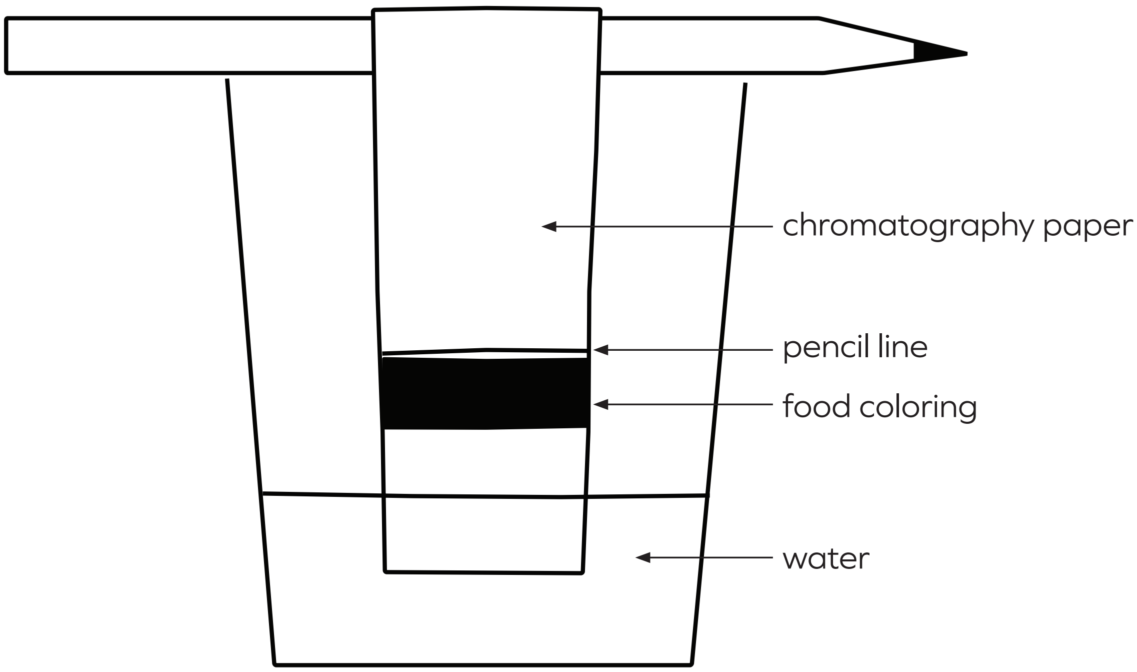
The Chemistry of Food

Investigation Notebook

Name: ______________________________ Date: ______________

Using Chromatography to Separate a Mixture

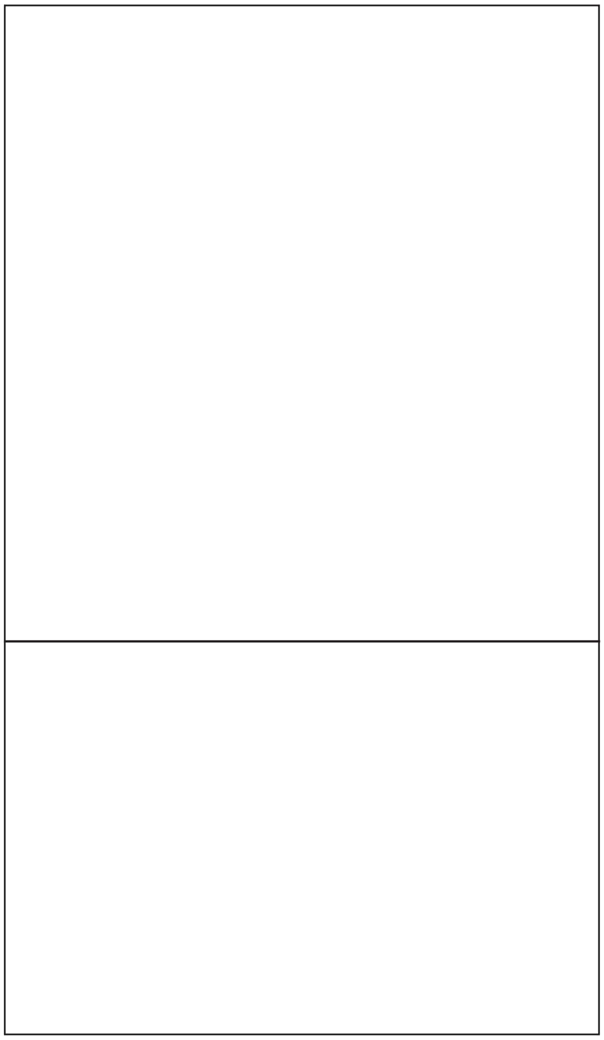
1. **Draw a pencil line.** On the paper strip, draw a pencil line along the top edge of the food coloring.
2. **Attach the paper strip so it hangs in the water, but the food coloring is still above the water.** Tape the top of the paper strip to a pencil. The bottom of the paper strip should just touch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



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.



pencil line

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.

Learner Profiles

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.

Name: ______________________________ Date: ______________

Getting Ready to Read: *Break It Down: How Scientists Separate Mixtures*

1. Before reading the book *Break It Down*, read the sentences below.
2. If you agree with the sentence, write an "A" on the line before the sentence.
3. If you disagree with the sentence, write a "D" on the line before the sentence.
4. After you read the book, see if your ideas have changed. Be ready to explain your thinking.

________ Most things are mixtures.

________ Chromatography is the only way to separate a mixture of different kinds of molecules.

________ One way that scientists separate some mixtures is to spin the mixtures very fast.

________ Air is a mixture.

________ Scientists use the properties of molecules to separate mixtures.

Name: ____________________________________ Date: _______________

Making Inferences in
Break It Down: How Scientists Separate Mixtures

Record in the table below as you read *Break It Down*. Use the images, captions, and text in the book to help you make inferences

Section in book	**Make an inference to answer a question**	**What helped you make the inference?** • what you already know • which image, caption, or text? (Include page.)
Break It Down to Solve Problems: pages 10–11	In ocean water, are water molecules attracted to the atoms that make up salt? Yes No	
Break It Down to Save Lives: pages 12–15	Are there different kinds of molecules in blood? Yes No	
Break It Down to Uncover the Past: pages 16–21	Are the different molecules in goat meat, lentils, honey, wine, and olive oil all the same size? Yes No	
Mixtures and Properties: pages 22–23	What properties of molecules might you be able to use to separate pollution from other substances? Answer:	

Name: ______________________________ Date: ______________

Reading Reflection:
Break It Down: How Scientists Separate Mixtures

If you were a scientist trying to separate pollution molecules from the air, how might you do it? (This question appears on page 23 of *Break It Down*.)

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Make a drawing to explain your ideas. Label your drawing.

Name: ______________________________ Date: ____________

Color-Changing Model

1. Read the explanation for this model below and review the diagram of the model on the next page.
2. Turn to pages 28–29, Evaluating Chromatography Models, and discuss each question with your partner.
   - On page 28, circle **Yes** or **No** for each question to indicate if it does or does not explain what you observed in chromatography and what you know about molecules.

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.

Name: ______________________________ Date: ____________

Attraction Model

1. Read the explanation for this model below and review the diagram of the model on the next page.
2. Turn to pages 28–29, Evaluating Chromatography Models, and discuss each question with your partner.
    - On page 29, circle **Yes** or **No** for each question to indicate if it does or does not explain what you observed in chromatography and what you know about molecules.

What happened to the dye and water molecules during chromatography?

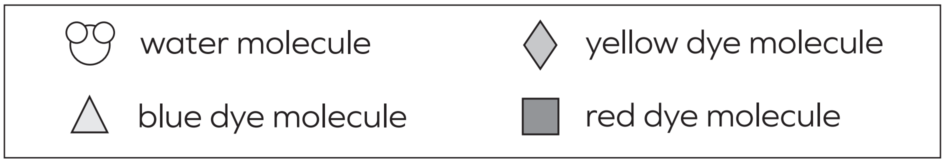
The water molecules were attracted to the paper molecules, so the water molecules climbed up the paper.

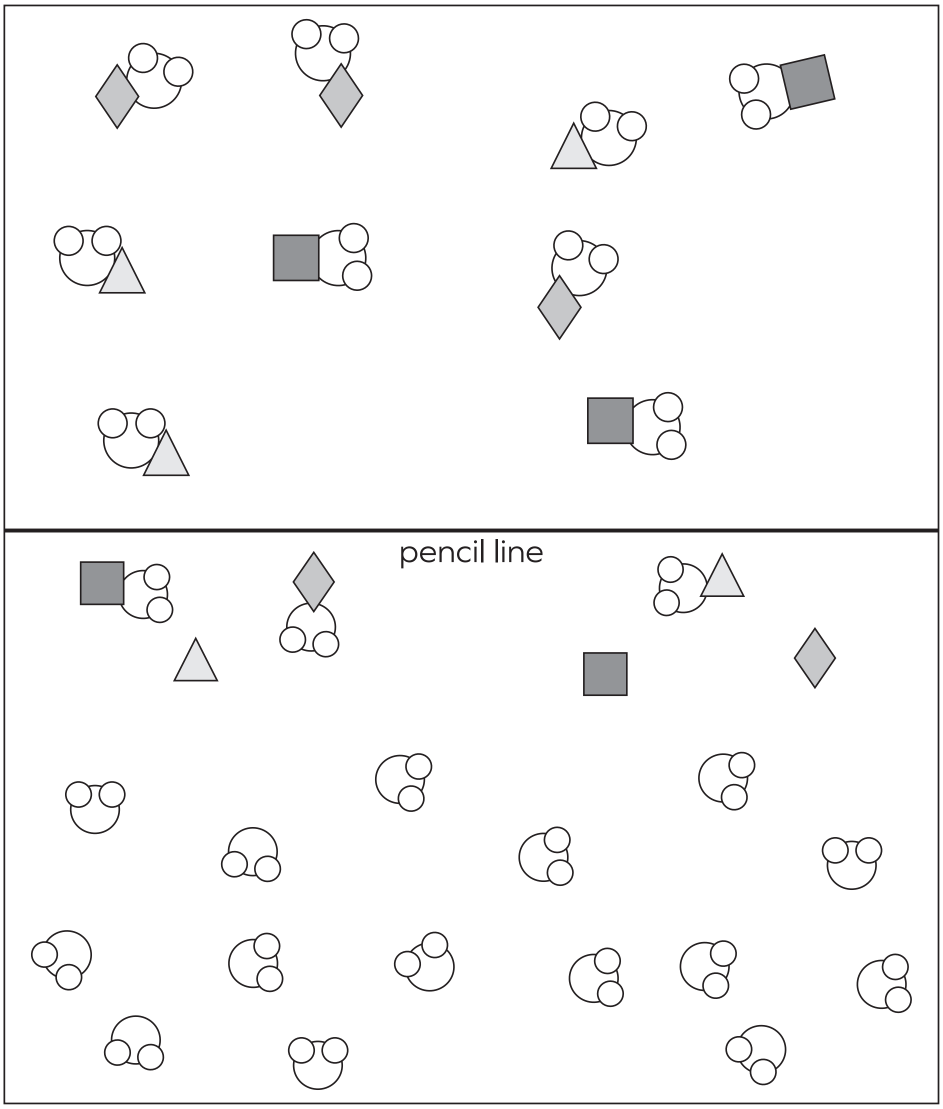
The dye molecules were also attracted to the water molecules. Since they were attracted to the water molecules, the dye molecules got carried up the paper. At some point, the dye molecules were more attracted to the paper molecules than to the water molecules, so they stopped moving up.

Name: ______________________________ Date: ______________

Attraction Model (continued)

Key





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

Name: ______________________ Date: ____________

Evaluating Chromatography Models (continued)

Growing 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

Attraction 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

Name: ______________________________ Date: ______________

Scientific Explanation of Dissolving

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: Which flavor ingredients will not leave sediments in the salad dressing? Why?

Name: ______________________________________ Date: ________________

Chapter 2: Check Your Understanding

This is a chance for you to reflect on your learning so far. This is not a test. Be open and truthful when you respond.

Scientists investigate in order to figure out how things work. Am I getting closer to figuring out why some salad-dressing ingredients mix, and others do not?

I understand what happens with the molecules when a solid mixes into a liquid. _____ Yes _____ Not yet

I understand what happens with the molecules when two liquids mix or don't mix. _____ Yes _____ Not yet

I understand that scientific explanations can change based on new evidence. _____ Yes _____ Not yet

I think I understand or don’t yet understand these ideas because

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What are you still wondering about mixing and non-mixing substances or about molecules?

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Name: ______________________________ Date: ______________

You can use this page to record notes or create drawings.

Name: ______________________________ Date: ______________

Daily Written Reflection

How do models help explain solubility?

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Make a drawing to explain your ideas. Label your drawing.

Name: ______________________________ Date: ______________

Making Mixtures in the Simulation

1. In the Solubility mode of the Simulation, create the combinations of molecules listed in the first column of the table on the next page.
   - In the space between the two arrows, record the level of attraction between the two molecules.
2. In the second column, circle how mixed the two substances are.
3. In the third column, record your evidence. What did you observe that makes you think the substances will interact in that way?
4. Answer the question at the bottom of the next page.

Level of attraction between molecules of these two substances	**How mixed are these two substances?**	**What is your evidence?**
Example: [2] ‹ › [3]	completely mixed mostly mixed slightly mixed not mixed	

Name: ______________________________ Date: ______________

Making Mixtures in the Simulation (continued)

Level of attraction between molecules of these two substances	How mixed are these two substances?	What is your evidence?
1 ‹ › 5	completely mixed mostly mixed slightly mixed not mixed	
2 ‹ › 4	completely mixed mostly mixed slightly mixed not mixed	
‹ ›	completely mixed mostly mixed slightly mixed not mixed	

Based on what you've learned about mixing and dissolving, if a solid dissolves into a liquid, what does it mean about the properties of their molecules? Describe what it would look like on the nanoscale.

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Name: ______________________________ Date: ______________

Explanations of Dissolving

Question: Why does sugar dissolve in water, but pepper does not?

Explanation A

Sugar is soluble in water. When I put sugar in water and stirred, the sugar seemed to disappear. However, because the water tasted sweet, I knew that the sugar was still there. Pepper, on the other hand, is not soluble in water. Even after stirring a long time, I could still see clumps of pepper in the water.

Explanation B

Sugar dissolves in water because it is soluble in water. Molecules that are attracted to one another spread apart and mix evenly in a mixture. This is what happened with the sugar and water. When I put sugar in water and stirred, the sugar seemed to disappear. However, because the water tasted sweet, I knew that the sugar was still there.

Pepper, on the other hand, is not soluble in water. Even after stirring a long time, I could still see clumps of pepper in the water. This must have happened because pepper molecules and water molecules have low attraction to one another. Sugar and pepper do not interact in the same way when you mix them with water because of the different properties of their molecules.

Name: ________________________________ Date: ______________

Evaluating Explanations of Dissolving

1. Evaluate Explanation A by writing "yes" in the second column if it includes that feature of a scientific explanation. If that feature is not included in the explanation, write "no."
2. Repeat for Explanation B, recording your answers in the third column.
3. On the next page, answer the two questions.

What is a scientific explanation?	**Explanation A**	**Explanation B**
It answers the question.		
It describes things that are not easy to observe.		
The ideas in the explanation are correct based on the scientific ideas we have learned.		

Name: ______________________________ Date: ______________

Evaluating Explanations of Dissolving (continued)

What advice would you give the writer of Explanation A to help improve it? Think about how accurate the science ideas in the explanation are, as well as about how well the explanation is written.

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What advice would you give the writer of Explanation B to help improve it? Think about how accurate the science ideas in the explanation are, as well as about how well the explanation is written.

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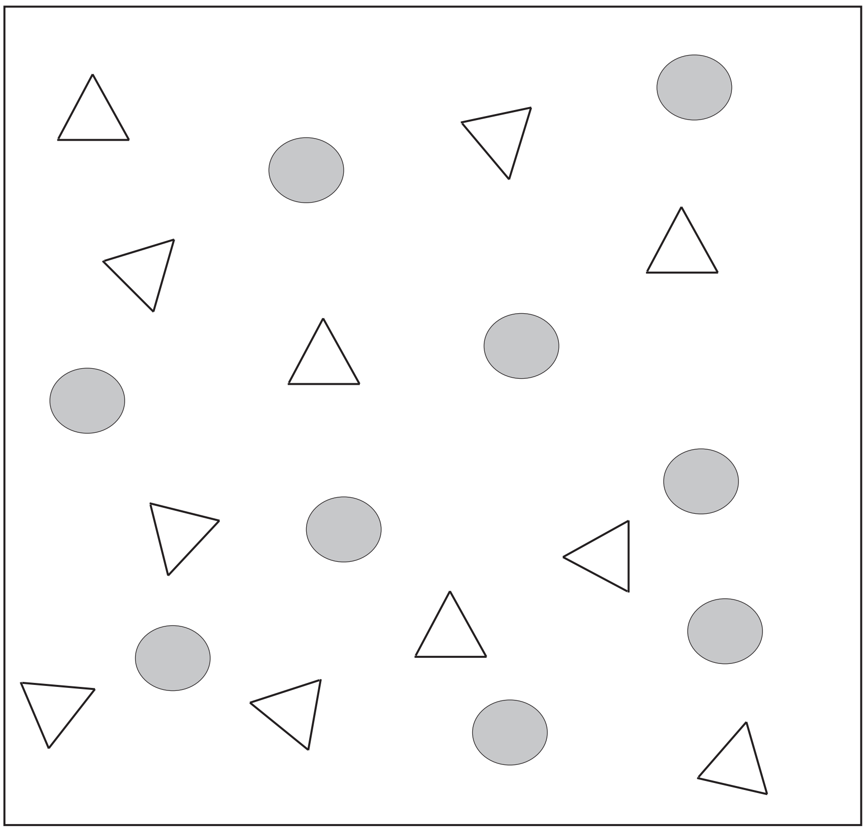
Name: ______________________________ Date: ______________

You can use this page to record notes or create drawings.

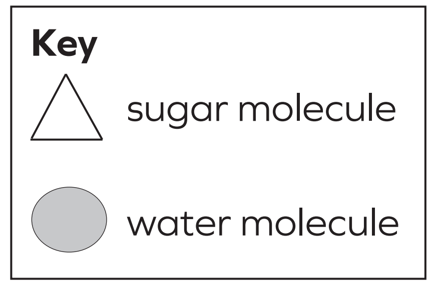
Name: ______________________________ Date: ______________

Evaluating a Dissolving Model

1. Review pages 12–13 and 16–17 in *Solving Dissolving*.
2. Evaluate the model below and then answer the questions on the next page.



Sugar molecules spread apart and mix evenly with water molecules.



Name: ______________________ Date: ______________

Evaluating a Dissolving Model (continued)

1. What does this model show well about dissolving?

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2. What does this model not show well about dissolving?

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3. Describe what you would change about this model. Make a drawing (in the box below) if it helps you explain your thinking. Label your drawing.

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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?

Connecting key concepts to chapter explanations

Modeling Matter

Directions:

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

Ch	Key concepts	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.
3	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)	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.

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?

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.

Grade 5: Unit 2 - Modeling Matter

Sample Rubric Compilation & Scoring Guide for the End of Unit Assessment (Lesson 3.7)

Criteria	0	1	2	3	4
Causal and Explanatory Does the explanation go beyond, or add to, what can be observed to explain the non mixing and mixing of ingredients?	No or inaccurate explanation	The explanation **does not** go beyond, or add to what was observed to explain why the ingredients sometimes separated and sometimes mixed together.	The explanation **somewhat** goes beyond or adds to describing why the oil and vinegar initially separated but the addition of lecithin resulted in mixing or why different molecules interact in different ways.	The explanation **goes beyond or adds to what was observed** describing why the oil and vinegar initially separated but the addition of lecithin resulted in mixing **and** why different molecules interact in different ways.	The explanation **goes beyond and adds to what was observed** describing why the oil and vinegar initially separated but the addition of lecithin resulted in mixing **and** why different molecules interact in different ways.
Clear and Well Organized Is the explanation written in a way that will allow the audience to understand it?	No or inaccurate explanation	The explanation is not structured in a way that will allow the audience to understand it.	The explanation is structured in a way that will somewhat allow the audience to understand it.	The explanation is structured in a way that will clearly allow the audience to understand it.	The explanation is structured in a way that the audience can clearly understand and includes science appropriate vocabulary.
Grounded in Evidence Is the explanation consistent with the relevant science ideas that students have experienced so far?	No or inaccurate explanation	Explanation is not consistent with the understanding that substances are made of particles too small to be seen, or the understanding that the particles that make up materials have properties that explain why ingredients sometimes mix, or the understanding that the particles that makeup materials have properties that explain why materials sometimes separate. Addresses one criteria.	Explanation somewhat consistent with the understanding that substances are made of particles too small to be seen, or the understanding that the particles that make up materials have properties that explain why ingredients sometimes mix, or the understanding that the particles that makeup materials have properties that explain why materials sometimes separate. Addresses two criteria.	Explanation shows understanding consistent with the understanding that substances are made of particles too small to be seen, particles that make up materials have properties that explain why ingredients sometimes mix, and the particles that makeup materials have properties that explain why materials sometimes separate. Addresses all criteria	Explanation shows understanding consistent with the understanding that substances are made of particles too small to be seen, particles that make up materials have properties that explain why ingredients sometimes mix, and the particles that makeup materials have properties that explain why materials sometimes separate. Addresses all criteria and cites classroom examples or data to support the explanations.
Grounded in Evidence Does the explanation use changes that happen at one scale to account for something that can be observed at another scale?	No or inaccurate explanation	Explanation **does not** recognize that objects can exist at the observable scale and also at a scale that is too small to be observed with the naked eye or does not account for the observable separation or mixing of ingredients by describing interactions of particles that are too small to be observed with the naked eye.	Explanation **somewhat** recognizes objects can exist at the observable scale and also at a scale too small to be observed with the naked eye **or** does not account for the observable mixing of ingredients by describing interactions of particles too small to be observed with the naked eye.	Explanation **shows understanding** that objects can exist at the observable scale and also at a scale that is too small to be observed with the naked eye **and** accounts for the observable separation or mixing of ingredients by describing interactions of particles that are too small to be observed with the naked eye.	Explanation **shows understanding** that objects can exist at the observable scale and also at a scale that is too small to be observed with the naked eye **and** accounts for the observable separation or mixing of ingredients by describing interactions of particles that are too small to be observed with the naked eye **and** cites classroom examples or data to support the explanations.

Preparing to teach

Directions:

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

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

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

Grade: ____________________ Unit Name:____

Scoring Guide for the End of Unit Assessment (Template)

Criteria	0	1	2	3	4

[Status of the Class Data Collection and Organizational Tool]

Teacher: **Grade Level** : **Date:**
Unit Name: **Chapter:** **Lesson:**

A.) Determine the "Look For's" for the On the Fly Assessment
On-the-Fly Assessment # ____:

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

Students	Look For #1	Look For #2	Look For #3	Look For #4	Look For #5

Amplify Support

Program Guide

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

Amplify Help

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

Customer care

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

800-823-1969

scihelp@amplify.com

Amplify Chat

When contacting customer care, be sure to:

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

Notes

Notes