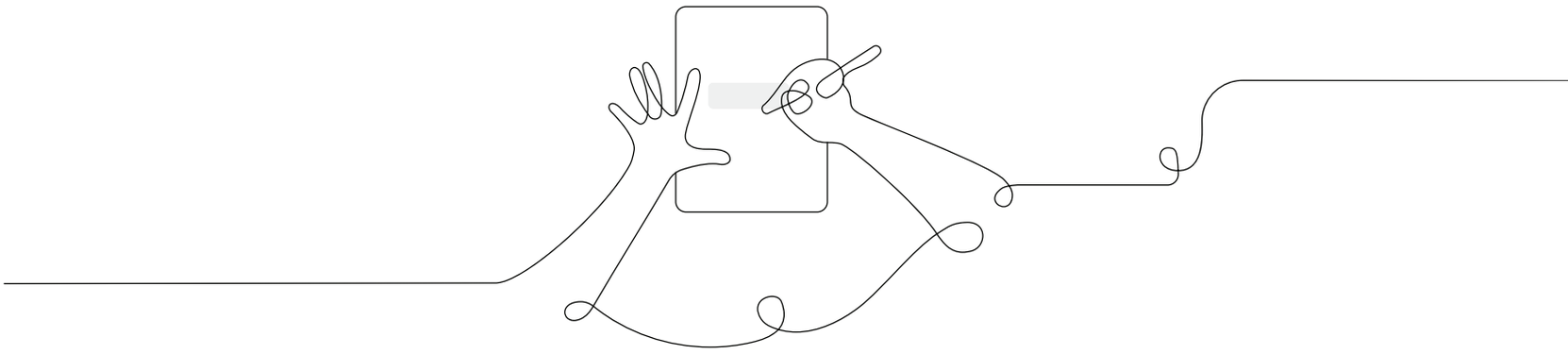
Amplify Science

Participant Notebook

Deep-dive and Strengthening Workshop
Light and Sound

Grade 1



Welcome to the workshop

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

Light and Sound
Grade 1

Amplify Science

Unit-specific workshop agenda

Introductions

Framing the day

- Reflecting on our teaching
- Scenario challenge

Experiencing the unit

- Framing with a coherence lens
- Light and Sound instructional sequence and embedded reflection

The story of the unit

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

Targeted small group work time:

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

Closing

- Questions
- Survey

Demo account for your workshop:

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

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

Password: **AmplifyNumber1**

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Notes

Notes

Reflecting on Amplify Science implementation

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

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

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

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

Directions:

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

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

Unit Map

How can we use light and sound to design shadow scenery and sound effects for a puppet theater?

Students take on the dual role of light engineers and sound engineers for a puppet-show company as they investigate cause-and-effect relationships and learn about the nature of light and sound. They apply what they learn to designing shadow scenery and sound effects for a puppet show.

Chapter 1: How do we make brighter or darker areas on a surface?

Students figure out: Without light, we cannot see. Light comes from a source and travels to a surface. Light from the source must be getting to the surface in order to make some parts of the surface look bright. If there is no light source, a surface looks dark.

How they figure it out: The class attempts, in vain, to make the classroom completely dark, identifying light sources at each failed attempt. Students read a book about whether one can see in the dark, and then they hunt for light sources in their school and in the pictures of a book. Students investigate a series of questions with their own light source (a flashlight), investigating how light gets to a surface.

Chapter 2: How do we make a dark area in a bright puppet show scene?

Students figure out: A dark area is the result of putting an object between a light source and a surface. When an object blocks a light source, the surface behind the object looks darker. This dark area is called a shadow.

How they figure it out: Students explore by making shadows on different surfaces. They then investigate how to make a dark area on the surface by using different materials to block light from reaching a surface.

Chapter 3: How do we make bright, medium bright, and dark areas in a puppet show scene?

Students figure out: Different materials let different amounts of light pass through. Bright areas are the result of all or almost all the light passing through an object and reaching a surface. This happens if there is no object or if the object is transparent. Medium-bright areas result when only some of the light passes through and reaches the surface. Dark areas happen because no light passes through an object. Light is blocked, so the surface looks dark.

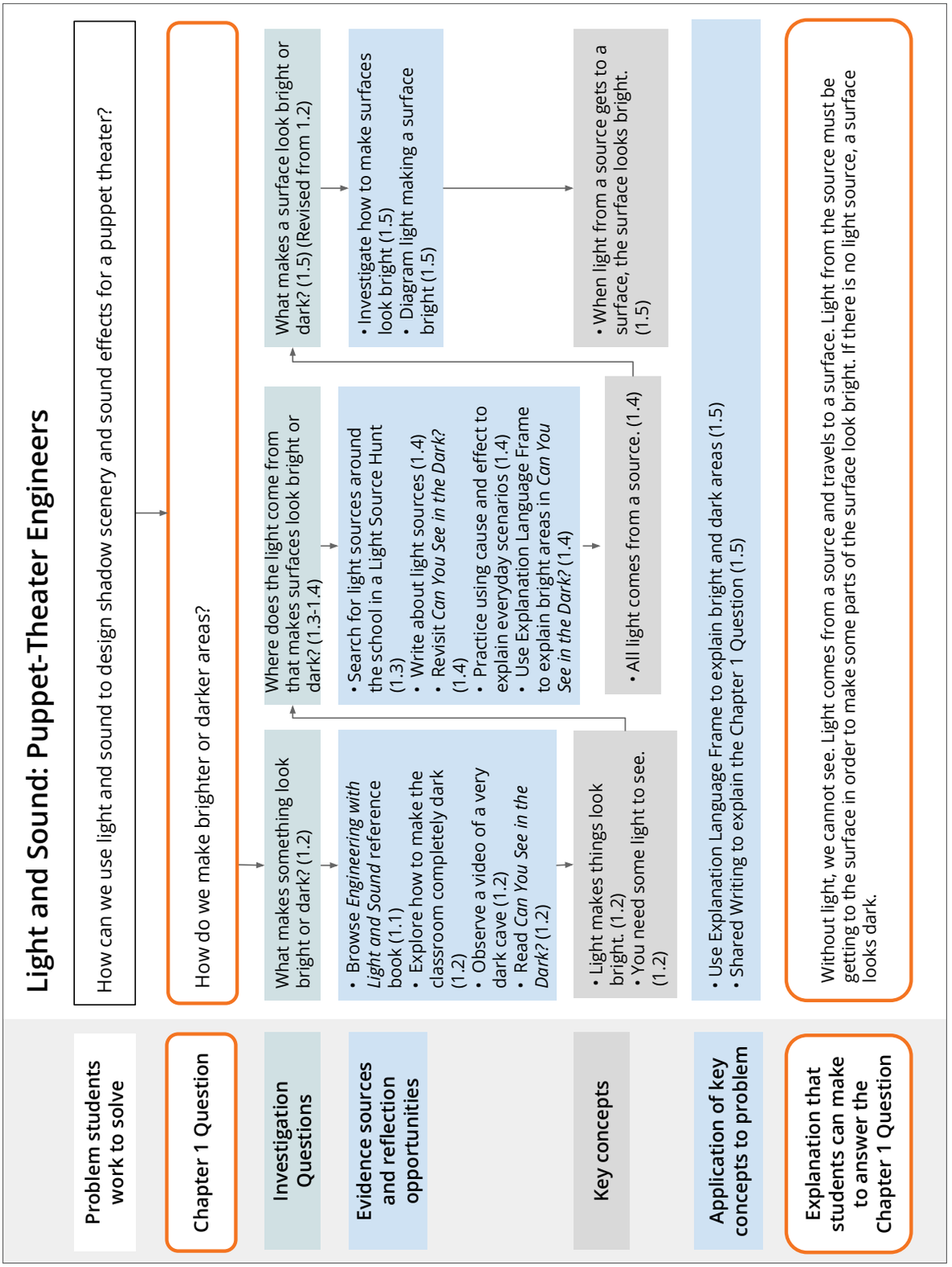
How they figure it out: Students refine their understanding of how light interacts with different materials and work as light engineers to plan, make, and test shadow scenery. Based on what they learn, students revise their own shadow scene to meet a set of design goals. Students write explanations of their scenes for the puppet-show company.

Chapter 4: How do we design a sound source to go with a puppet show scene?

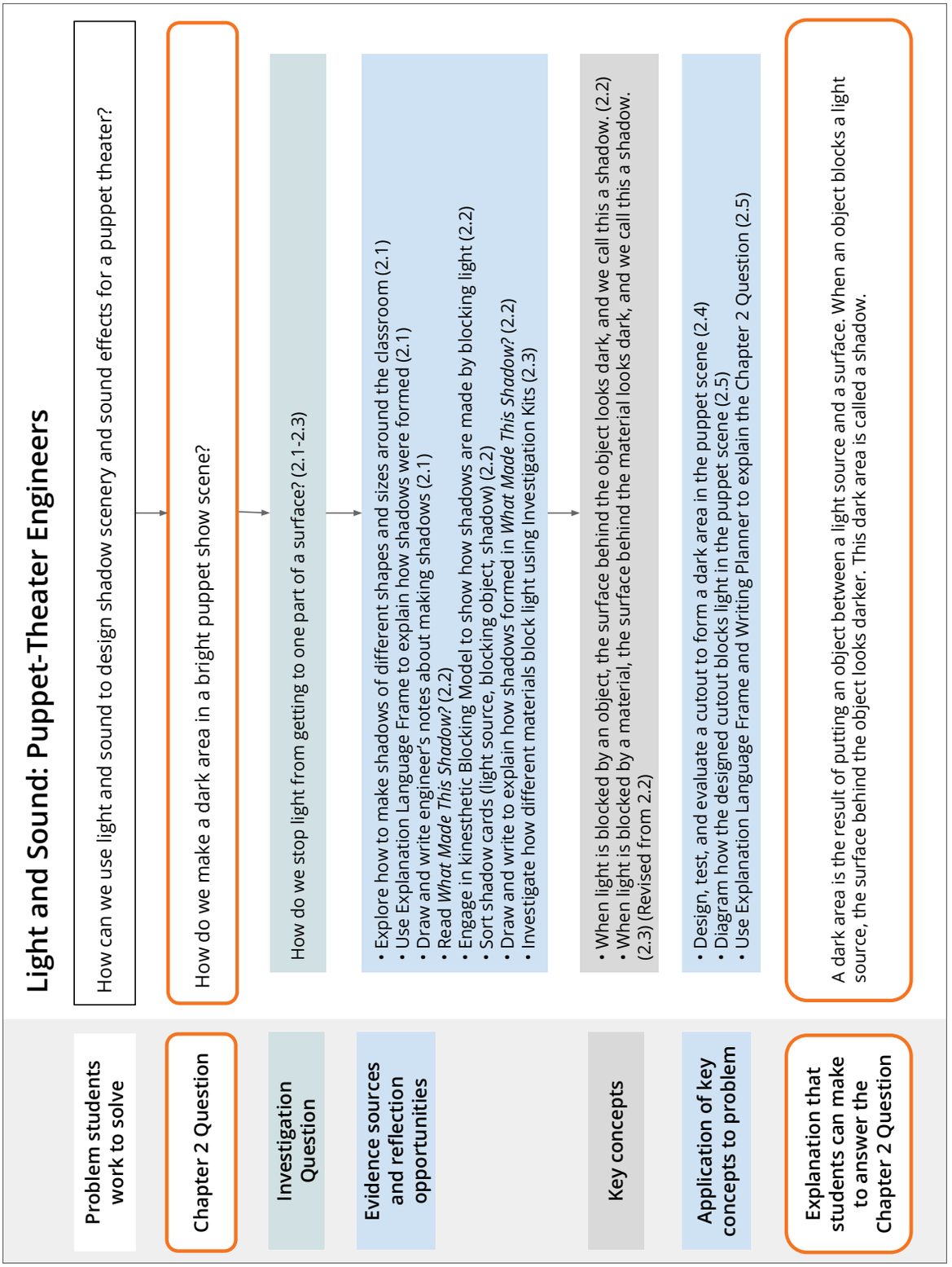
Students figure out: Sound has a source, just like light does. Sound is made when an object vibrates. The object that vibrates is the source of the sound. Like light, sound also travels. Sound travels from the source to our ears. You can start and stop sound by starting and stopping the vibration of an object.

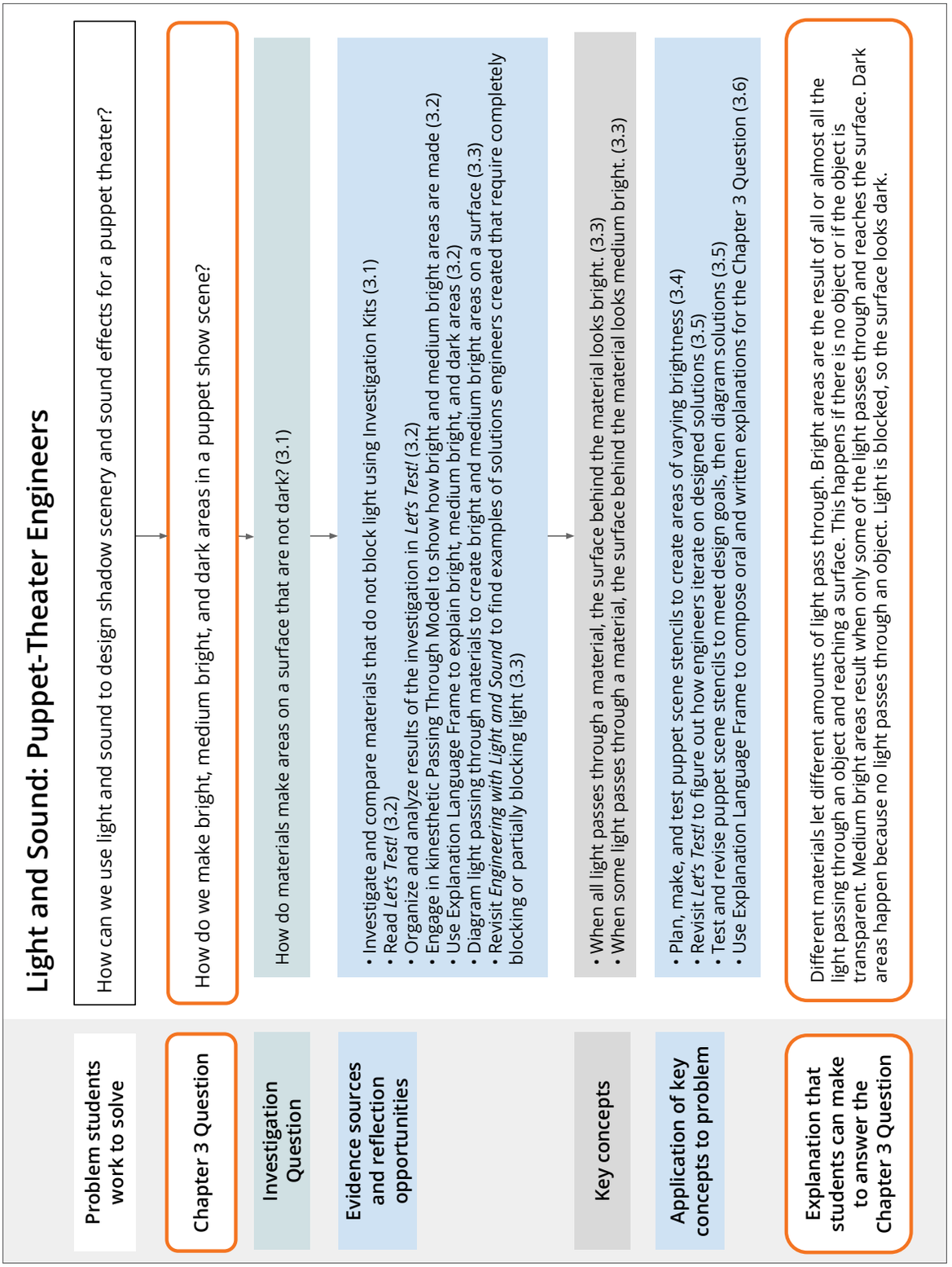
How they figure it out: Working as sound engineers, students hunt for sound sources, investigate how sounds are made, and explain what vibrates in a particular sound source. They plan, make, and test different ways of making sound effects. They read a book about sound and share what they learn in a mini-book they create for the puppet-show company.

Light and Sound Coherence Flowchart

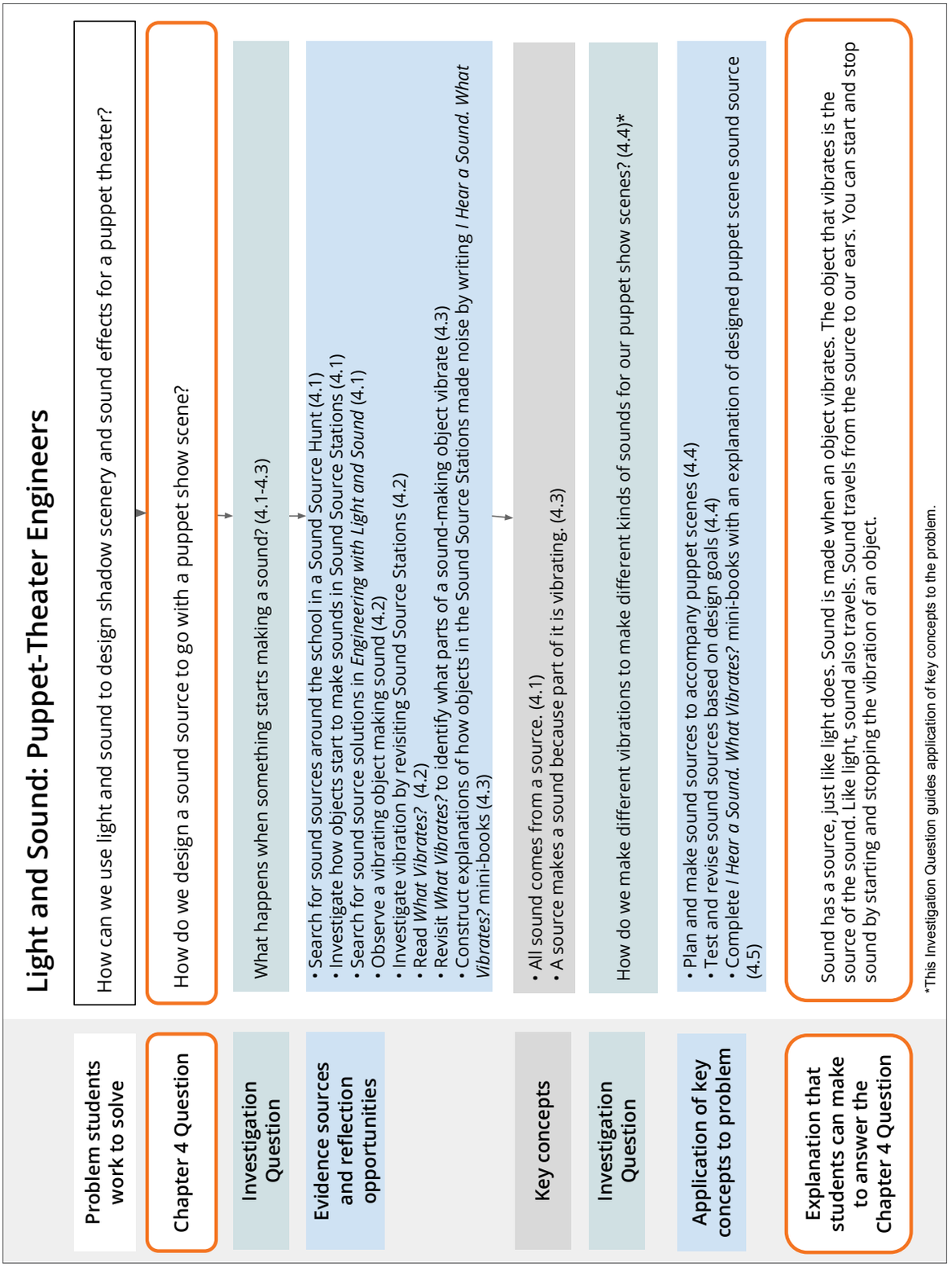


Light and Sound Coherence Flowchart cont.





Light and Sound Coherence Flowchart cont.



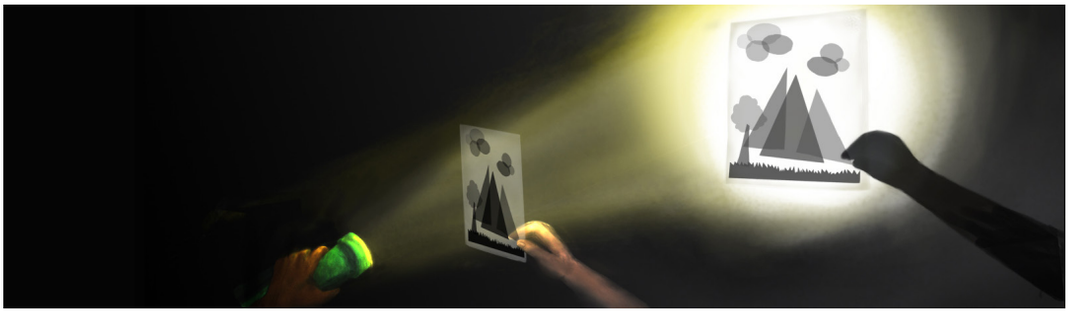
Name: _____ **Date:** _____

Shadow Cards Sorting Mat

Directions: Sort your cards into three columns.

Blocking object	Light source	Shadow

AmplifyScience



Light and Sound:

Puppet-Theater Engineers

Investigation Notebook

Name: _____ Date: _____

What Made This Shadow?

Directions:

1. Choose three Shadow Cards that go together.
2. Place one card in each column.
3. Write the name of the blocking object and the light source on the lines.

Blocking object	Light source	Shadow
The _____	blocks light from the _____,	so it makes this shadow.

Name: _____ Date: _____

Testing Materials

Directions:

1. For each material, circle **Yes** if the material blocked light or circle **No** if the material did not block light.

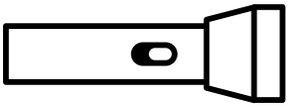
Material	Did the material block light?
cardboard	Yes No
clear plastic	Yes No
foam	Yes No
foil	Yes No
tinted plastic	Yes No
wax paper	Yes No

Name: _____ Date: _____

Writing Planner: Explaining the Dark Area

Directions:

1. Circle the words for the material, the light source, and the effect.
2. Write the words that you circled on the blank lines to complete the sentence.

Material	Light source	Effect
foil foam cardboard	 flashlight	 dark  bright

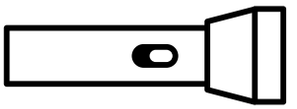
The _____ blocks light

from the _____, so the

surface looks _____.

Name: _____ Date: _____

Writing Planner: Explaining the Dark Area (continued)

Effect	Light source	Material
 dark  bright	 flashlight	foil foam cardboard

The surface looks _____, because light from the _____ is blocked by the _____.

Connecting key concepts to chapter explanations

Light and Sound

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	Light makes things look bright. (1.2) You need some light to see. (1.2) All light comes from a source. (1.4) When light from a source gets to a surface, the surface looks bright. (1.5)	**Puppet scene:** Students consider how they would make a specific surface bright for the puppet company. They show how they can shine a flashlight on a wall to make the wall look brighter. **Explanation:** Without light, we cannot see. Light comes from a source and travels to a surface. Light from the source must be getting to the surface in order to make some parts of the surface look bright. If there is no light source, a surface looks dark.
2	When light is blocked by a material, the surface behind the material looks dark, and we call this a shadow. (2.3)	**Puppet scene:** Students decide what they would like to represent as a dark object in their puppet scene, for example, a mountain or a house. Students select an opaque material (cardboard, foam, aluminum foil) and design a cutout in the shape of the object they chose for their puppet scene. **Explanation:** A dark area is the result of putting an object between a light source and a surface. When an object blocks a light source, the surface behind the object looks darker. This dark area is called a shadow.
3	When all light passes through a material, the surface behind the material looks bright. (3.3) When some light passes through a material, the surface behind the material looks medium bright. (3.3)	**Puppet scene:** Students assemble their completed puppet scene stencils. They use clear plastic for the background to create a bright sky on the projected scene. They use their opaque cutout from Chapter 2 to create a dark area. They select a semi-transparent material (tinted plastic, wax paper) to design cutouts for medium-bright areas and objects. **Explanation:** Different materials let different amounts of light pass through. Bright areas are the result of all or almost all the light passing through an object and reaching a surface. This happens if there is no object or if the object is transparent. Medium-bright areas result when only some of the light passes through and reaches the surface. Dark areas happen because no light passes through an object. Light is blocked, so the surface looks dark.

Reflecting on the progression of ideas

Directions:

Part 1: Reflecting on the progression

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

Part 2: Creating a visual

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

Progress Build

A Progress Build describes the way in which students' explanations of the central phenomenon should develop and deepen over the course of a unit. It is an important tool in understanding the design of the unit and in supporting students' learning. A Progress Build organizes the sequence of instruction, defines the focus of the assessments, and grounds inferences about students' understanding of the content, specifically at each of the Critical Juncture Assessments found throughout the unit. A Critical Juncture is the differentiated instruction designed to address specific gaps in students' understanding. This document will serve as an overview of the *Light and Sound: Puppet-Theater Engineers* Progress Build. Since the Progress Build is an increasingly complex yet integrated explanation, we represent it below by including the new ideas for each level in bold. Depending on the standards for a given grade level, a unit may include additional supporting content; however, the Progress Build serves as the conceptual core of the unit.

In the *Light and Sound* unit, students will learn to construct scientific explanations of how light from a single light source interacts differently with different materials to produce areas with varying levels of brightness. In addition to the ideas in the Progress Build, students learn that when audible sound is heard, it is because part of the sound source is vibrating.

Prior knowledge (preconceptions): There is no significant prior knowledge assumed. Students have likely had some direct or indirect experience with turning on and off overhead lights, lamps, or flashlights. They may also have some experience observing or creating shadows.

Progress Build Level 1: Light from a source makes surfaces visible and look brighter.

Anything that is visible has light getting to it from a source. If no light from a source is present, there is no light to get to anything, so nothing is visible (you can't see anything). When light from a source gets to a surface, it looks brighter than without the light.

Progress Build Level 2: Some materials can block light from reaching a surface.

Anything that is visible has light getting to it from a source. If no light from a source is present, there is no light to get to anything, so nothing is visible (you can't see anything). When light from a source gets to a surface, it looks brighter than without the light. **If an object is between the source and a surface, the light from the source may not pass through, and the surface is not as bright (darker) as when the light reaches it.**

Progress Build Level 3: Some materials allow all or some light to pass through them.

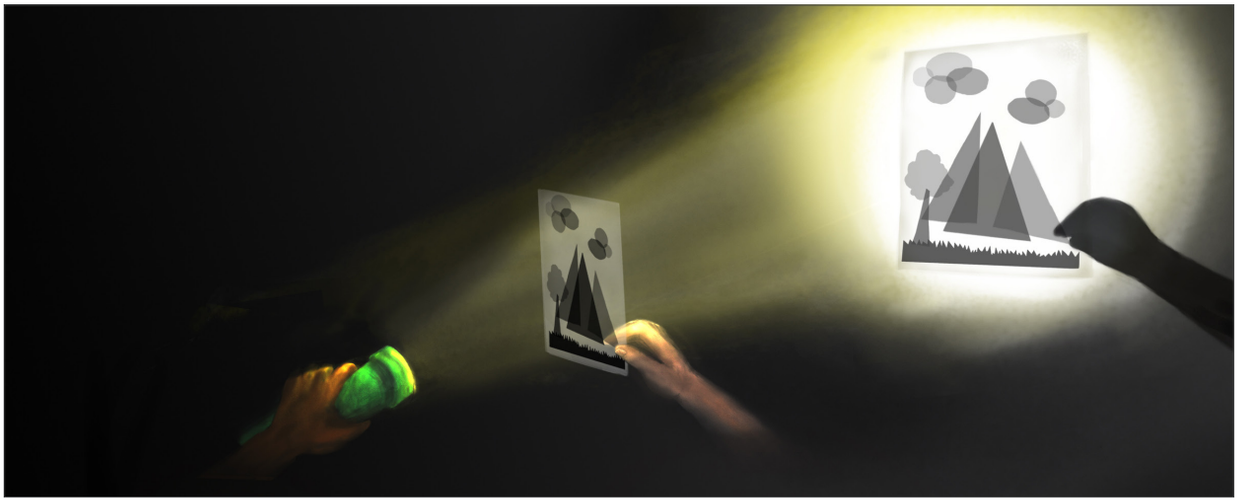
Anything that is visible has light getting to it from a source. If no light from a source is present, there is no light to get to anything, so nothing is visible (you can't see anything). When light from a source gets to a surface, it looks brighter than without the light. If an object is between the source and a surface, the light from the source may not pass through, and the surface is not as bright (darker) as when the light reaches it. **Different materials can allow different amounts of light to pass through them to reach a surface beyond. They can allow almost all light, some light, or no light to pass through. If they allow some light through, the surface looks brighter, but not as bright as with all the light.**

Progress Build and End-of-Unit Assessment

Light and Sound

Directions:

1. Refer to the Light and Sound End-of-Unit Assessment Questions and image of a sample stencil scene below.
2. Write expected responses to show how students at each level of the Progress Build would respond to the question from the assessment:
   - We have been working as light and sound engineers to make solutions for the puppet-theater company. One thing they asked us to do is to explain how the stencils we made work. I am going to ask you to explain to me how each part of your stencil works, just like you would explain it to them.
   - Why do these different areas of the wall look dark, bright, and medium bright?



Summary of Progress Build level*	Describe how a student would respond to the prompt
1: Light from a source makes surfaces visible and look brighter.	
2: Some materials can block light from reaching a surface.	
3: Some materials allow all or some light to pass through them.	

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

Self-inventory: Choosing an area of focus

Directions:

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

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

Targeted small group work time

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

Deepening content understanding and addressing preconceptions

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

Step 1: Getting ready

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

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

Step 2: Deepening understanding of unit content

Why develop content understanding?

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

Directions:

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

Step 3: Reflecting on student alternate conceptions

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

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

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

Directions:

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

Table 1: Reflecting on student alternate conceptions

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

Step 4: Planning to teach

Now what do I do?

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

Directions:

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

Table 2: Planning to teach

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

Coherent instruction

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

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

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

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

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

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

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

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

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

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

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

Coherent instruction cont.

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

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

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

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    a. **Consider evidence sources and reflection opportunities:**
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        - **In the Teacher's Guide, navigate to the lesson listed next to your chosen activity and read the Lesson Overview.** What is the purpose of the activity you chose to consider?

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

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

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

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

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

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

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

Formative assessment and differentiation

Light and Sound

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

Step 1: How do we assess learning?

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

First, let's analyze an embedded assessment opportunity we experienced earlier in the day. During our Light and Sound deep dive sequence, you conducted an investigation to explore whether or not various materials block light.

- Navigate to Light and Sound → Chapter 2 → Lesson 2.3 → Activity 2
- Select Embedded Formative Assessment
- Select On-the-Fly Assessment 6: Students' Understanding That Blocking Light Results in Dark Areas
- Read the Look for and Now what? sections and then complete the table below.

Light and Sound Lesson 2.3, Activity 2	
Which disciplinary core ideas, science and engineering practices, and/or crosscutting concepts are being assessed?	
What data can be collected from this assessment opportunity?	
How could you collect data?	
What will this formative assessment opportunity tell you about student understanding?	

Step 2: Reflecting on differentiated instruction

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

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

Step 3a: Determine strategies to differentiate instruction

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

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

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

Step 3b: Review Lesson Brief

Navigate to the 2.3 Lesson Brief and select the drop-down arrow to expand the Differentiation section. Read the Embedded Supports for Diverse Learners. Are there any additional strategies noted in this brief that you would like to capture in the table above?

Step 4: Preparing to differentiate

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

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

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

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

Preparing to teach

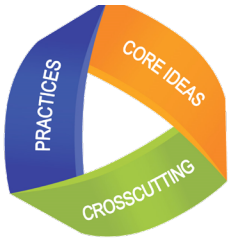
Directions:

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

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

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

Three dimensions of NYSSLS reference



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

Science and Engineering Practices

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

Disciplinary Core Ideas

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

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

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

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

Crosscutting Concepts

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

Amplify Support

Program Guide

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

Amplify Help

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

Customer care

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

800-823-1969

scihelp@amplify.com

Amplify Chat

When contacting customer care, be sure to:

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

Notes

Notes