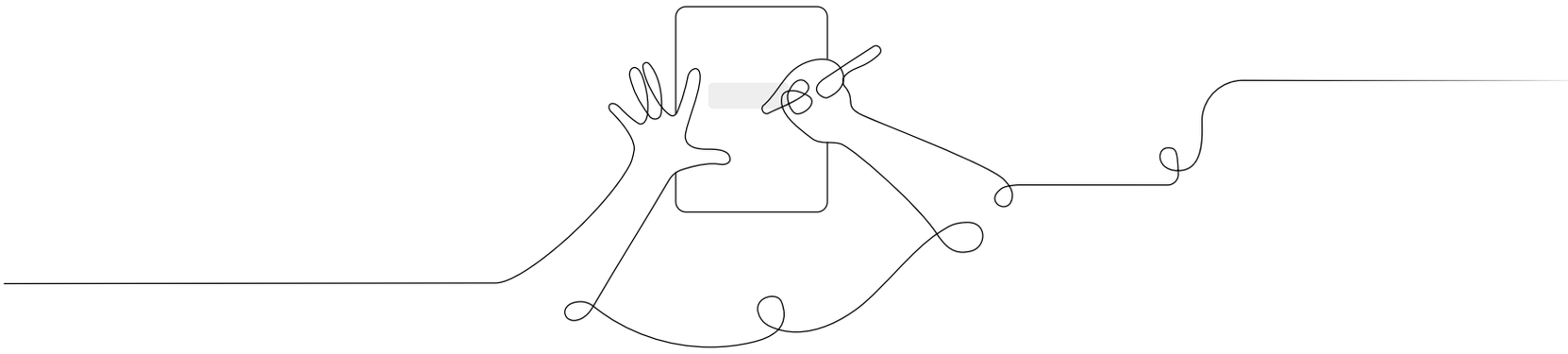
Amplify Science

Participant Notebook

Deep-dive and Strengthening Workshop
Vision and Light

Grade 4



Welcome to the workshop

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

Vision and Light
Grade 4

Amplify Science

Unit-specific workshop agenda

Introductions

Framing the day

- Reflecting on our teaching
- Scenario challenge

Experiencing the unit

- Framing with a coherence lens
- Vision and Light 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

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

Why is an increase in light affecting the health of Tokay geckos in a Philippine rain forest?

Working as conservation biologists, students figure out why a population of Tokay geckos has decreased since the installation of new highway lights in the rain forest. Students use their understanding of vision, light, and information processing to figure out why an increase in light in the geckos' habitat is affecting the population. Then students turn their attention to humans by designing their own investigations in order to learn more about how our senses help us survive.

Chapter 1: How does a Tokay gecko get information about its environment?

Students figure out: In order to survive, a gecko must avoid predators and find prey. To do this, geckos use structures to get information from their environment. For instance, a gecko uses its ears to hear if there is a predator nearby and its vision to watch for predators.

How they figure it out: Students do hands-on investigations with their own senses to learn that information travels to them from their environment. They read about what senses different animals use to find their food. Through a Mystery Box activity, students learn that we need light to see.

Chapter 2: How does light allow a Tokay gecko to see its prey?

Students figure out: First, light travels from a source to the gecko's prey. Then, it reflects off the prey and travels to the gecko's eyes. As it travels from the prey to the gecko's eyes, it carries information about the prey.

How they figure it out: Students use the *Vision and Light* Simulation to explore the path of light from a source to an object and to an animal's eye, a process that is necessary for the animal to see. Students confront several common misconceptions about the role of light in vision by improving inaccurate models of how light reaches the eye.

Chapter 3: How does a Tokay gecko know that it is looking at its prey?

Students figure out: Light from a source reflects off the prey and travels to the Tokay gecko's eyes. The light enters the eye through the pupil and then reaches light receptors. The light receptors respond to the light and send information from the light to the brain. The brain processes this information and forms an image. By comparing the image to memories, the gecko can recognize what it is looking at and make a decision that might help it survive.

How they figure it out: Through research in the Simulation and *Handbook of Animal Eyes*, students learn that light enters the eye through the pupil and then reaches light receptors. These light receptors respond and send information to the brain. Students return to the Simulation to investigate how a predator knows if it's looking at prey or at an animal that would be toxic to eat.

Chapter 4: How could more light at night make it hard for a Tokay gecko to see its prey?

Students figure out: When light gets to a Tokay gecko's eyes, the gecko's light receptors respond and send information to the brain. The brain processes this information to form an image. Since the highway lights were installed, there is much more light at night. Tokay geckos have light receptors that form clear images in very low-light conditions, so the extra light at night makes it difficult for them to form clear images of their prey.

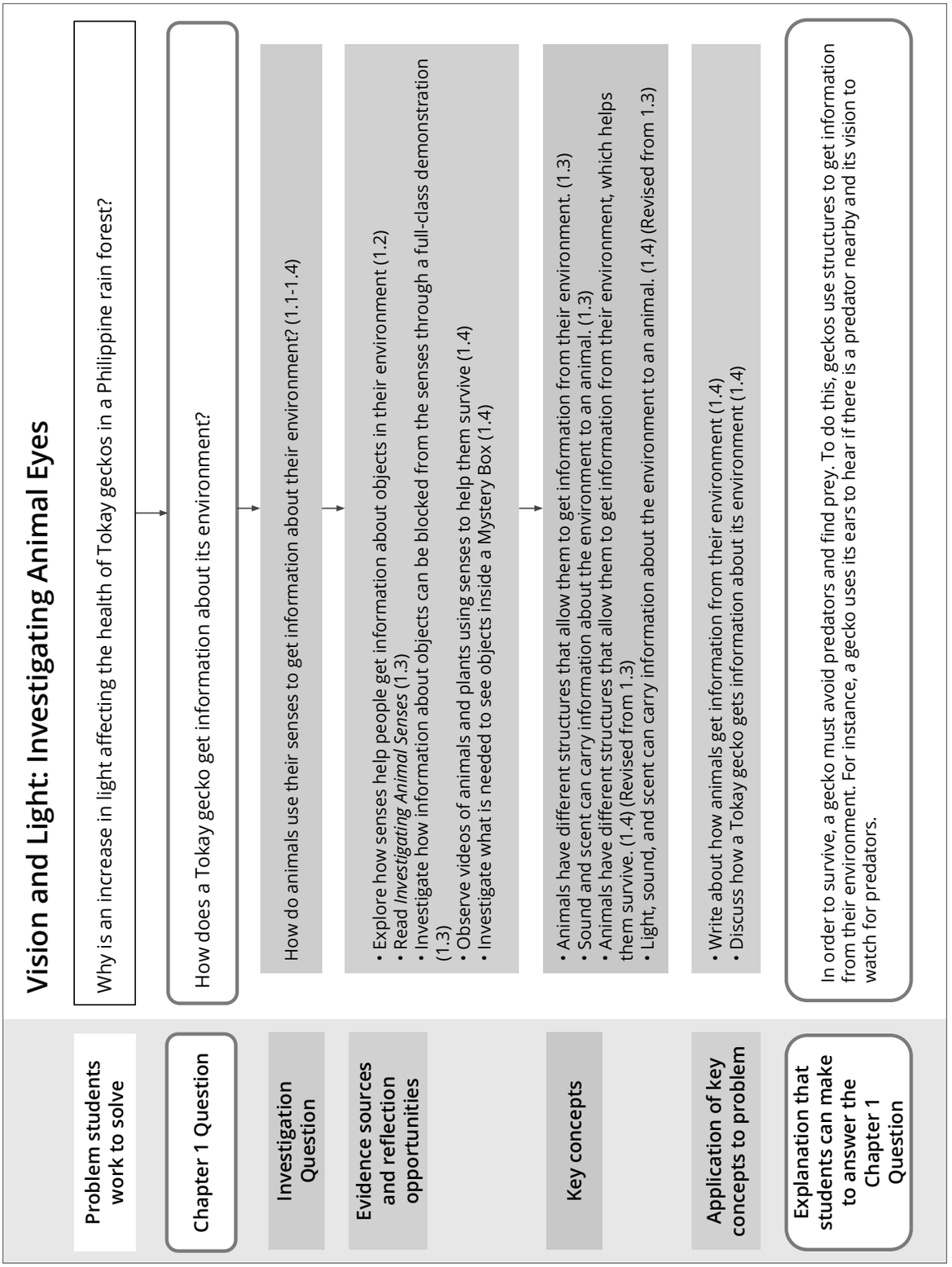
How they figure it out: Students use an informational text to learn that different animals sense information in different ways due to having specialized receptors with varying sensitivities. Students use the Simulation along with a digital model to compare the vision of nocturnal and diurnal animals in differing amounts of light. They build physical models of nocturnal and diurnal eyes and use them to explain the role of light in vision and survival.

Chapter 5: How do our senses help us understand our environment?

Students figure out: By designing an investigation that only changes one variable at a time, it's possible to understand how human structures and receptors inform our senses and help us survive.

How they figure it out: Using a jigsaw approach, groups of students design, conduct, and share the results of hands-on investigations into one of three human senses: hearing, smell, or touch. The shared results of multiple investigations allow students to learn about other senses and to compare the results of multiple investigations.

Vision and Light Coherence Flowchart

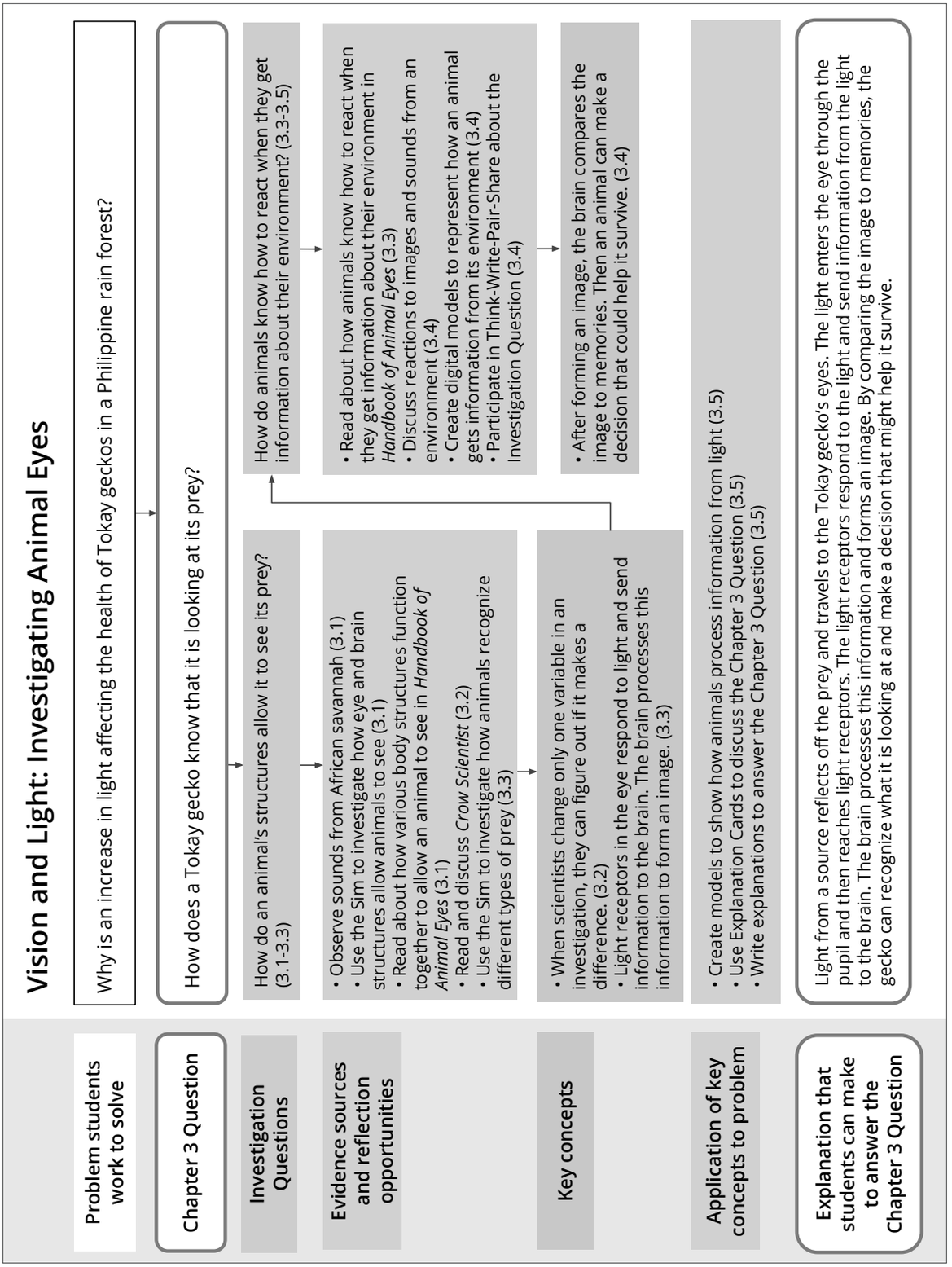


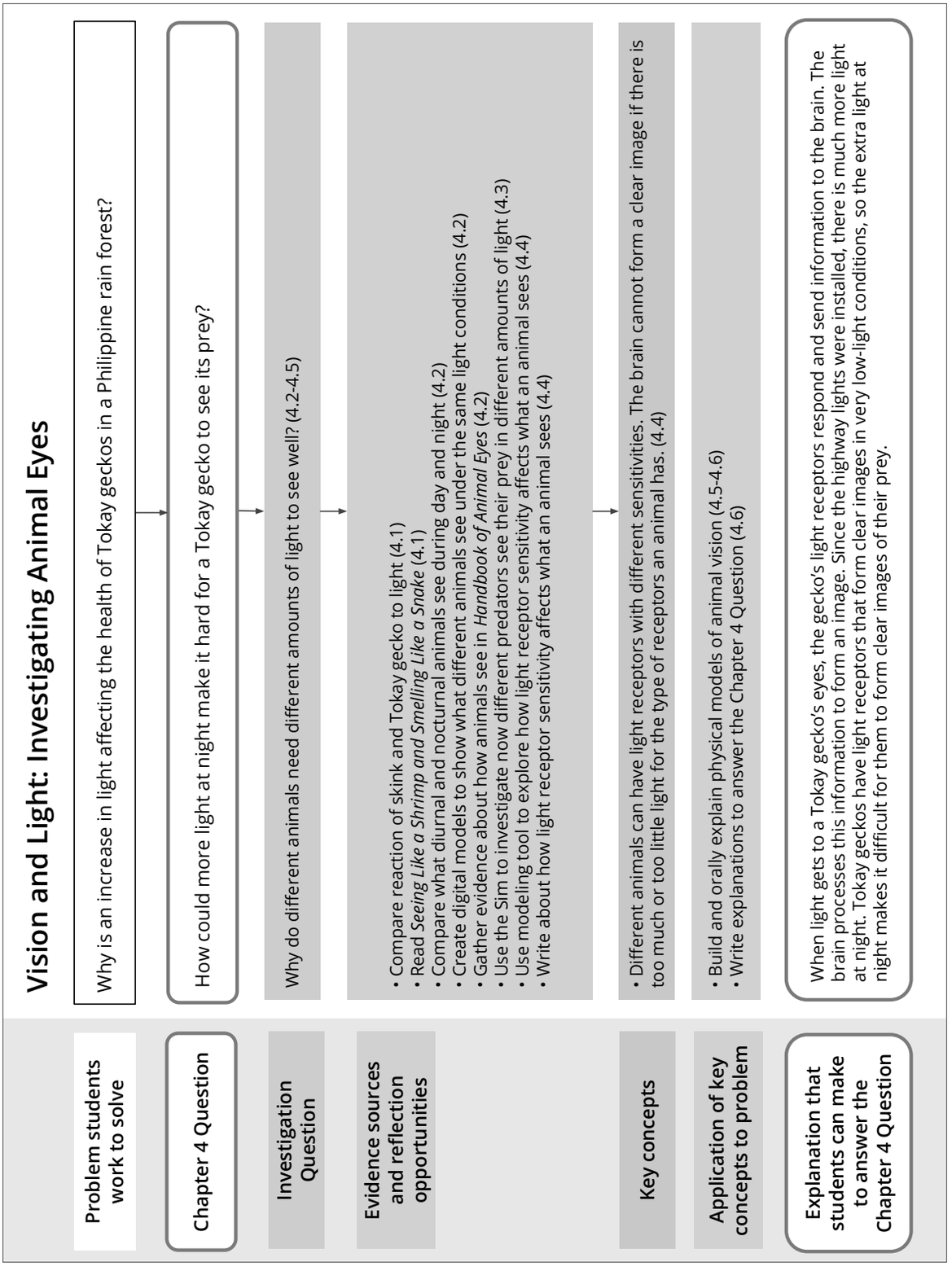
Vision and Light Coherence Flowchart cont.

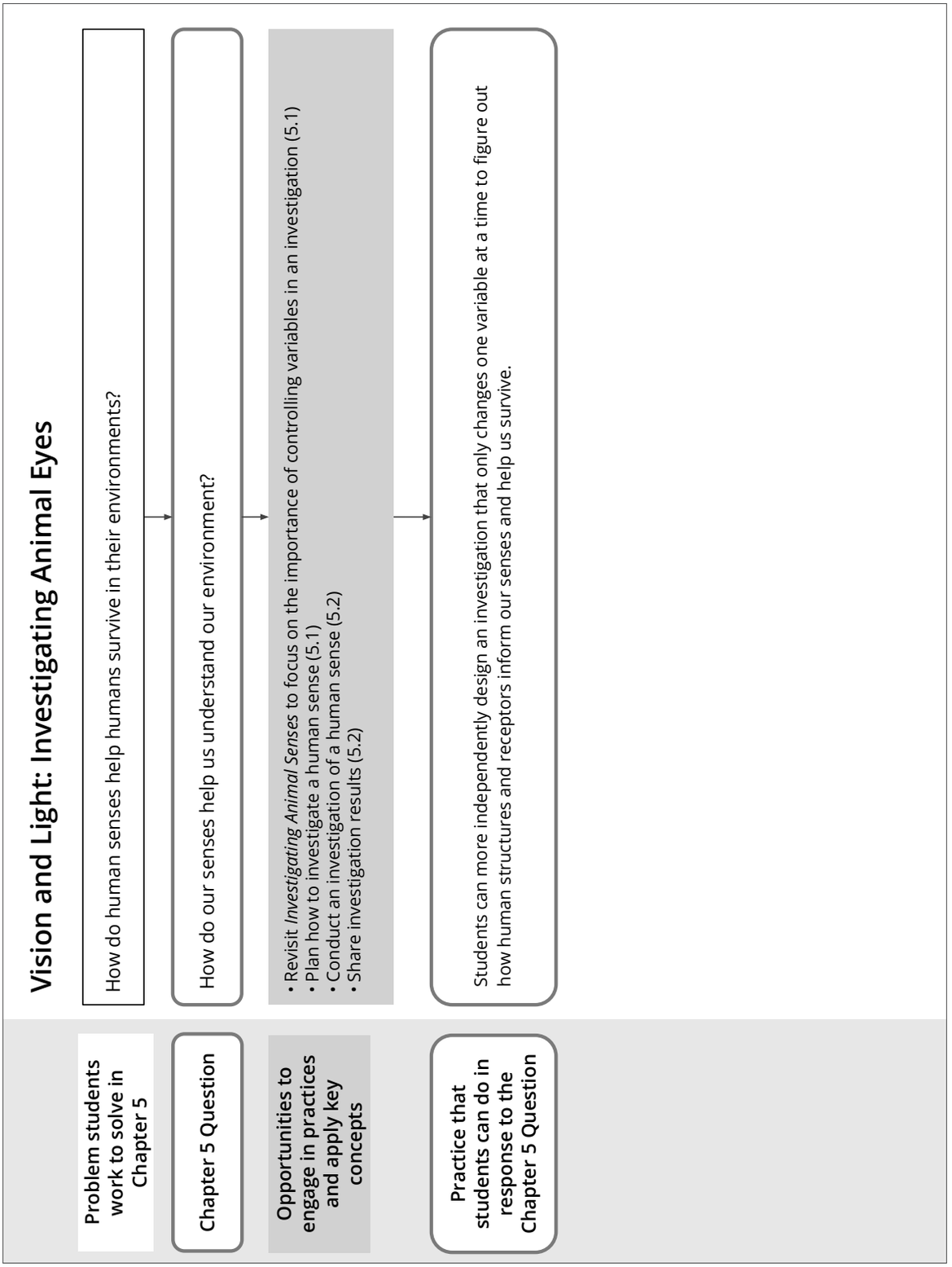
Vision and Light: Investigating Animal Eyes

Problem students work to solve	Why is an increase in light affecting the health of Tokay geckos in a Philippine rain forest?
Chapter 2 Question	How does light allow a Tokay gecko to see its prey?
Investigation Question	How does light allow an animal to see something? (2.1-2.5)
Evidence sources and reflection opportunities	• Read about an animal's eye in *Handbook of Animal Eyes* (2.1) • Use the Sim to investigate how light allows an animal to get information from its environment (2.1) • Revisit the Chapter 1 Mystery Box investigation (2.2) • Create digital models to show how light allows an observer to see something in the Mystery Box, and how the transfer of information can be blocked (2.2) • Read *I See What You Mean* (2.3) • Return to the Sim to further investigate how light allows an animal to get information from its environment (2.4) • Critique inaccurate models about how light allows animals to see things (2.4) • Model new ideas about the Mystery Box, using a digital tool (2.4)
Key concepts	• Light needs to get to an object for an animal to see the object. (2.3) • Light needs to reflect off an object and get to the eye for an animal to see the object. (2.4)
Application of key concepts to problem	• Use Explanation Cards to discuss the Chapter 2 Question (2.5) • Write explanations to answer the Chapter 2 Question (2.5)
Explanation that students can make to answer the Chapter 2 Question	First, light travels from a source to the gecko's prey. Then, it reflects off the prey and travels to the gecko's eyes. As it travels from the prey to the gecko's eyes, it carries information about the prey.

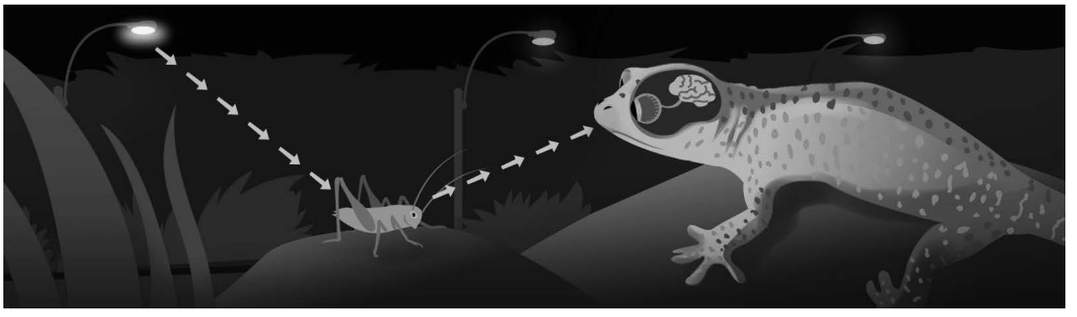
Vision and Light Coherence Flowchart cont.







AmplifyScience



Vision and Light:

Investigating Animal Eyes

Investigation Notebook

Name: _____ Date: _____

Exploring the Mystery Box

1. Follow the directions in each part to answer the questions below.

Part 1

When it is your turn, look through the eyehole of the Mystery Box. What do you see? Write your answer below and draw it in the box.

_____

_____

Stop here until your teacher says to go to Part 2.

Name: _____ Date: _____

Exploring the Mystery Box (continued)

Part 2

When given the signal, work with your group to figure out the answer to this question: What do you need in order to see the "food" that is inside the box?

_____

_____

With your group, decide one thing you will change about the Mystery Box so that you can see what is inside. Make this change, and then look through the hole to find out if you can see what is inside.

What did you change?

_____

_____

What kind of information did you observe about the object inside the box?

_____

_____

Name: _____ Date: _____

Investigating Light

1. Use the *Vision and Light* Simulation to figure out how light allows a predator to see its prey.
2. Use what you observe to answer the questions below.

Investigation 1

Open the Sim. What did you observe when the light is on?

_____

_____

_____

Now turn the light off and observe what happens when the light is off. What did you observe when the light is off?

_____

_____

_____

Investigation 2

Restart the Sim. Change the direction of light by dragging the lamp along the track. What did you observe when the light travels in a different direction?

_____

_____

_____

Name: _____ Date: _____

Investigating Light (continued)

Reflecting on Investigations 1 and 2

What are your ideas now about how light allows a predator to see its prey?

_____

_____

_____

_____

Draw a picture in the box below if it helps you describe your ideas.

Name: _____ Date: _____

Getting Ready to Read: *I See What You Mean*

1. Before reading the book *I See What You Mean*, 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.

_____ All light stops when it reaches an object.

_____ Light comes from a source and then floats around.

_____ Only shiny things, like spoons and mirrors, reflect light.

_____ We see because light reflects off objects and travels to our eyes.

_____ Light carries information about objects, such as what color and shape they are.

Name: _____ Date: _____

Asking Questions When Reading: *I See What You Mean*

1. As you read the book, record questions you have in the first column.
2. If you find the answers to your questions as you read, record your answers in the second column.

Question	**Information from the book that helps answer my question**

Name: _____ Date: _____

Multiple Meaning Words

Some words can mean more than one thing. For each word in the chart:

1. Read the sentence from the book *I See What You Mean* that uses the word.
2. Read the two meanings the word can have.
3. Decide which meaning the word has in the sentence from the book and circle that meaning.

Word	**Sentence from the book**	**Meaning 1**	**Meaning 2**
mean	I see what you **mean**, but still . . . there must be more to it.	not nice	to have in mind
vision	It made her wonder—how did **vision** work anyway?	the ability to see	a clear idea of what should happen in the future
reflect	The peach **reflects** light from the lamp.	to cause light to bounce off a material	to think back on something

Name: _____ Date: _____

Reading Reflection: *I See What You Mean*

1. Now that you have finished reading *I See What You Mean*, answer the questions below.

Would Jayla be able to see the peach if light from the lamp traveled straight to her eyes? Why or why not?

_____

_____

_____

_____

Would Zoey be able to see the peach if the lamp in the room were not turned on? Why or why not?

_____

_____

_____

_____

Name: _____ Date: _____

Think-Write-Pair-Share: Light and Information

1. Look at the projection of pages 18–19 of *I See What You Mean*.
2. Think about how you would answer the question below.
3. Record your ideas.
4. Share your ideas with your partner.

Jayla can see the peach because light from the peach travels to her eyes. What kind of information about the peach is this light carrying?

_____

_____

_____

_____

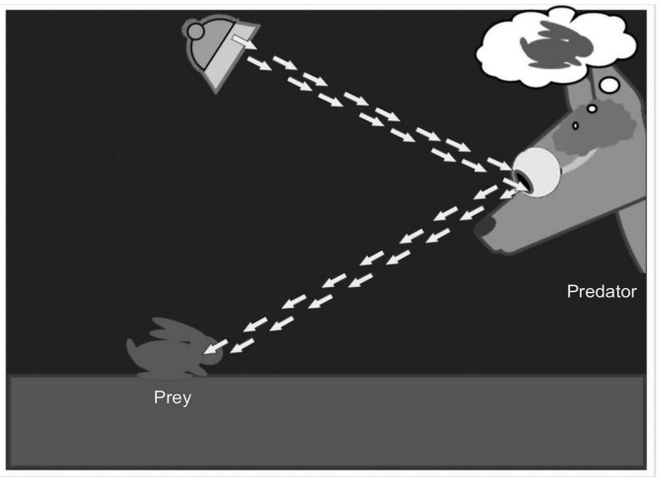
_____

Name: _____ Date: _____

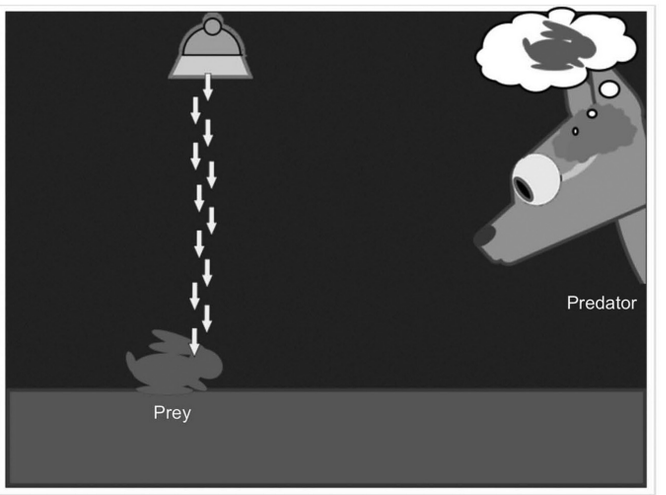
Reviewing Models About Vision and Light

1. Review Models 2 and 3 with your partner. Discuss how each model is incorrect or incomplete and how each could be improved.
2. On the following page, choose either Model 2 or Model 3. Write about how your model is incorrect or incomplete and how it could be improved.

Model 2



Model 3



Name: _____ Date: _____

Reviewing Models About Vision and Light (continued)

I am writing about Model _____.

This model is incorrect or incomplete because

_____

_____

_____

_____

In order to show what actually happens when an animal sees an object, I would improve this model by

_____

_____

_____

_____

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

Connecting key concepts to chapter explanations

Vision and Light

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	Animals have different structures that allow them to get information from their environment, which helps them survive. (1.4) Light, sound, and scent can carry information about the environment to an animal. (1.4)	In order to survive, a gecko must avoid predators and find prey. To do this, geckos use structures to get information from their environment. For instance, a gecko uses its ears to hear if there is a predator nearby and its vision to watch for predators.
2	Light needs to get to an object for an animal to see the object. (2.3) Light needs to reflect off an object and get to the eye for an animal to see the object. (2.4)	First, light travels from a source to the gecko's prey. Then, it reflects off the prey and travels to the gecko's eyes. As it travels from the prey to the gecko's eyes, it carries information about the prey.
3	Light receptors in the eye respond to light and send information to the brain. The brain processes this information to form an image. (3.3) After forming an image, the brain compares the image to memories. Then an animal can make a decision that could help it survive. (3.4)	Light from a source reflects off the prey and travels to the Tokay gecko's eyes. The light enters the eye through the pupil and then reaches light receptors. The light receptors respond to the light and send information from the light to the brain. The brain processes this information and forms an image. By comparing the image to memories, the gecko can recognize what it is looking at and make a decision that might help it survive.
4	Different animals can have light receptors with different sensitivities. The brain cannot form a clear image if there is too much or too little light for the type of receptors an animal has. (4.4)	When light gets to a Tokay gecko's eyes, the gecko's light receptors respond and send information to the brain. The brain processes this information to form an image. Since the highway lights were installed, there is much more light at night. Tokay geckos have light receptors that form clear images in very low-light conditions, so the extra light at night makes it difficult for them to form clear images of their prey.

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 phenomena 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 Assessment guides the instruction designed to address specific gaps in students' understanding. This document will serve as an overview of the *Vision and Light* 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.

In the *Vision and Light* unit, students will learn to construct scientific explanations about how animals use vision and other senses to survive in their environment.

Prior knowledge (preconceptions): Students are expected to have had many everyday experiences using their senses to see, smell, hear, taste, and touch. Students are likely to understand that animals need to find food and avoid being eaten to survive in their environment. While these ideas are not necessary for students to participate fully in the unit, having exposure to them will prepare students well for what they will be learning.

Progress Build Level 1: Animals use senses to learn about their environment.

Animals have sensory structures that allow them to learn about their environment by getting information from it. Learning about the environment helps animals survive.

Progress Build Level 2: Light allows objects in an environment to become visible to the eye.

Animals have sensory structures that allow them to learn about their environment by getting information from it. Learning about the environment helps animals survive. **In order for an animal to get visual information about an object in its environment, light from a source needs to get to the object, reflect off it, and get to the animal's eye with information about the object.**

Progress Build Level 3: Light receptors in the eye respond to light and the brain forms an image.

Animals have sensory structures that allow them to learn about their environment by getting information from it. Learning about the environment helps animals survive. In order for an animal to get visual information about an object in its environment, light from a source needs to get to the object, reflect off it, and get to the animal's eye with information about the object. **After light from the object enters the animal's eye, it hits the light receptors in the eye that respond to the light. The light receptors then send the information about the object from the light to the brain, which processes the information to form an image of the object. Then the brain compares this image to memories to decide which action to take.**

Progress Build Level 4: Different animals have light receptors with different sensitivities to light.

Animals have sensory structures that allow them to learn about their environment by getting information from it. Learning about the environment helps animals survive. In order for an animal to get visual information about an object in its environment, light from a source needs to get to the object, reflect off it, and get to the animal's eye with information about the object. After light from the object enters the animal's eye, it hits the light receptors in the eye that

respond to the light. The light receptors then send the information about the object from the light to the brain, which processes the information to form an image of the object. Then the brain compares this image to memories to decide which action to take. **The amount of light that the light receptors need in order for the brain to form a clear image is different for different kinds of animals. This is because different kinds of animals have light receptors that are sensitive to different amounts of light. If there is too much or too little light for the type of light receptors an animal has, its brain cannot form a clear image.**

Progress Build and End-of-Unit Assessment

Vision and Light

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 and draw on this assessment.

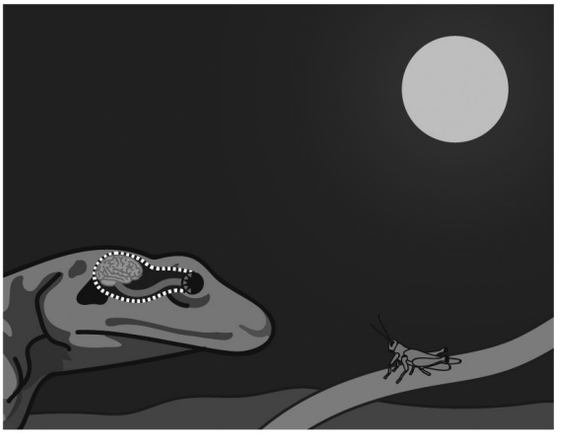
End-of-Unit Writing: Explaining Why More Light Makes It Harder for a Tokay Gecko to See

Picture 1 shows the Tokay gecko at night before the highway lights were installed.

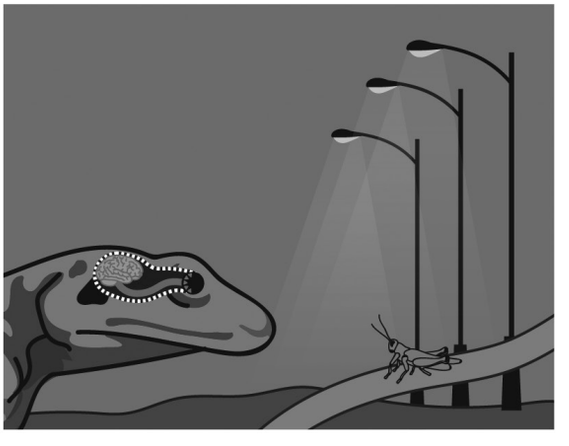
Picture 2 shows the Tokay gecko at night after the highway lights were installed. The lights are turned on.

1. Draw arrows on the pictures to show how information about the prey gets to the Tokay gecko so that it can see.
2. Answer the questions on the next page.

Picture 1



Picture 2



How does a Tokay gecko usually see? Why does more light at night make it hard for it to see?

Summary of Progress Build level*	Describe how a student would label the diagram	Describe how a student would respond to the writing prompt
1: Animals use senses to learn about the environment.		
2: Light allows objects in an environment to become visible to the eye.		
3: Light receptors in the eye respond to light and the brain forms an image.		
4: Different animals have light receptors with different sensitivities to light.		

*For a more detailed description of each Progress Build level, refer to the Vision and Light 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?

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?

Coherent instruction cont.

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

Vision and Light

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 Vision and Light deep dive sequence, you engaged in a Think-Write-Pair-Share to reflect after reading *I See What You Mean*. Follow the steps below to navigate to the On-the-Fly Assessment in Lesson 1.4.

- Navigate to Vision and Light → Chapter 2 → Lesson 2.3 → Activity 3
- Select Embedded Formative Assessment
- Select On-the-Fly Assessment 6: Light Carries Information
- Read the Look for and Now what? sections and then complete the table below.

Vision and Light Lesson 2.3, Activity 3	
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 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

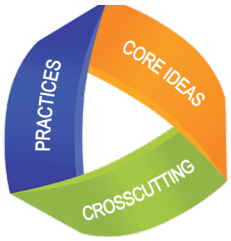
Directions:

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