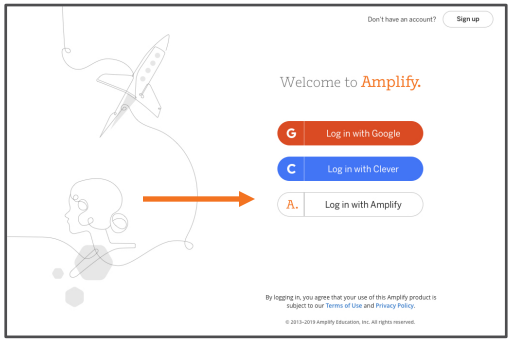
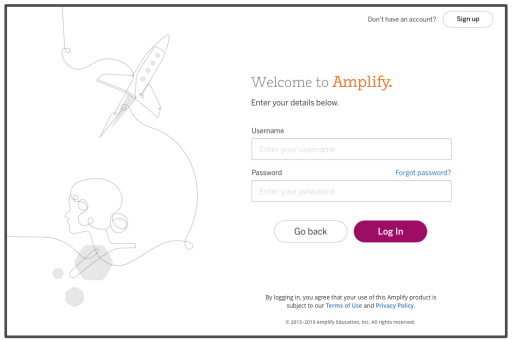
Welcome to Amplify Science!

Do now: Name tent and login





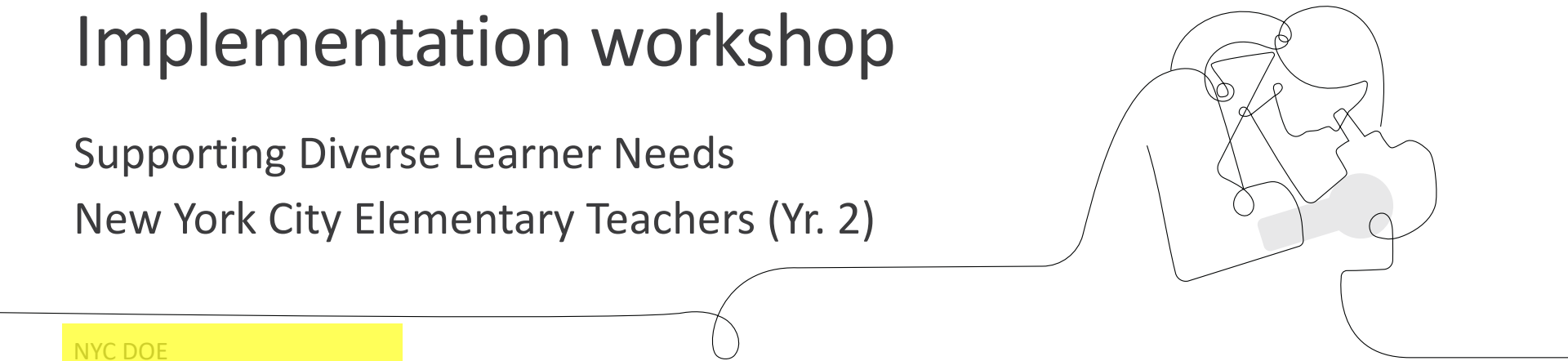
1. Make a name tent
2. Go to learning.amplify.com
3. Select Log in with Amplify
4. Enter teacher demo account credentials
   - XXXX@tryamplify.net
   - Password: AmplifyNumber1
5. Explore as we wait to begin

Amplify Science

Grade 4: Vision and Light
Implementation workshop

Supporting Diverse Learner Needs

New York City Elementary Teachers (Yr. 2)



NYC DOE
November 5, 2019
Presented by Your Name

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

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

Implementation Not Yet Started

Effective Implementation

Sharing Ideals and Solutions

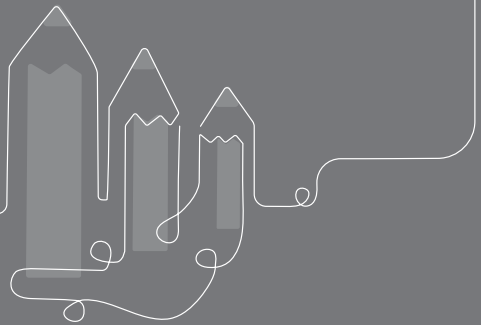
- Move to right side if you feel confident in the implementation area.
- Move to the left side if you feel less confident in the implementation area.
- On cue, form groups of two (confident / less confident ratings) to discuss the implementation area.
- Each rotation will be 1 minute.

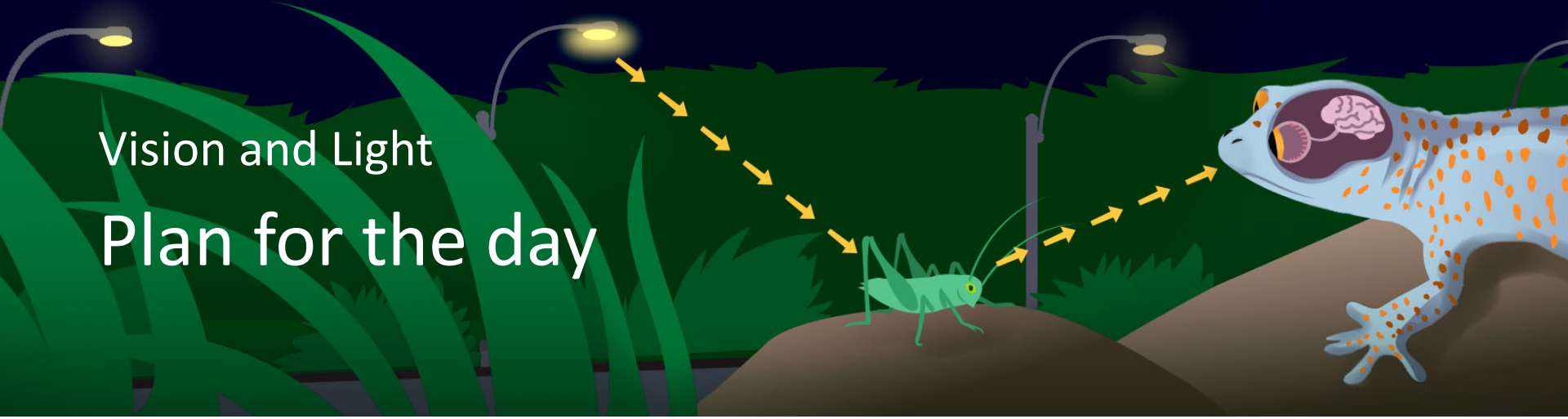
Implementation Areas:

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

Workshop goal

- Prepare teachers to implement Vision and Light in their classrooms

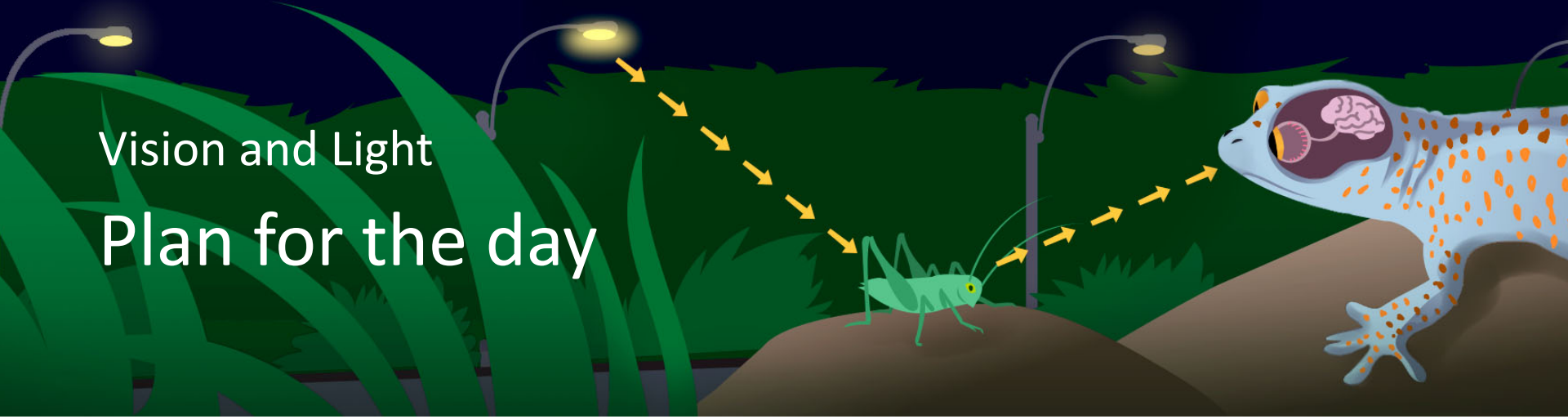




Vision and Light

Plan for the day

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



Vision and Light

Plan for the day

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Elementary school course curriculum structure

Grade K

- Needs of Plants and Animals
- Pushes and Pulls
- Sunlight and Weather

Grade 1

- Animal and Plant Defenses
- Light and Sound
- Spinning Earth

Grade 2

- Plant and Animal Relationships
- Properties of Materials
- Changing Landforms

Grade 3

- Balancing Forces
- Inheritance and Traits
- Environments and Survival
- Weather and Climate

Grade 4

- Energy Conversions
- Vision and Light
- Earth's Features
- Waves, Energy, and Information

Grade 5

- Patterns of Earth and Sky
- Modeling Matter
- The Earth System
- Ecosystem Restoration

AmplifyScience

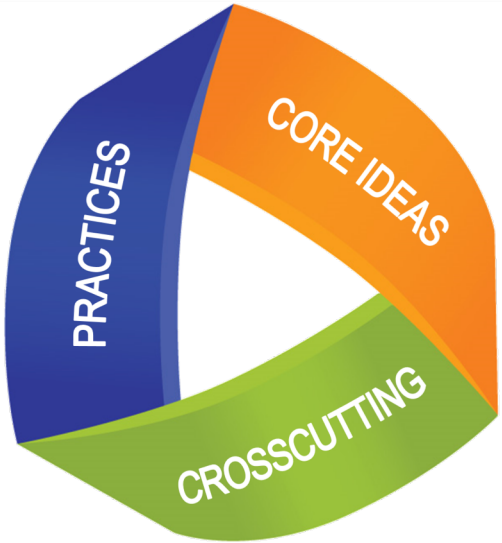
authored by THE LAWRENCE HALL OF SCIENCE UNIVERSITY OF CALIFORNIA, BERKELEY

Amplify.

Problem-based deep dives

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

Thinking three dimensionally



Disciplinary Core Ideas

- Refer to the key concepts

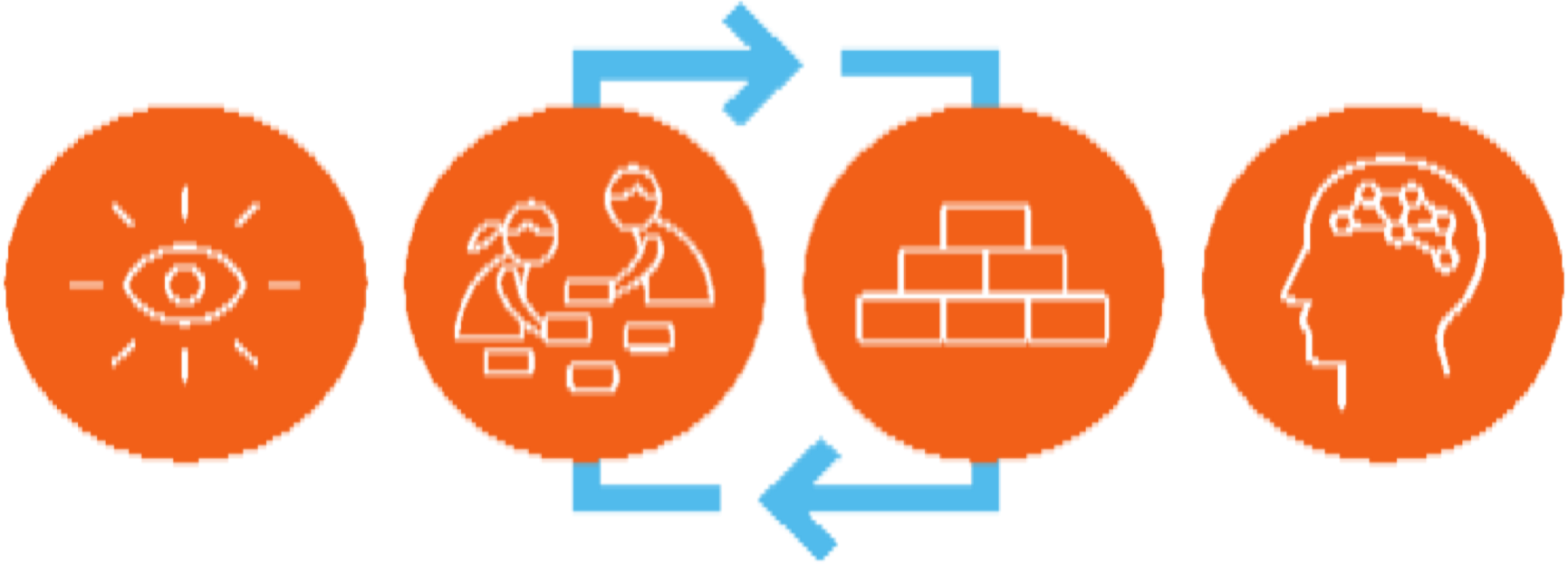
Science and Engineering Practices

- Which practices did you use to figure out these ideas?

Crosscutting Concepts

- Which crosscutting concepts were useful to make sense of what you figured out?

Amplify Science approach



Introduce a phenomenon and a related problem

Collect evidence from multiple sources

Build increasingly complex explanations

Apply knowledge to a different context

Amplify Science approach

Introduce a phenomenon and a related problem

Collect evidence from multiple sources

Build an explanation

Apply knowledge to a different context

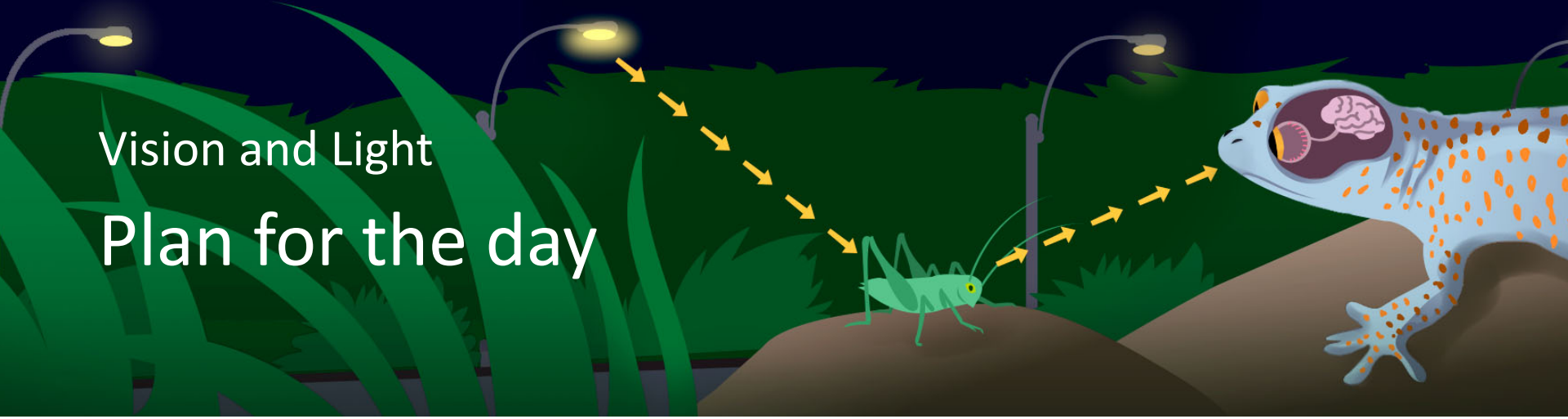
Amplify.

Workshop Title: Supporting Diverse Learner Needs

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

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

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



Vision and Light

Plan for the day

- Reflections and Framing the Day
- **Defining Diverse Learners**
- Understanding Opportunities for Supporting Diverse Learners
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- Planning to Teach
- Closing

Who are our Diverse Learners?

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

Anonymous Educator

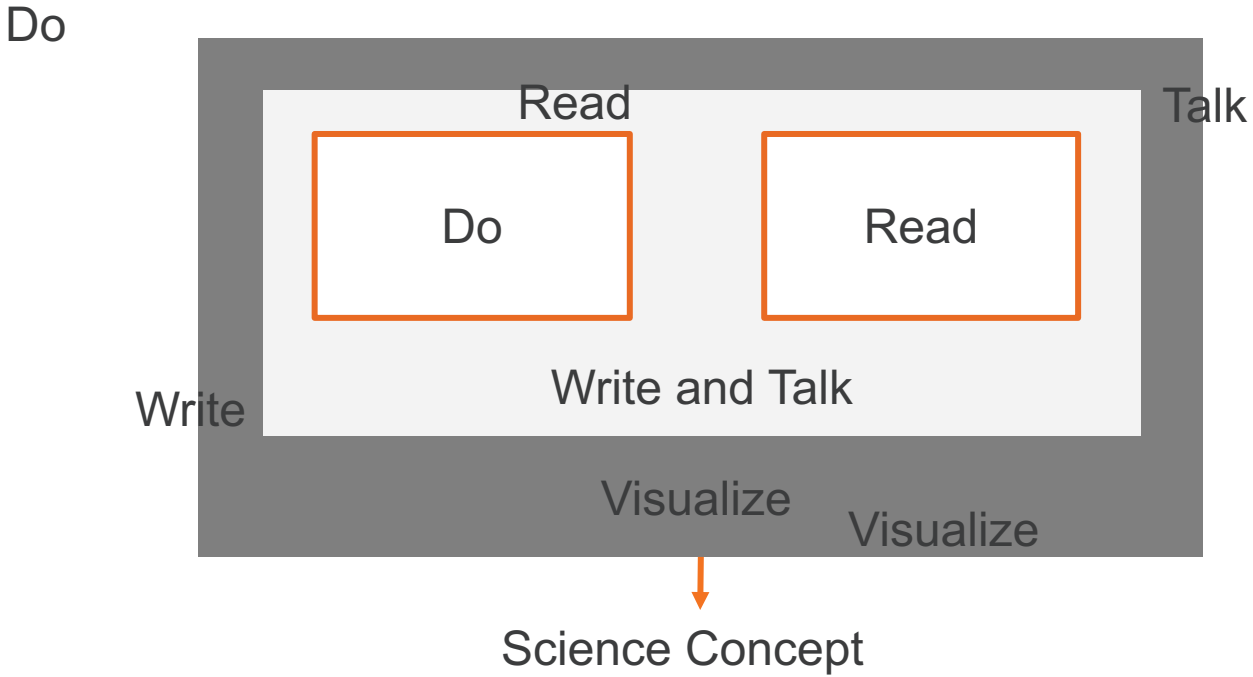
Charting Ideas from **your own** Teacher Toolkit?

What intuitive teacher strategies would you add to this list?

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

Multimodal instruction

Do, Talk, Read, Write, Visualize

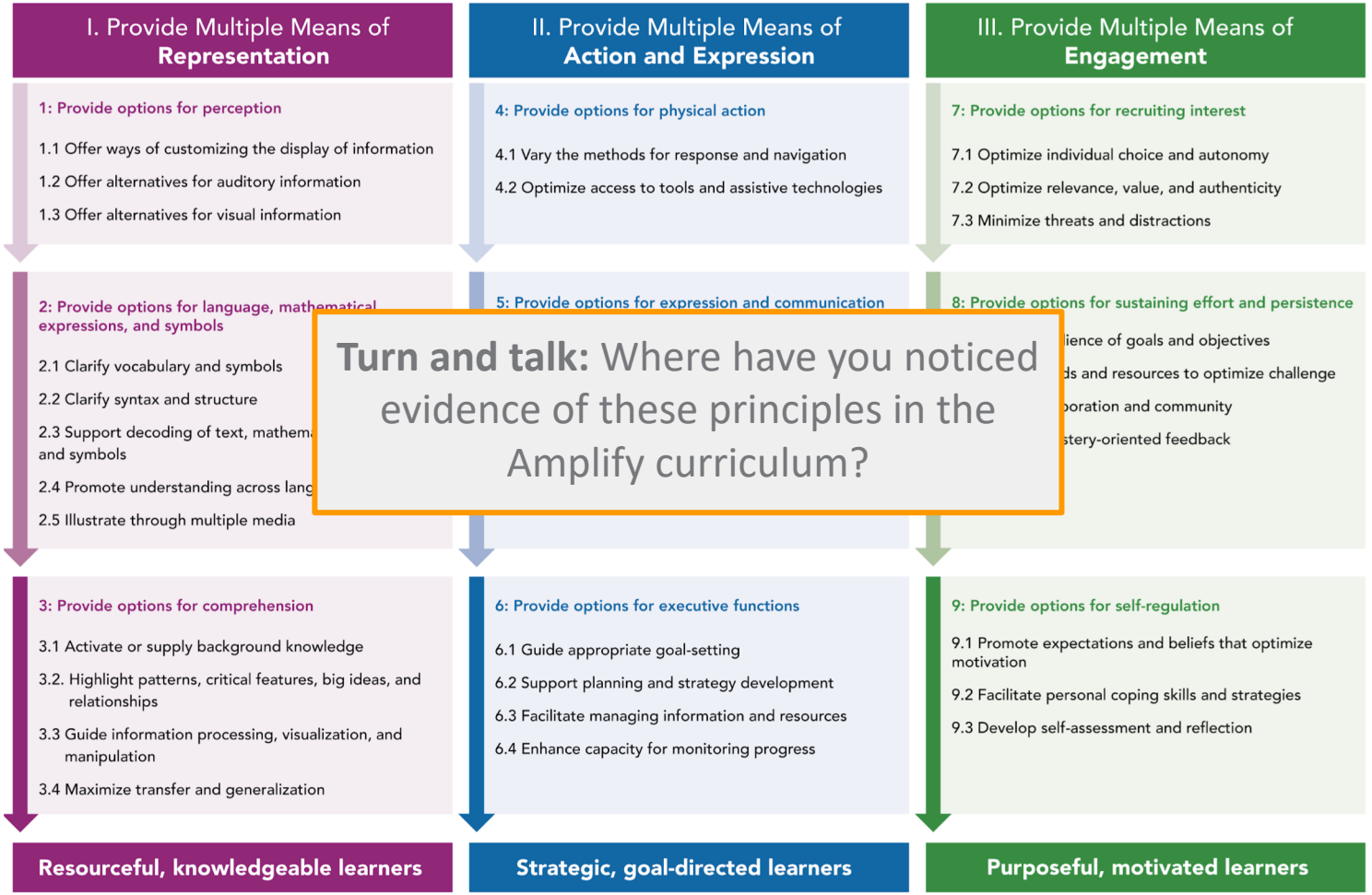


The Amplify Science Curriculum was developed with Supporting Diverse Learning Needs In Mind.

Universal Design for Learning

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

Universal Design for Learning Guidelines



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

Culturally and linguistically responsive teaching

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

Access and Equity

Culturally and linguistically responsive teaching

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

CULTURALLY AND LINGUISTICALLY RESPONSIVE TEACHING PRINCIPLES

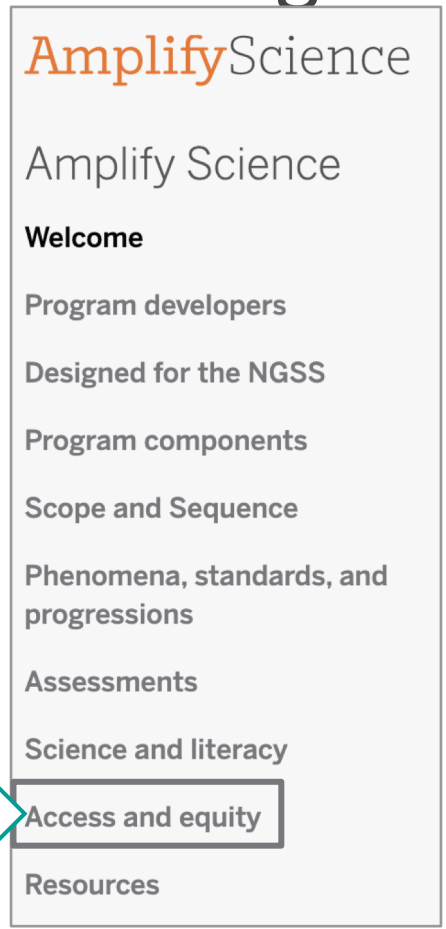
- Promote a positive disposition toward diversity: +
- Leverage students' cultural and experiential backgrounds: +
- Value language diversity and multilingualism: +
- Cultivate students' development of the language of science: +

Differentiation Strategies

1

2

3



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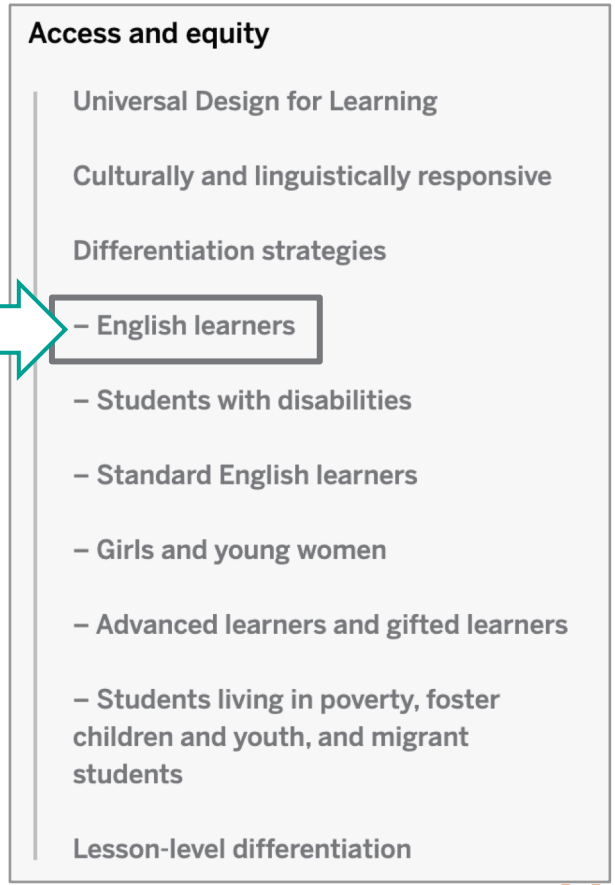


English Learners

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

Language supports for English Learners in Amplify

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

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

English Learners jigsaw

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

DIRECTIONS

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

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

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

Standard English learners

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

Girls and young women

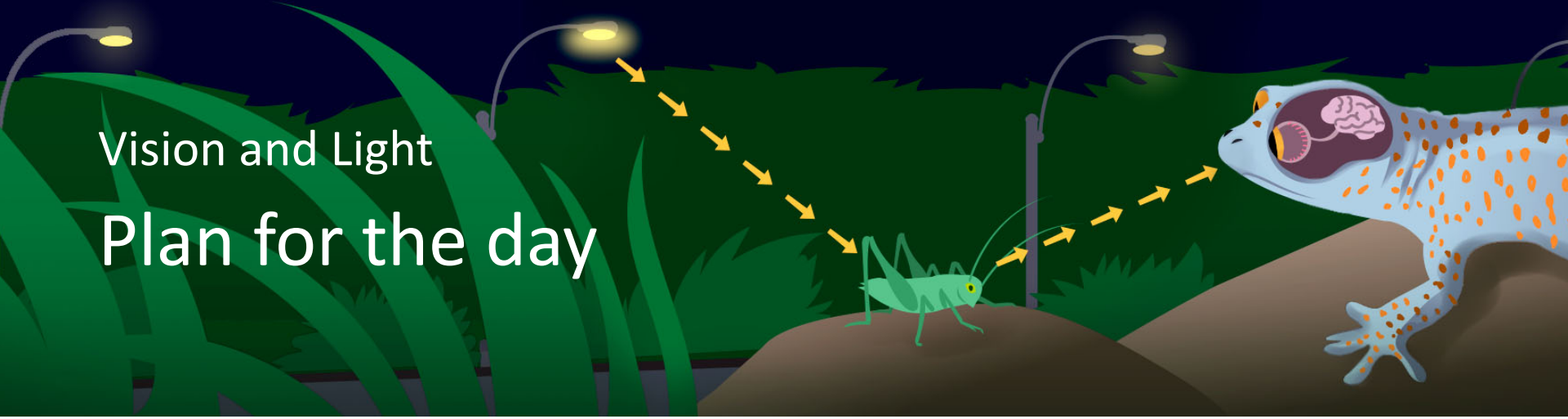
Historically, girls and young women have had **fewer opportunities** to participate in and benefit from **deep science and engineering learning**. To help combat this issue, Amplify Science aids teachers in **positioning girls and young women as powerful science and engineering learners**.

Advanced learners and gifted learners

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

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

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



Vision and Light

Plan for the day

- Reflections and Framing the Day
- Defining Diverse Learners
- **Understanding Opportunities for Supporting Diverse Learners**
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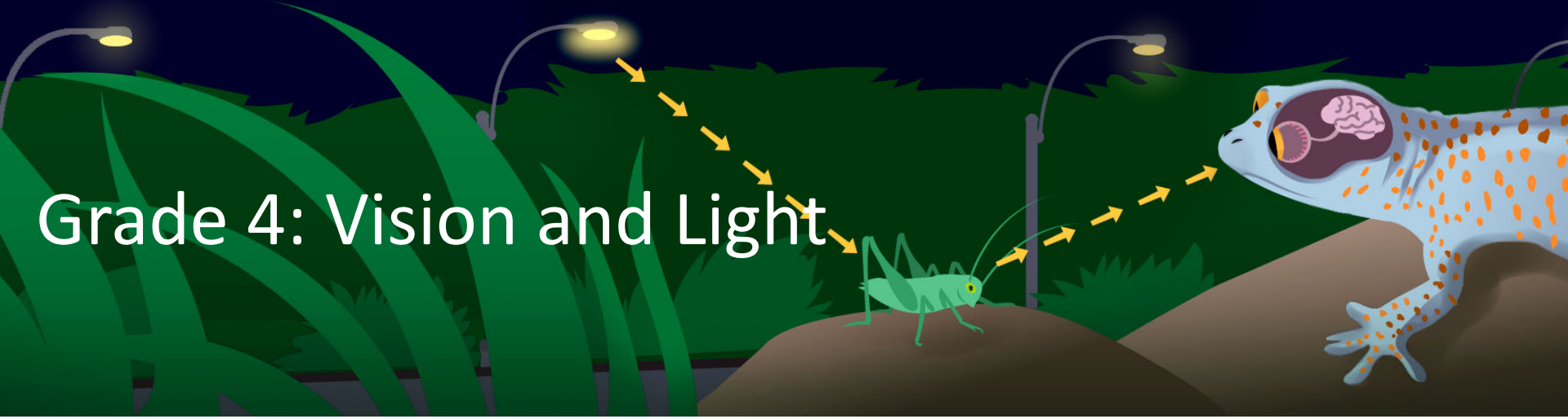
- Closing

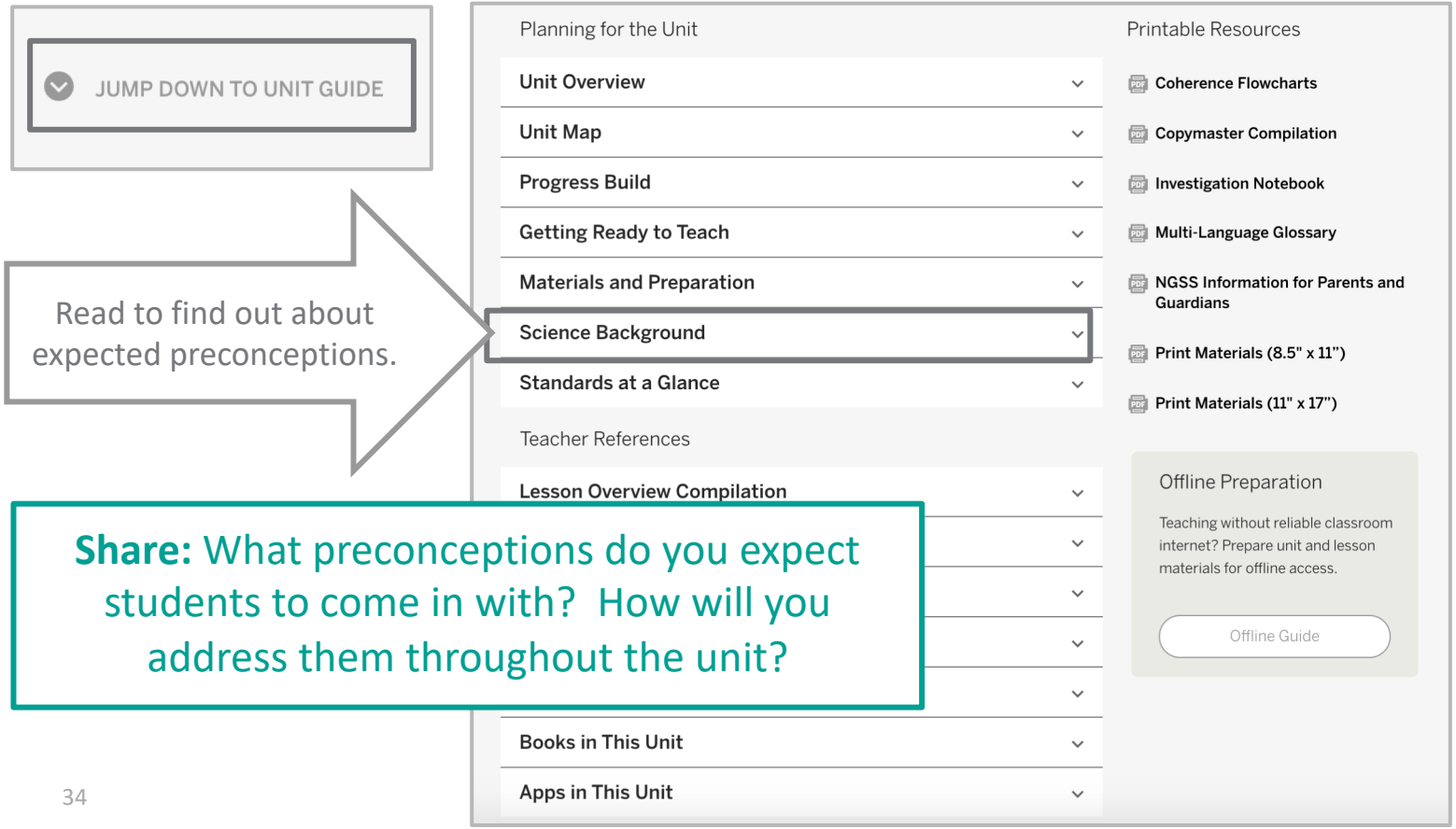


Grade 4: Vision and Light

Anchor Phenomena: The population of Tokay geckos in a rainforest in the Philippines has decreased since the installation of new highway lights.

Role of the Student: 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.

Student preconceptions in this unit



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

Unit Level 3-D Statement

Key

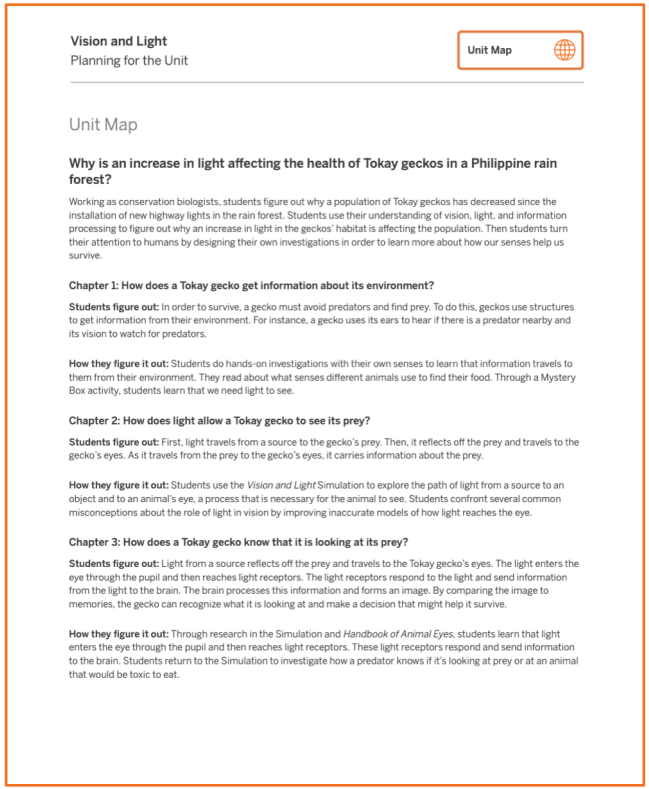
Practices **Disciplinary Core Ideas** **Crosscutting Concepts**

Unit Level

Students ask and investigate questions about the role that animals' senses, primarily vision, play in survival (structure and function) in order to figure out why there is a decline in the number of Tokay geckos living in one area of a rain forest in the Philippines (cause and effect). Students use a digital model, create their own diagram models, and construct explanations to explain that we need light to see and how we see (systems and system models).

Unit Map

Pg. xx



Vision and Light
Planning for the Unit

Unit Map

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?

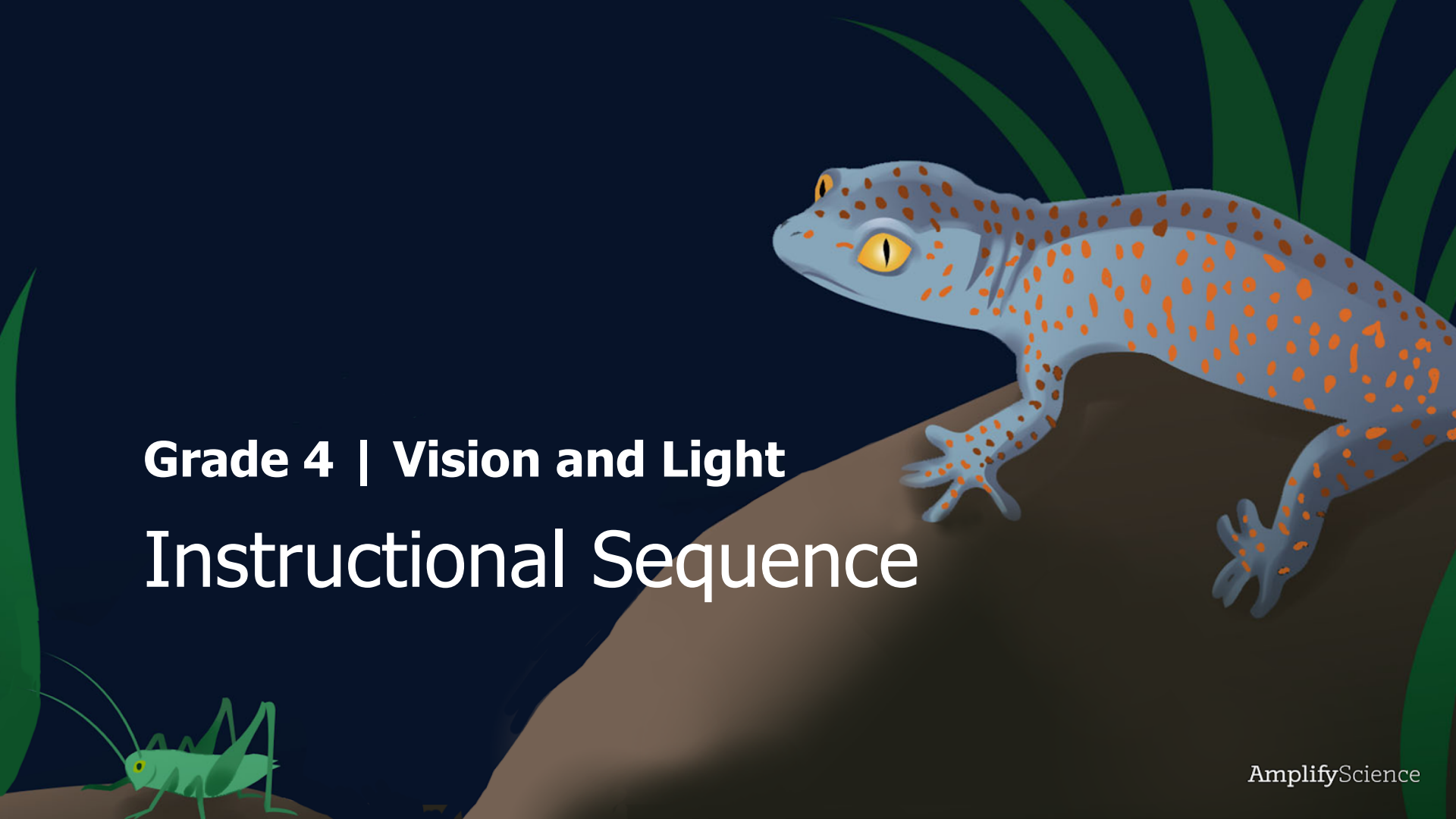
Students figure out: First, light travels from a source to the gecko's prey. Then, it reflects off the prey and travels to the gecko's eyes. As it travels from the prey to the gecko's eyes, it carries information about the prey.

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.



Grade 4 | Vision and Light

Instructional Sequence

AmplifyScience

This science unit is about **how animals survive in their environment**.

The **Rain Forest Conservation Group** needs our help solving an animal survival problem.

To: Conservation Biologists
From: Rain Forest Conservation Group
Subject: A Problem with the Tokay Geckos

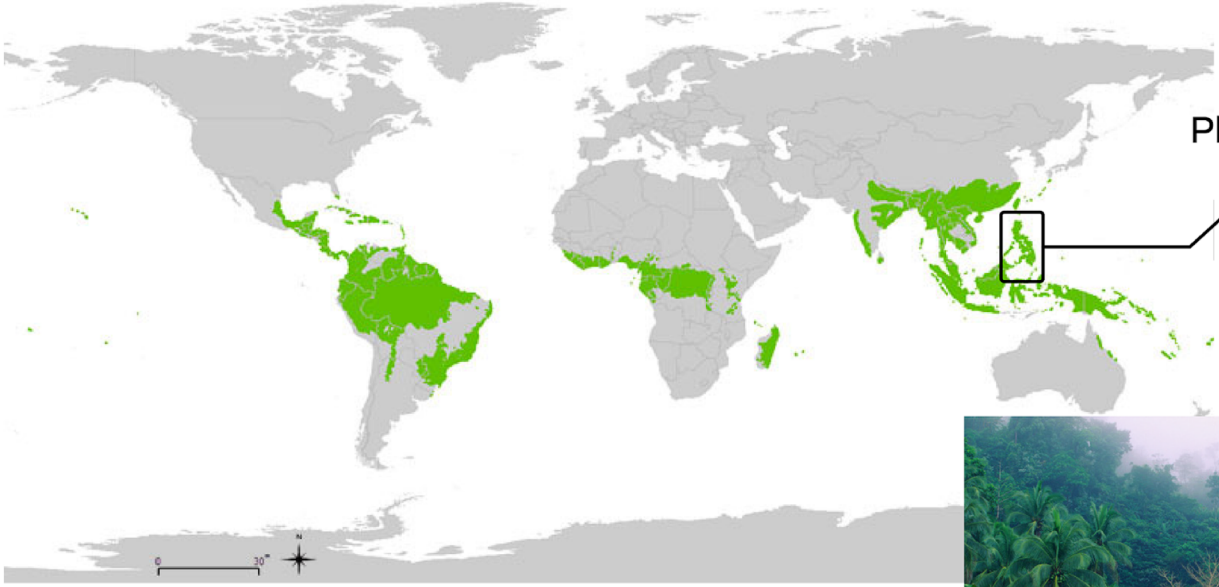
Our biologists have noticed there are fewer Tokay geckos than there used to be in a small area of rain forest in the Philippines. Why are there fewer Tokay geckos? Is something making it hard for Tokay geckos to survive in their environment? We need your help to figure this out!

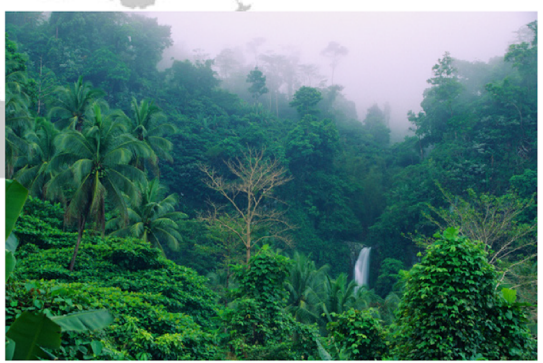
Tokay Gecko

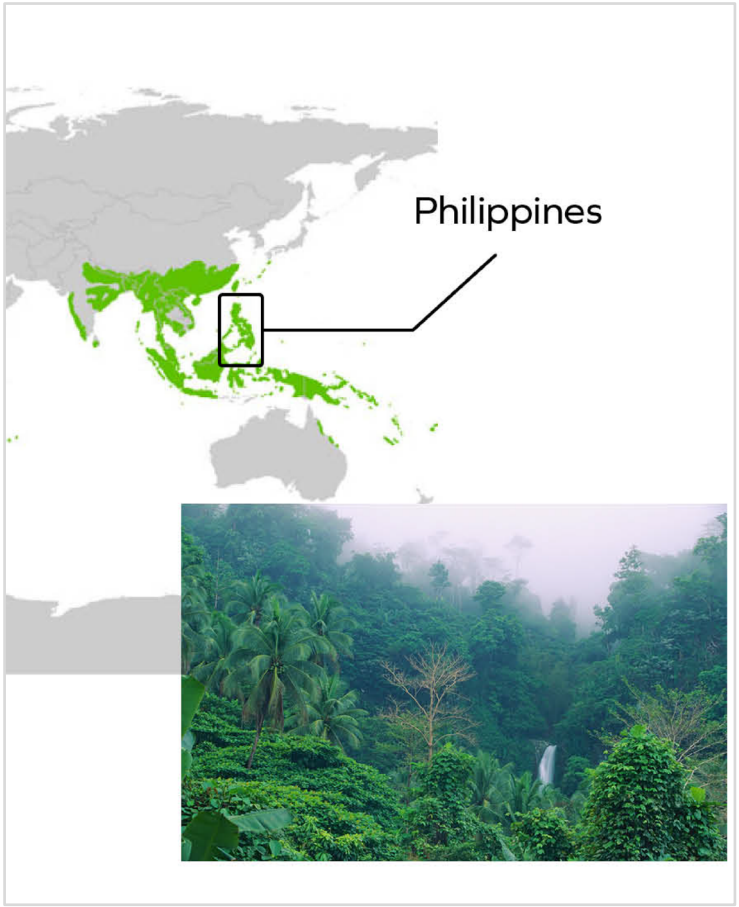
This is the Tokay gecko.

The Rain Forest Conservation Group is wondering **why there are fewer Tokay geckos** than there used to be.

Tropical Rain Forests of the World



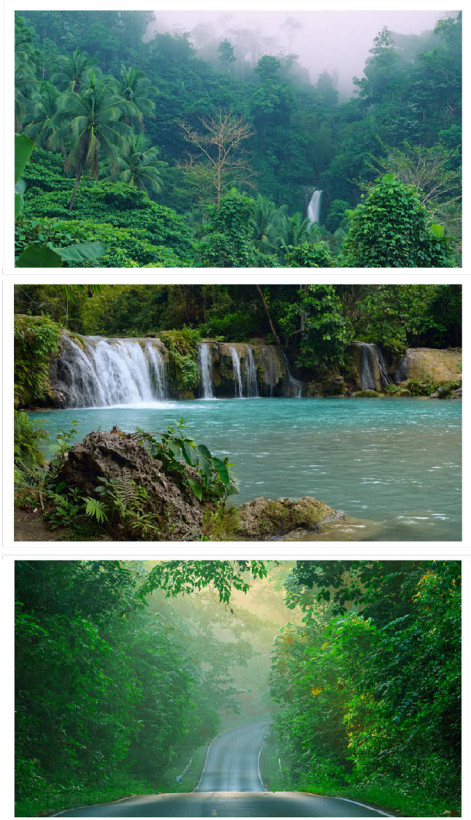




Tokay geckos are lizards that live in the rain forests of the Philippine Islands.

Does anyone know anything about **rain forests**?

Rain Forest Environment



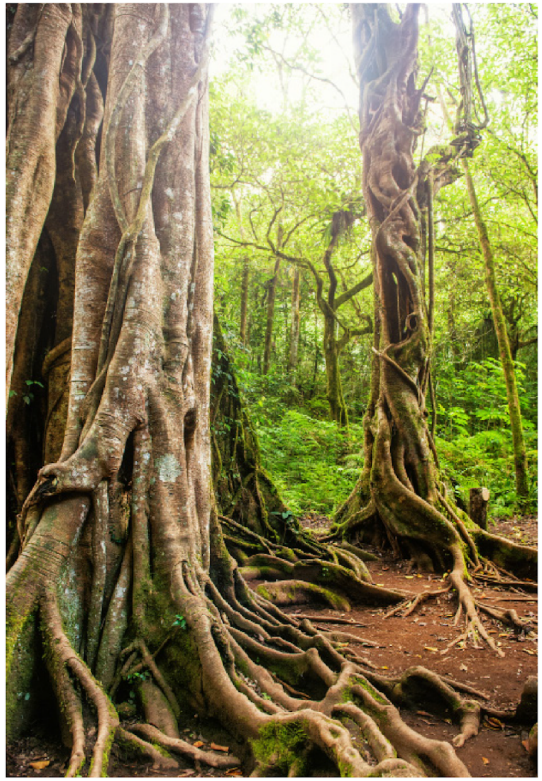
Environment means all the living and nonliving things in an area.

What are some examples of **living and nonliving things** in these pictures of the rain forest environment?

Next, we're going look at photos of some plants and animals that live in rain forests and **discuss them with partners.**

There are many interesting things to **notice** and **wonder** about in the photos.

Rain Forest Plants and Animals



Rain Forest Plants and Animals

Conservation Biologists

You will be conservation biologists—scientists who help protect plants and animals.

You will figure out **why there are fewer Tokay geckos** in an area.

Rain Forest Conversation Group

A conservation group works to make sure that **plants and animals can survive**. That's why the Rain Forest Conservation Group is worried about the Tokay geckos.

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

JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

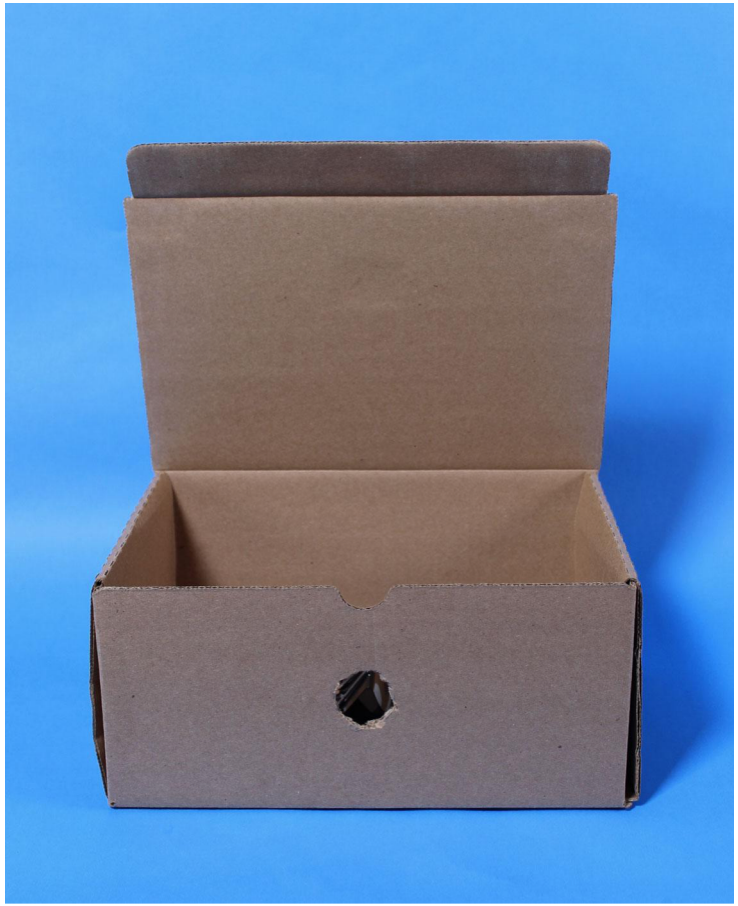
Lesson 1.2:
Introducing Animal Senses

Lesson 1.3:
Investigating Animal Senses

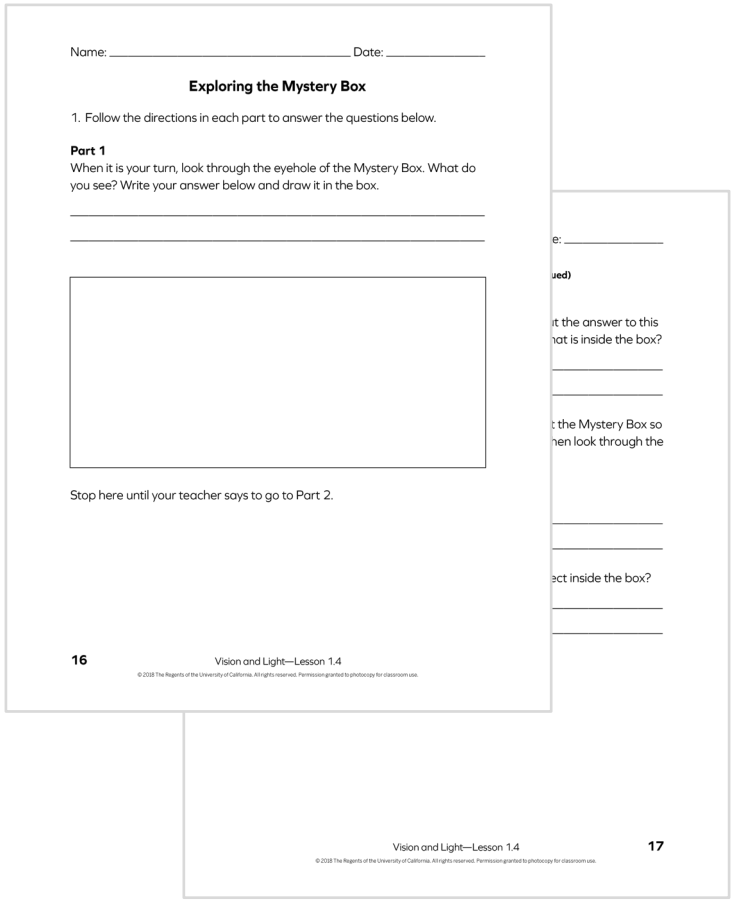
Lesson 1.4:
Exploring How Animals Survive

To: Conservation Biologists
From: Rain Forest Conservation Group
Subject: A Problem with the Tokay Geckos

Thank you for the update about how geckos get information from their environment in order to survive. We wanted to let you know we observed that the Tokay geckos rely mostly on their vision to find their prey, such as insects. We hope that this information is useful to you.



This is the **Mystery Box**. It will help us understand more about **vision** and how it can help animals get information about their environment.



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.

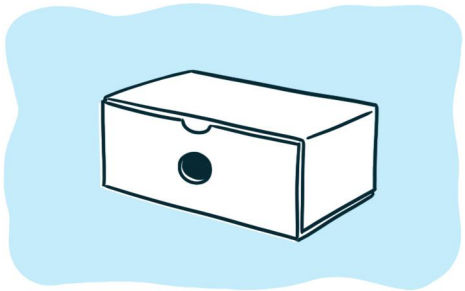
16 Vision and Light—Lesson 1.4

Vision and Light—Lesson 1.4 17

Turn to pages 16–17 in your notebooks.

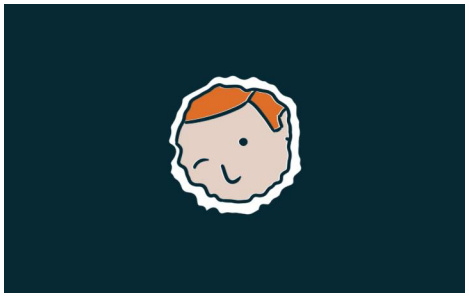
You will work in groups to figure out what you need in order to see your "food" in the box.

Exploring the Mystery Box: Part 1



Step 1

Keep the box flat on the table and **leave it closed.**



Step 2

When it is your turn, **look through the eyehole** of the Mystery Box.

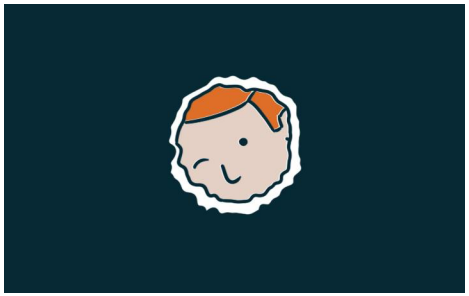
Step 3

Write or draw what you see on page 16 in your notebook. Wait for the signal to move on to Part 2.

Exploring the Mystery Box: Part 2

Step 1

Discuss the question **What do you need in order to see the "food" that is inside the box?**



Step 2

Decide what one thing you will change about the Mystery Box so you can see what is inside. **Make this change**. Then look through the eyehole.

Step 3

Answer the questions on page 17 in your notebook.

What did you see when you first looked through the eyehole? Could you see what was inside?

What did you need in order to see your "food" inside the box?

What kind of **information** could you get about the object inside the box?

What **new ideas** does this give you about **what animals need** in order to see their food?

Key Concept

Light, sound, and scent can carry information about the environment to an animal.

Vision and Light: Investigating Animal Eyes

The problem students work to solve

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

Pg. xx

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)
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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 the 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.

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

JUMP DOWN TO CHAPTER OVERVIEW

To: Conservation Biologists
From: Rain Forest Conservation Group
Subject: Update on Tokay Geckos

Thank you for your efforts to figure out why there are fewer Tokay geckos in this part of the rain forest. We wanted to provide you with an update.

Our biologists observed that the surviving geckos are very thin. Therefore, they think the geckos are not finding enough food in their environment. We also know that the number of insects that the geckos eat has increased in this part of the rain forest, which means there is enough food available for them in their environment. We wonder if the geckos are having trouble seeing the insects they hunt and eat. Can you explain how geckos see their prey?

Chapter 2 Question

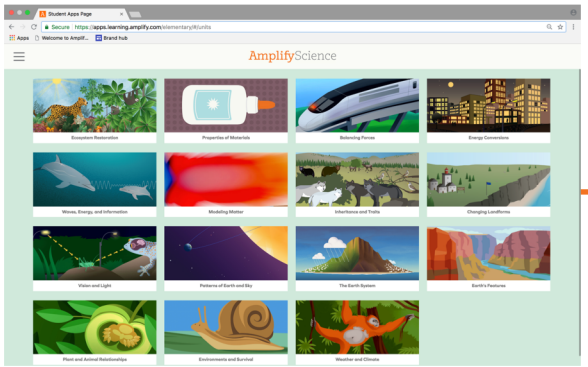
How does light allow a Tokay gecko to see its prey?

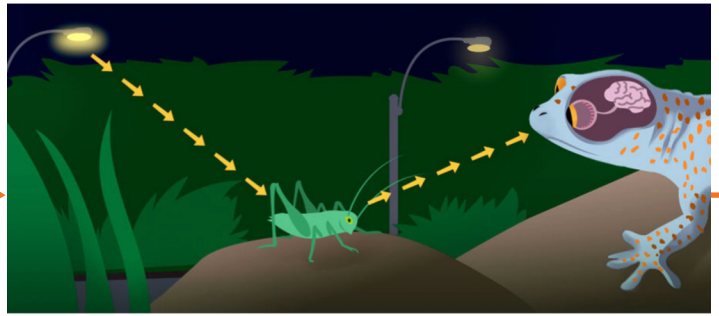
Today, we are going to investigate this question:

How does light allow an animal to see something?

Navigating to the Sim

Safari or Chrome





Vision and Light

1. Go to apps.learning.amplify.com/elementary
2. Click on Vision and Light
3. Select Box 1 under Simulation

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?

_____

_____

_____

Turn to page xx in your notebooks.

Complete the Investigations and **answer the questions** in your notebooks.

ON-THE-FLY

Let's discuss what you learned from the Sim to help you answer this question:

How does light allow an animal to see something?

Vision and Light: Investigating Animal Eyes

The 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

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Application of key concepts to the problem

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

JUMP DOWN TO CHAPTER OVERVIEW

Vision and Light: Investigating Animal Eyes

The problem students work to solve

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

Pg. xx

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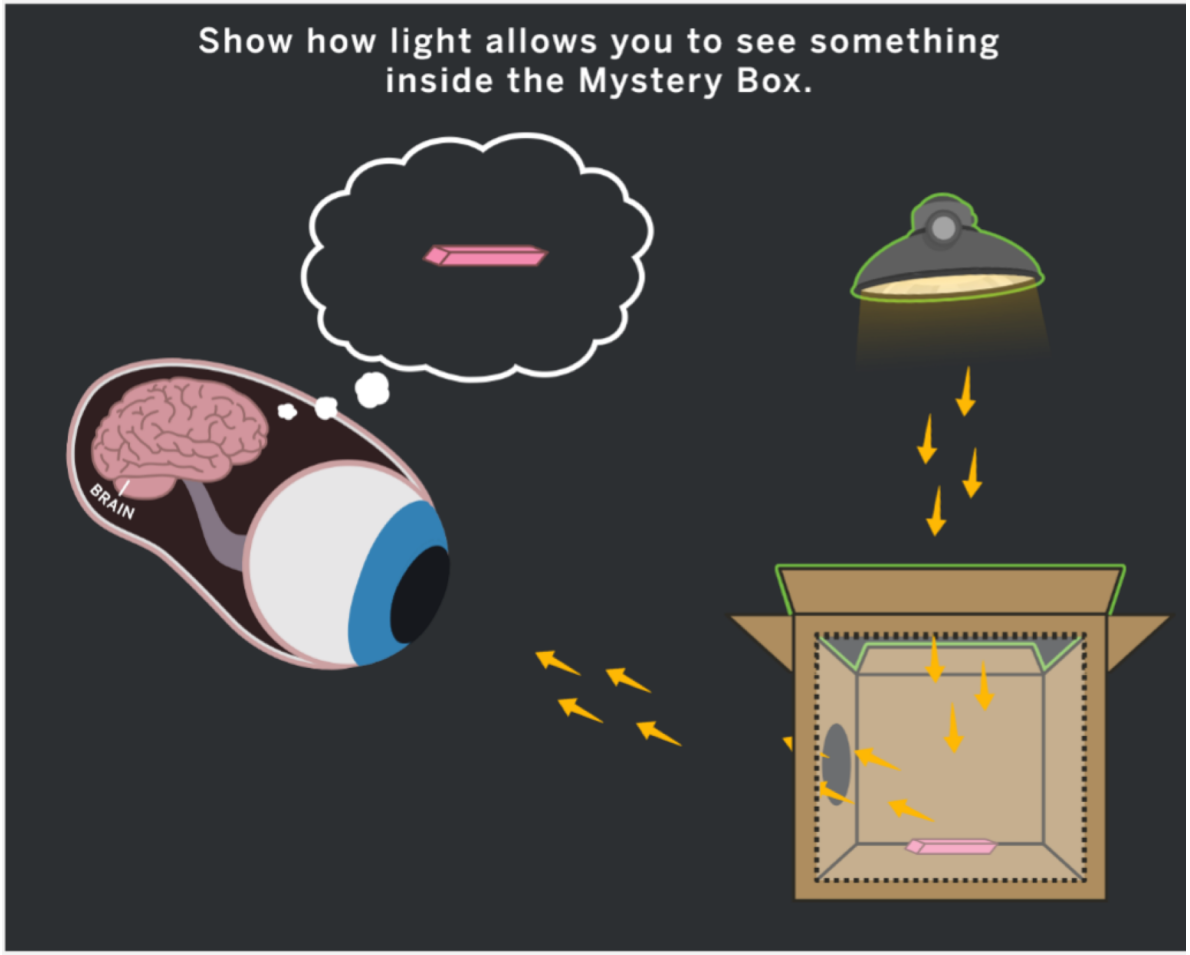

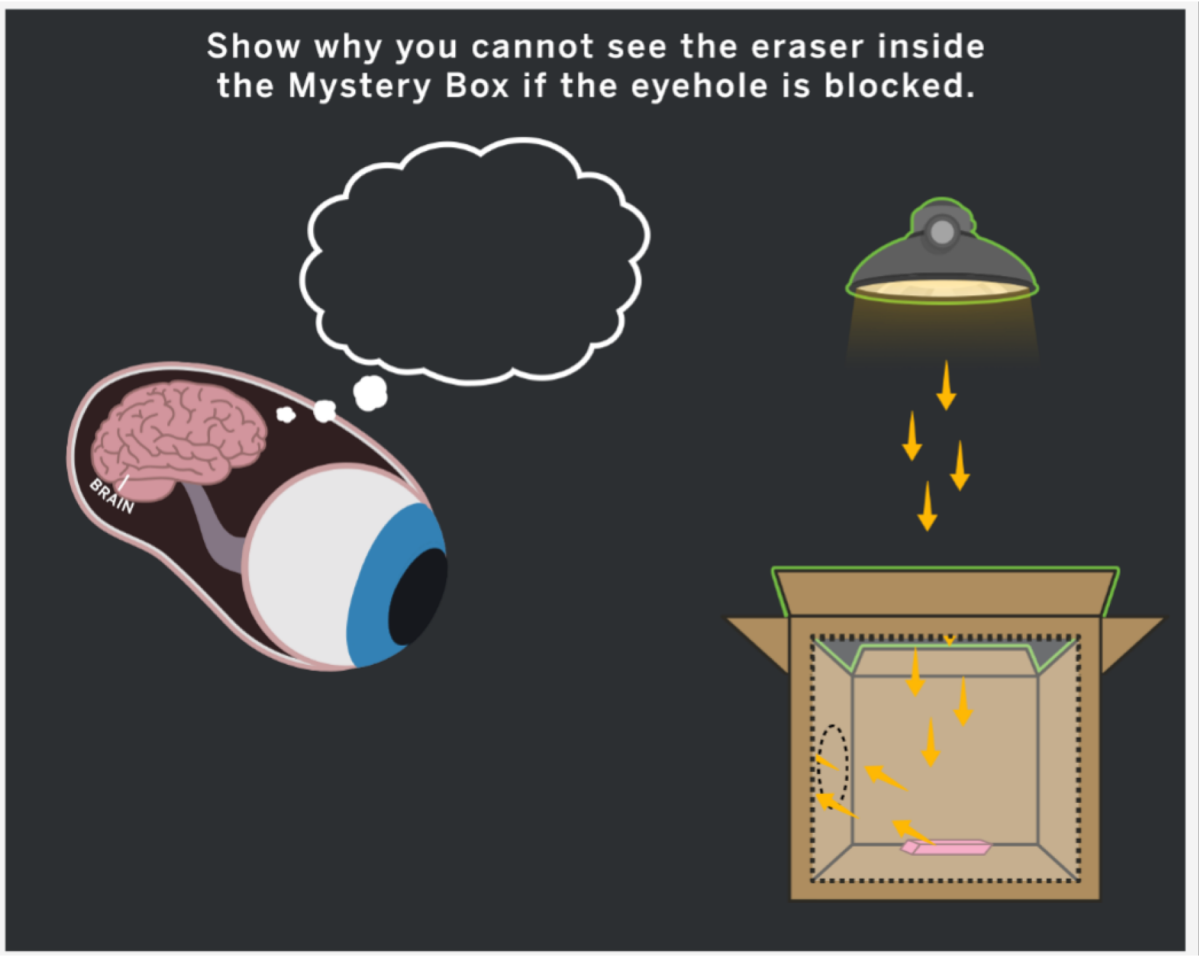

Chapter 2: How does light allow a Tokay gecko to see its prey?

JUMP DOWN TO CHAPTER OVERVIEW

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

Vision and Light: Investigating Animal Eyes

The problem students work to solve

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

Pg. xx

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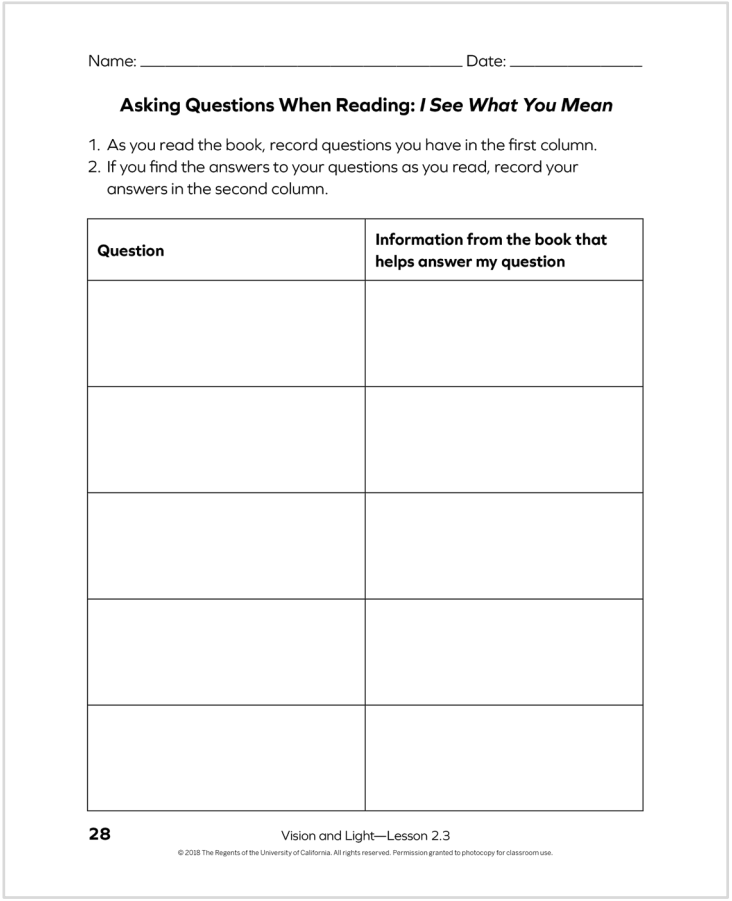
Partner Reading Guidelines

1. Sit next to your partner and place the book between you.
2. Take turns reading.
3. Read in a quiet voice.
4. Be respectful and polite to your partner.
5. Ask your partner for help if you need it. Work together to make sure you both understand what you read.



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.

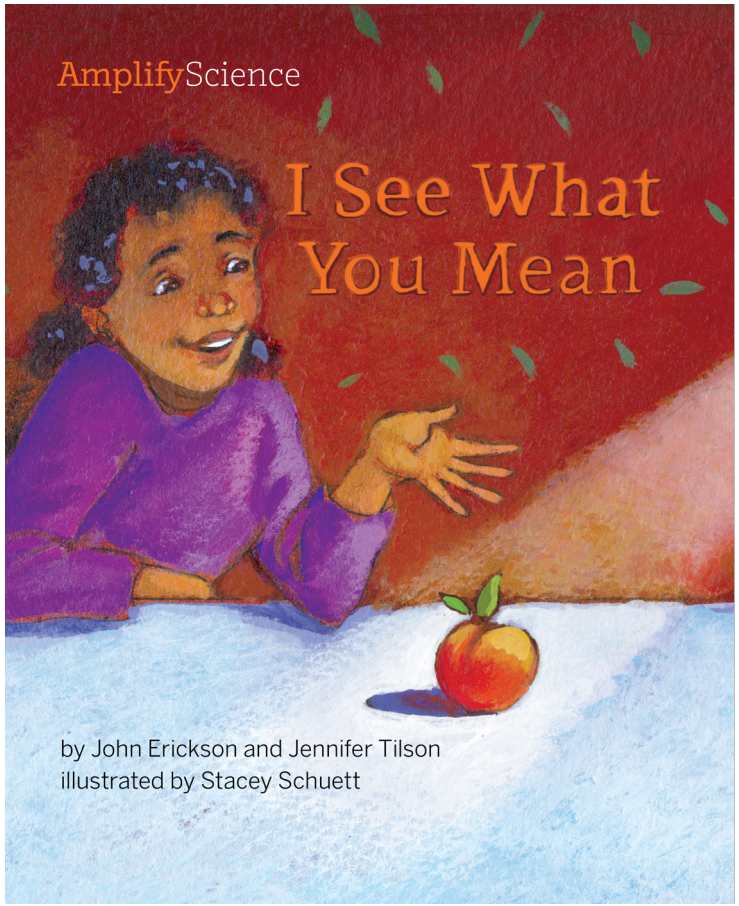
Question	Information from the book that helps answer my question

28 Vision and Light—Lesson 2.3

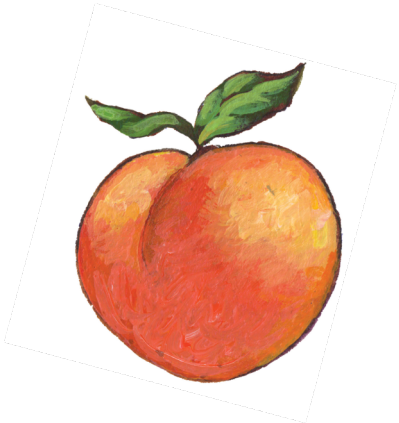
Turn to page xx in your notebooks.

Let's review the directions.

You'll record questions in one column and helpful information in the other.



I will read the first two pages out loud and show you how to **ask a question** and **find information** to help answer that question.



Jayla and Zoey were at Jayla's house one day after school. Jayla's mom had gone to the store that day and bought some delicious, ripe peaches to snack on. Jayla got a peach to share with Zoey. She held it in her hand while she and Zoey looked it over to make sure it didn't have any bruises. Looking at the peach got them thinking.

Jayla said, "I can see that this peach looks perfect."

"I can see that, too, but I wonder why it is that we can see this peach. What makes it possible for us to see it?" Zoey asked.

Follow along as I read the first two pages out loud.

Jayla and Zoey smiled at each other, because they both liked to think and talk about things that they noticed and wondered about. They often asked each other questions to try to figure things out.

Jayla bent down next to the table so that the peach was at her eye level. She said, "You asked why we can see the peach, and my answer is that I see the peach because I am looking at it!" The minute she said it, she knew that answer wasn't complete. It made her wonder—how did **vision** work, anyway?

4

Let's keep reading.

Jayla and Zoey smiled at each other, because they both liked to think and talk about things that they noticed and wondered about. They often asked each other questions to try to figure things out.

Jayla bent down next to the table so that the peach was at her eye level. She said, "You asked why we can see the peach, and my answer is that I see the peach because I am looking at it!" The minute she said it, she knew that answer wasn't complete. It made her wonder—how did **vision** work, anyway?

They're trying to **figure out why they can see the peach**.

I'm thinking about the **Sim** we used. When we **turned off** the light, the predator **couldn't see**.

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
Do they see the peach because there is a light source in the room?	

This makes me wonder:
Is there a light source in the room with the peach?

We can record this question.

"But," Jayla continued slowly, "I guess just looking at something isn't the whole story, is it? My eyes have to get information about the peach. I couldn't see this peach in the dark, even if I looked right at it. So I guess I could say that I see the peach because I am looking at it and because there is light in the room. The peach is in the light, and so I see the peach."

"I see what you mean," said Zoey, and they both laughed. "But still, there must be more to it. Doesn't the light have to come from somewhere?"

5

Let's keep reading to see if we can answer our question.

"Right!" exclaimed Jayla. "We know that light comes from a **source**, and the source of the light in this room is this lamp. So I must see the peach when I look at it because light is coming from the lamp, and the peach is in the light."

6

We know there's light now, but my question was about a **light source**, so let's keep reading to see if we can get more information.

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**
Do they see the peach because there is a light source in the room?	There is a light source—a lamp (page 6). Still need to know more about what the light is doing.

We can **record the information** that helps us answer our question.

It's okay if you can't answer all your questions right away.

We read earlier that the **lamp had to be on** in order for Jayla and Zoey to **see the peach**.

Let’s discuss and trace the **path of light**.

Where did light from the lamp go first?

Key Concept

Light needs to get to an object for an animal to see the object.

What happens **after light gets to an object**?

Would Jayla be able to **see the peach** if there were **no light**?

Jayla can see the peach because light travels from the peach to her eyes.

What **information about the peach** is this light carrying?

Vision and Light: Investigating Animal Eyes

The problem students work to solve

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

Pg. xx

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

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What are students figuring out?

Why post this key concept now?

Key concepts

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Application of key concepts to the problem

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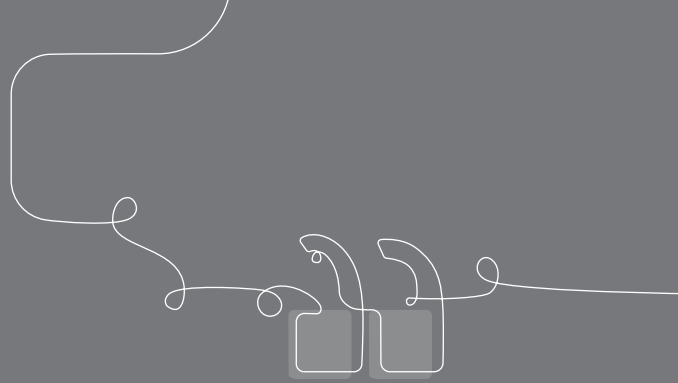
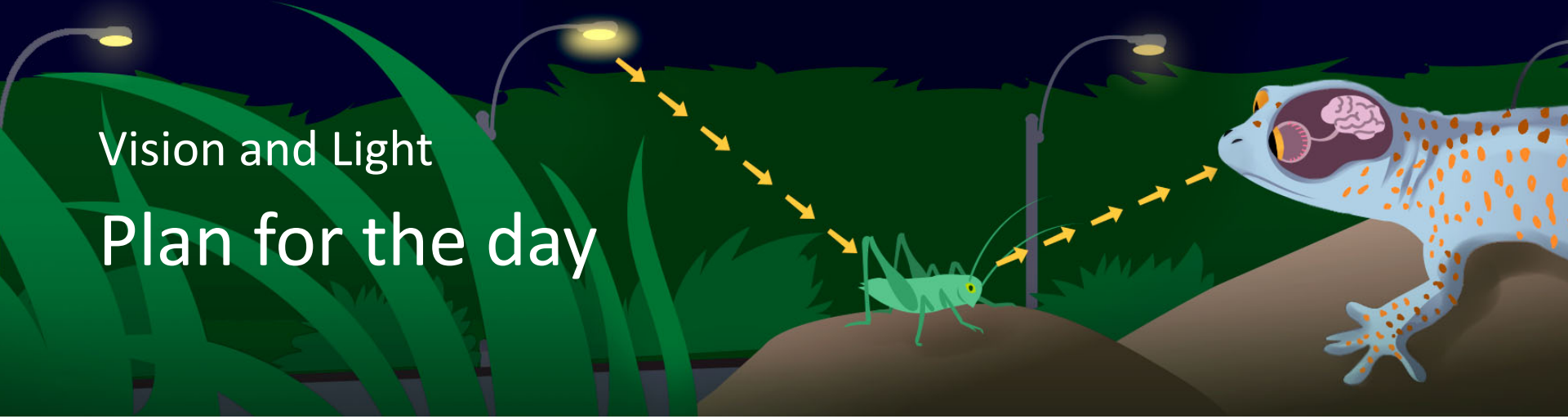


Turn and talk:

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

Engaging with ideas over multiple activities

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



Vision and Light

Plan for the day

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

Unpack and Analyze the Embedded Formative Assessment Data

What do you notice about each diverse learner needs?

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

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

Amplify Science

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

Teacher: Mr. Saturn **Grade Level** : 4 **Date:** 8 /2018
Unit Name: Vision and Light **Chapter:** 2 **Lesson:** 2.3, Act. 3

A.) Determine the "Look For's" for the On the Fly Assessment
On-the-Fly Assessment 6: Light Carries Information

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 participants in the "Pair" and "Share" routine with a peer.	2	3	2	1
Look For #2: Student recognizes that light carries visual information about an object when it reflects off that object and gets to the eye.	2	1	2	1
Look For #3: Student understands what counts as information. (For example, some students may not think of shape, color, and texture as information about an object.)	2	1	2	2
Look For #4: Student understands the 'term' carry; as they may be thinking about observable movement.	2	1	2	2
Look For #5: Student uses vocabulary appropriately (environment, observe, prey, survive, vision)	3	2	1	2

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

Sample Classroom Profile

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

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

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

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

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

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

JUMP DOWN TO CHAPTER OVERVIEW

Vision and Light: Investigating Animal Eyes

The problem students work to solve

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

Pg. xx

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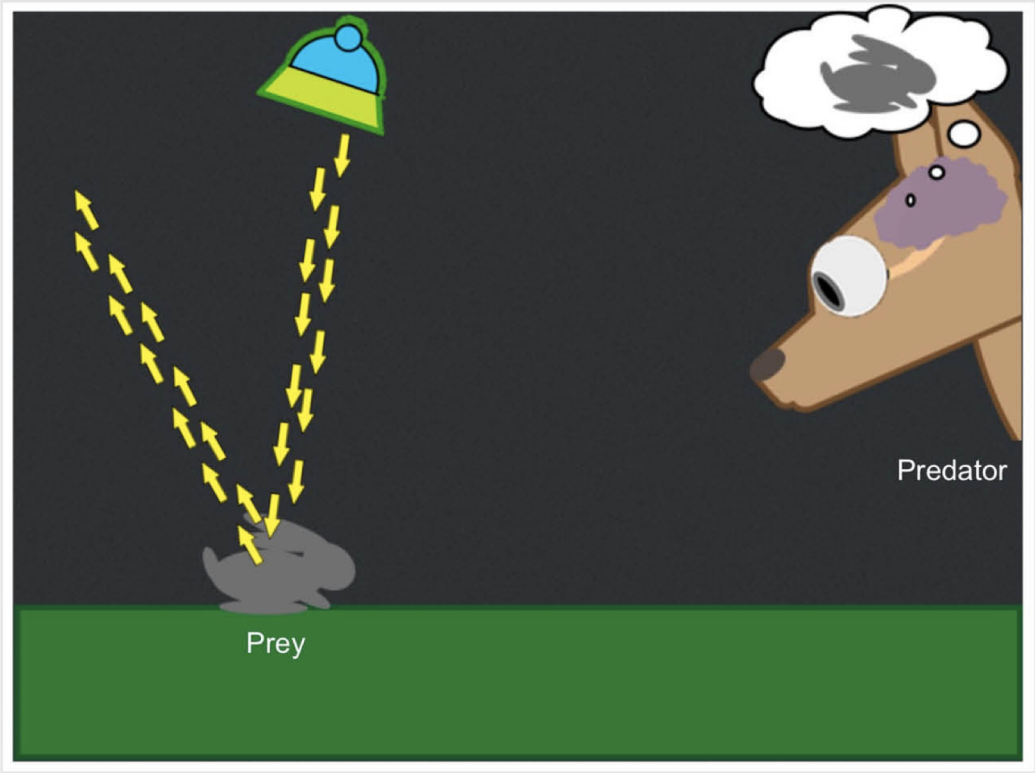
First, light travels from a source to the gecko's prey. Then, it reflects off the prey and travels to the gecko's eyes. As it travels from the prey to the gecko's eyes, it carries information about the prey.

Vocabulary

reflect

to cause light to bounce off a material

Model 1

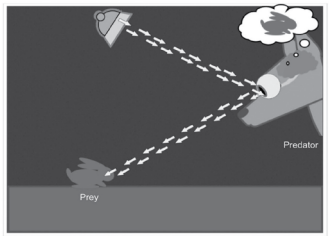


Name: _____ Date: _____

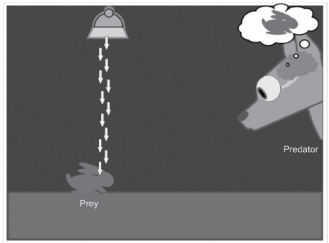
Reviewing Models About Vision and Light

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



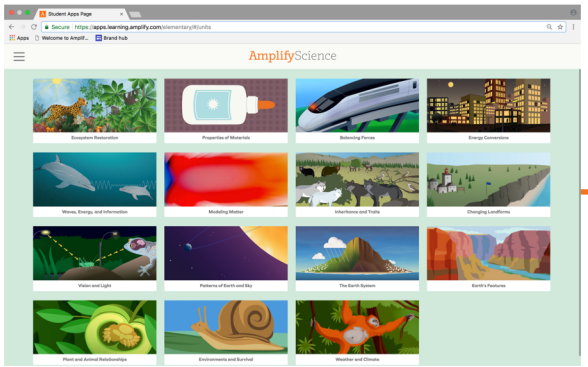
Turn to page xx in your notebooks.

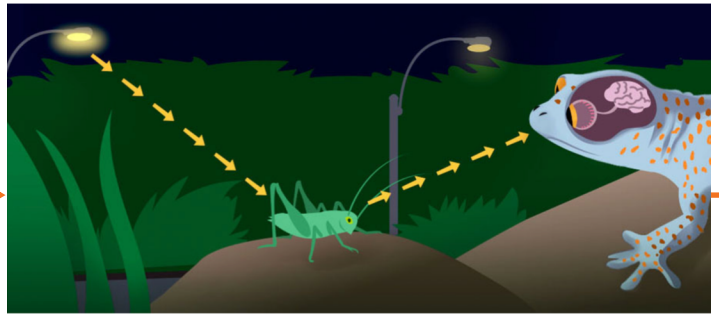
Let's **review the directions.**

First, you'll discuss both models. Then, you'll write in your notebooks.

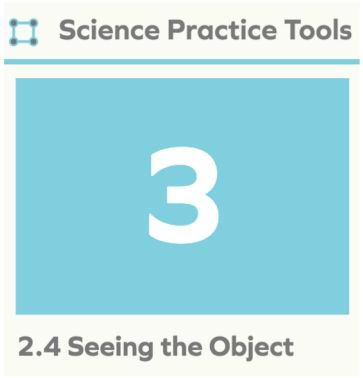
Navigating to the Modeling Tool

Safari or Chrome





Vision and Light



1. Go to apps.learning.amplify.com/elementary
2. Click on Vision and Light
3. Select Box 3 under Science Practice Tools

Key Concept

Light needs to reflect off an object and get to the eye for an animal to see the object.

Turn and Talk

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

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

JUMP DOWN TO CHAPTER OVERVIEW

Lesson 2.1: Investigating Light

Lesson 2.2: Modeling Ideas About Light

Lesson 2.3: I See What You Mean

Lesson 2.4: Reviewing Models About Vision and Light

Lesson 2.5: Explaining How Light Allows an Animal to See

Vision and Light: Investigating Animal Eyes

The problem students work to solve

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

Pg. xx

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What are students figuring out?

Key concepts

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- Light needs to reflect off an object and get to the eye for an animal to see the object. (2.4)

What can we explain with these ideas?

Application of key concepts to the 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.

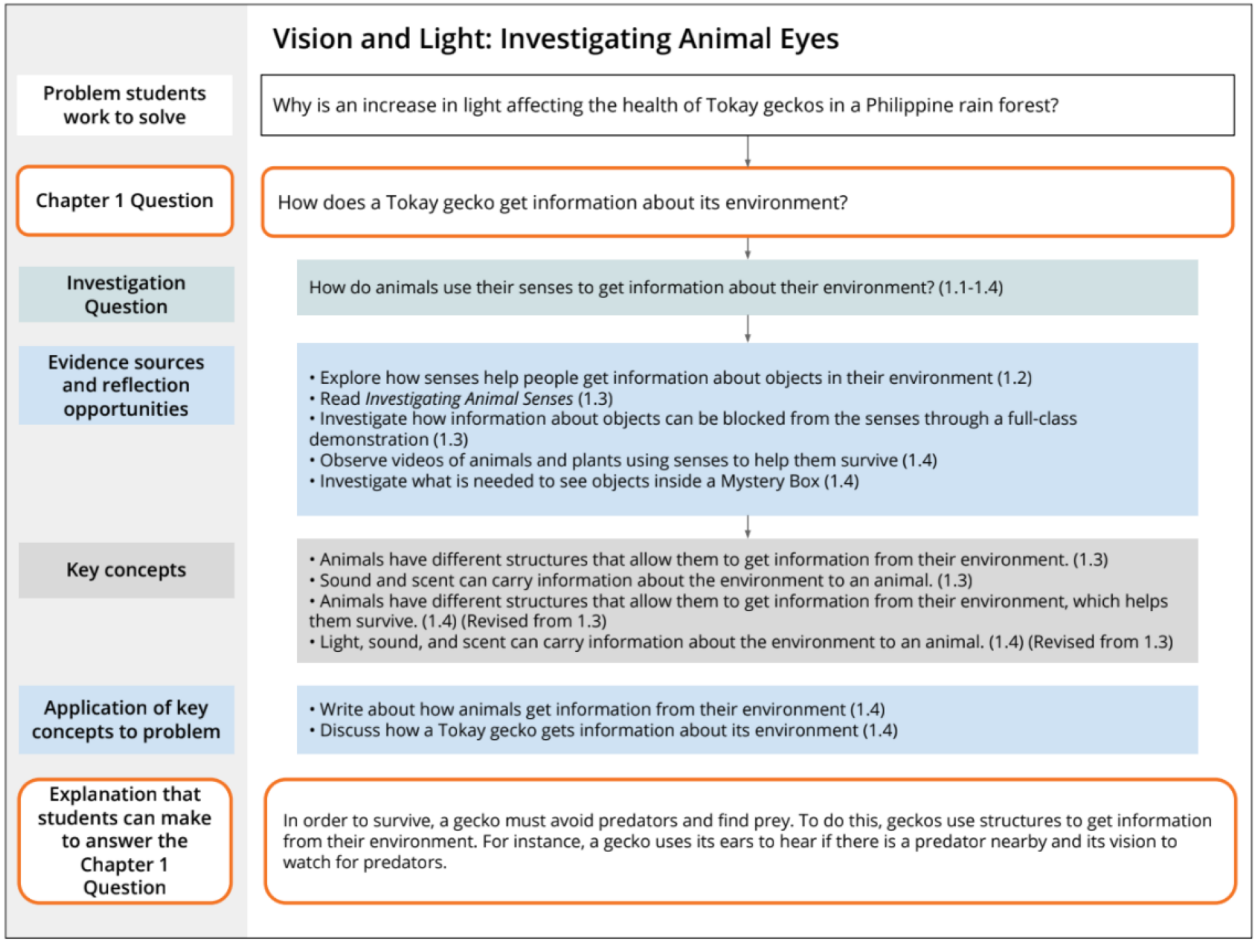
Coherence FlowCharts

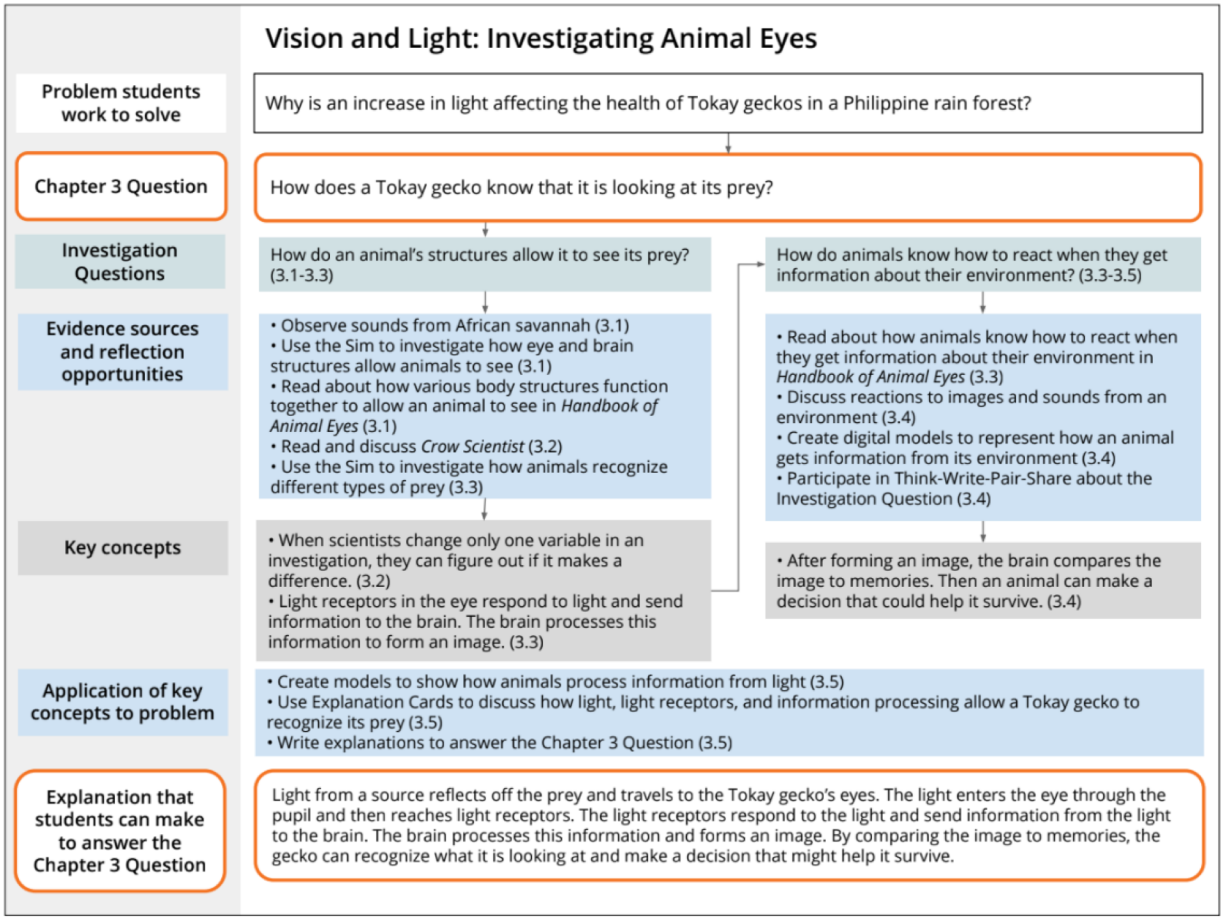
Reviewing coherence (5 mins):

- Review the Coherence Flowcharts for Chapters 1 & 3. CFs can be found on page __ of the Participant Notebook.
    - Partner A will review Ch. 1
    - Partner B will review Ch.3
- Partners will make connections between the application of key concepts section and the differentiation Brief for their chapter. Each partner will jot down key strategies for supporting Diverse Learners.

Pair share (5 mins):

- Partner A will take up to 1 minute to share connections for Ch. 1. Then Partner B will paraphrase what he/she heard the partner share.
- Then, Partner B will take up to 1 minute to share connections for Ch. 3. Then Partner A will paraphrase what he/she heard the partner share.

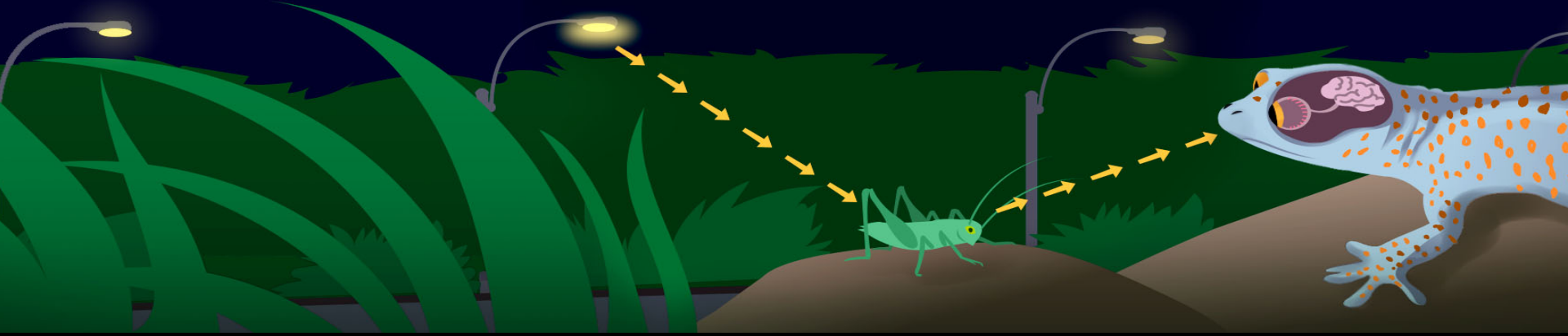

Vision and Light: Investigating Animal Eyes
Problem students work to solve
Why is an increase in light affecting the health of Tokay geckos in a Philippine rain forest?
Chapter 1 Question
How does a Tokay gecko get information about its environment?
Investigation Question
How do animals use their senses to get information about their environment? (1.1-1.4)
Evidence sources and reflection opportunities
• Explore how senses help people get information about objects in their environment (1.2)
• Read Investigating Animal Senses (1.3)
• Investigate how information about objects can be blocked from the senses through a full-class demonstration (1.3)
• Observe videos of animals and plants using senses to help them survive (1.4)
• Investigate what is needed to see objects inside a Mystery Box (1.4)
Key concepts
• Animals have different structures that allow them to get information from their environment. (1.3)
• Sound and scent can carry information about the environment to an animal. (1.3)
• Animals have different structures that allow them to get information from their environment, which helps them survive. (1.4) (Revised from 1.3)
• Light, sound, and scent can carry information about the environment to an animal. (1.4) (Revised from 1.3)
Application of key concepts to problem
• Write about how animals get information from their environment (1.4)
• Discuss how a Tokay gecko gets information about its environment (1.4)
Explanation that students can make to answer the Chapter 1 Question
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.


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 3 Question
How does a Tokay gecko know that it is looking at its prey?
Investigation Questions
How do an animal's structures allow it to see its prey? (3.1-3.3)
How do animals know how to react when they get information about their environment? (3.3-3.5)
Evidence sources and reflection opportunities
• Observe sounds from African savannah (3.1)
• Use the Sim to investigate how eye and brain structures allow animals to see (3.1)
• Read about how various body structures function together to allow an animal to see in Handbook of Animal Eyes (3.1)
• Read and discuss Crow Scientist (3.2)
• Use the Sim to investigate how animals recognize different types of prey (3.3)
• Read about how animals know how to react when they get information about their environment in Handbook of Animal Eyes (3.3)
• Discuss reactions to images and sounds from an environment (3.4)
• Create digital models to represent how an animal gets information from its environment (3.4)
• Participate in Think-Write-Pair-Share about the Investigation Question (3.4)
Key concepts
• When scientists change only one variable in an investigation, they can figure out if it makes a difference. (3.2)
• 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)
Application of key concepts to problem
• Create models to show how animals process information from light (3.5)
• Use Explanation Cards to discuss how light, light receptors, and information processing allow a Tokay gecko to recognize its prey (3.5)
• Write explanations to answer the Chapter 3 Question (3.5)
Explanation that students can make to answer the Chapter 3 Question
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.

Engaging with ideas over multiple activities

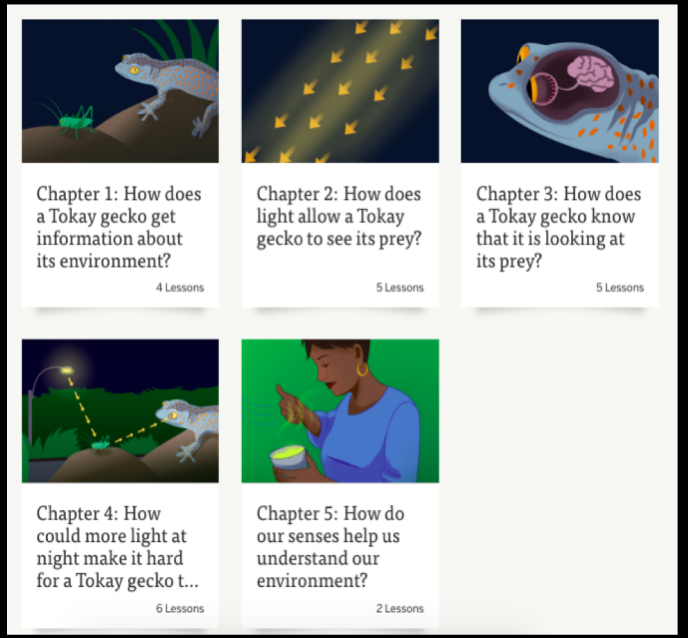
- Supports all learners
- Supports making connections
- Provides different, related pieces of evidence
- Models what scientists do
- Situates concepts in a variety of contexts

A Model Lesson Experience



Grade 4 | Vision and Light

Model Lesson 4.4



Walk and Talk:

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

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

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

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

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

As you experience the Lesson...

A. Stay in the role of the student

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

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

Add Classroom Slides Here:

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

It’s Lunch Time

1 Hour

Reflection Part 1

Solo Time (5 minutes)

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

Keeping Diverse Learner Needs in Mind
Reflection Tool

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

Cirlce the Selected Learner Profile: A B C D

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

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

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

Keeping Diverse Learner Needs in Mind
Reflection Tool

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

Circle the Selected Learner Profile: A B C D

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

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

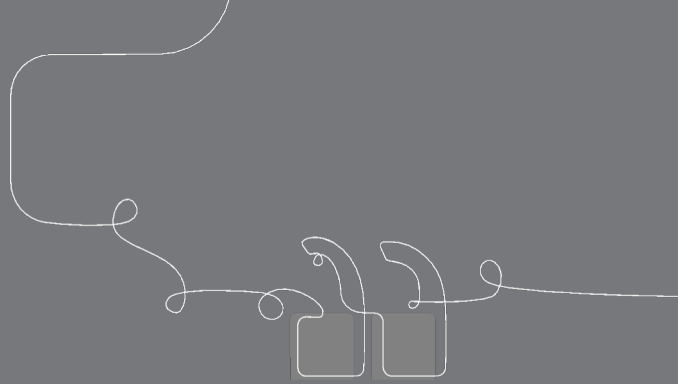
Take a Moment: How will this activity influence your planning practices?

Reflection Part 2

Collaborative Group (20 minutes)

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

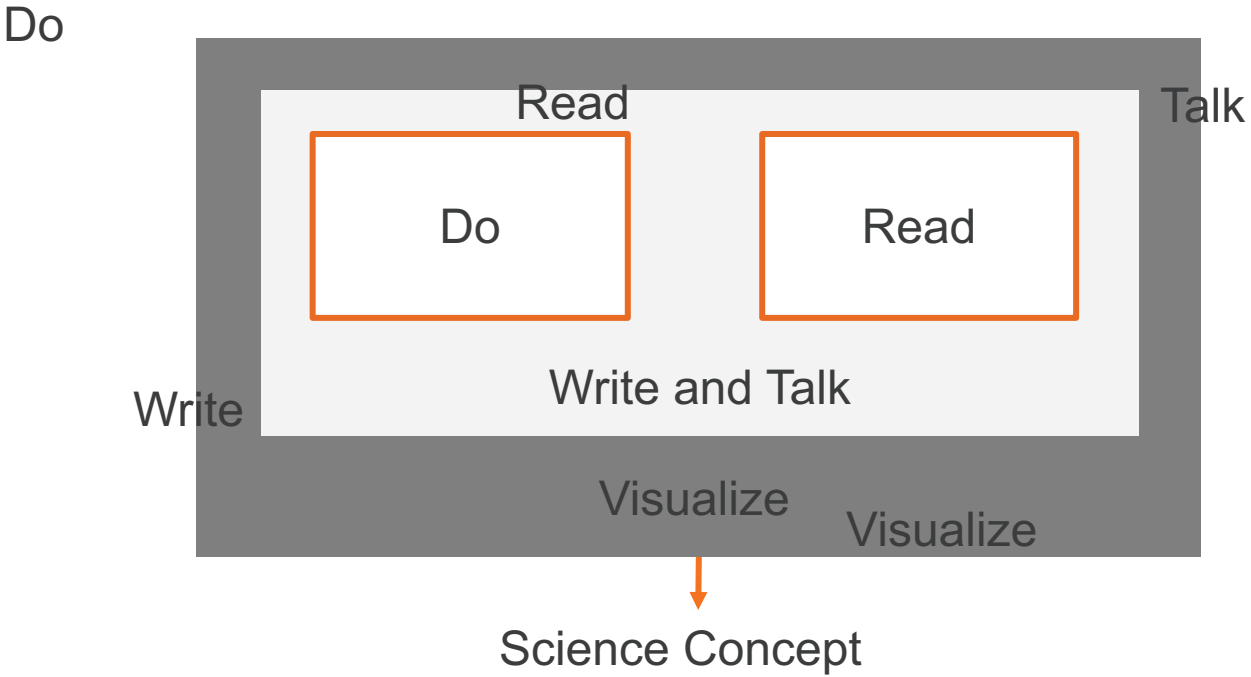
Questions?

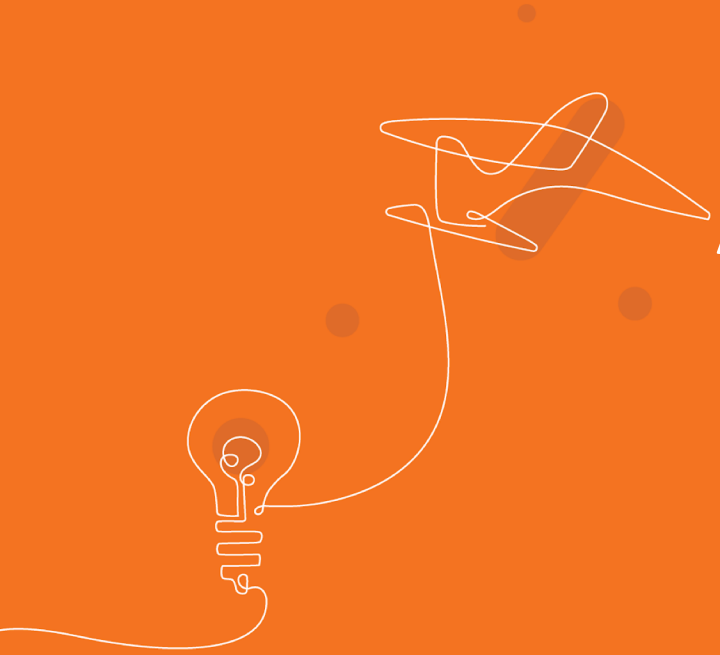


Multimodal instruction

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

Do, Talk, Read, Write, Visualize





Building Complex Explanations Across the Unit

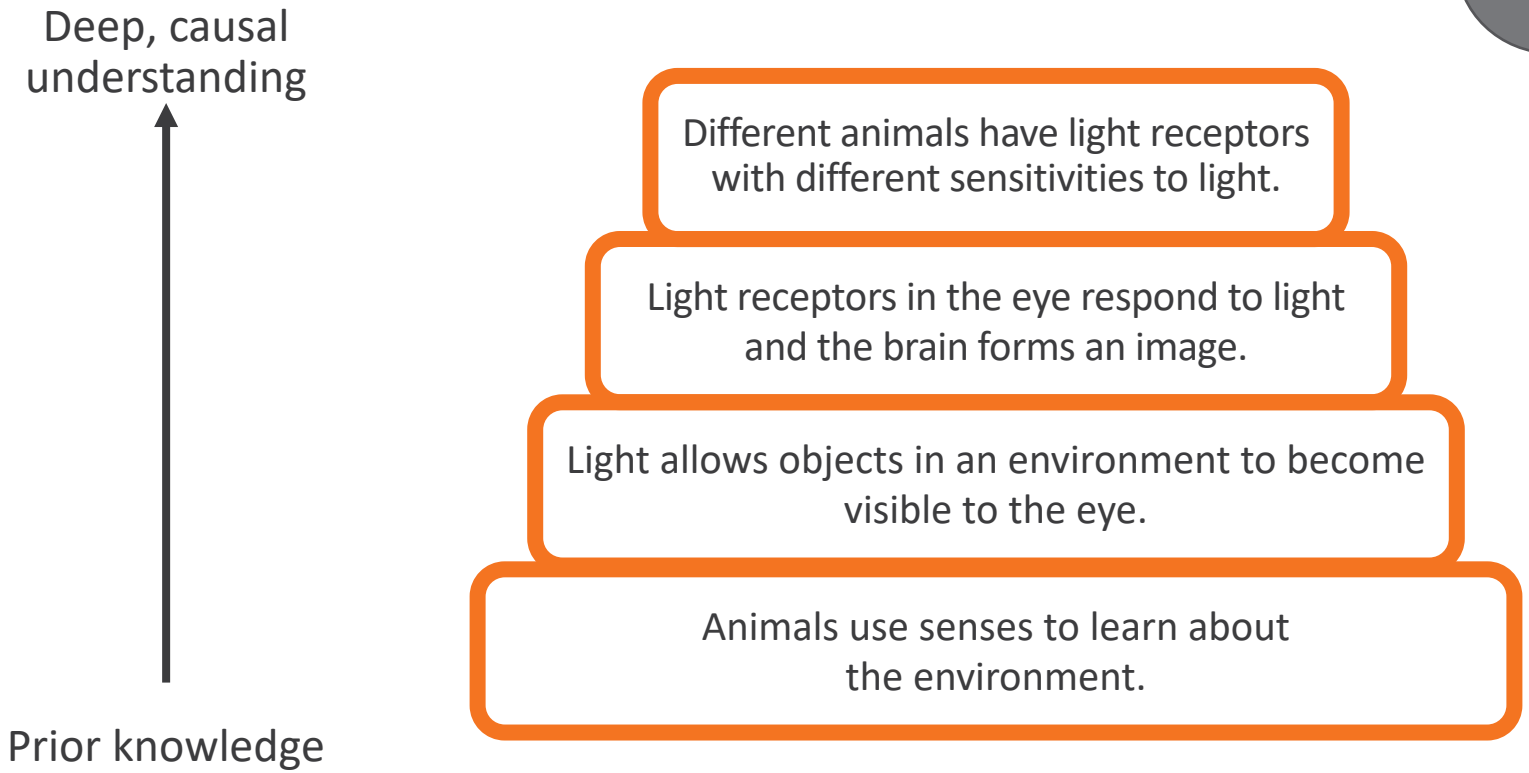
Coherence and Progress Builds

Progress Build: A unit-specific learning progression

Pg. xx

Vision and Light Progress Build

Pg. xx



Chapter 2 key concepts and explanation

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

Pg. xx

Ch	Key concepts	Explanation
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.

The prey is the object the light travels to

Chapter 2 key concepts and explanation

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

Pg. xx

Ch	Key concepts	Explanation
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.

Light reflects off the object (prey)

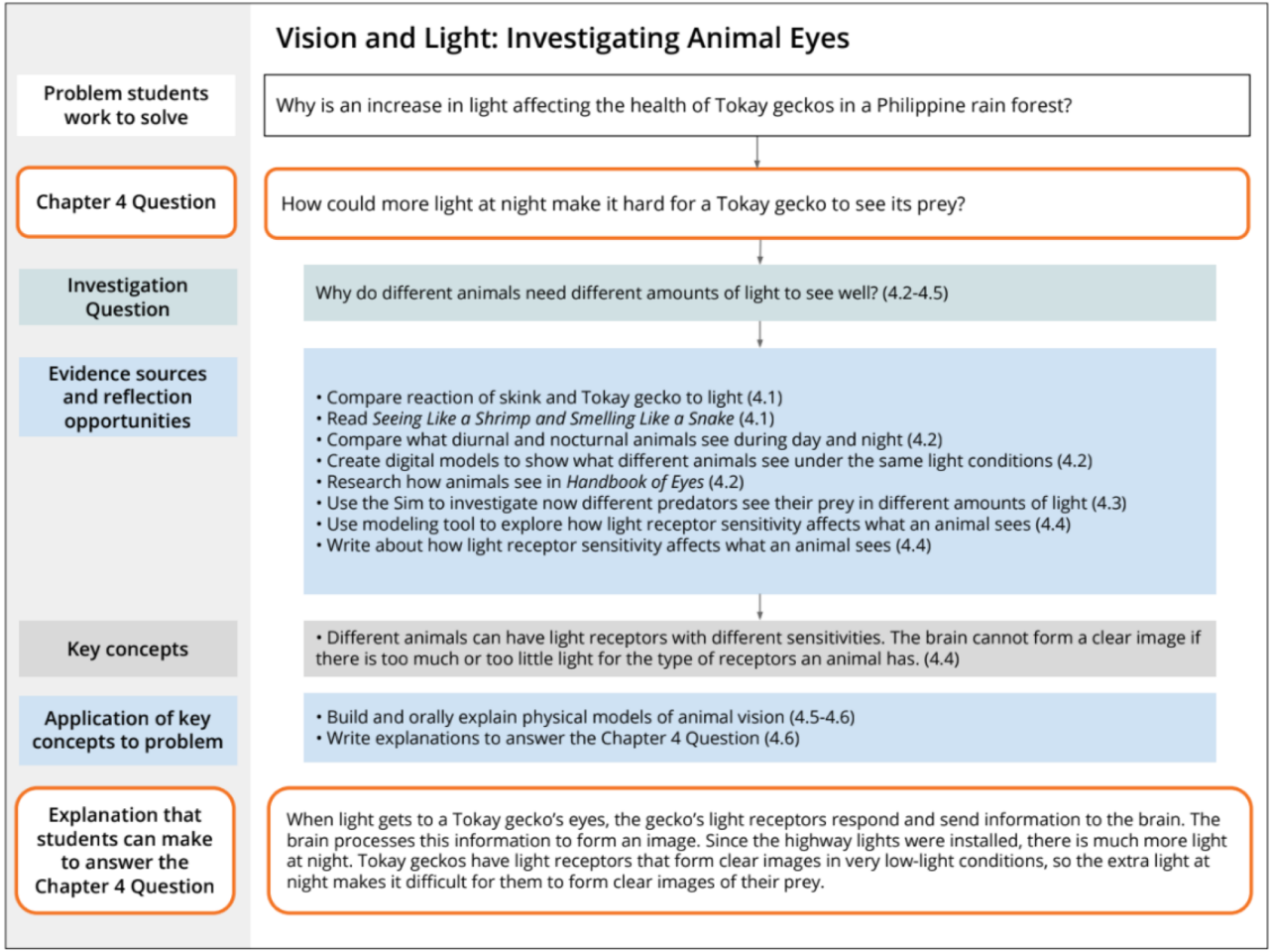
Turn and talk:

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

Pg. xx

Ch	Key concepts	Explanation
1	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.

End-of-Unit Assessment


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 4 Question
How could more light at night make it hard for a Tokay gecko to see its prey?
Investigation Question
Why do different animals need different amounts of light to see well? (4.2-4.5)
Evidence sources and reflection opportunities
• Compare reaction of skink and Tokay gecko to light (4.1)
• Read Seeing Like a Shrimp and Smelling Like a Snake (4.1)
• Compare what diurnal and nocturnal animals see during day and night (4.2)
• Create digital models to show what different animals see under the same light conditions (4.2)
• Research how animals see in Handbook of Eyes (4.2)
• Use the Sim to investigate now different predators see their prey in different amounts of light (4.3)
• Use modeling tool to explore how light receptor sensitivity affects what an animal sees (4.4)
• Write about how light receptor sensitivity affects what an animal sees (4.4)
Key concepts
• 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)
Application of key concepts to problem
• Build and orally explain physical models of animal vision (4.5-4.6)
• Write explanations to answer the Chapter 4 Question (4.6)
Explanation that students can make to answer the Chapter 4 Question
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.

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

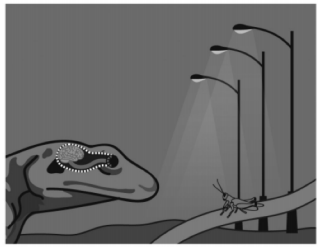
Picture 1 shows the Tokay gecko at night before the highway lights were installed.

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?

Name: _____ Date: _____

Pg. xx

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

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

Analyzing the End of Unit Assessment

- Annotate the End of Unit Assessment (3 minutes)

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

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

Analyzing the End of Unit Assessment

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

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

Vision and Light: Investigating Animal Eyes

Problem students work to solve in Chapter 5

How do human senses help humans survive in their environments?

Chapter 5 Question

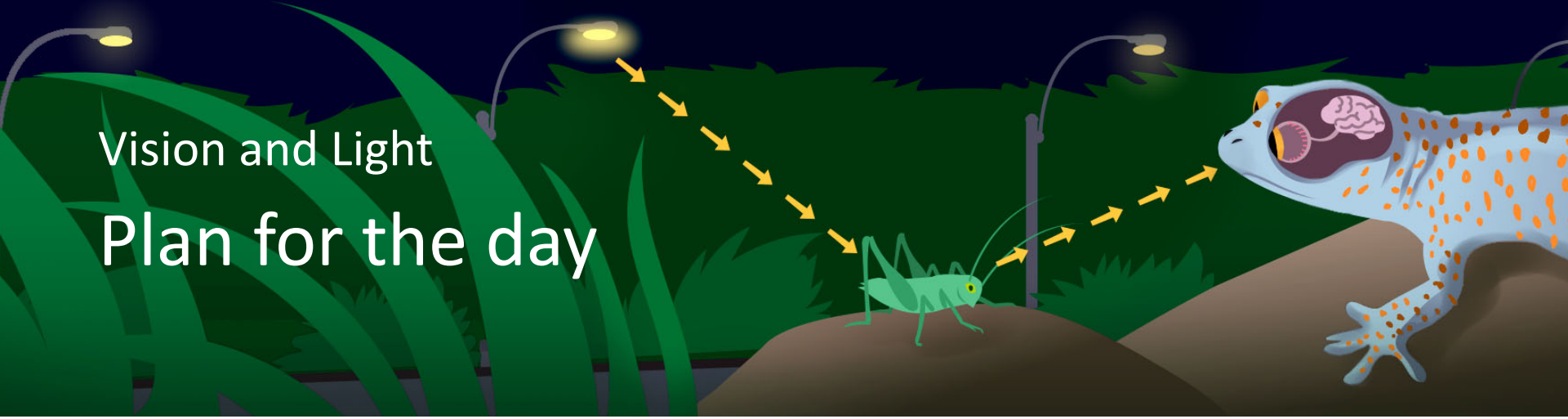
How do our senses help us understand our environment?

Opportunities to engage in practices and apply key concepts

- Revisit *Investigating Animal Senses* to focus on the importance of controlling variables in an investigation (5.1)
- Plan how to investigate a human sense (5.1)
- Conduct an investigation of a human sense (5.2)
- Share investigation results (5.2)

Practice that students can do in response to the Chapter 5 Question

Students can more independently design an investigation that only changes one variable at a time to figure out how human structures and receptors inform our senses and help us survive.



Vision and Light

Plan for the day

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

Planning to teach

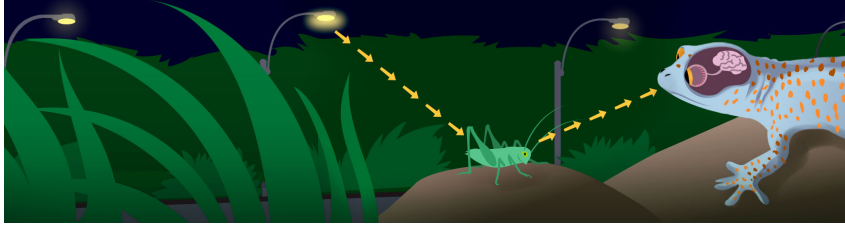
The purpose of this part of the day is for you to:

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

Planning to Teach

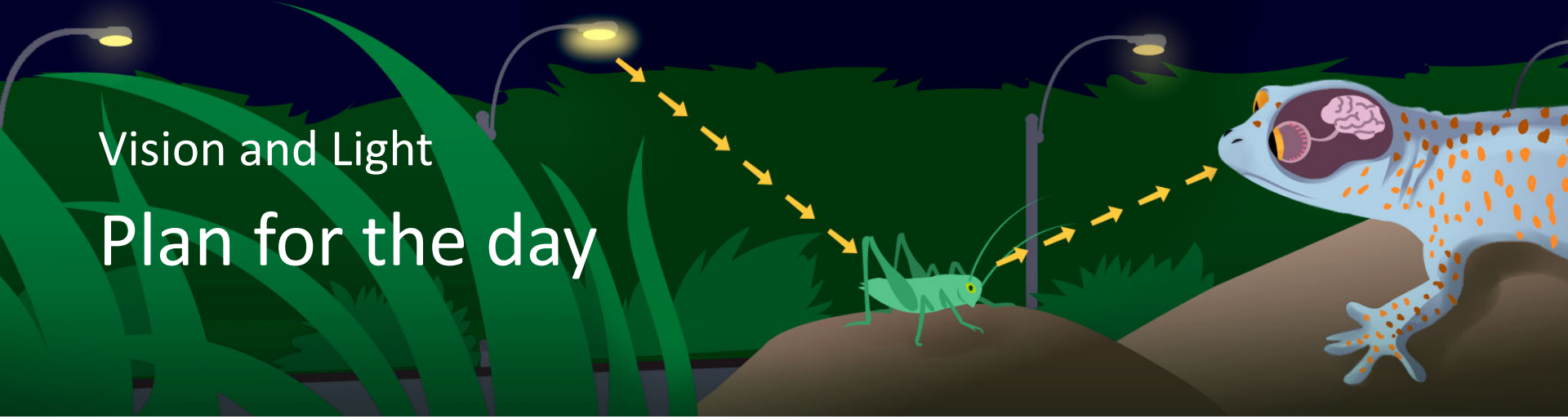
Teacher's Choice (20 mins)

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



Reflecting on your plans (10 mins)

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



Vision and Light

Plan for the day

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

Workshop Title: Supporting Diverse Learner Needs

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

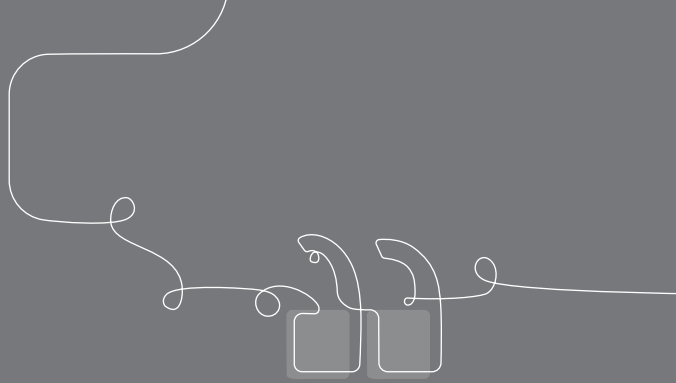
Did we meet the outcomes of this session?

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

Closing

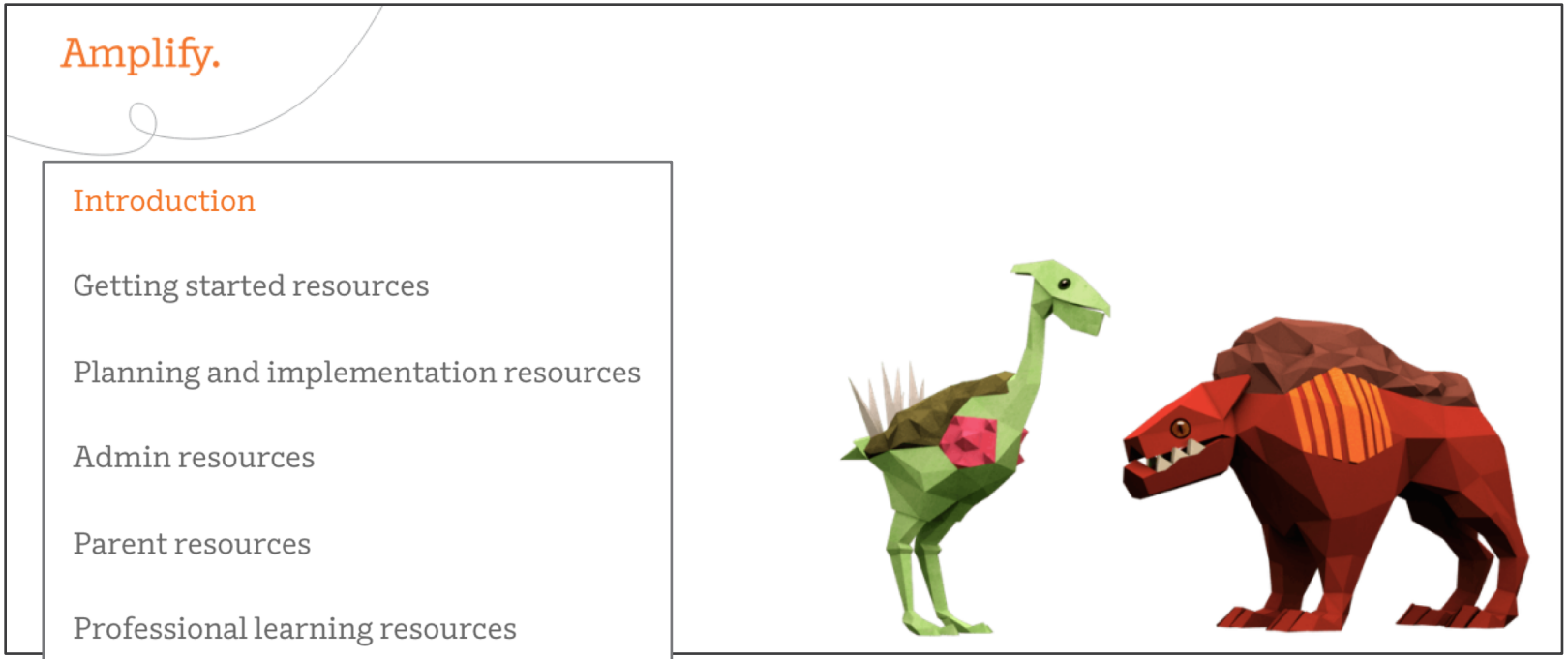
- ❑ Share 1 thing, from this session, that is “Sticking with You”. (I can apply)
- ❑ Share 1 thing, from this session, you are “Stuck On”. (I still need more support before I can apply)

Questions?



NYC Resource Site

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



Missing Materials

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

Email: curriculum@schools.nyc.gov

Phone: (718) 935-3334

Thank you for your feedback!

Presenter Name:
Workshop Title: