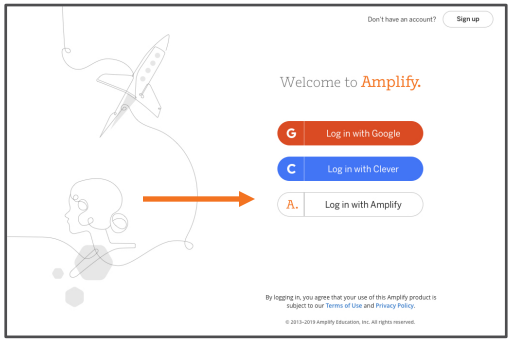
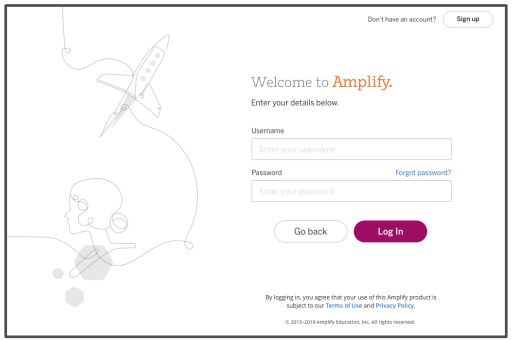
Welcome to Amplify Science!

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

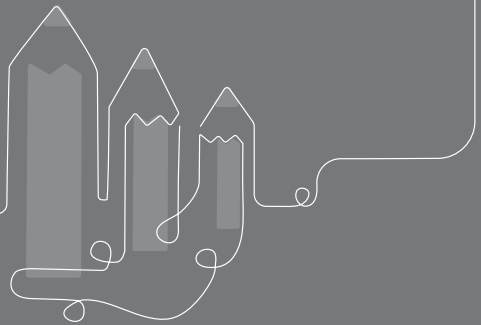
Vision and Light Implementation workshop

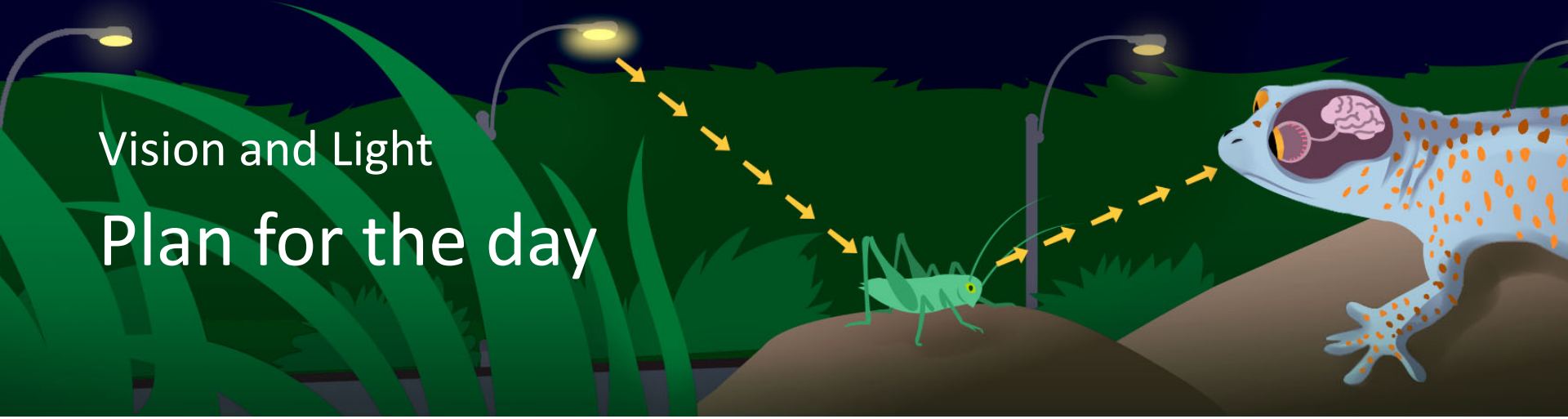
A professional learning experience
designed by the Lawrence Hall of Science

NYC DOE
November 5, 2019
Presented by Your Name

Workshop goal

- Prepare teachers to implement Vision and Light in their classrooms

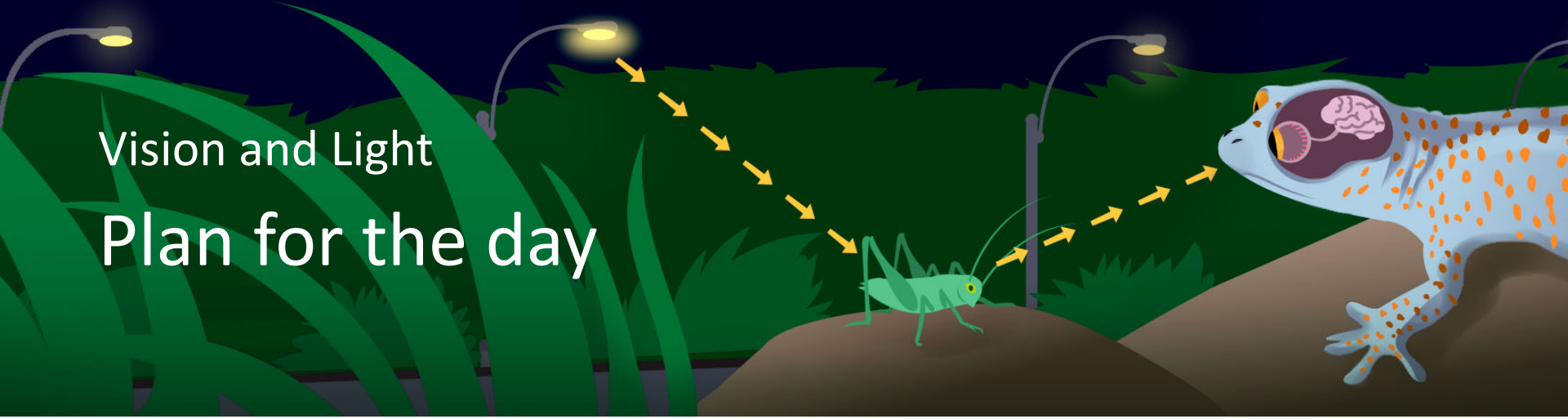




Vision and Light

Plan for the day

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



Vision and Light

Plan for the day

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

Framing and reflection

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

- Share your experience implementing Amplify Science.
- Refresh your understanding of key program resources and Amplify's approach.
- Identify successes and areas of need in your classroom, which will frame your work throughout the day.

Reflection roles

Pg. xx

- Facilitator: Asks questions to ensure that there is equity of voice
- Timekeeper: Keeps team on time/task
- Recorder: Captures the information on paper as each person is presenting
- Summarizer: Shares highlights and summaries to the larger group

Scenario 1

Ms. Lambertsen needs to refresh her content knowledge of her next unit. She has a few questions about the science content in the unit, and wants to be ready when her students ask questions, too.

To deepen her understanding of the science ideas in the unit, what resources would you recommend she use?

Scenario 2

Mr. Garcia wants to plan what data he can collect on his students during an upcoming lesson and how he can then use the data to inform instruction to best support his students. He's also looking for some strategies to support students in his classroom that need more challenge.

What can he look at in the Teacher's Guide to support his planning?

Scenario 3

To prepare to administer the End-of-Unit Assessment, Ms. Lucey wants to familiarize herself with how students with different levels of understanding might respond to the assessment. She's also looking for some insight into how to evaluate their responses.

Where can she look for information to support her preparation to administer the assessment?

Scenario 4

Mr. Moore needs to identify the standards in his upcoming unit for his principal. Specifically, his principal wants to know how students engage with the three dimensions of NGSS to figure out the unit phenomenon/problem.

Where would Mr. Moore find out the answer to his principal's question? How do students engage in three-dimensional learning in this unit?

Scenario 5

At back to school night, Mr. Patel is going to tell his students' families about the next unit his class will work with. He wants to describe how students develop ideas through Chapter 1.

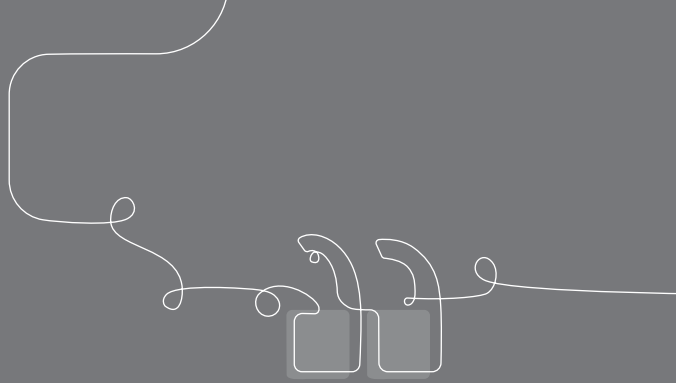
How do you think he could explain this to his students' families? Where might he look to find information that will help him plan what to say?

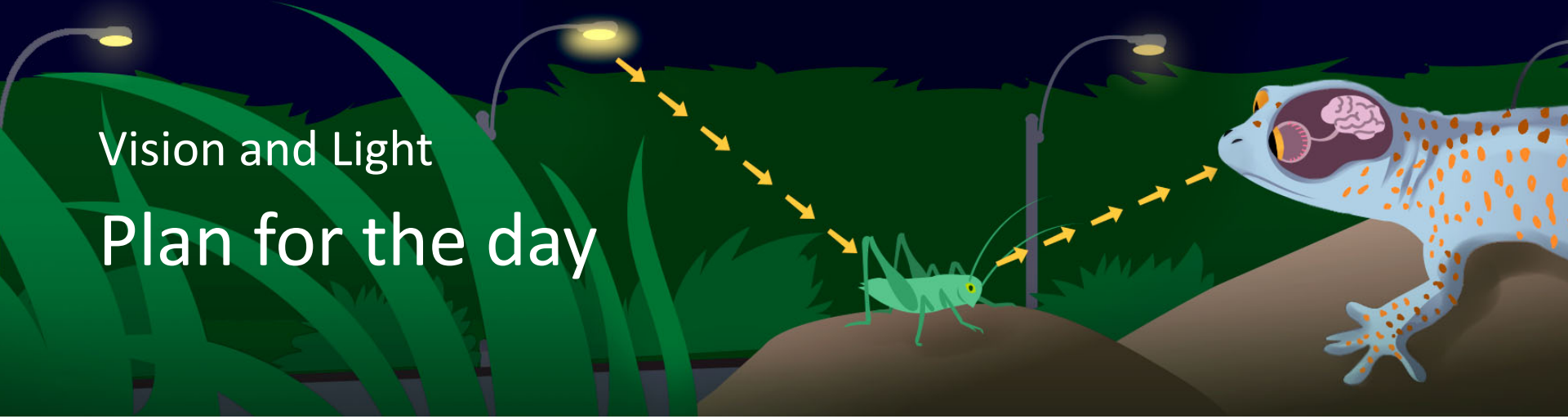
Scenario 6

Mrs. Doolittle is starting a new unit next week (the same one you are diving into today!). She's familiar with what students learn throughout the unit, but she's not sure where to start preparing to teach the first lesson.

What do you suggest she refer to as she prepares for her first lesson? What should she do or read first, and what should she do after that?

Questions?





Vision and Light

Plan for the day

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

Experiencing the unit

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

- Understand how a phenomenon motivates student learning.
- Understand what students learn in a chapter of Vision and Light, and how they learn it.
- Reflect on the instructional design in the Amplify Science program.

Elementary school course curriculum structure

Grade K

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

Grade 1

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

Grade 2

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

Grade 3

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

Grade 4

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

Grade 5

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

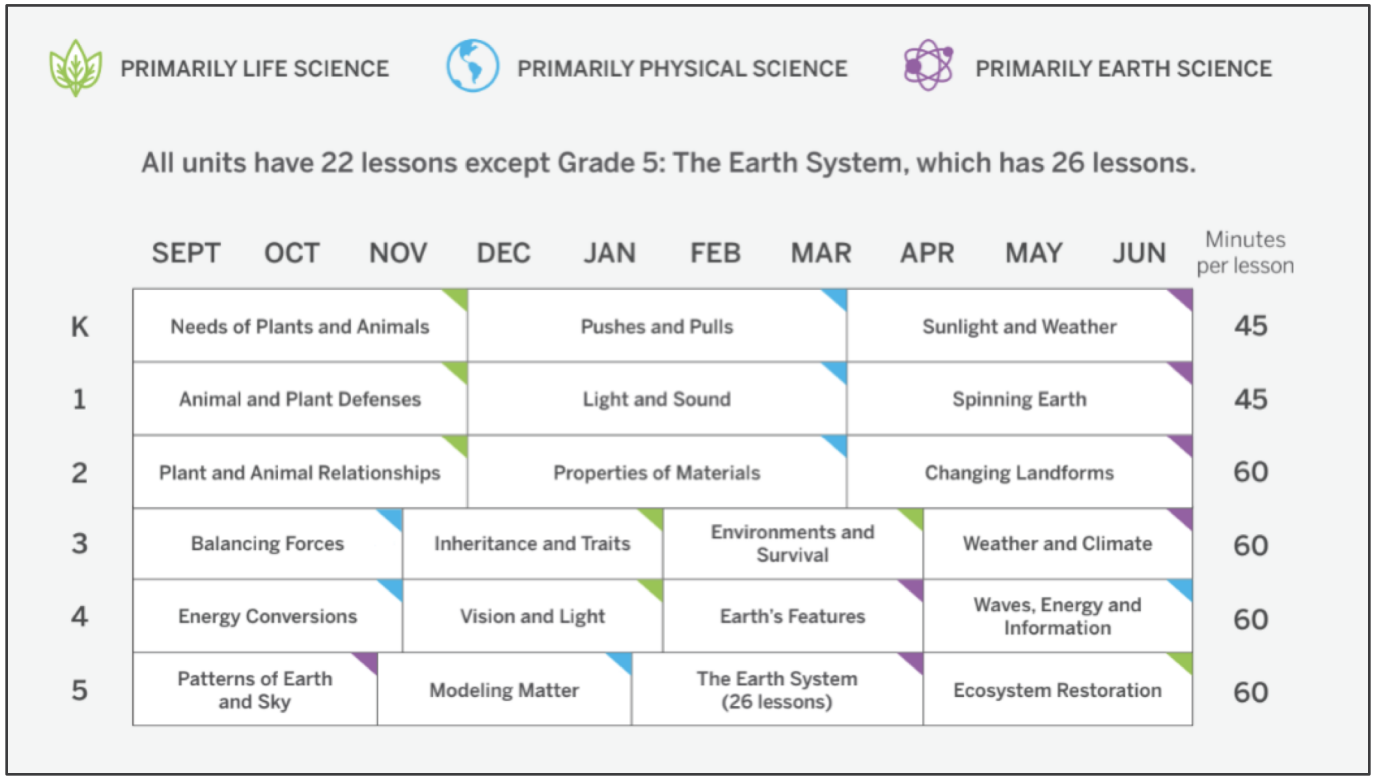
AmplifyScience

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

Amplify.

Planning your year

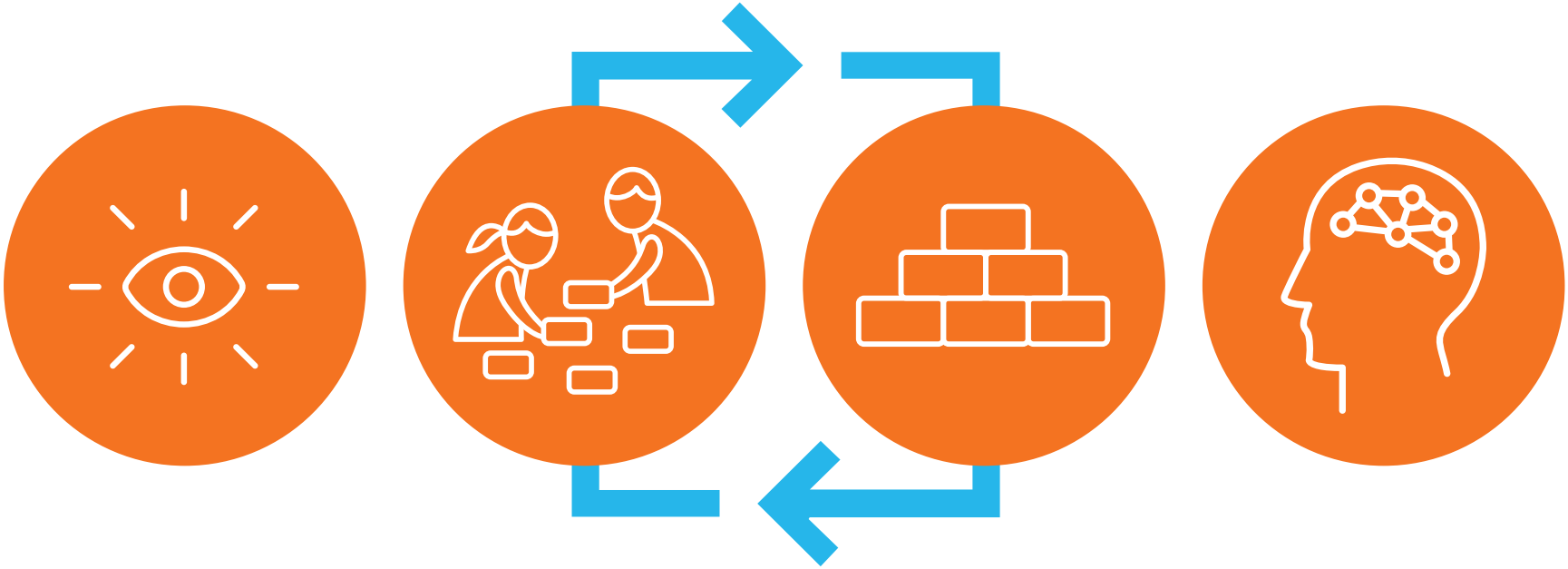
Overview: Amplify Science K-5 course structure



Problem-based deep dives

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

Amplify Science approach



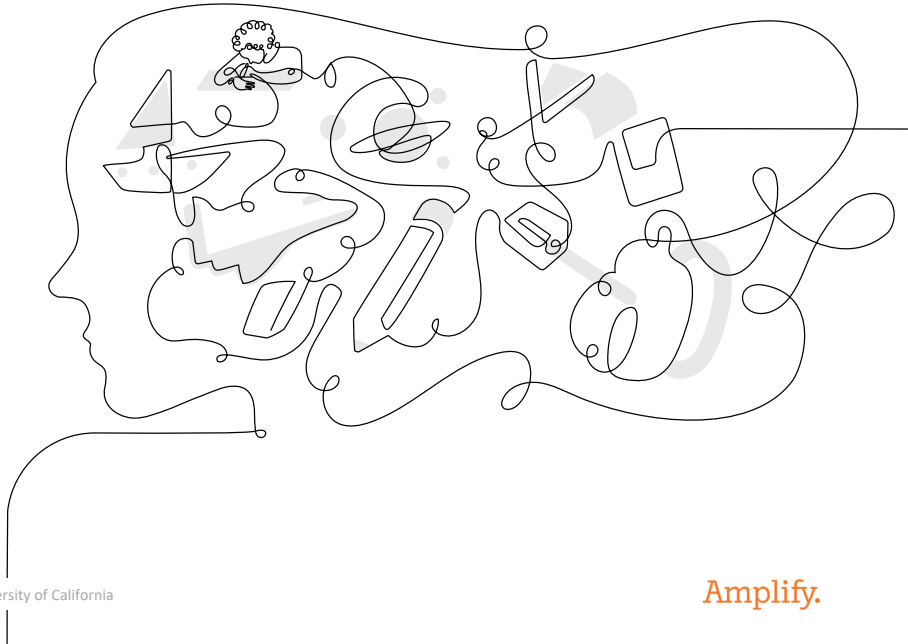
Introduce a phenomenon and a related problem

Collect evidence from multiple sources

Build increasingly complex explanations

Apply knowledge to a different context

Figure out, not learn about



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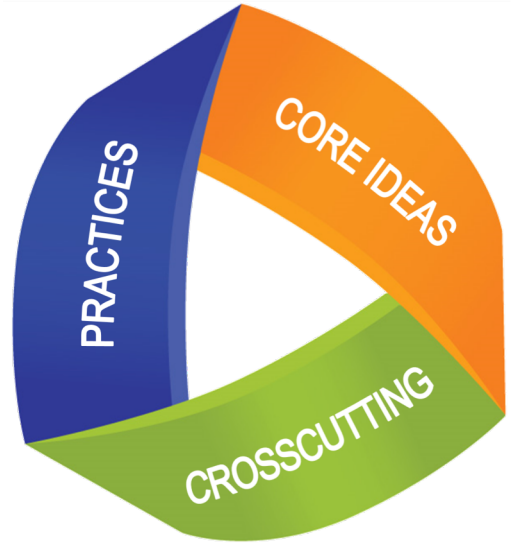


Standards as three-dimensional performance expectations that integrate disciplinary core ideas, science and engineering practices, and crosscutting concepts

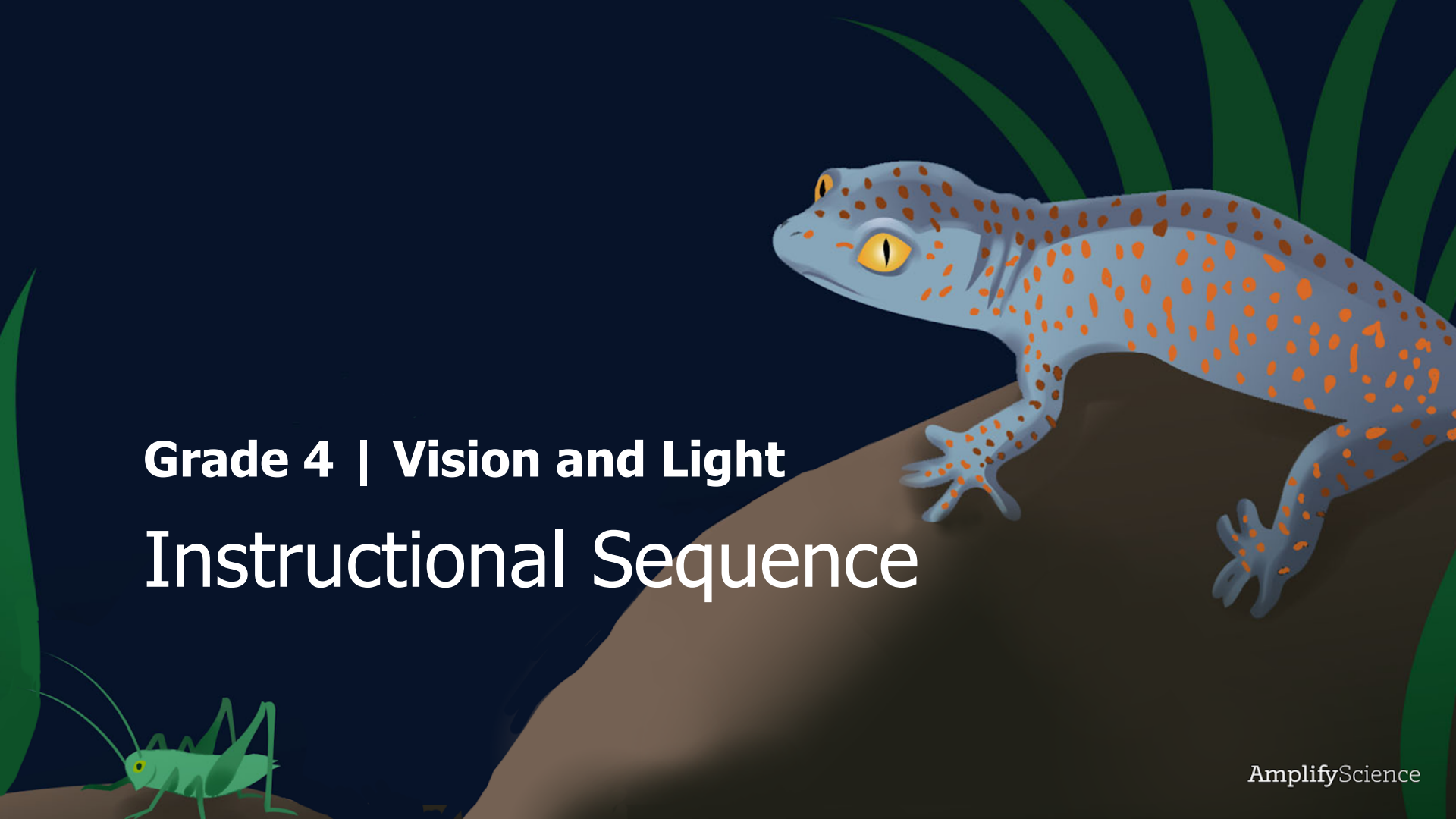
Unit Level 3-D Statement

Key

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

Unit Level

Students 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).



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

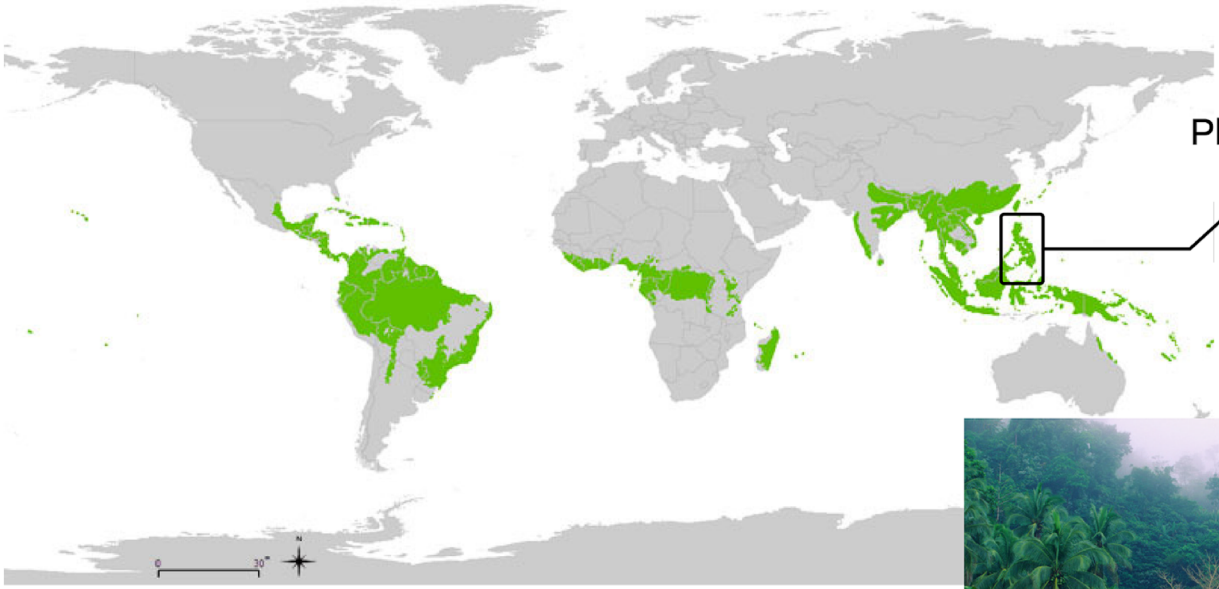
Our biologists have noticed there are fewer Tokay geckos than there used to be in a small area of rain forest in the Philippines. Why are there fewer Tokay geckos? Is something making it hard for Tokay geckos to survive in their environment? We need your help to figure this out!

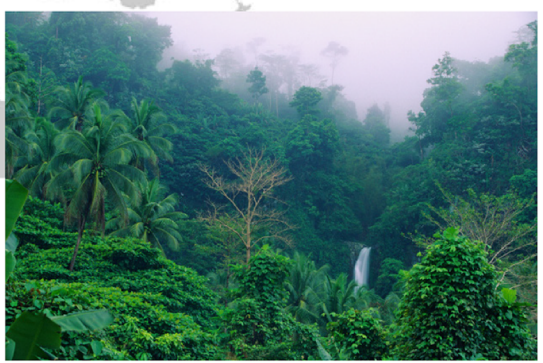
Tokay Gecko

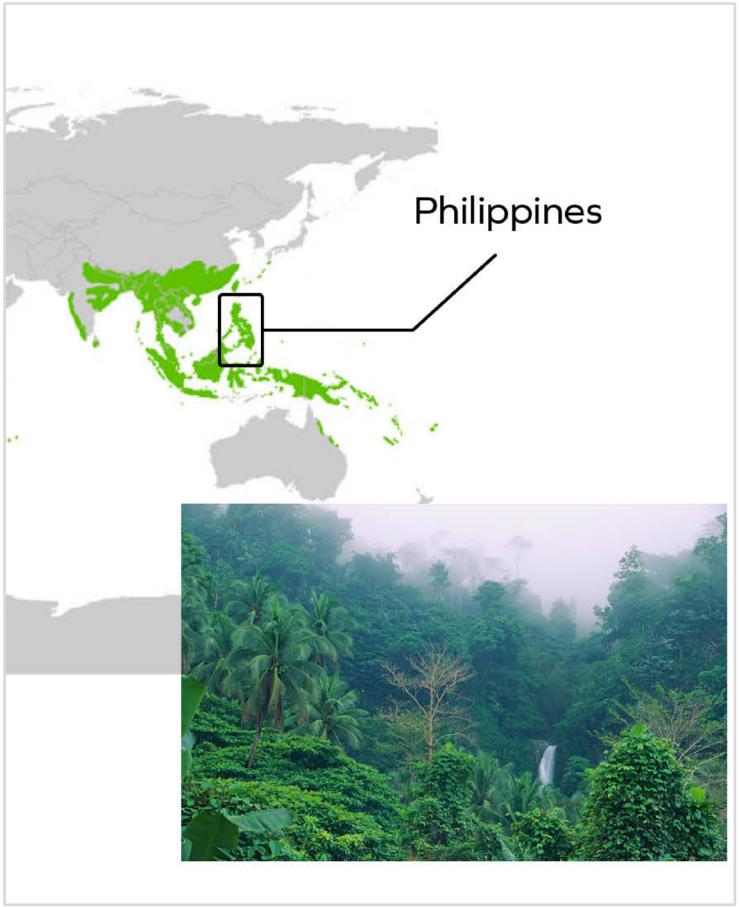
This is the Tokay gecko.

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

Tropical Rain Forests of the World



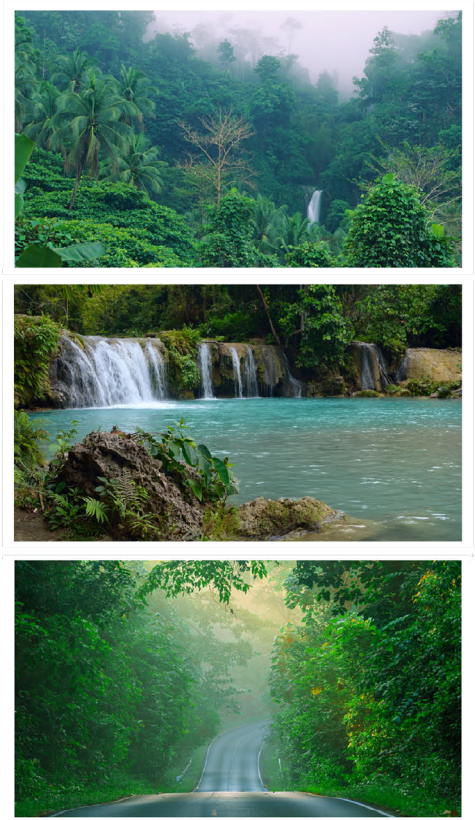




Tokay geckos are lizards that live in the rain forests of the Philippine Islands.

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

Rain Forest Environment



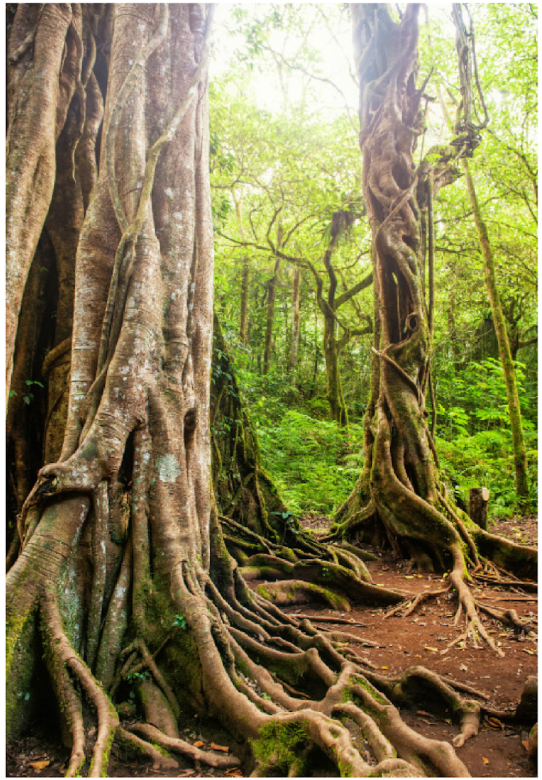
Environment means all the living and nonliving things in an area.

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

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

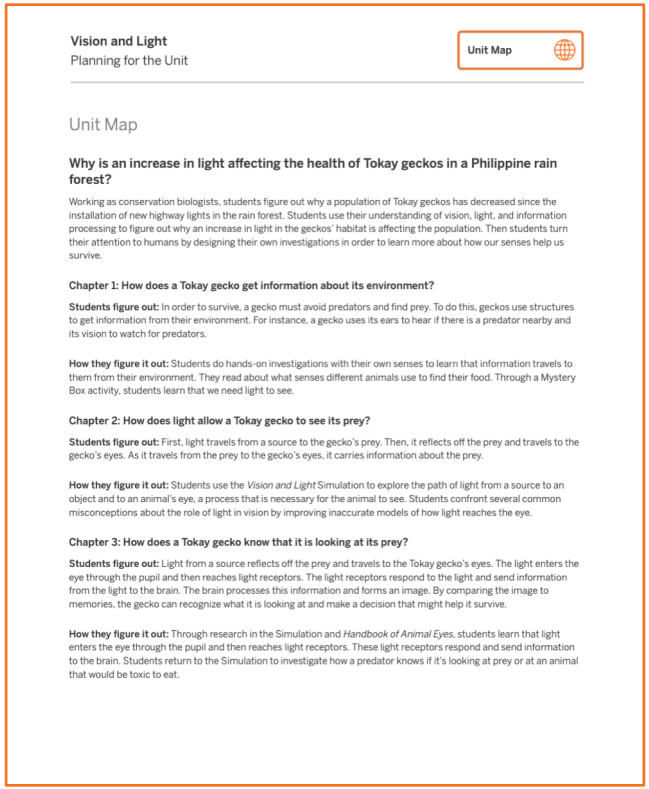
You will figure out **why there are fewer Tokay geckos** in an area.

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.

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.

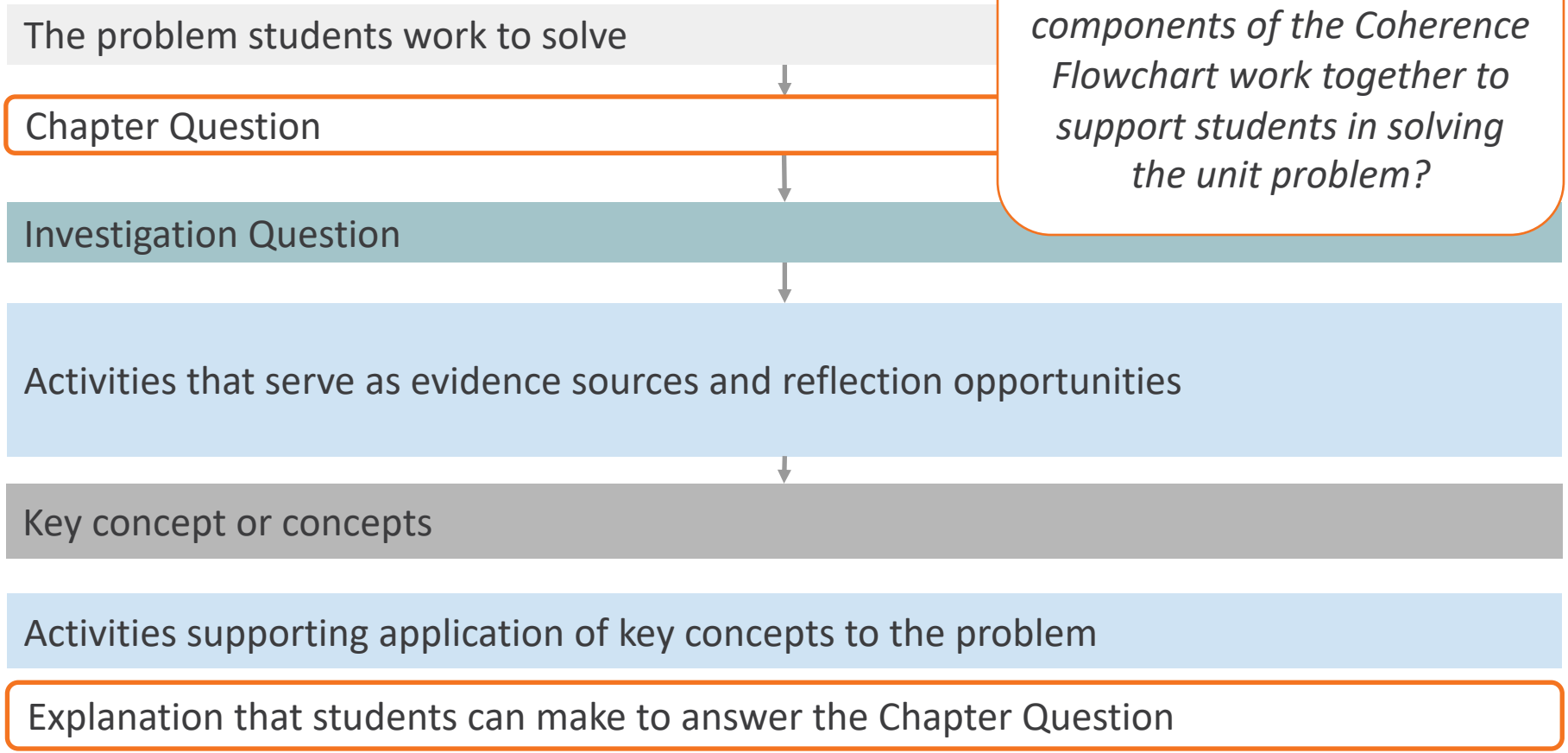
End-of-unit explanation

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 have been installed, there is more light at night when there is usually very little natural light. This is too much light for the kind of light receptors that the gecko has. This makes it difficult for the gecko's brain to form a clear image and for the gecko to see well.

Coherence as a design principle

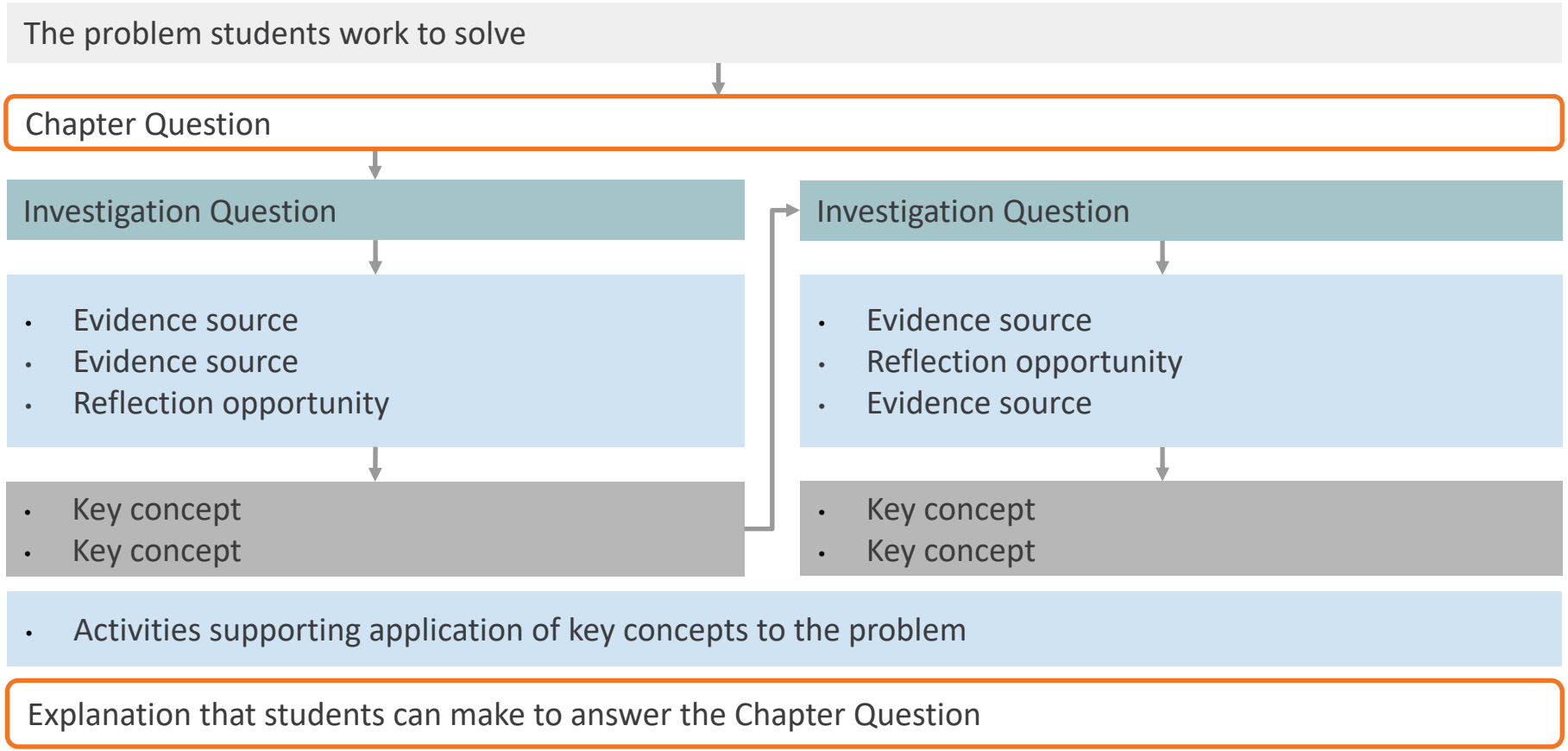
- Supports students in building a rich network of concepts
- Allows for increasingly complex explanations
- Supports students in integrating ideas
- Provides motivation to look more deeply at the phenomenon

Coherence Flowchart structure



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

Coherence Flowchart structure



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

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

JUMP DOWN TO CHAPTER OVERVIEW

Lesson 1.1:
Pre-Unit Assessment

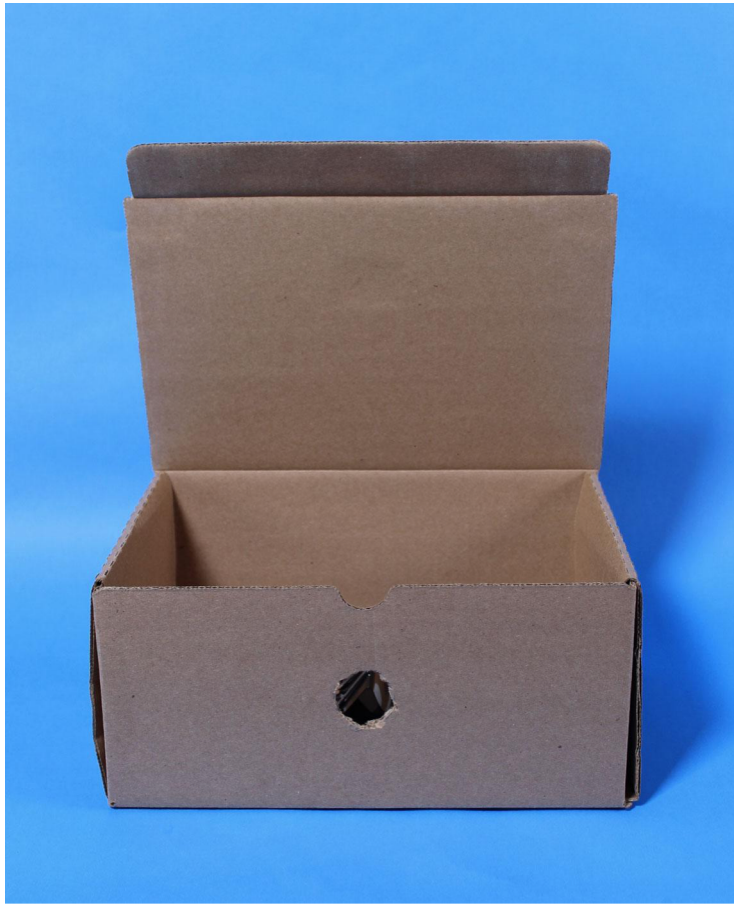
Lesson 1.2:
Introducing Animal Senses

Lesson 1.3:
Investigating Animal Senses

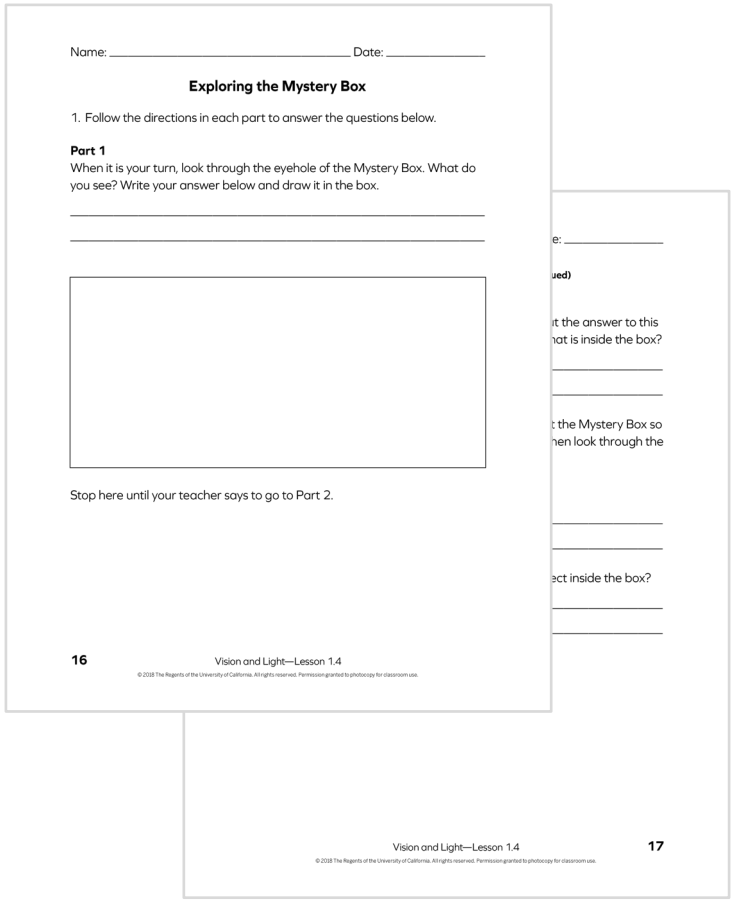
Lesson 1.4:
Exploring How Animals Survive

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.

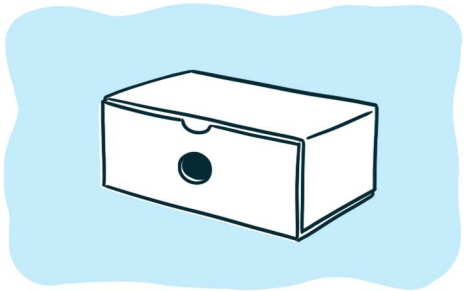
16 Vision and Light—Lesson 1.4

Vision and Light—Lesson 1.4 17

Turn to pages 16–17 in your notebooks.

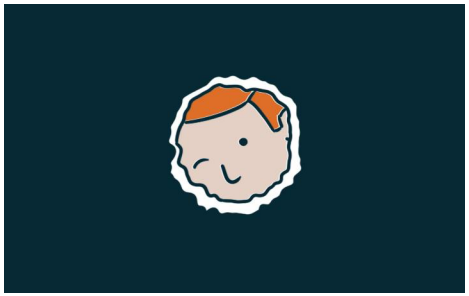
You will work in groups to figure out what you need in order to see your "food" in the box.

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.

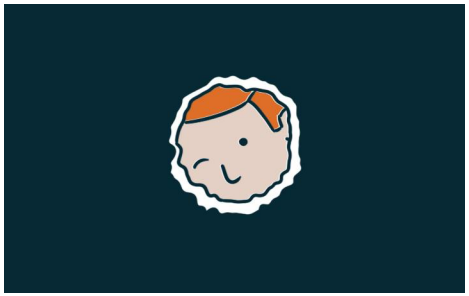
Step 3

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)
- 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 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

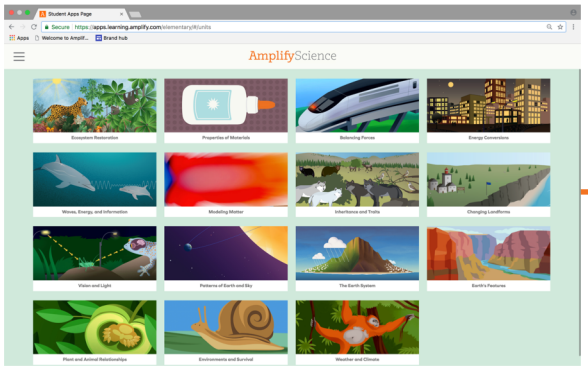
How does light allow a Tokay gecko to see its prey?

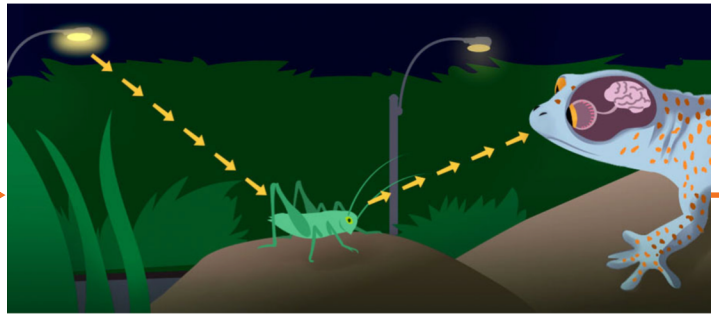
Today, we are going to investigate this question:

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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- 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)

What are students figuring out?

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

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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- **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)**
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- Model new ideas about the Mystery Box, using a digital tool (2.4)

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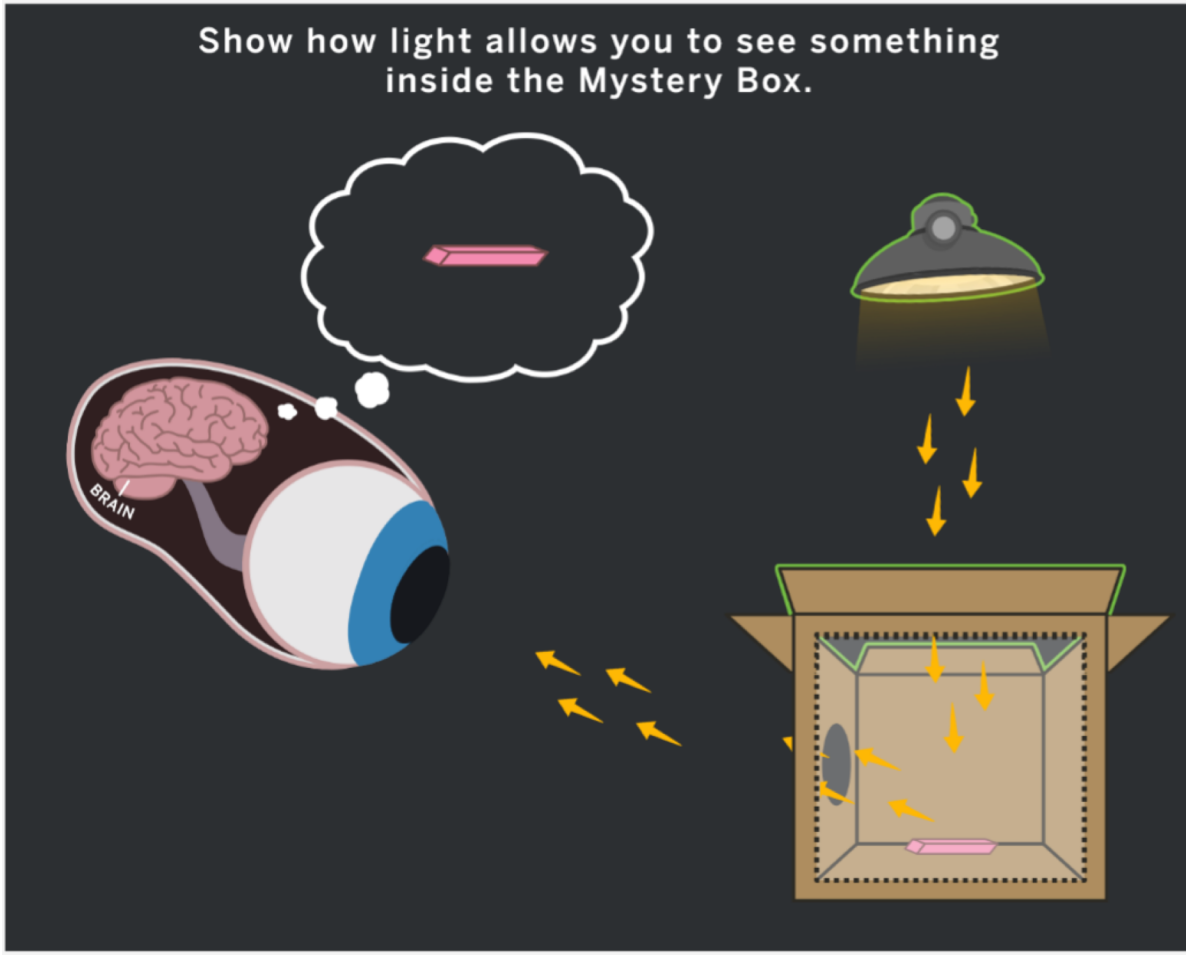

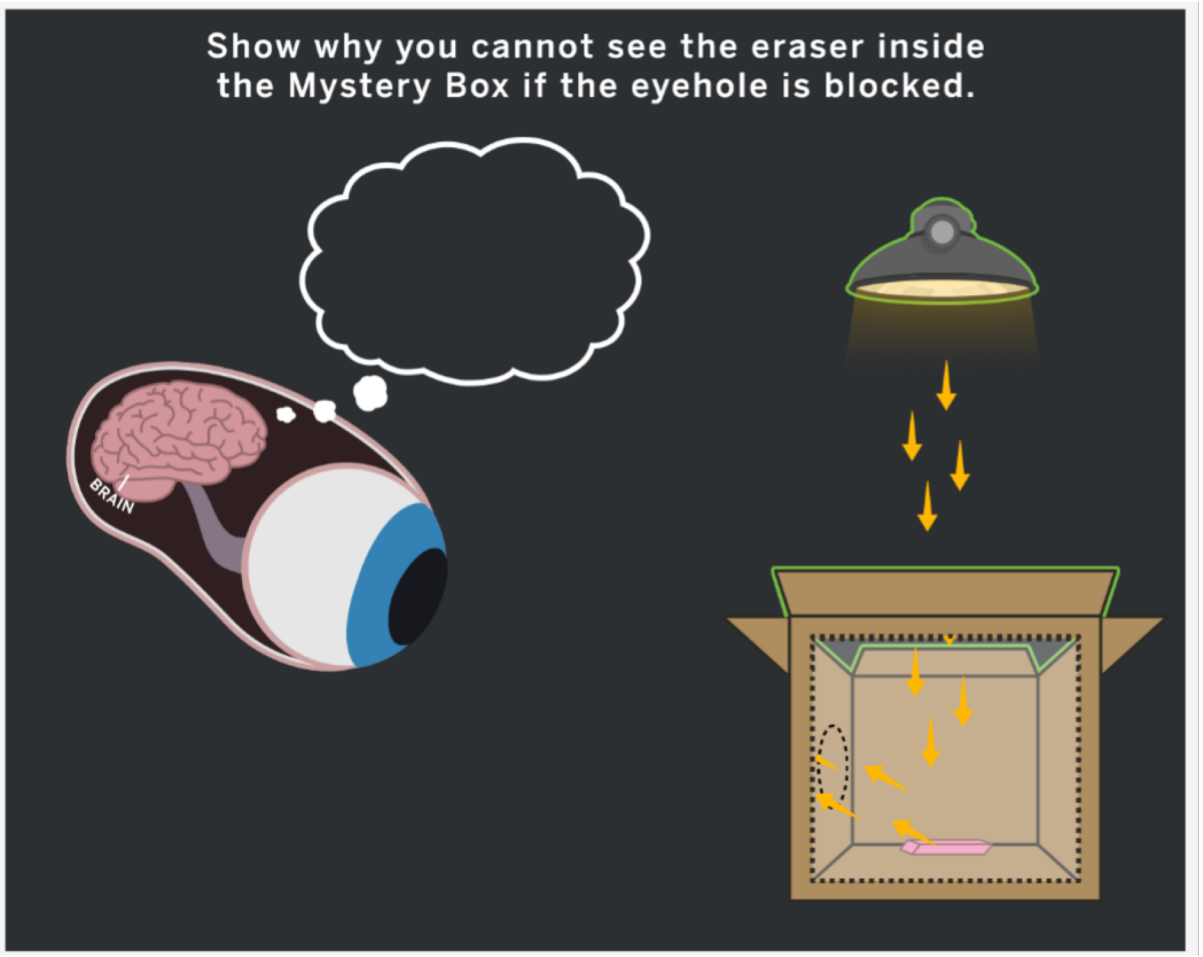

Chapter 2: How does light allow a Tokay gecko to see its prey?

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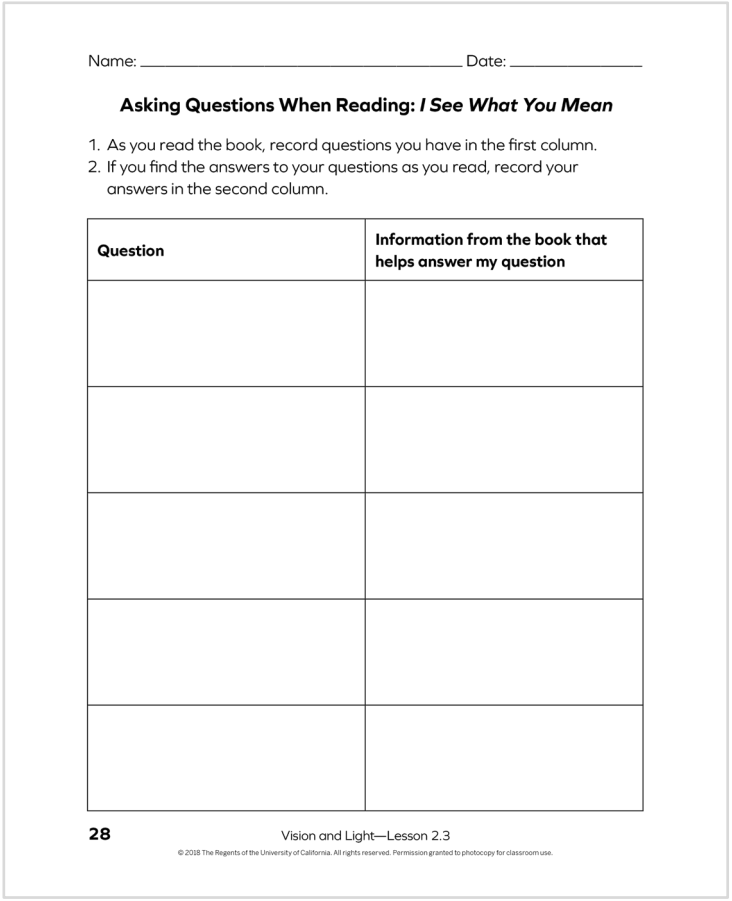
Partner Reading Guidelines

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.

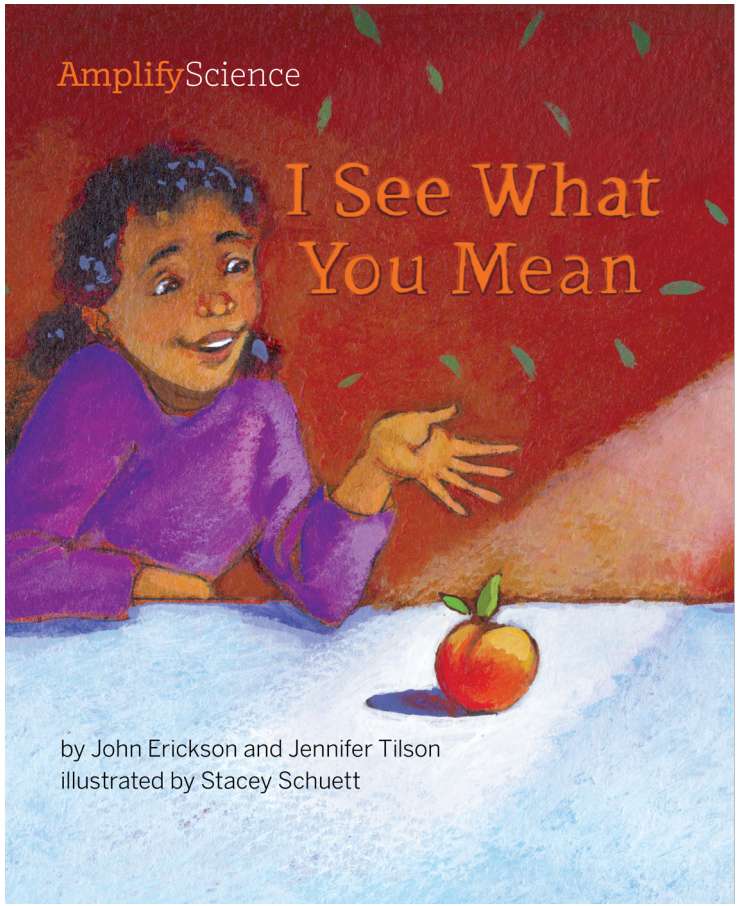
Question	Information from the book that helps answer my question

28 Vision and Light—Lesson 2.3

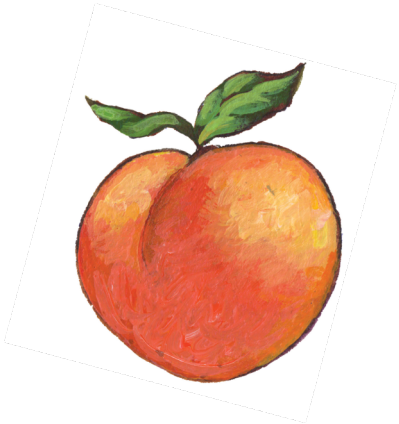
Turn to page xx in your notebooks.

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?

4

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

- 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)
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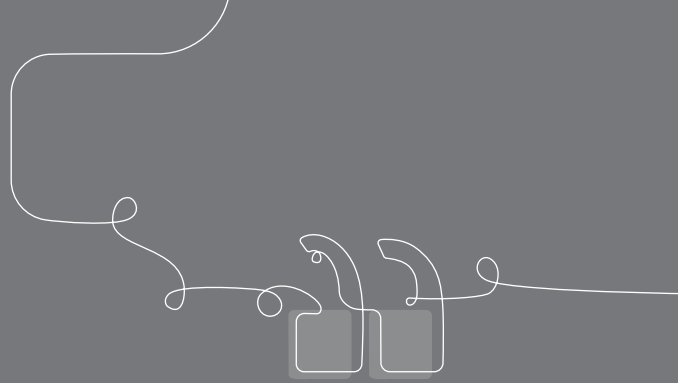
Explanation that students can make to answer the Chapter 2 Question

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.



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

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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Explanation that students can make to answer the Chapter 2 Question

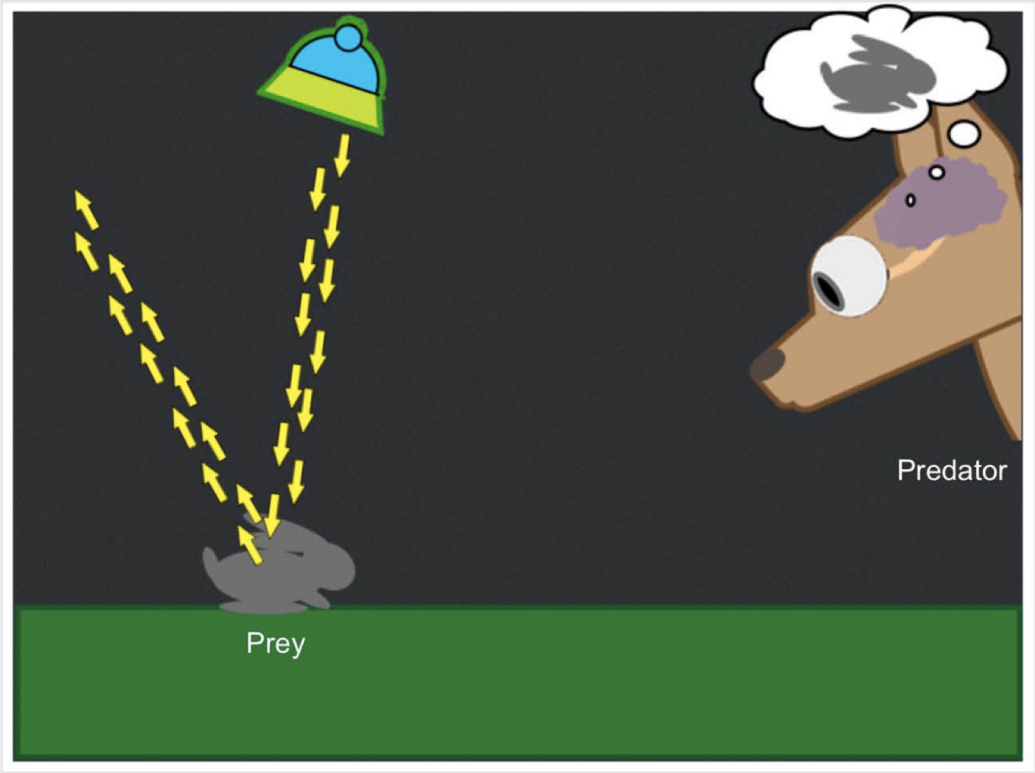
First, light travels from a source to the gecko's prey. Then, it reflects off the prey and travels to the gecko's eyes. As it travels from the prey to the gecko's eyes, it carries information about the prey.

Vocabulary

reflect

to cause light to bounce off a material

Model 1

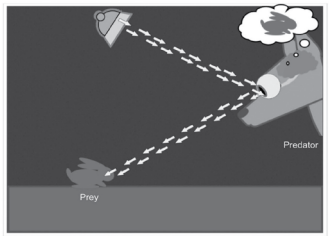


Name: _____ Date: _____

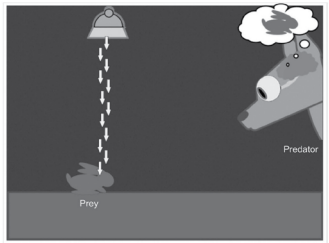
Reviewing Models About Vision and Light

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



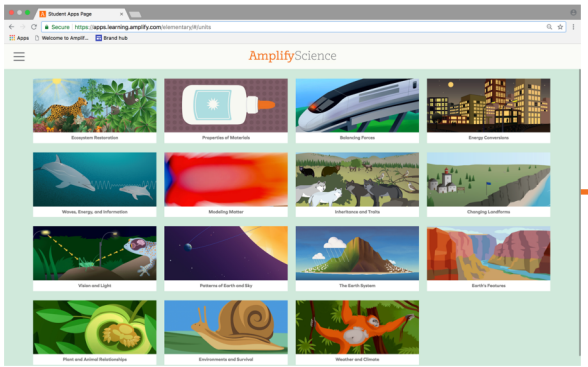
Turn to page xx in your notebooks.

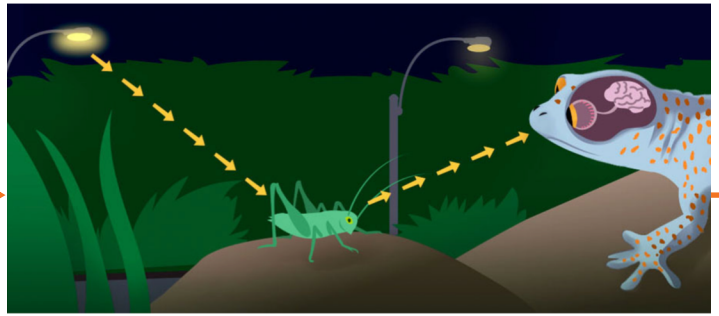
Let's **review the directions.**

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

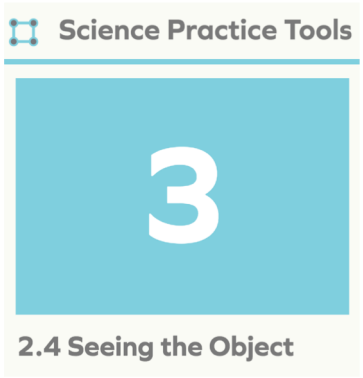
Navigating to the Modeling Tool

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.

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

- 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)

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.

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

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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.

What Is a Scientific Explanation?

1. It answers a question about how or why something happens.

2. It describes things that are not easy to observe.

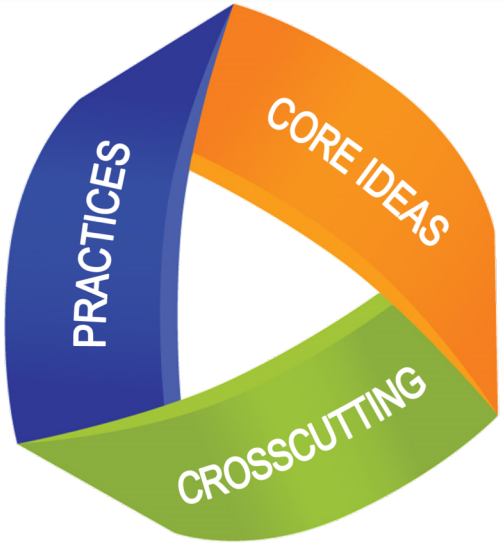
3. It is based on the ideas you have learned from investigations and text.

These cards will help you **review** what we have learned so far about **how light allows an animal to see** its prey.

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

First, light from the light source gets to the Tokay gecko's prey, the insect. Then, the light needs to reflect off the prey and get to the Tokay gecko's eyes.

Thinking three dimensionally



Disciplinary Core Ideas

- Refer to the key concepts

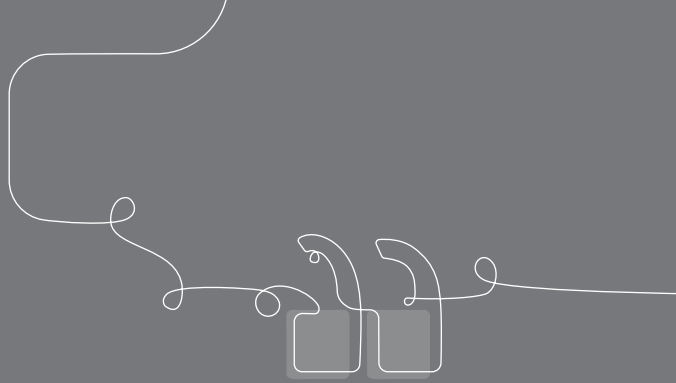
Science and Engineering Practices

- 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?

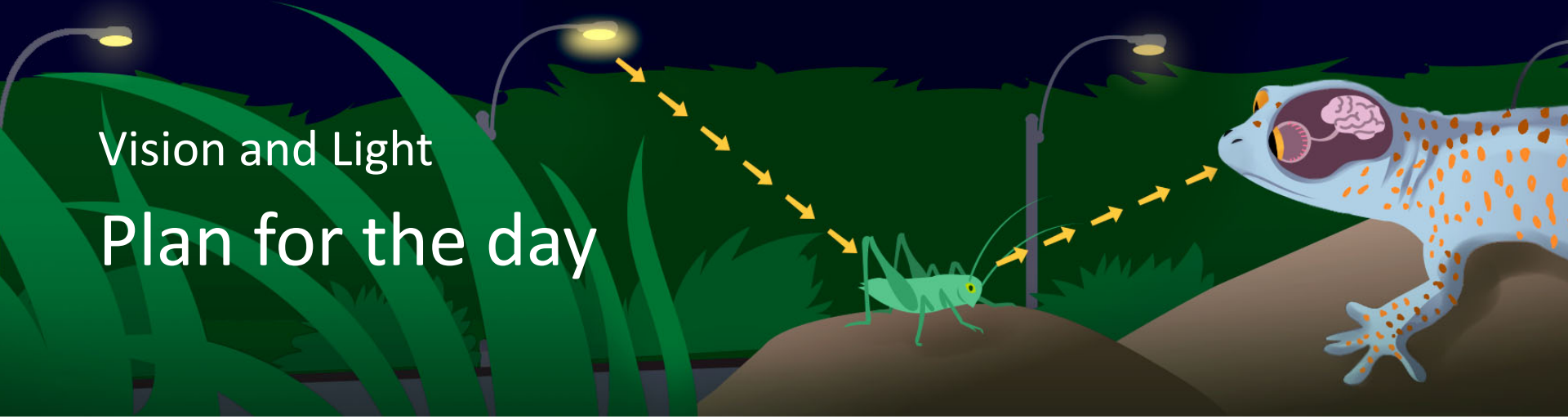
Questions?



Stop and Jot on your way to lunch

Rate your comfort with the following statement from 1-4 (4 being very comfortable):
I understand how activities within a lesson support students with building complex explanations.

Please also note any needs or wonderings for the afternoon!



Vision and Light

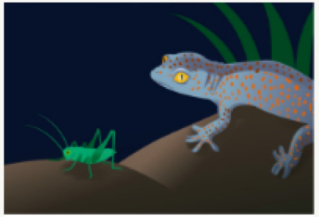
Plan for the day

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

The story of the unit

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

- Understand how students build and apply science knowledge throughout Vision and Light.
- Apply this understanding to the End-of-Unit Assessment.
- Describe the content focus and coherence of the unit.
- Leverage the progress builds to gauge student understanding throughout the unit.

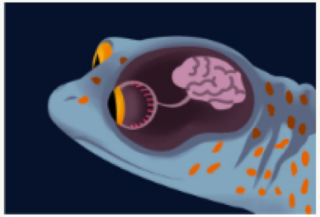


Chapter 1: How does a Tokay gecko get information about its environment?

4 Lessons

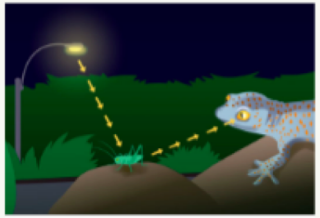
Chapter 2: How does light allow a Tokay gecko to see its prey?

5 Lessons



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

5 Lessons



Chapter 4: How could more light at night make it hard for a Tokay gecko t...

6 Lessons

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

2 Lessons

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.

Progress Build: A unit-specific learning progression

Pg. xx

In your group take turns sharing…

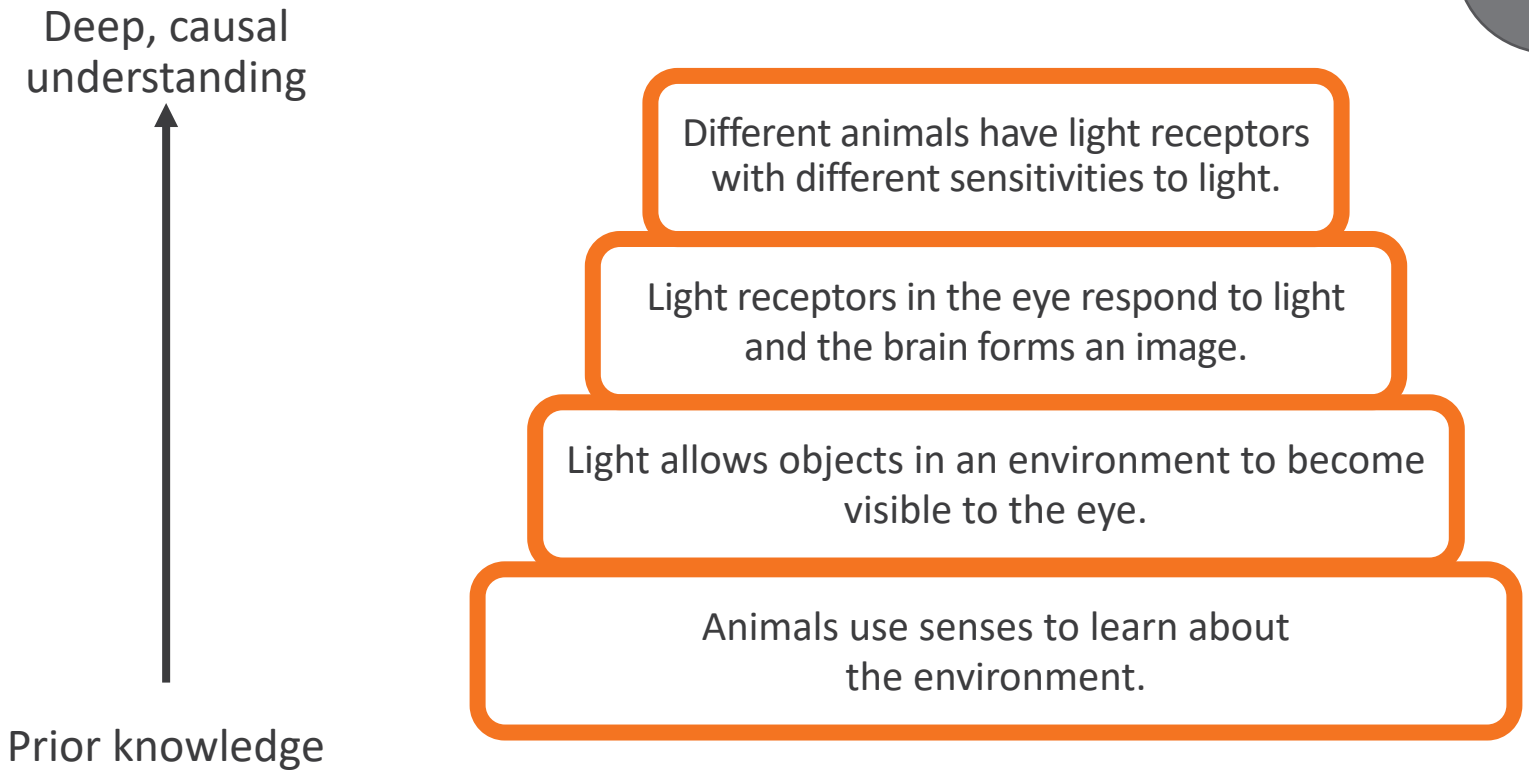
- Which ideas are revisited over multiple chapters? (started as foundational but built upon throughout your model?)
- What new ideas are added in each level of your build? (how did you represent new ideas in your model?)

Listening group:

-Listen for what is the same or different about the other group's visual to your own.

Vision and Light Progress Build

Pg. xx



End-of-Unit Assessment

Anticipatory turn and talk

Reflect on the End-of-Unit Assessment in your last unit

- What kind of data did you gather from the End-of-Unit Assessment?
- What did you like about the End-of-Unit Assessment?
- What did you find challenging about the End-of-Unit Assessment?

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

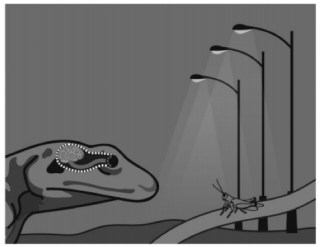
Picture 1 shows the Tokay gecko at night before the highway lights were installed.

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?

Progress Build Level 1: Animals have sensory structures that allow them to learn about their environment by getting information from it. Learning about the environment helps animals survive.

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.	Draw an arrow from the prey to the eye. Draw same arrows on both images.	A tokay gecko uses its eyes to see.

*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.

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Opportunities to monitor progress

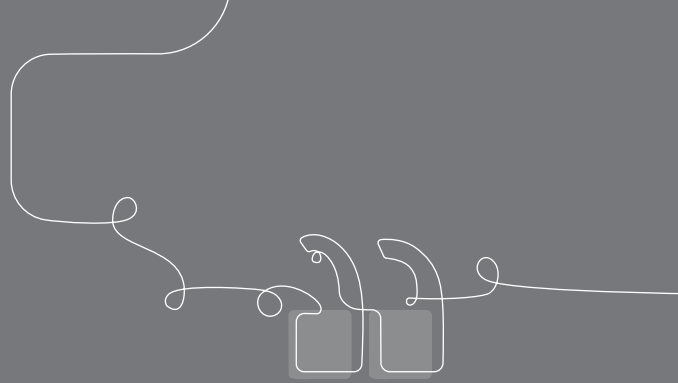
What other embedded assessment opportunities can you use to help monitor progress up the Progress Build before students get to the End-of-Unit Assessment?

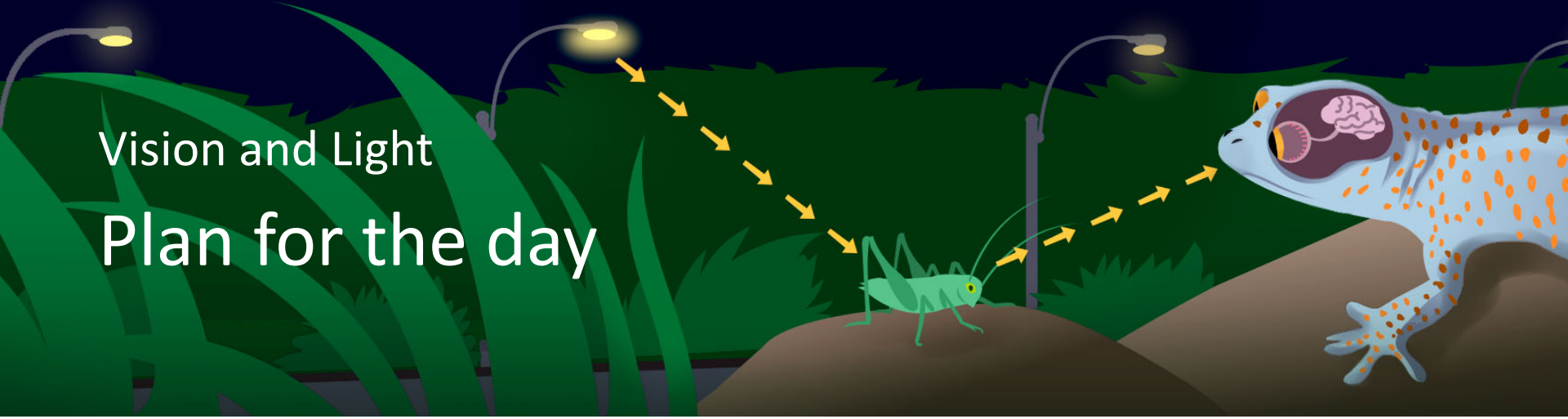
- Find the Critical Juncture opportunities and add these to your visual.
- Next, locate at least one On-the-Fly Assessment that can be used to progress monitor students' developing conceptual understanding leading up to each Critical Juncture.

Self-Reflection

- What kind of data did you gather from the End-of-Unit Assessment?
- What did you like about the End-of-Unit Assessment?
- What did you find challenging about the End-of-Unit Assessment?

Questions?





Vision and Light

Plan for the day

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

Planning to teach

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

- Reflect on implementing Amplify Science in your classroom to select an area of growth.
- Engage in targeted small group practice in your area of growth.

Targeted small group work focus areas

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

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Choosing a focus area

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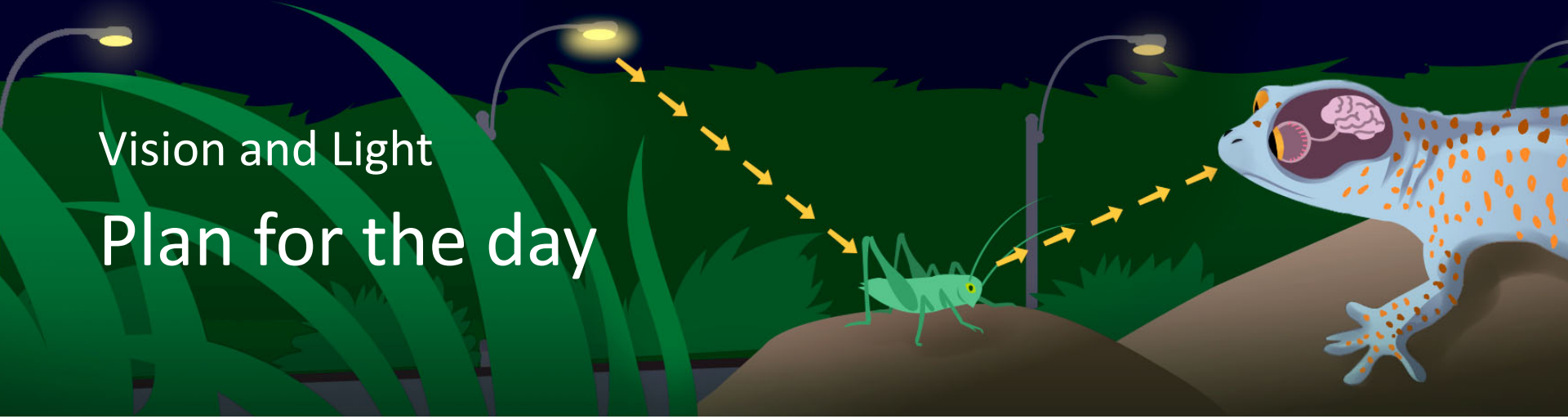
- While thinking about what to focus on, ask yourself:
  - For which category (1, 2, or 3) did I mark myself as “least comfortable”?
  - Did that change over the course of today’s workshop?
  - Is there a newly illuminated challenge area that I would rather focus on?
  - What would be most helpful to examine collaboratively in this space?

Setting up your targeted group work

- *With your group determine your focus or goal for the work time. Be prepared to share what you focused on, what you learned, and any remaining questions for the presenter.*

Focus area reflection

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



Vision and Light

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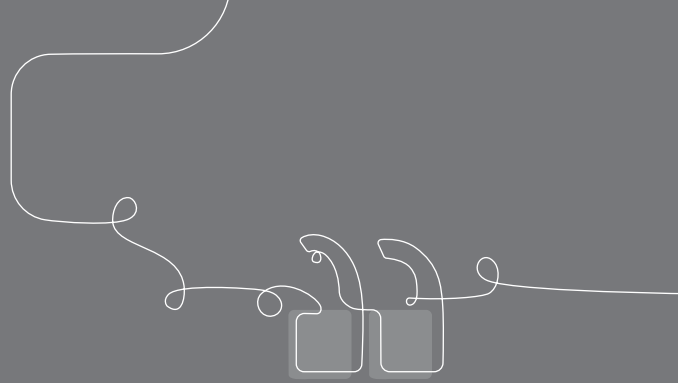
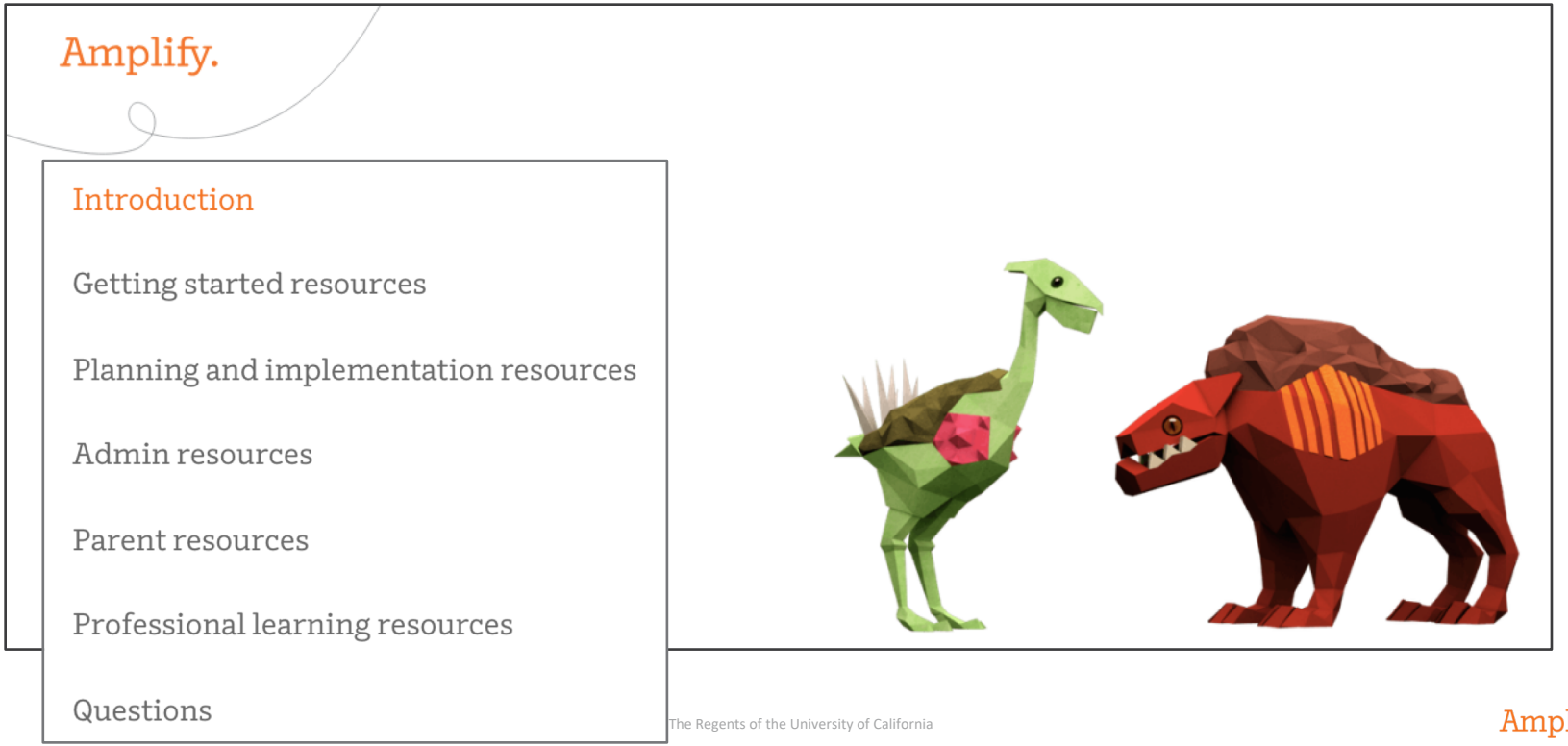


NYC Resource Site

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!

https://www.surveymonkey.com/r/AmplifySciPLSurvey

Presenter Name:
Workshop Title: