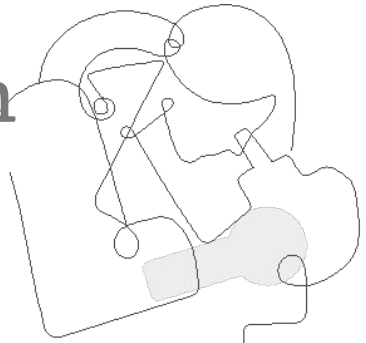
Amplify Science

Supporting English Learners
Grade 6: Traits and Reproduction

Strengthen workshop



LAUSD
November 2022
Presented by\

Amplify's purpose statement

Dear teachers,

You do a job that is nearly impossible and **utterly essential.**

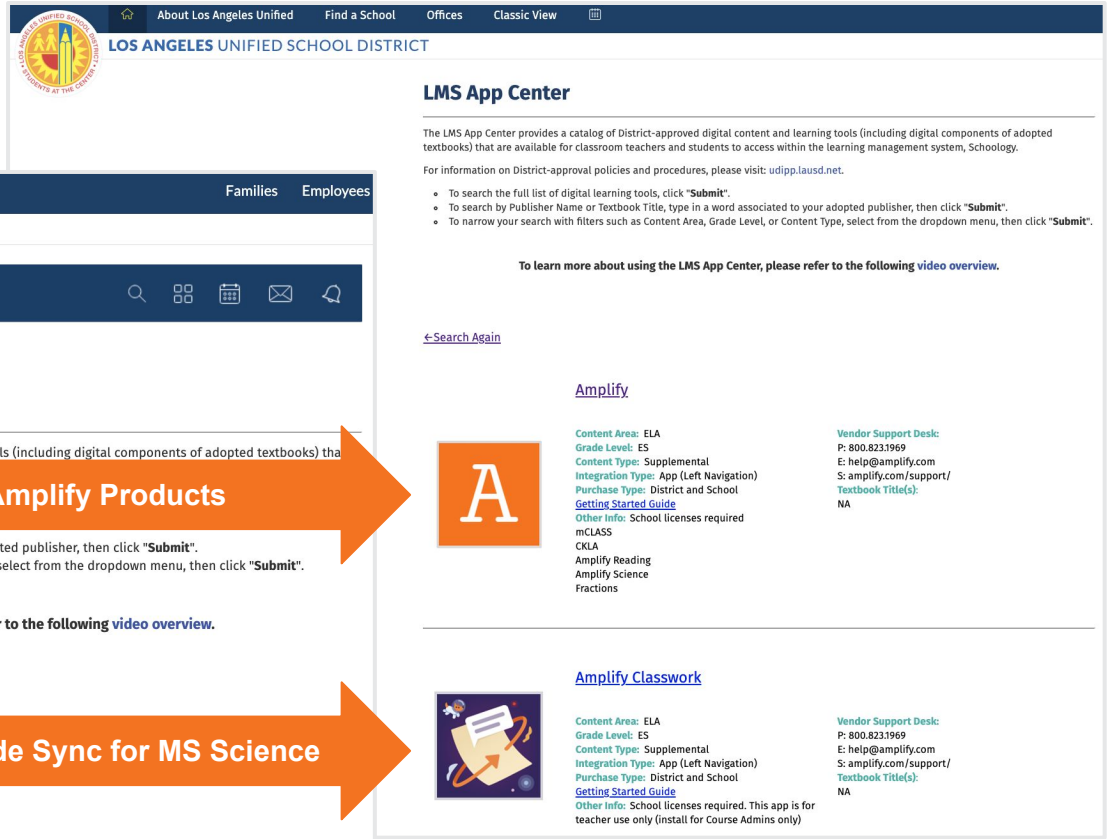
We are in your corner – extending your reach, saving you time, and enhancing your understanding of each student.

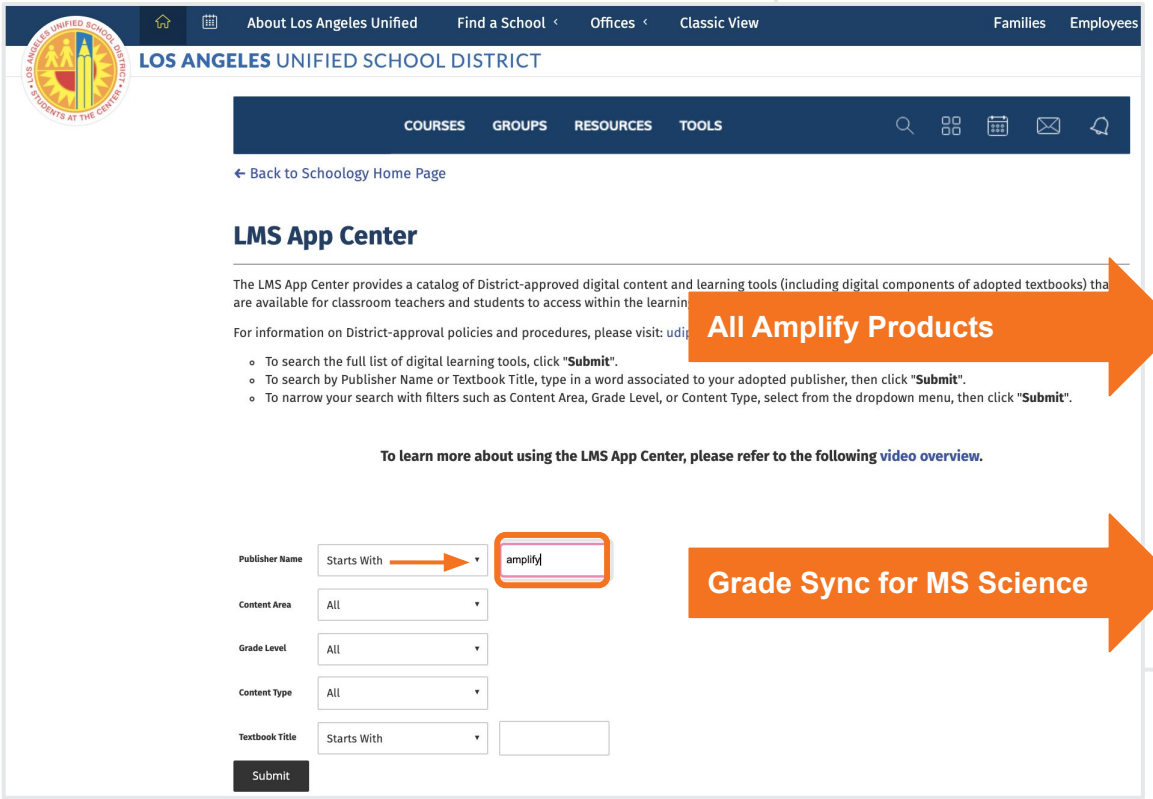
Thank you for working with us to craft rigorous and riveting learning experiences for your classroom.

We share your goal of **inspiring all students to think deeply, creatively, and for themselves.**

Sincerely,
Amplify

Apps in Schoology



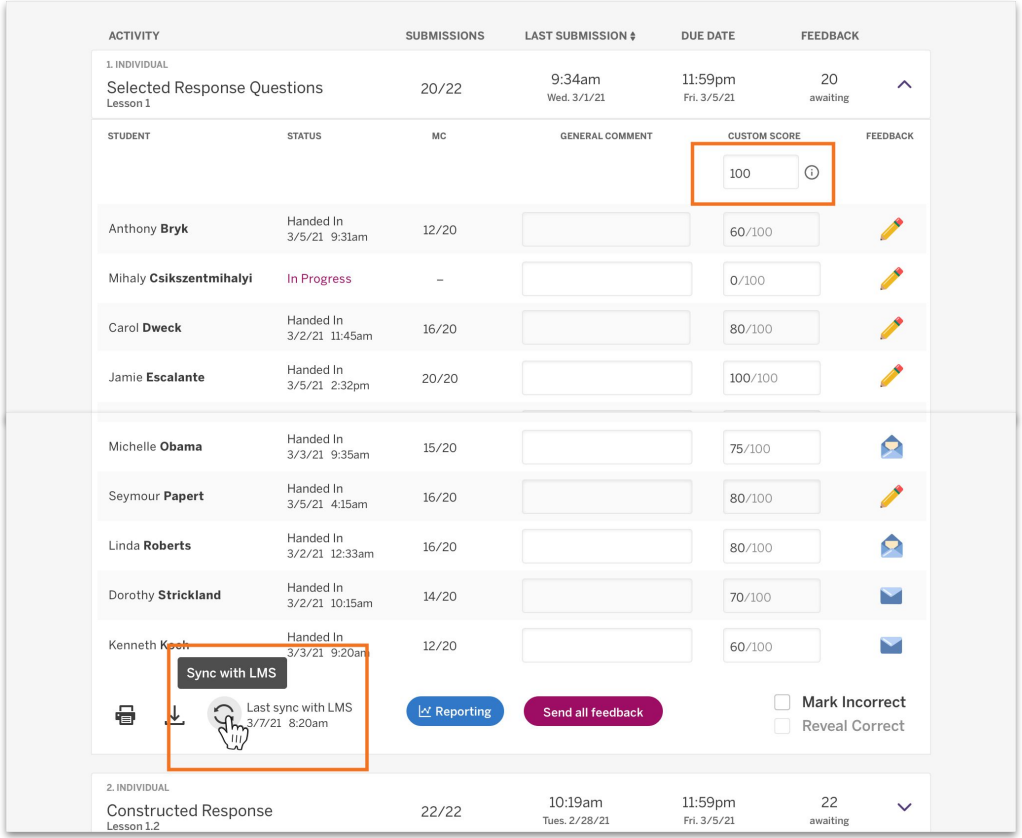


All Amplify Products

Grade Sync for MS Science

Amplify.

Grade sync from Classwork to Schoology



Join Amplify Science Schoology Group

To join Amplify Science Schoology MS Group: SPG7G-K7BT9

Navigation Temperature Check

Rate yourself on your comfort level accessing Amplify Science materials and navigating a digital curriculum.

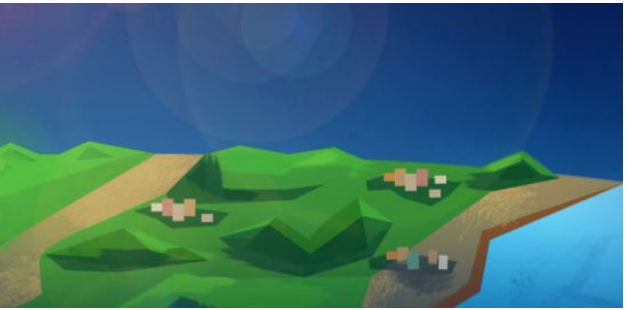
1 = Extremely Uncomfortable

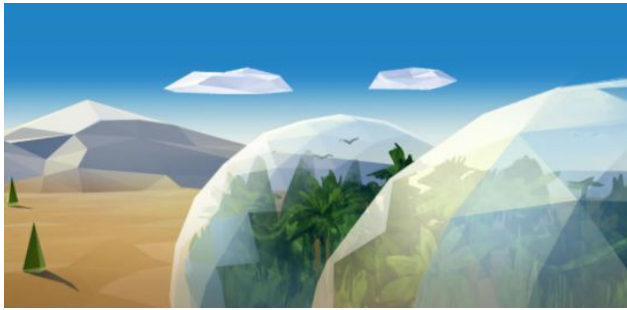
2 = Uncomfortable

3 = Mild

4 = Comfortable

5 = Extremely Comfortable





Plan for the day

- Introduction
- Language of the Science Classroom
- Embedded and Additional Supports
- Experiencing a Lesson
- Planning for Supports
- Closing

Overarching goals

- Describe the language and literacy demands in a lesson and their role in students developing science understanding
- Implement key strategies to promote English learners' academic language development and science understanding

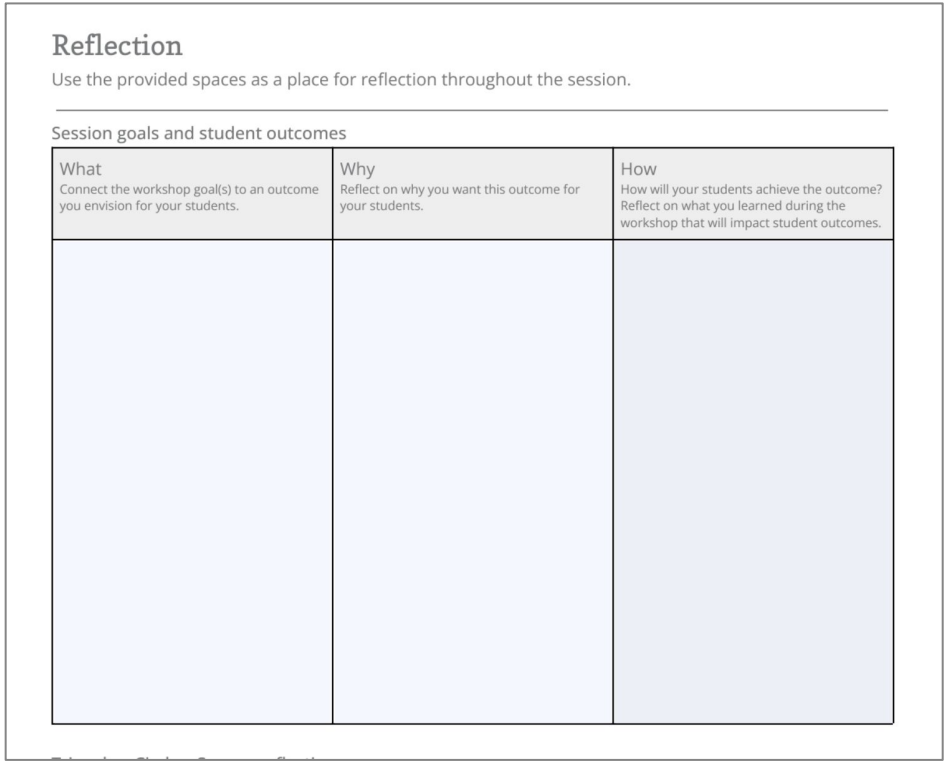
Opening Reflection

What are your goals
for student outcomes?

Participant Notebook

Gr. 6
http://bit.ly/3T7MkBq

Gr. 8
http://bit.ly/3UndKFf



Reflection

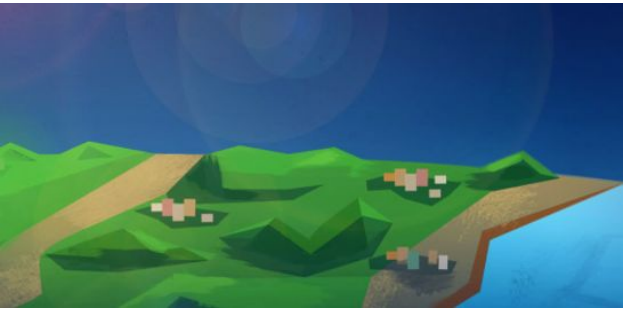
Use the provided spaces as a place for reflection throughout the session.

Session goals and student outcomes

What	Why	How
Connect the workshop goal(s) to an outcome you envision for your students.	Reflect on why you want this outcome for your students.	How will your students achieve the outcome? Reflect on what you learned during the workshop that will impact student outcomes.

Norms: Establishing a culture of learners

- **Take risks:** Ask any questions, provide any answers.
- **Participate:** Share your thinking, participate in discussion and reflection.
- **Be fully present:** Unplug and immerse yourself in the moment.
- **Physical needs:** Stand up, get water, take breaks.



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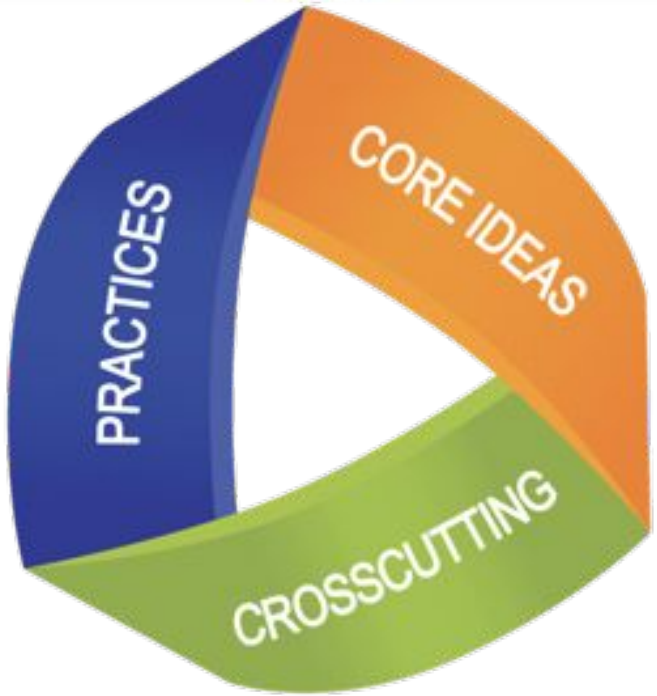
NGSS - Three dimensional learning

Evaluate your knowledge

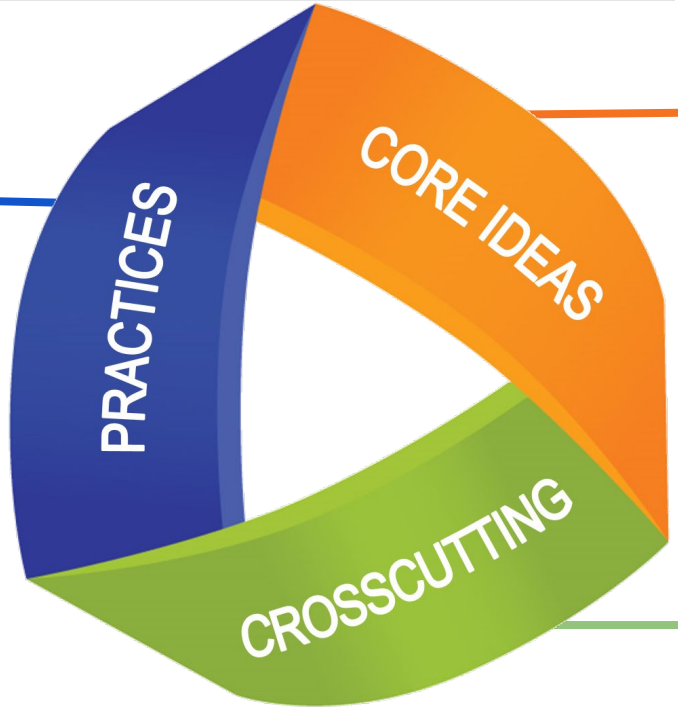
- On a scale of 0-5, how would you rate your familiarity with 3-D learning?



Language of the science classroom

Language and 3-D learning

What scientists do
Science and Engineering Practices



What scientists want to know
Disciplinary Core Ideas

How scientists think
Crosscutting Concepts

Crosscutting Concepts

4. Systems and System Models
A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

5. Energy and Matter
Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior.

6. Structure and Function
The way an object is shaped or structured determines many of its properties and functions.

7. Stability and Change
For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.

Science and Engineering Practices

inquiry

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations

math

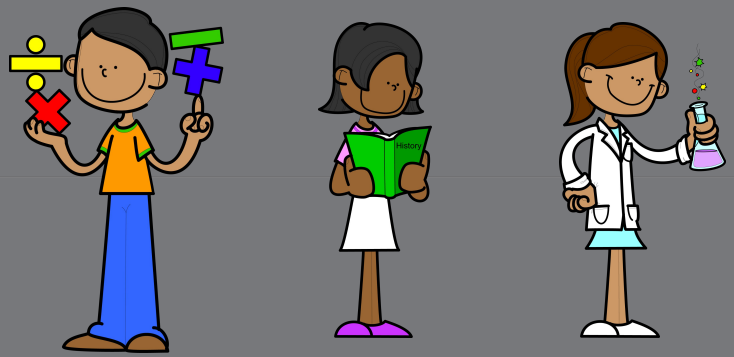
4. Analyzing and interpreting data
5. Using mathematics and computational thinking

language

6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Academic language proficiency

The ability to successfully use language for reading and writing and for accessing information in disciplinary content areas.

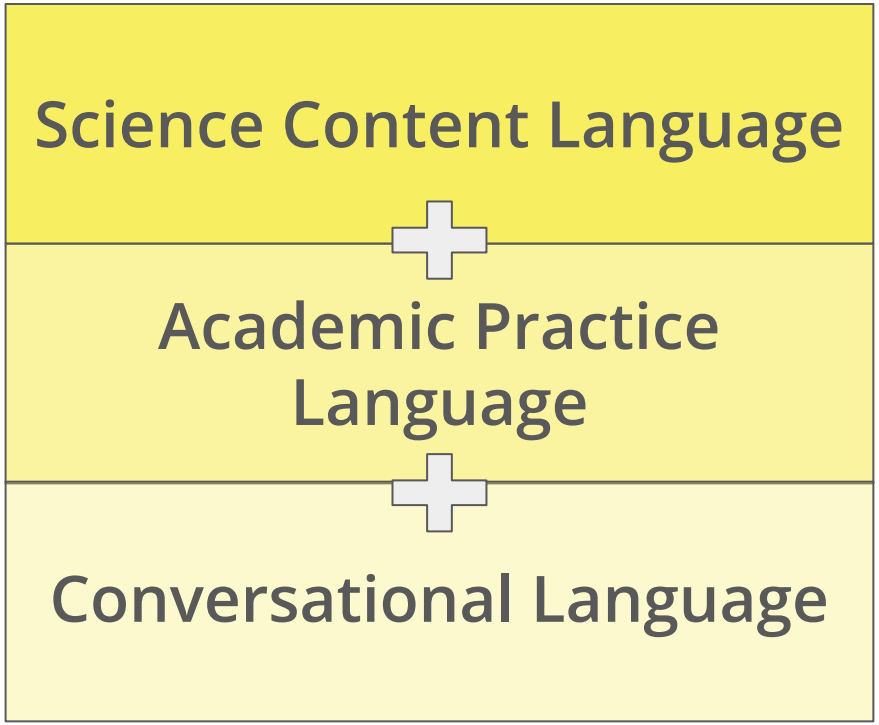


Language acquisition

Language of Science

- The language of the science classroom is grounded in **conversational** or everyday language but **moves toward the disciplinary language of science.**

- All students face language and literacy challenges that are specific to science, but such challenges and opportunities are amplified for EL students.

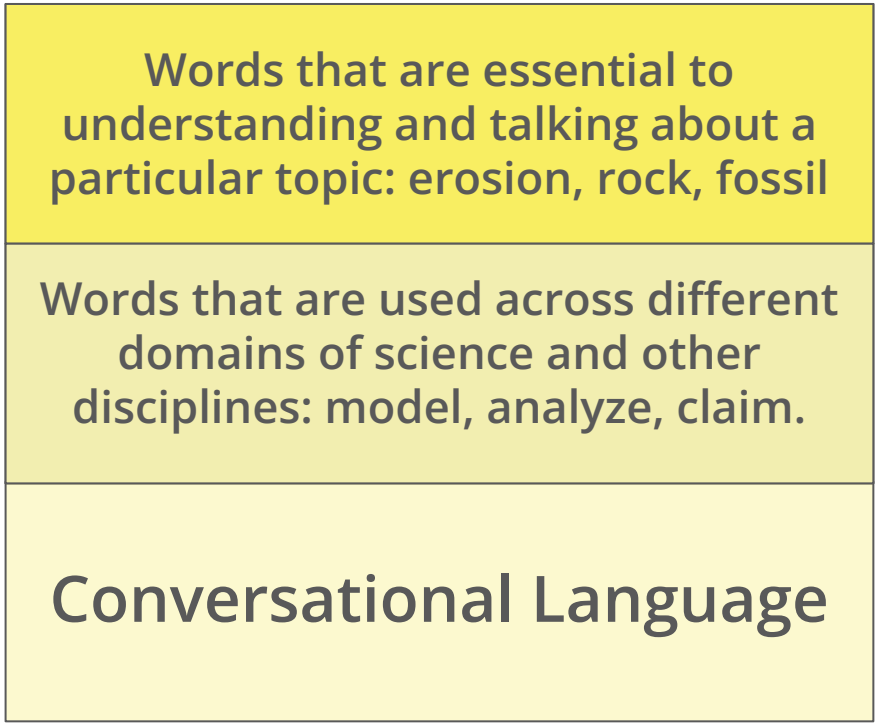


Language acquisition

Language of Science

Each unit focuses on a powerful set of vocabulary words that fall under two categories:

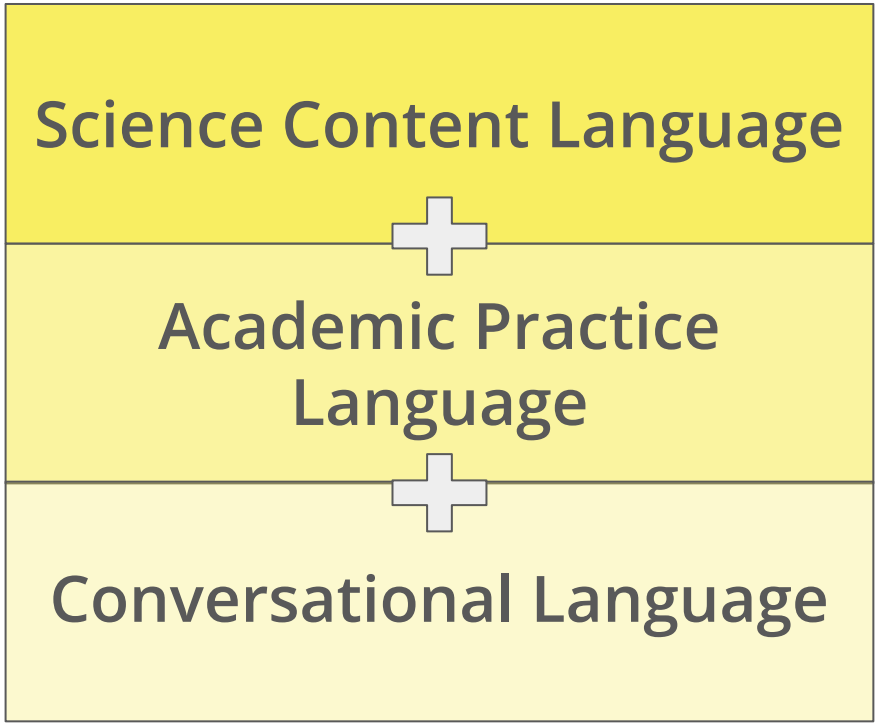
- Academic Practice Vocabulary
- Science Content Vocabulary



Language acquisition

Language of Science

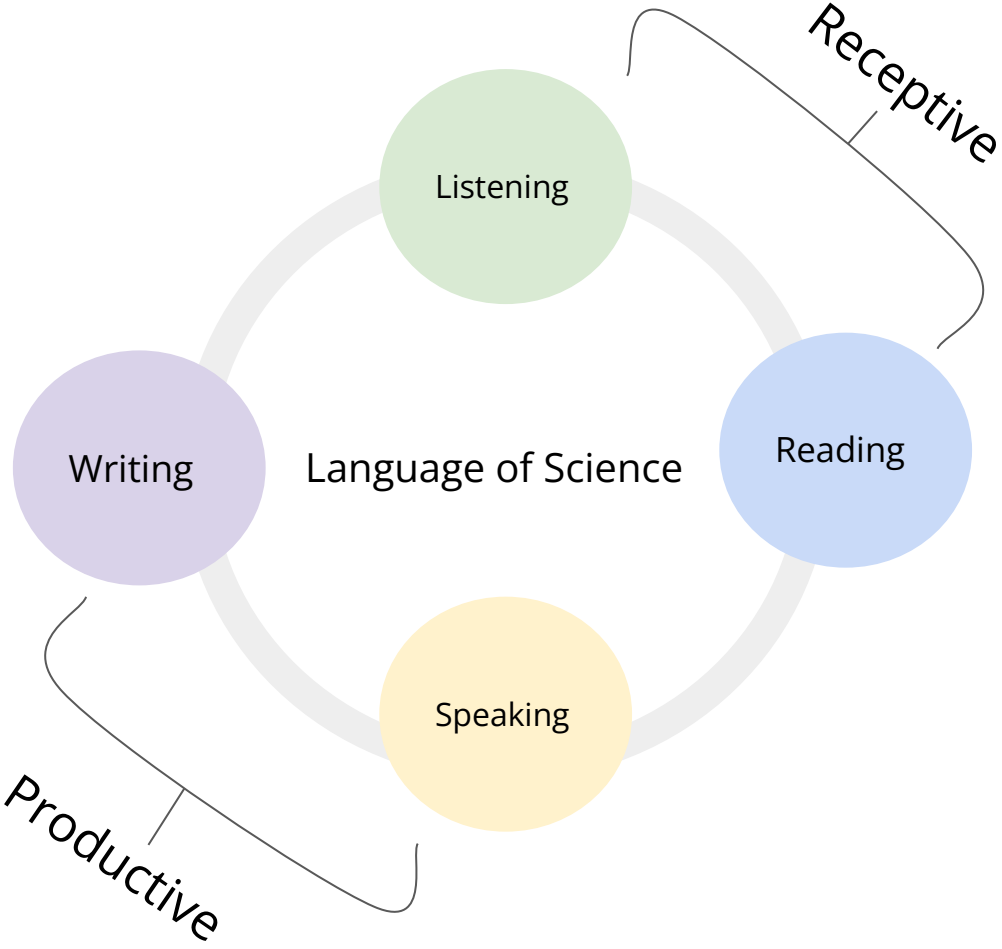
- Multimodal experiences with language
- Explicit instruction and practice
  - ➔ Embedded Supports
  - ➔ Additional Supports



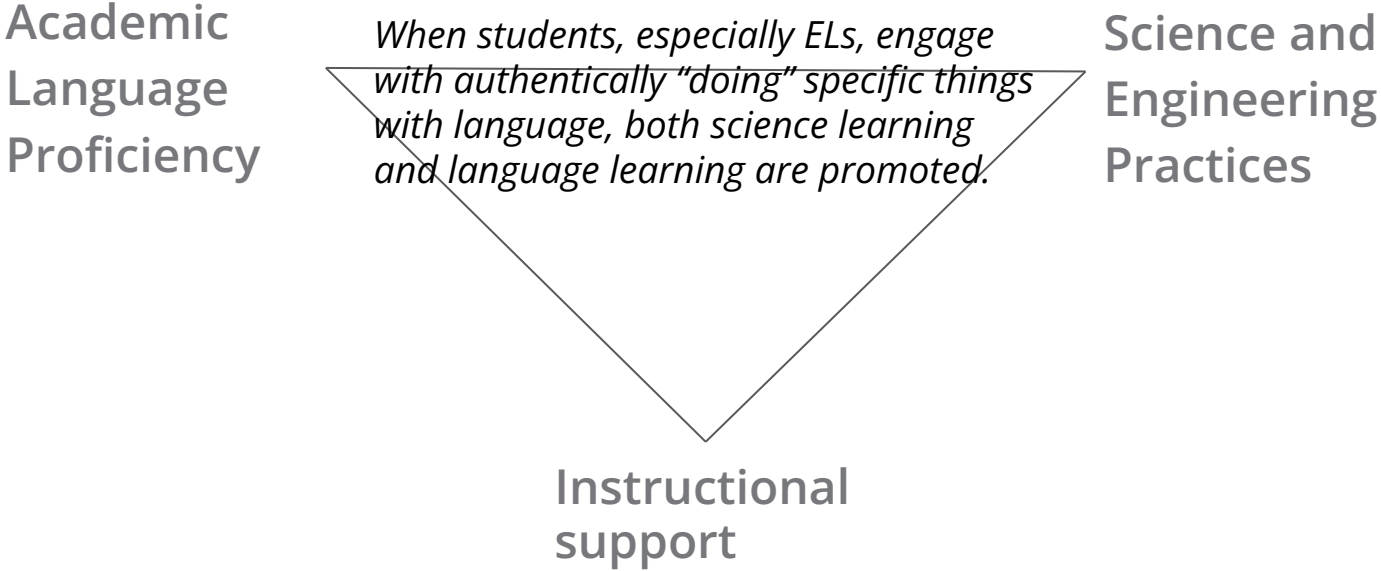
Language acquisition

Language of Science

- Learning activities support productive as well as receptive language.
- Not only do students hear and read the words, but they are encouraged, prompted, and reminded to use them in their discussions and written work.
- This is done in a variety of ways, including through teacher modeling, words posted on the classroom wall and on charts, sentence frames and graphic organizers, and class discussion.

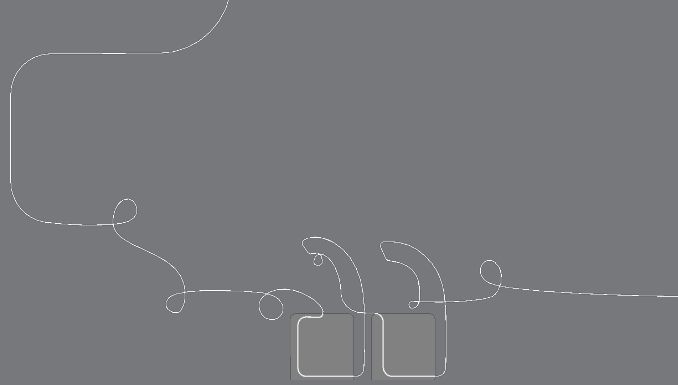


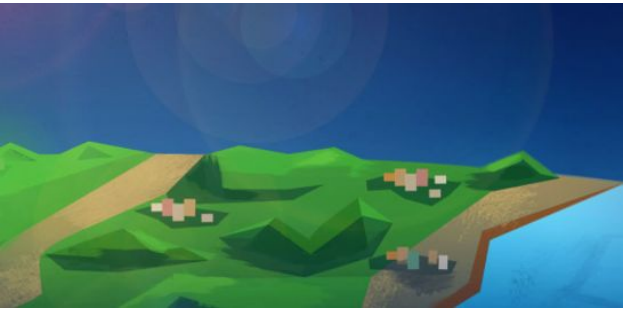
Establishing connections among concepts



The science classroom is a language development opportunity,

Questions?





Plan for the day

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Embedded supports

5 Principles for Supporting 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.

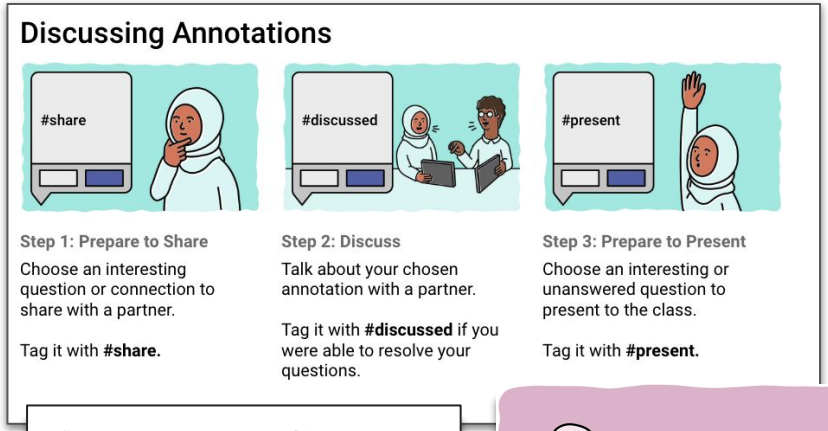
Principle 4: Provide opportunities for scaffolded practice.

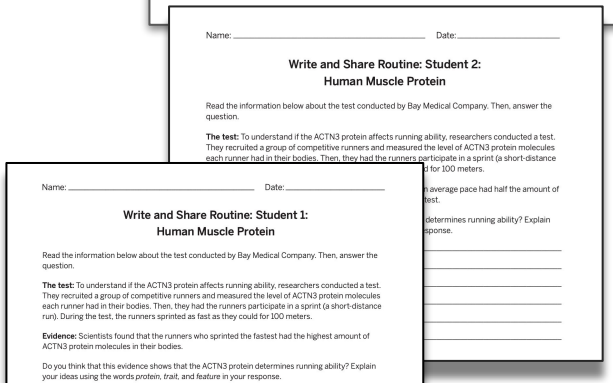
Principle 5: Provide multimodal means of accessing science content and expressing language.

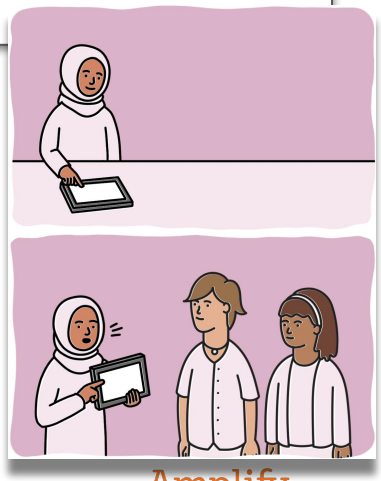
Embedded supports

Examples

- Discourse and sensemaking Routines
- Write and Share Routine
- Oral Rehearsal before writing







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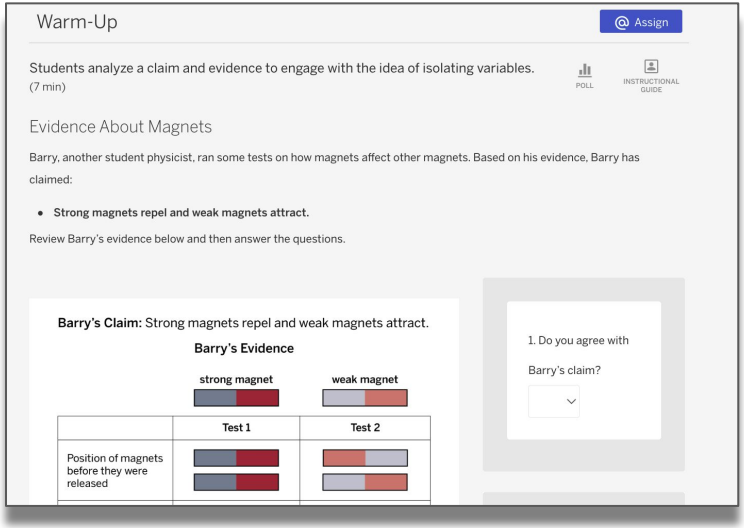
Embedded supports

Examples



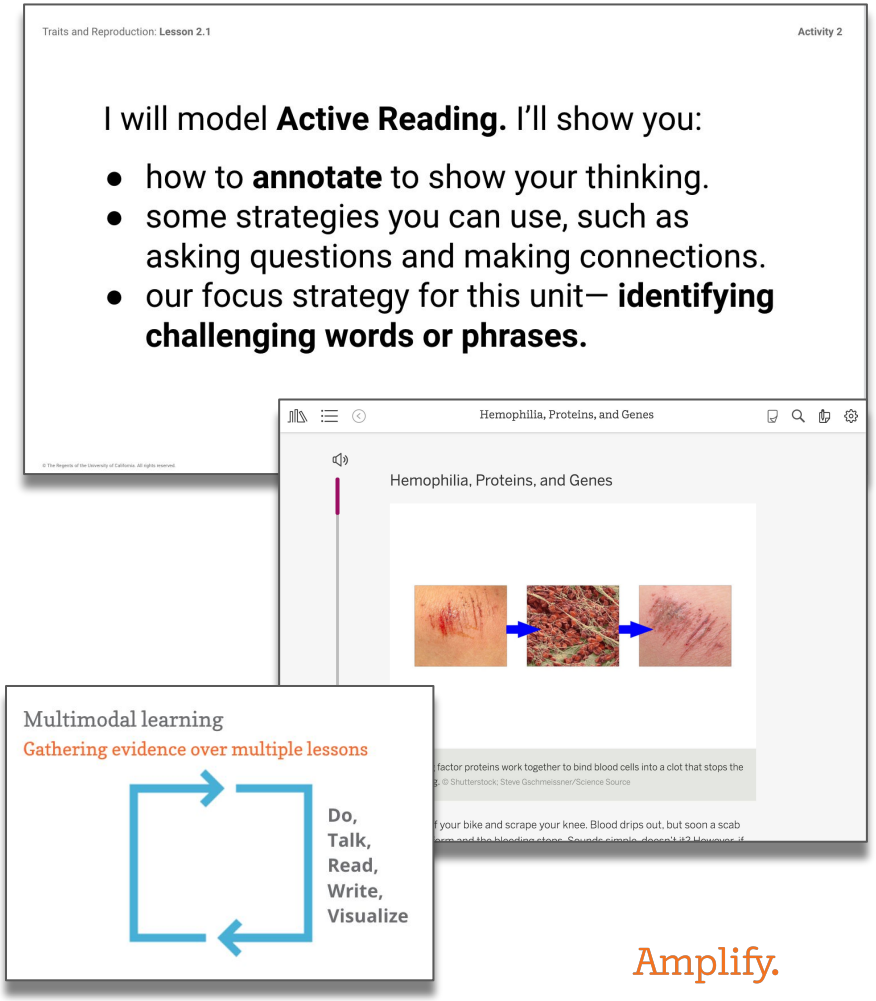
- Warm-Ups

  The brief written Warm-Up at the beginning of each session is designed to be accessible for all students and often allows students to reflect on what they already know or have just learned in order to prepare them for what they will learn in the coming session.

Embedded supports

Examples

- Active Reading Guidelines
- Extended Teacher Modeling
- Multimodal Instruction



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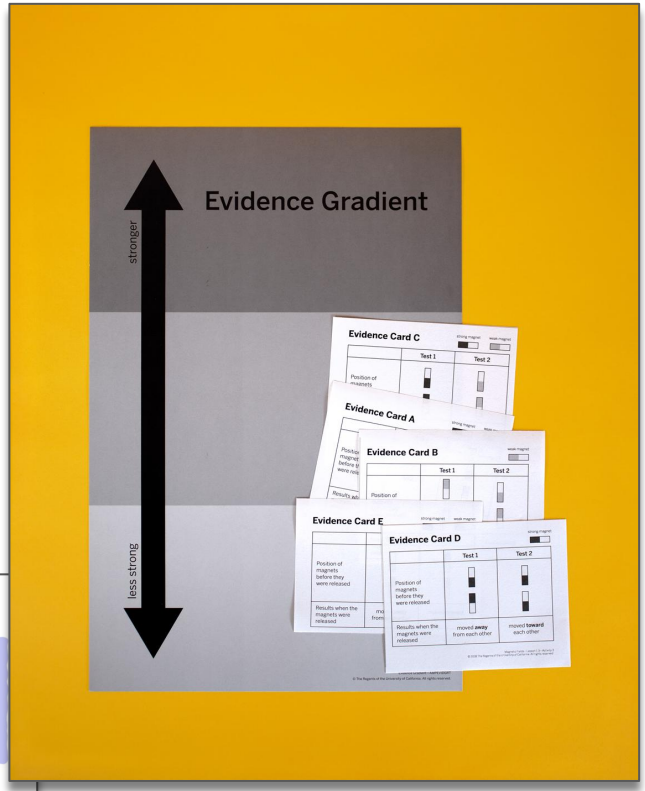
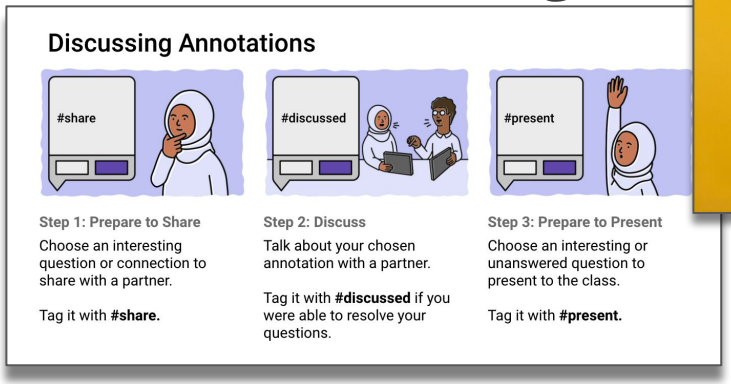
Embedded supports

Examples

- Paired discussion using the Evidence Gradient
- Student to Student Discussion
  - To make sense of reading





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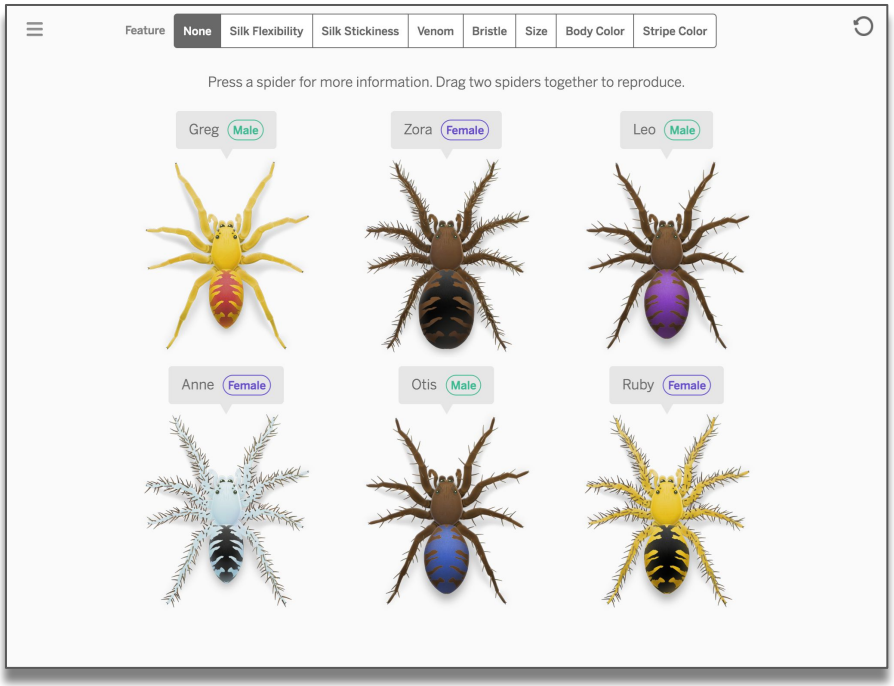
Embedded supports

Examples

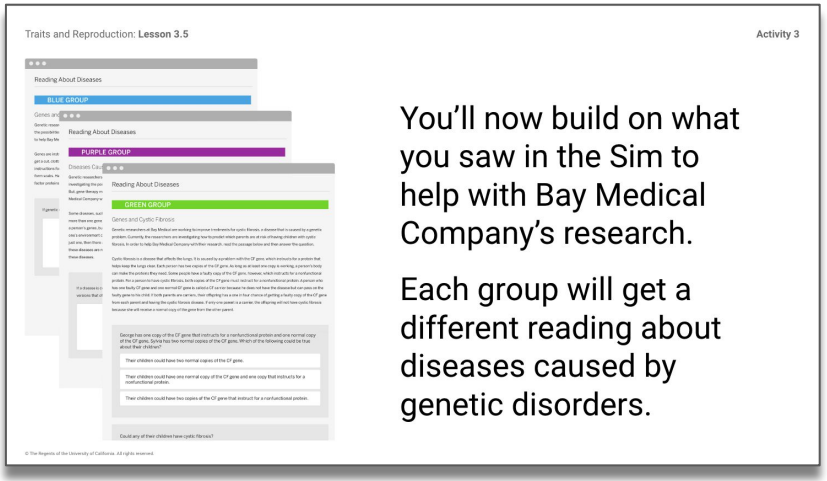
- Visual and digital models
- Visual Representations

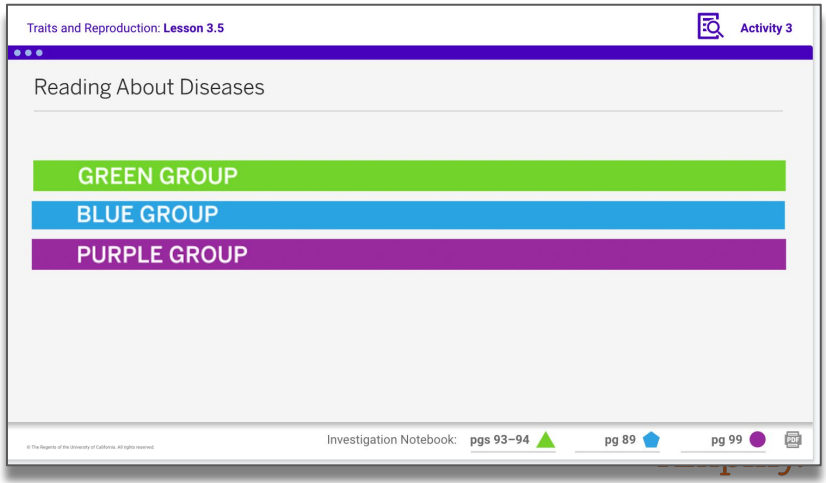


Embedded supports

Examples

- Differentiated Activities
  - Day after the Critical Juncture

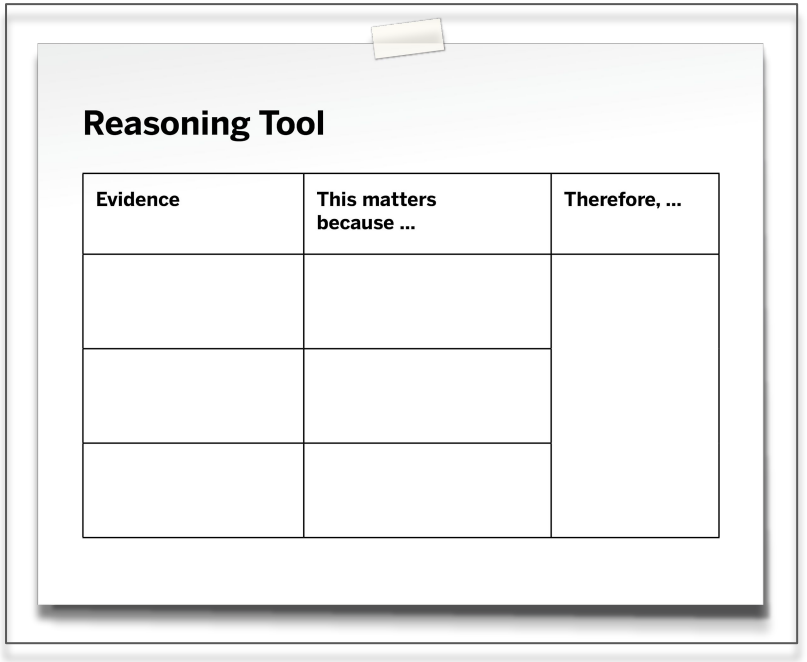




Embedded supports

Example

- Graphic Organizers



Reasoning Tool

Evidence	This matters because ...	Therefore, ...

Embedded supports

Example

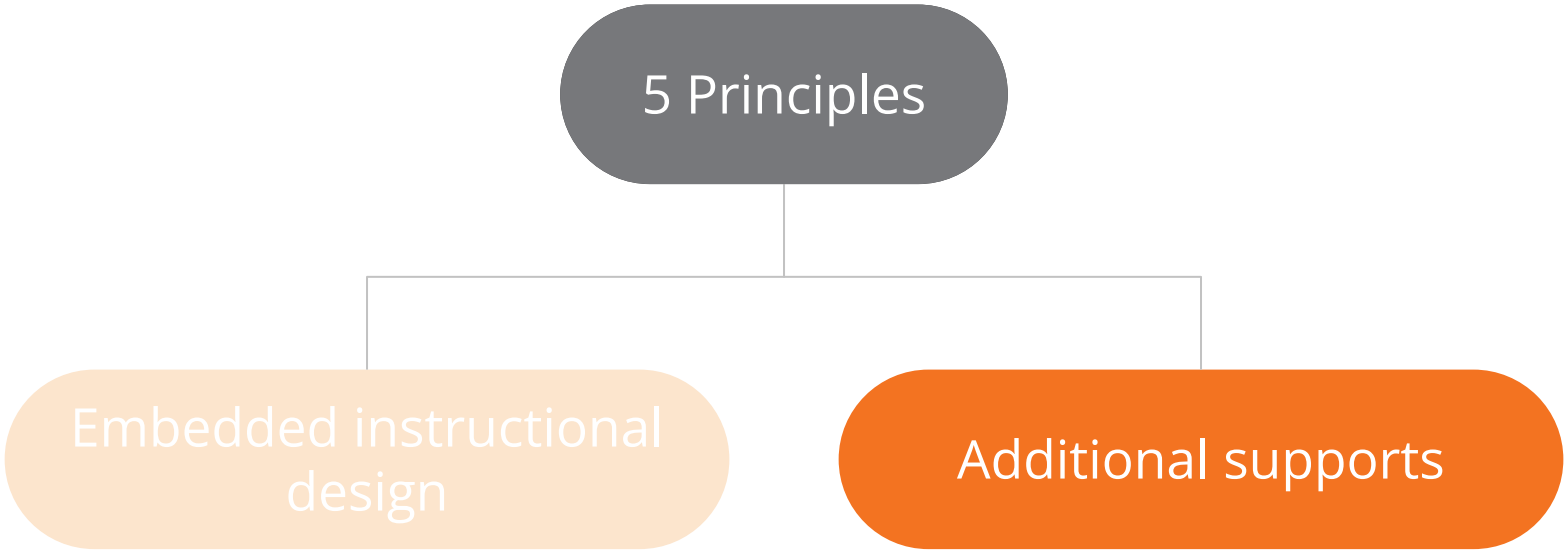
- Preparation time and partner rehearsal

Traits and Reproduction: **Lesson 4.2** Activity 2

You will prepare for the whole-class discussion by first **sharing your ideas** with your partner.

You might be convinced by your partner's argument, and you may change your minds about which claim is **most convincing.** That's okay. Scientists often change their minds.

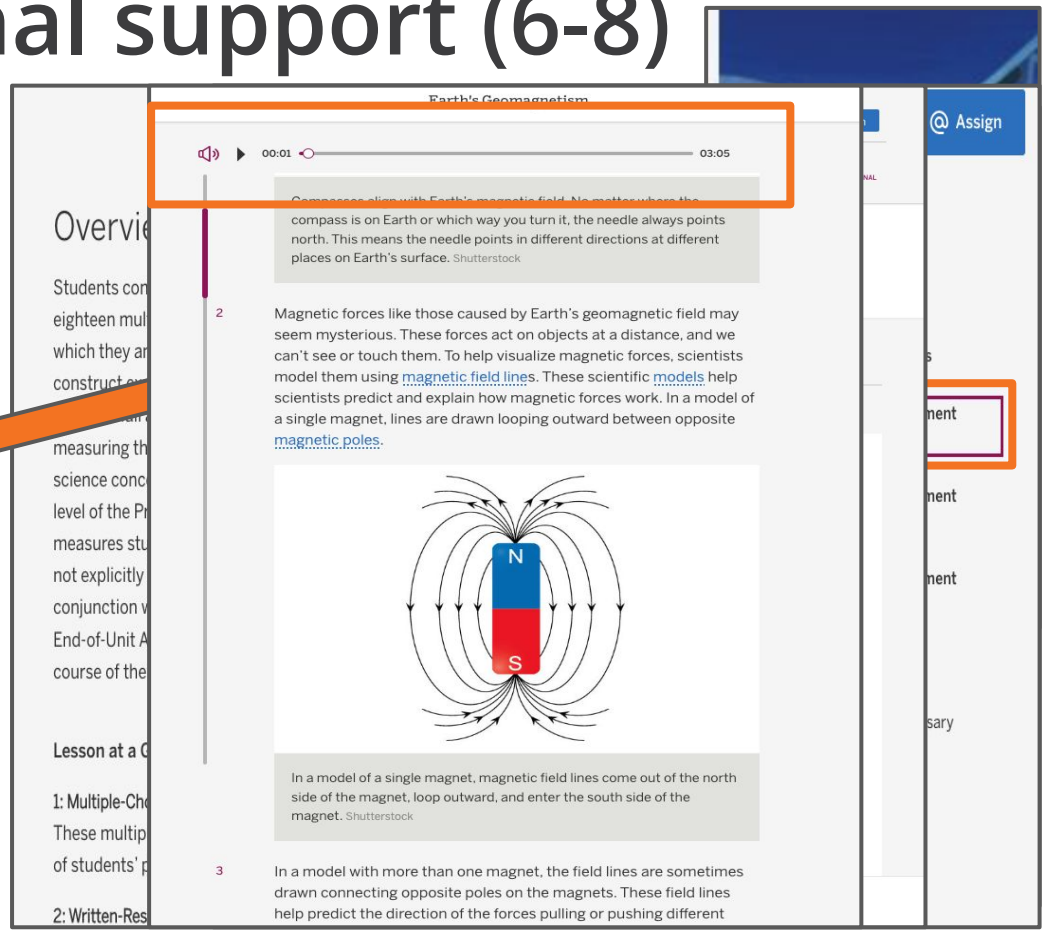
Supports for English learners



Providing additional support (6-8)

Additional resources

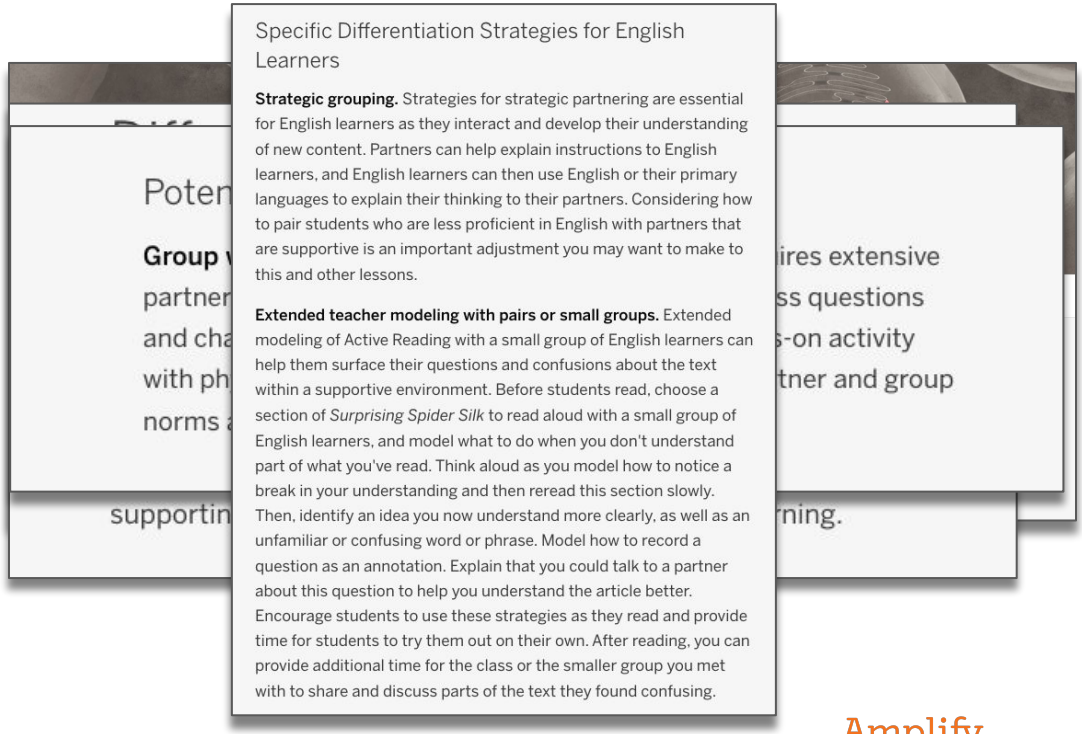
- Magnetic Fields Glossary
- Multilingual glossary
- Word Version - Print Version (6-8)
- Read Aloud - Assessments
- Read Aloud - Articles



Providing additional support

Lesson-specific differentiation

- Embedded supports for diverse learners
- Potential challenges in this lesson
- Specific differentiation strategies for:
  - English Learners
  - Students Who Need More Support
  - Students Who Need More Challenge



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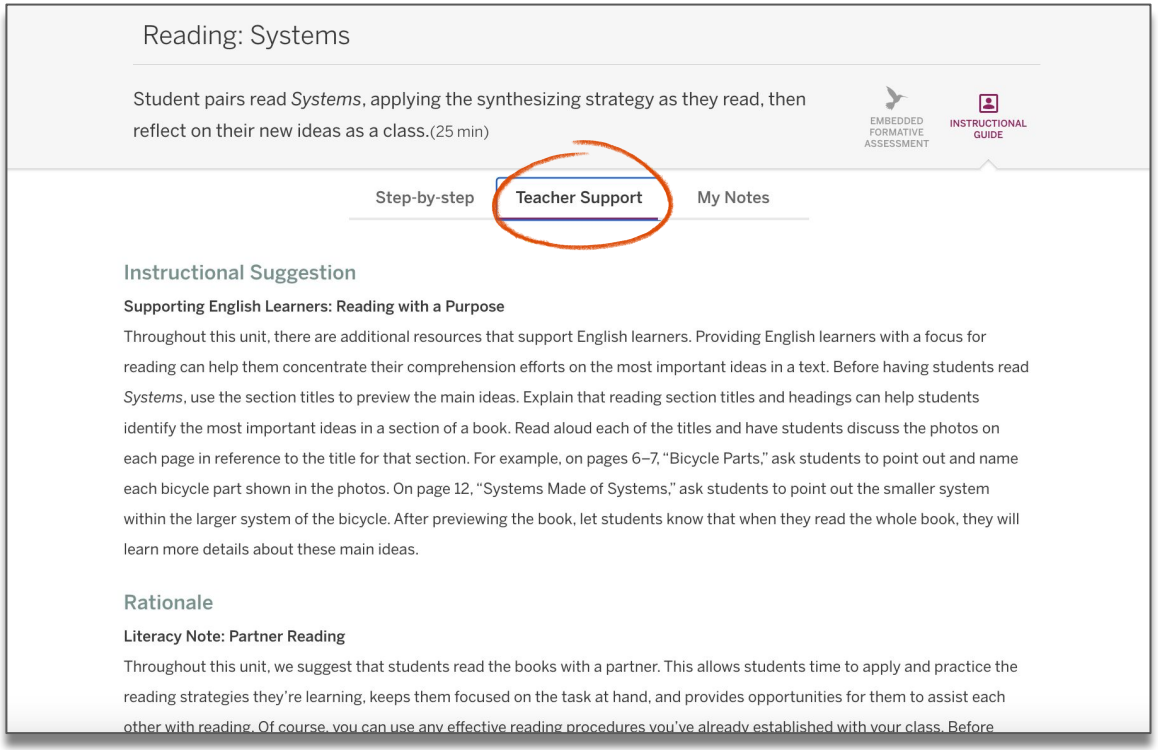
Providing additional support

Teacher Support notes



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Providing additional S

Additional resources

- Multilingual glossaries
- Response options
- Word banks (Provide)
- Read aloud functions

Name: _____ Date: _____

End-of-Unit Writing: Arguing About Solutions for Ergstown's Electrical System (continued)

The best solution for improving Ergstown's electrical system is _____

I know this solution meets the criterion of _____

because _____

The limitations of this solution are _____

Energy Conversions—Lesson 4.6 (Version B)

English-Chinese Glossary

argument: the use of evidence to say why one idea is the best
论证： 用证据来表明某个观点为何最合理

claim: a proposed answer to a question
主张： 对某个问题的拟定答案

climate: the typical weather in a place over a long period of time
气候： 某个地方长期以来的常见天气

data: observations or measurements recorded in an investigation
数据： 调查中记录到的观察结果或测量值

evaluate: to judge how useful or accurate something is
评估： 判断某事物是否有用或准确

evidence: information that supports an answer to a question
证据： 支持问题答案的资料

graph: a way of organizing numbers that can help you see patterns
图表： 组织数字的方式，有助于了解模式

measure: to use a tool to find out information such as how heavy, how big, how fast, or how hot or cold something is
测量： 使用工具来获取物体的轻重、大小、快慢或冷热等信息

4 Weather and Climate—English-Chinese Glossary

5 Principles for Supporting English Learners

Pg. 6-14

Embedded and Additional Supports in Amplify Science

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.

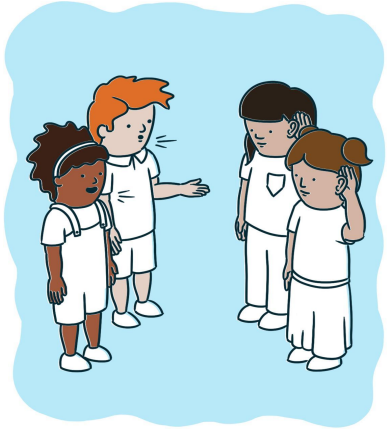
Principle 5: Provide multimodal means of accessing science content and expressing language.

Let's Work

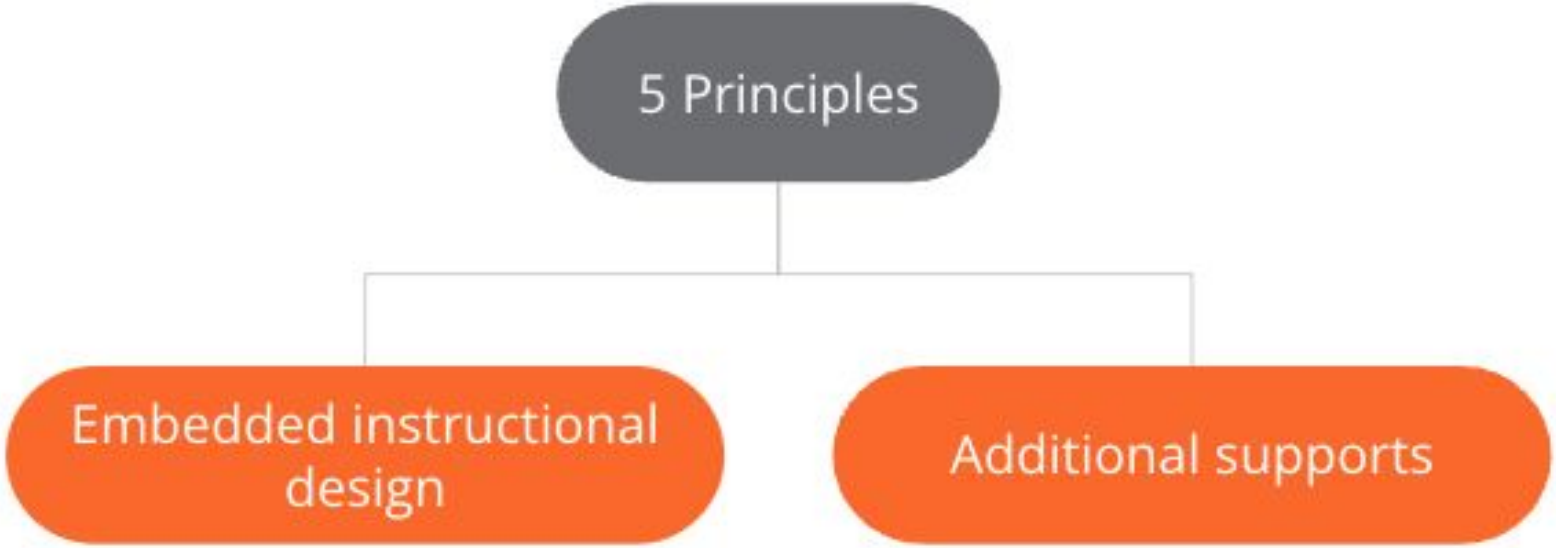
Pg. 6-14

What are the Principles for Supporting English Learners?

- Form 5 groups in the room (could be by tables)
- Each group will be assigned a Principle to internalize.
- Independently read your group's Principle for Supporting ELLs.
- Discuss and Summarize with your group.
- Create an illustration/poster of your findings
- Share out

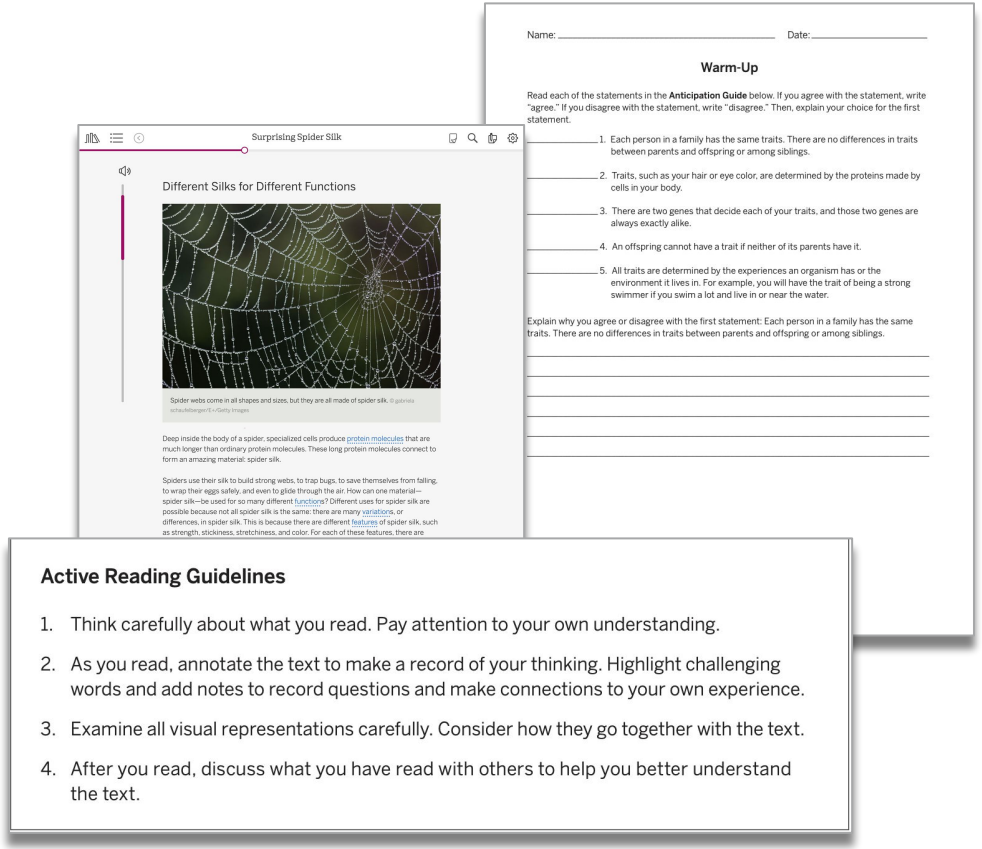


What are the embedded and additional supports that apply to each principle?



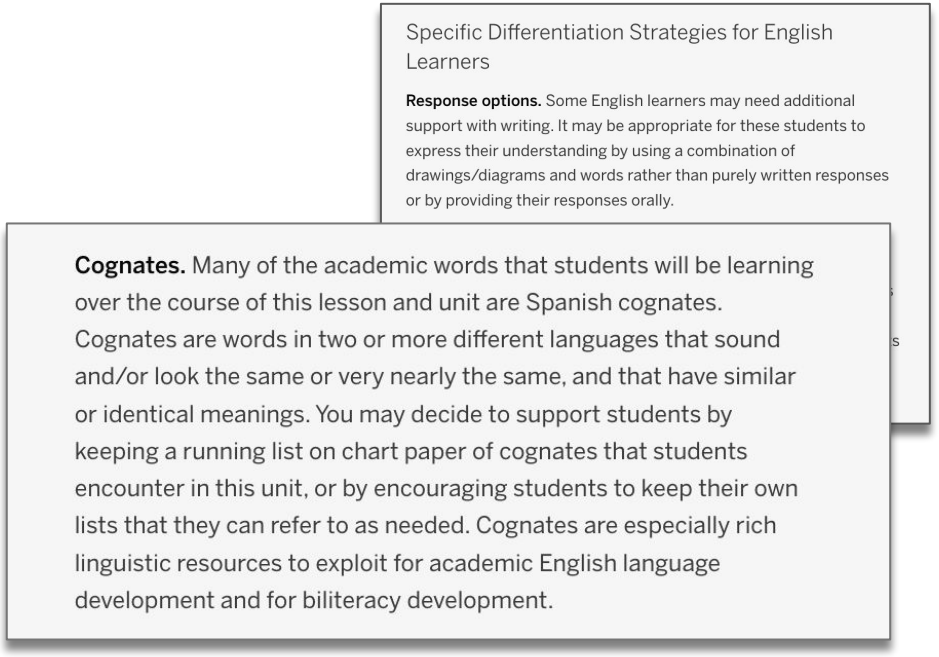
Principle 1: Leverage and build students' informational background knowledge.

- Partner discourse routines
- Daily written reflections
- Active reading
- Anticipation guides



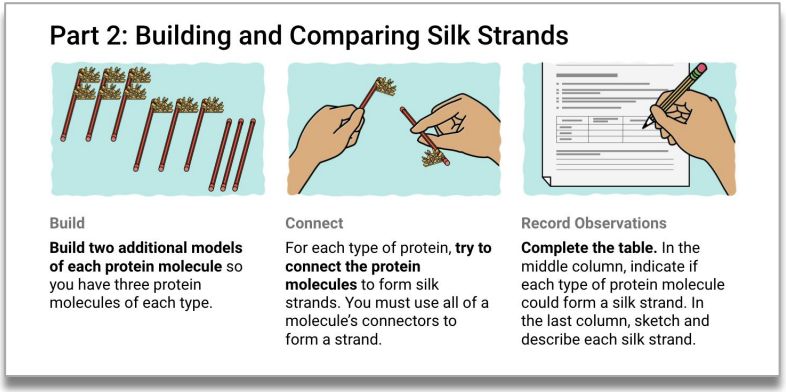
Principle 2: Capitalize on students' knowledge of language.

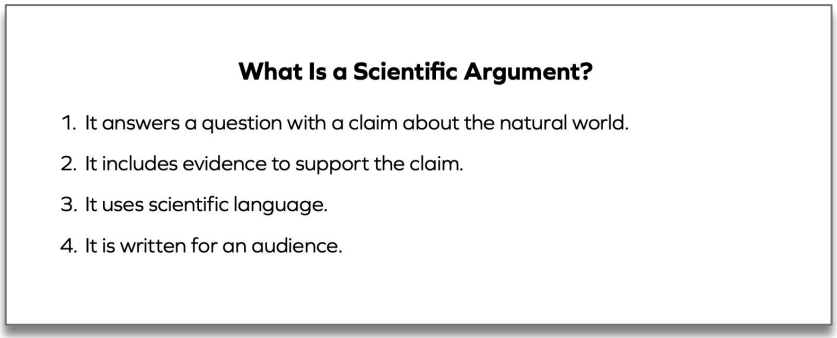
- Science/Everyday word charts
- Leveraging native language
- Cognates
- Multilingual glossary



Principle 3: Provide explicit instruction about the language of science.

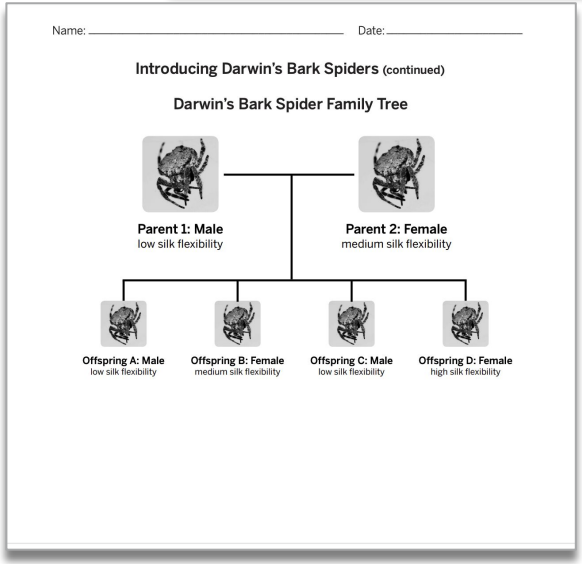
- Argumentation
- Modeling active reading
- Word Relationships
- Word banks
- Multiple meaning words





Principle 4: Provide opportunities for scaffolded practice.

- Gradual release
- Graphic organizers
- Argumentation
- Reflective writing
- Clear and concise instructions
- Language Practice
- Modeling tools



Name: _____ Date: _____

Introducing Darwin's Bark Spiders (continued)

Darwin's Bark Spider Family Tree

Parent 1: Male
low silk flexibility

Parent 2: Female
medium silk flexibility

Offspring A: Male
low silk flexibility

Offspring B: Female
medium silk flexibility

Offspring C: Male
low silk flexibility

Offspring D: Female
high silk flexibility

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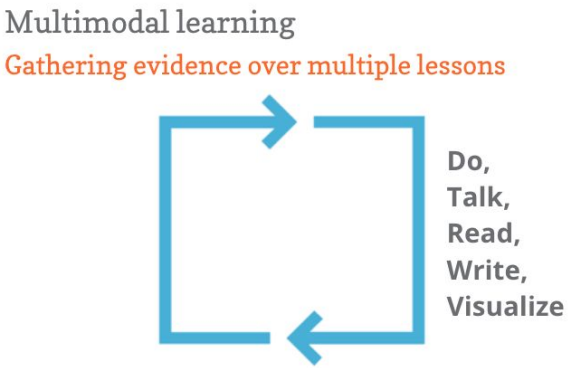
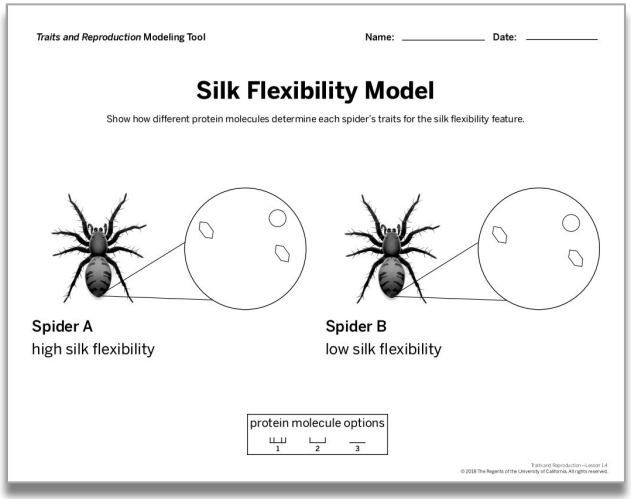
Principle 4: Provide opportunities for scaffolded practice (cont'd)

- Create and using models
- Strategic grouping
- Promoting inclusion in discussion
- Extended modeling
- Partner reading

Principle 5: Provide multimodal means of accessing science content and expressing language.

- Multimodal instruction
- Use of visual representations of images
- Interpreting and creating visual representations
- Use of physical and digital models
- Additional practice in other modalities
- Additional visual representations

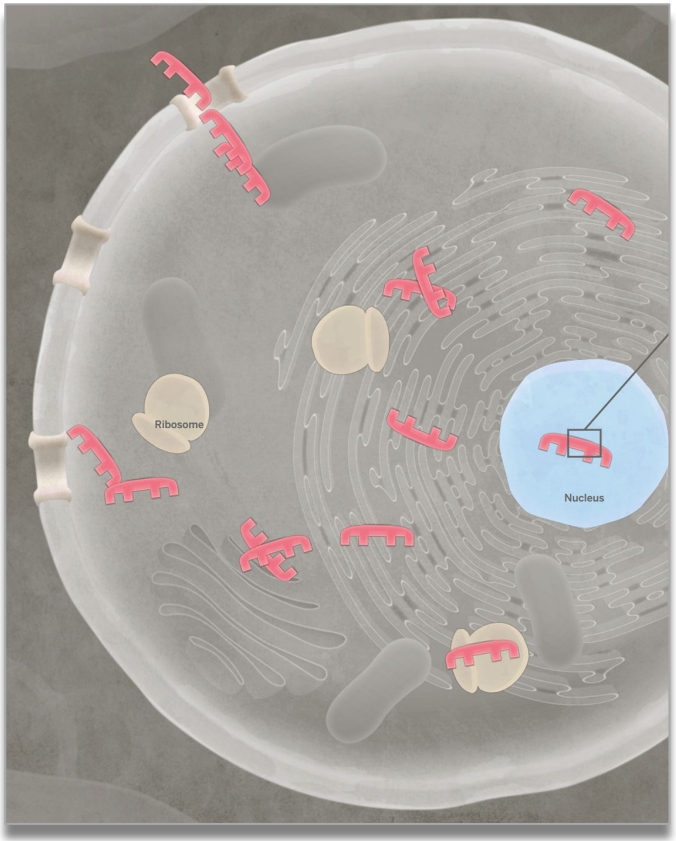




Amplify.

Principle 5: Provide multimodal means of accessing science content and expressing language (cont'd)

- Optional graphic organizers
- Response options
- Increase wait time for student responses
- Student summarize
- Additional visual representations



Now it’s your turn

5 Principles for Supporting English Learners

There are several resources available to review for embedded and additional supports

Unit 1 Landing page

- Printable Resources
  - Investigation Notebook
  - Multi-language Glossary
  - Eliciting and Leveraging….

Lesson Page

- Lesson Brief
  - Teacher support tab
- Digital resources (depends on lesson)
  - Classroom Slides
  - Additional resources

Background

Science Note: Earth's Magnetic Field

Earth acts as a large magnet with the poles found deep inside, near its core. Scientists theorize that Earth acts as a magnet because of the way that convection currents in the magma of Earth's outer core move liquid iron. Since the liquid iron is electrically conductive, the convection current makes Earth act like a giant electromagnet. Earth's magnetic field exerts a force on iron objects and magnets around Earth. This force makes it possible to use a compass for navigation.

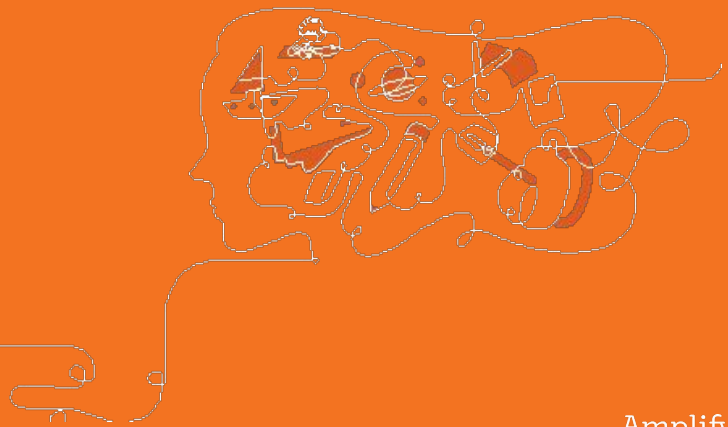
Instructional Suggestion

Providing More Experience: Visualizing Magnetic Fields

Although the representations of magnetic fields in this unit show magnetic fields as two-dimensional, real magnetic fields exist in three dimensions. You may want to conduct a simple demonstration for small groups of students to show a three-dimensional magnetic field.

- Gather materials: large bottle of baby oil, magnet, iron filings, or iron wool
  - If you do not have iron filings on hand, make some by cutting iron wool into small pieces.
- Drop a few teaspoons of iron filings into the bottle of baby oil. Seal the lid.
- Gently shake the bottle to distribute the iron filings.
- Hold the bottle sideways and move a bar or ring magnet under the bottle. The iron filings will align with the magnetic field to show three-dimensional field lines.
- If the iron filings become too clumped, shake the bottle and repeat.

Break



Discourse within Amplify Science

Discussions and writing

Articles
Hands-on activities
Digital tools

Science and Engineering Practices

inquiry
1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations

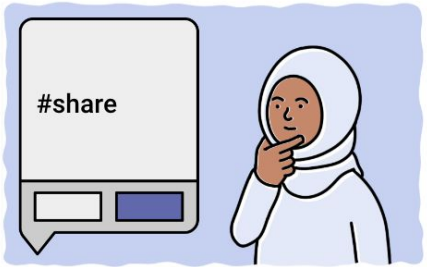
math
4. Analyzing and interpreting data
5. Using mathematics and computational thinking

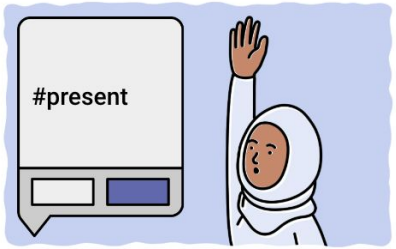
language
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Amplify.

Let's Practice

Discourse Routines





Discourse Routine Reference

https://bit.ly/3sVicie

Think-Pair-Share

Think-Pair-Share Routine

Think

Think silently about the question.

Pair

Turn and talk to a partner about the question.

Share

Share your ideas about the question with the class.

Think-Draw-Pair-Share Routine

Think

Think silently about the question.

Draw

Draw your ideas in your notebook.

Pair

Turn and talk to a partner about the question.

Share

Share your ideas about the question with the class.

Think-Write-Pair-Share Routine

Think

Think silently about the question.

Write

Write your ideas about the question in your notebook.

Pair

Turn and talk to a partner about the question.

Share

Share your ideas about the question with the class.

We are used to using this routine. Is there anyone that has tried to build on this strategy or different ways to group students?

Thought Swap

Thought Swap

Step 1

Make two lines so that you each have a partner directly across from you.

Step 2

Discuss the first question with your partner.

Step 3

Switch partners and discuss the next question.

Thought Swap Question 1:

What have you been successful with in teaching Amplify Science?

Now, switch partners for Thought Swap Question 2:

What have you struggled with in teaching Amplify Science? How did you address it?

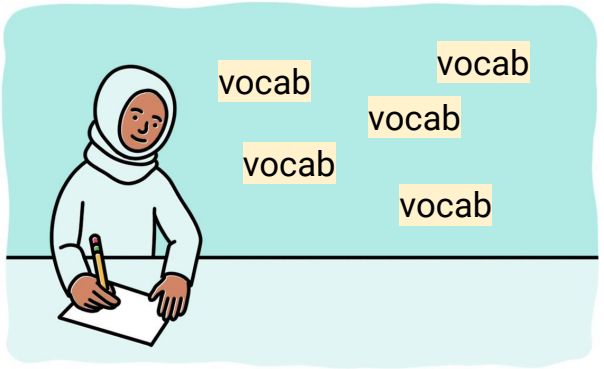
Variation on Thought Swap

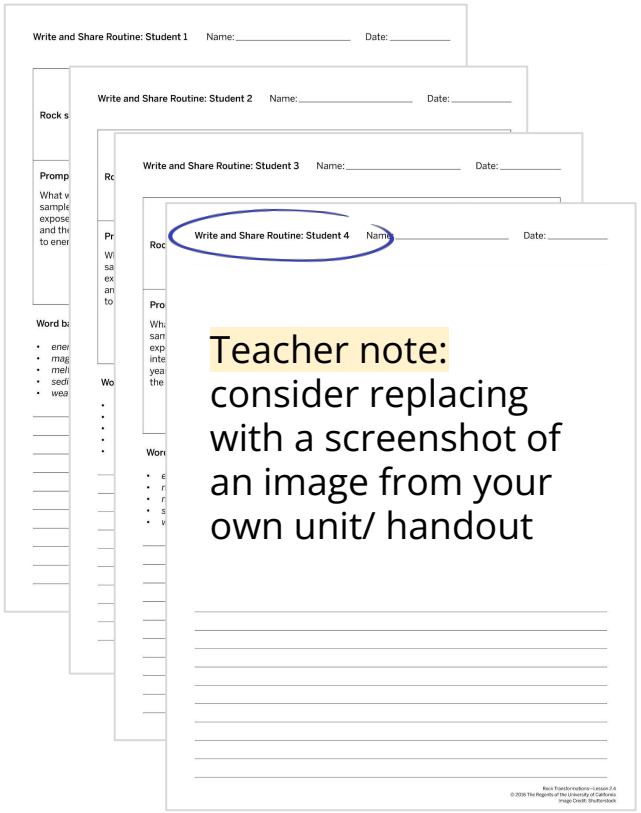
Put students in groups of 8 (or 6) and have them rotate as the questions change.

Write and Share

Write and Share Routine

1. Carefully **read and annotate** the information you're given.
2. **Answer your prompt** using the vocabulary words.
3. After everyone in your group has had a chance to write, **take turns introducing your prompts and sharing** your responses.
4. While one student presents, the others should **listen carefully.**
5. After each student presents, the other students in the group can **ask questions** or make comments.

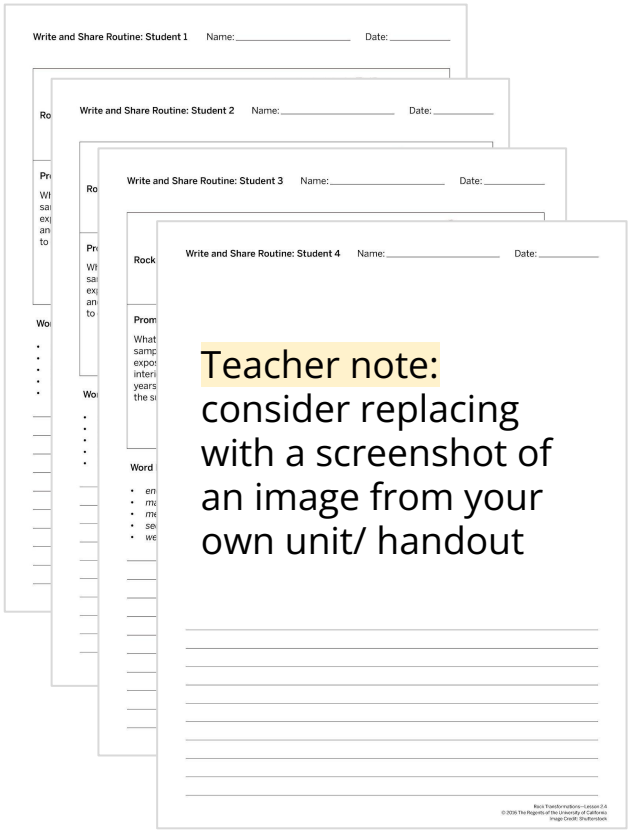




I'll give each member of your group a number.

Find the sheet that matches your number. This is the piece of evidence you will respond to.

Investigation Notebook **pgs XX- XX**



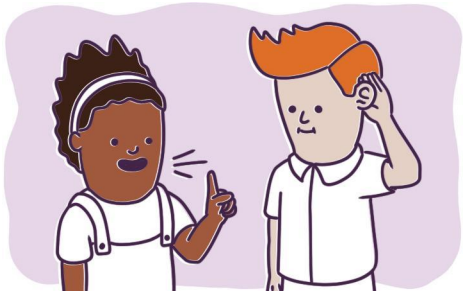
Let's hear from a few different groups.

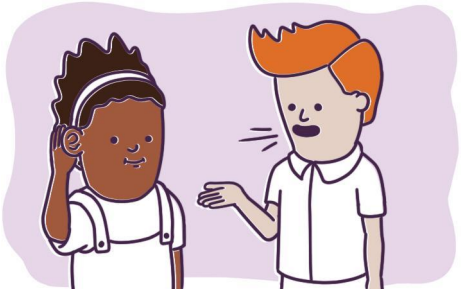
What ideas did you share in your group?

What did you **learn** from another group member?

Discourse Routine Templates

Discourse Routines

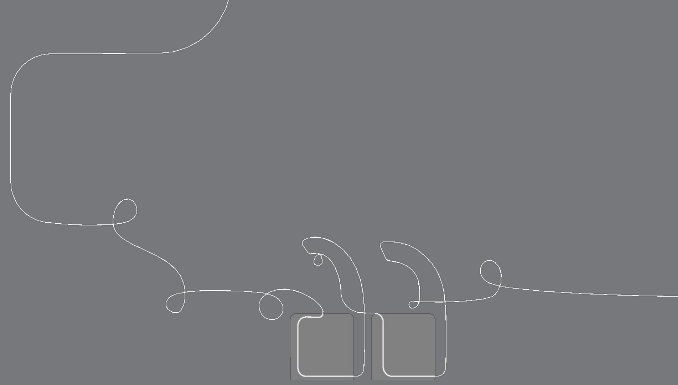




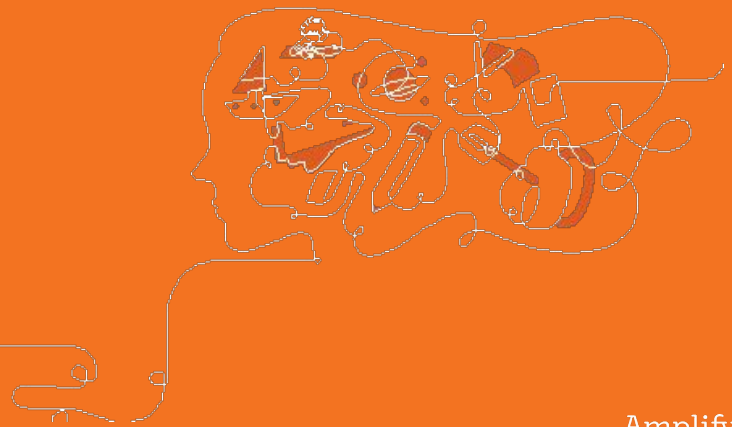
Discourse Routine Templates

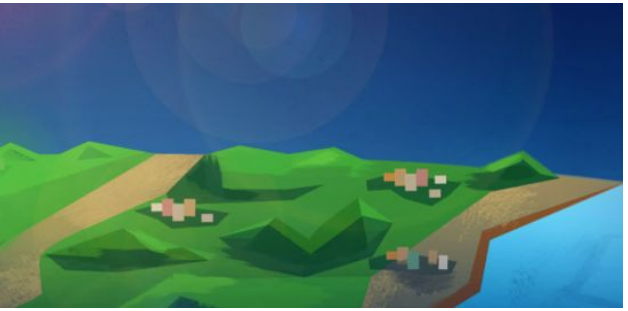
https://bit.ly/3WtzCQs

Questions?



Lunch Break

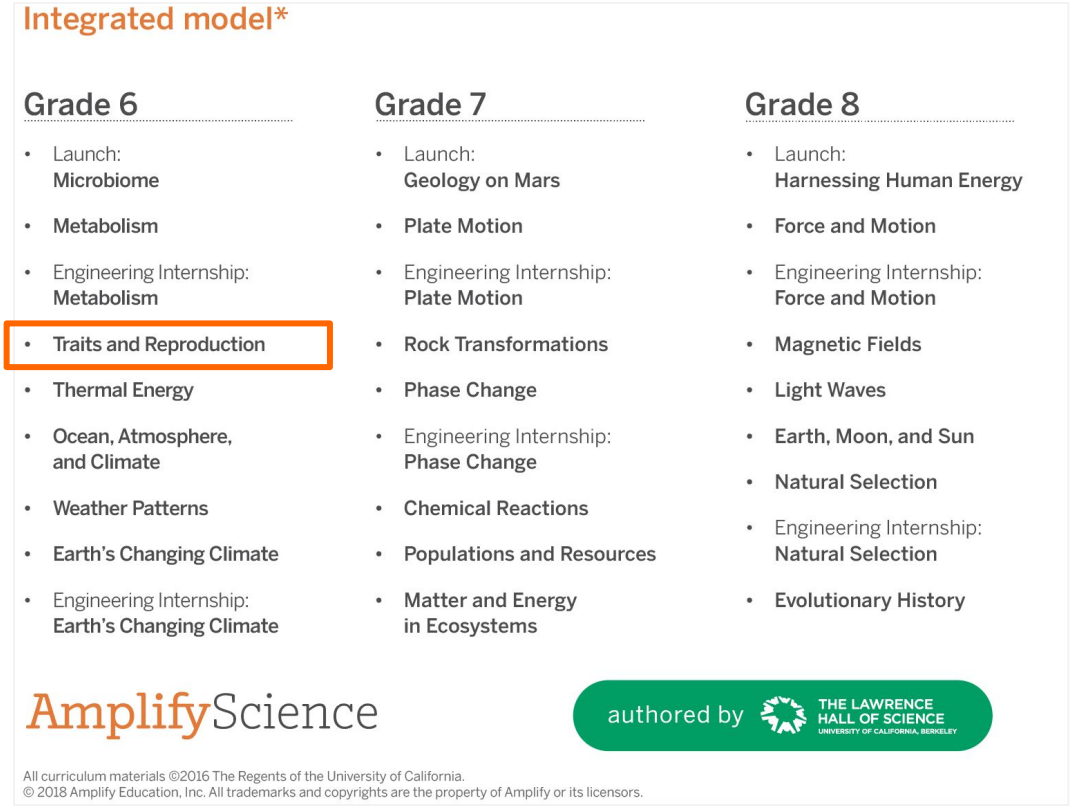




Plan for the day

- Introduction
- Language of the Science Classroom
- Embedded and Additional Supports
- Experiencing a Lesson
- Planning for Supports
- Closing

Middle school course curriculum structure



Launch unit

- First unit
- 11 lessons

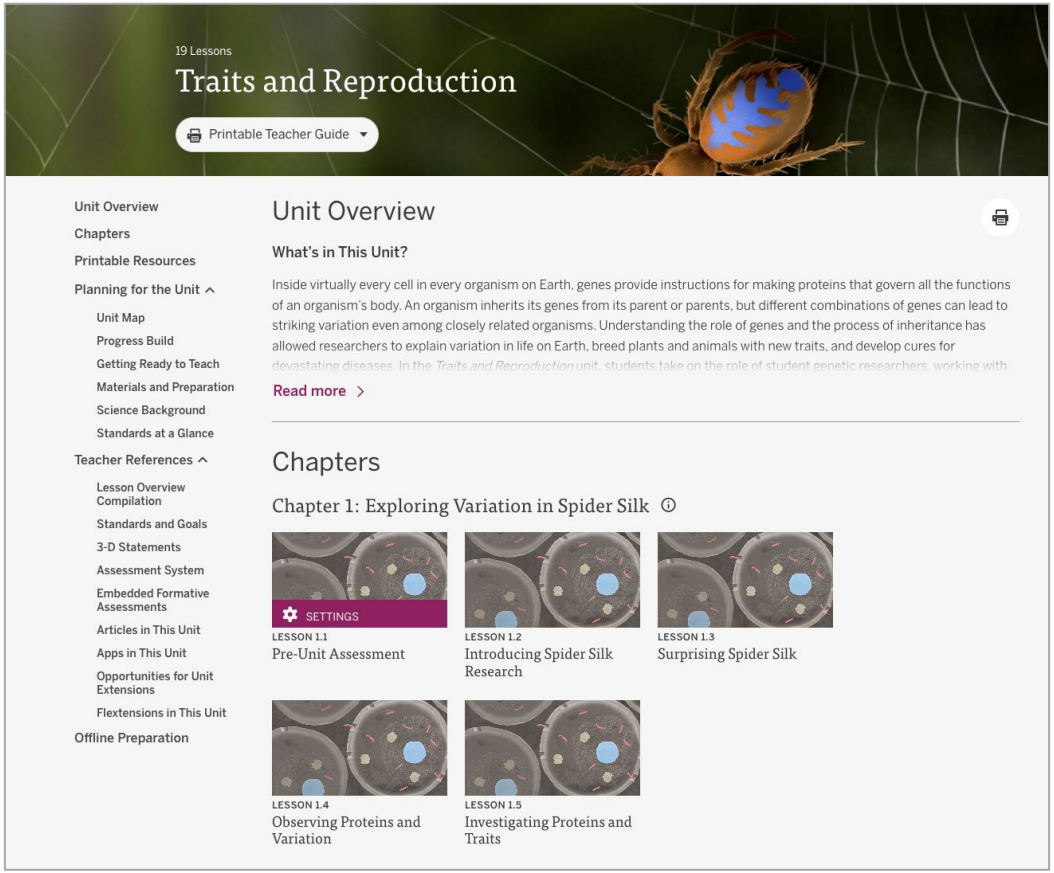
Core units

- Majority of units
- 19 lessons

Engineering Internships

- Two per year
- 10 lessons

Traits and Reproduction



CORE Unit 4

TRAITS and REPRODUCTION

AmplifyScience

TRAITS and REPRODUCTION

Students learn about the role proteins, genes, and sexual reproduction play in trait variation.

They are able to apply what they learn about spiders to a human context.

Traits and Reproduction

Problem: Why do Darwin's bark spider offspring have different silk flexibility traits even though they have the same parents?

Role: Student geneticists

Students investigate what causes variation in spider silk traits. Specifically, they explain why parent spiders have offspring with widely varied silk flexibility traits. They uncover the roles of proteins and genes and the way that genes are inherited.

Coherent storylines

Why do traits for silk flexibility vary within this family of Darwin's bark spiders?

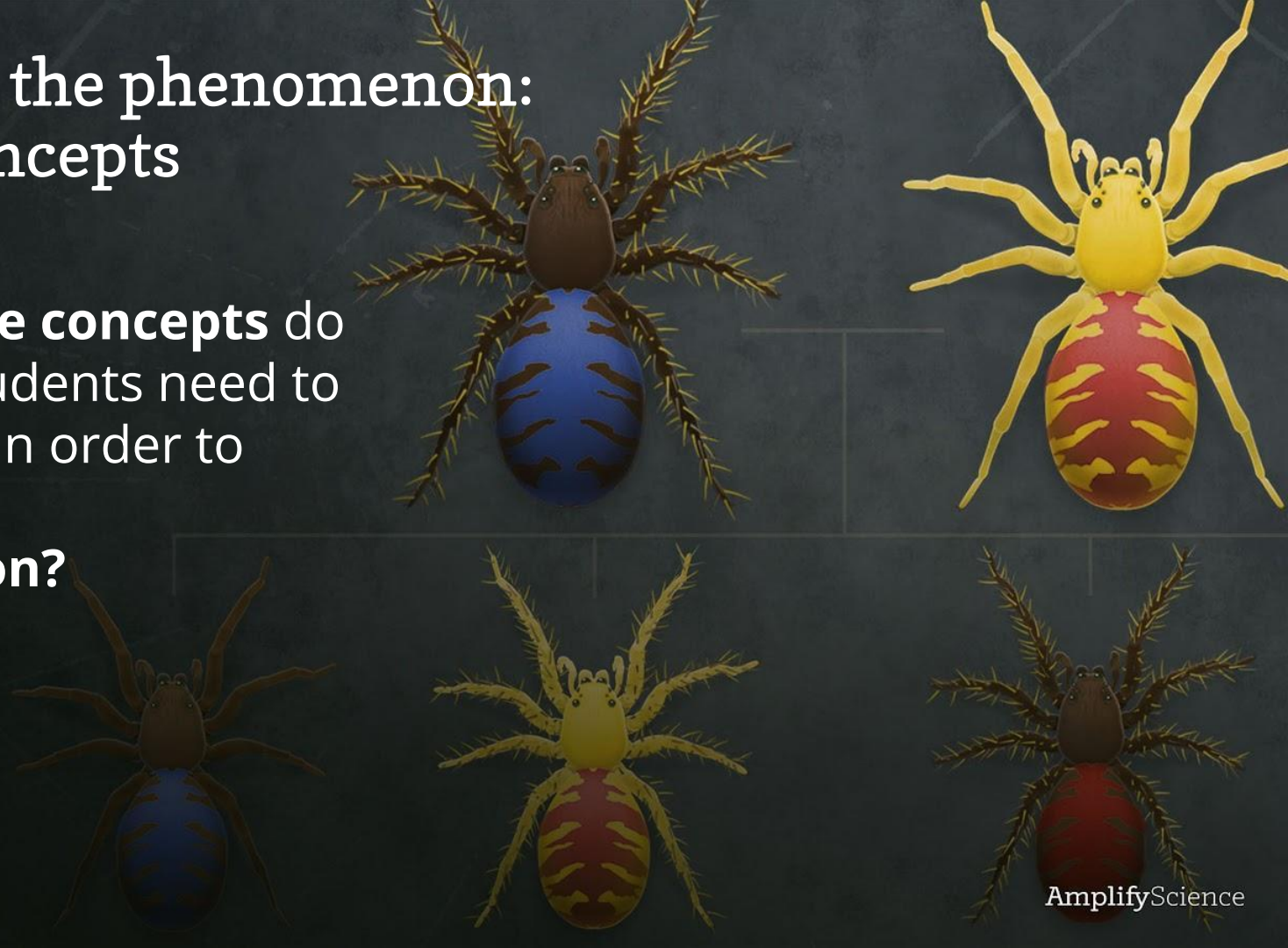
Why do Darwin's bark spiders make different proteins for silk flexibility?

Why do the Darwin's bark spider offspring have different gene combinations even though they have the same parents?

Students apply what they learn to a new question- Why is Jackie an elite distance runner when no one else in her family has that trait?

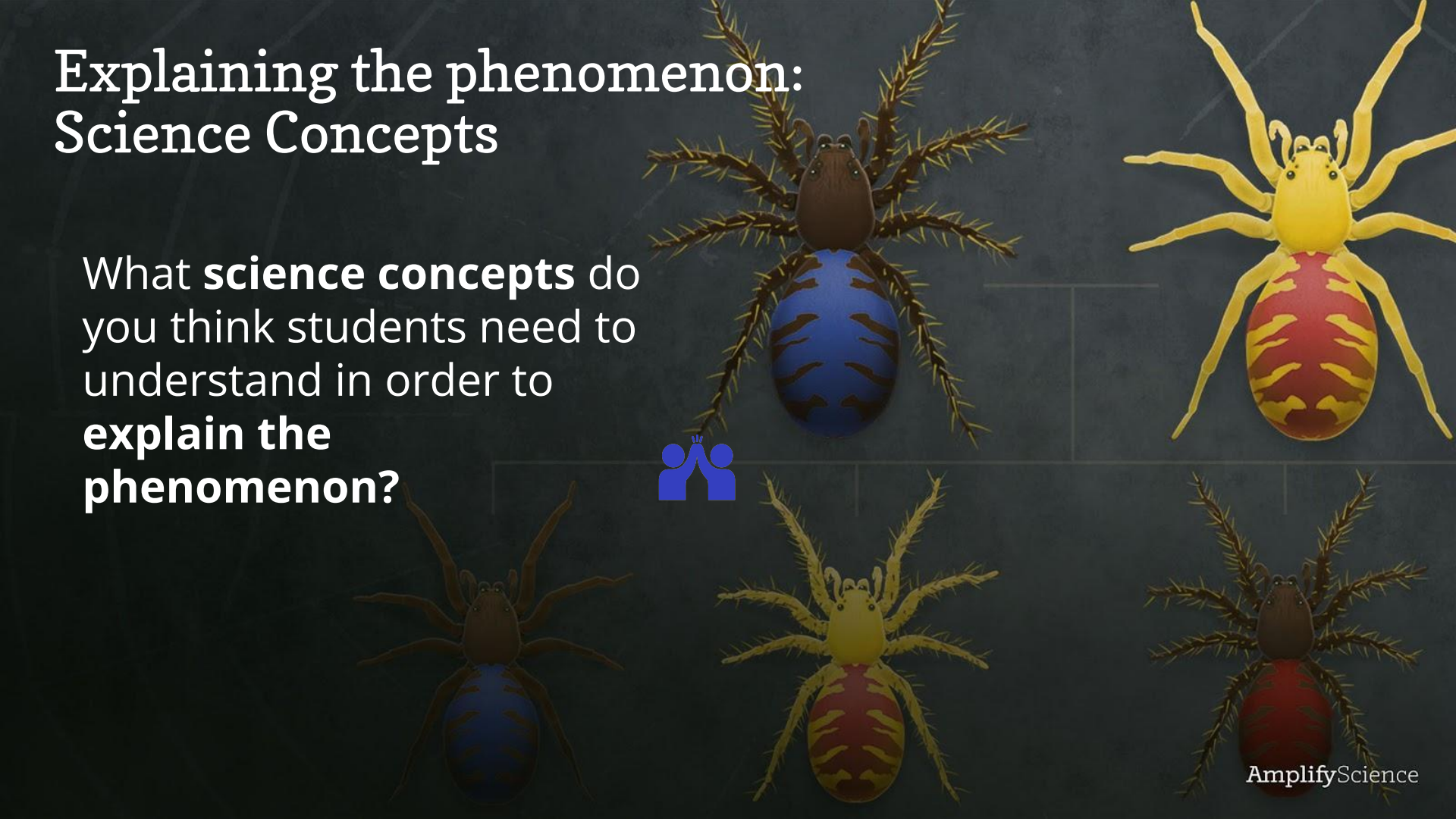
Explaining the phenomenon: Science Concepts

What **science concepts** do you think students need to understand in order to **explain the phenomenon?**



Explaining the phenomenon: Science Concepts

What **science concepts** do you think students need to understand in order to **explain the phenomenon?**



Progress Build

Traits and Reproduction

Level 1

The traits of an organism are determined by the structure of protein molecules and the interactions of those protein molecules in cells.

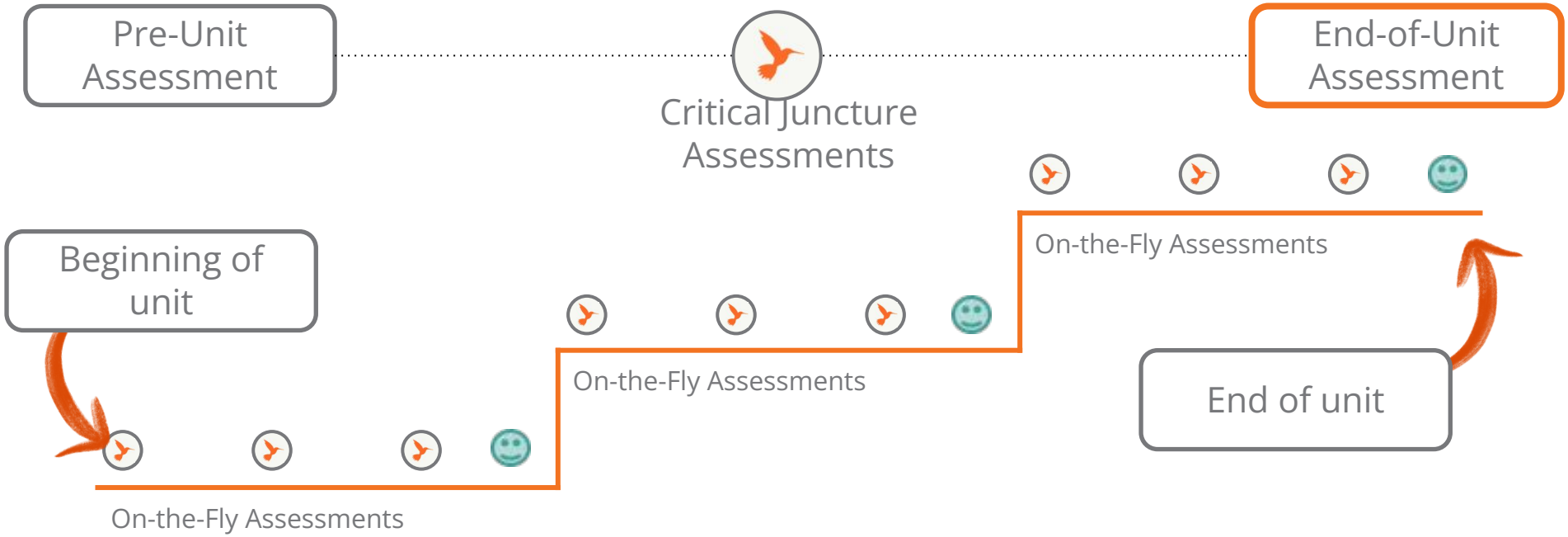
Level 2

Genes are instructions for producing proteins

Level 3

Through sexual reproduction, an organism inherits a random combination of gene versions from its parents.

6-8 Core Unit Assessment System



Traits and Reproduction: The Genetics of Spider Silk

Problem students work to solve

Why do Darwin's bark spider offspring have different silk flexibility traits even though they have the same parents?

Chapter 1 Question

Why do traits for silk flexibility vary within this family of Darwin's bark spiders?

Investigation Question

What determines an organism's traits at the molecular scale? (1.3-1.5)

Evidence sources and reflection opportunities

- Compare spider traits in the Sim (1.2)
- Read "Surprising Spider Silk" (1.3)
- Build physical models of spider silk protein molecules (1.3)
- Use the Sim to observe protein molecules of spiders with different traits for silk flexibility (1.4)

Key concepts

- The function of a protein molecule depends on its structure and how it interacts with other protein molecules. (1.3)
- Differences in the structure of protein molecules affect how they connect to other protein molecules. This can result in different traits. (1.4)
- The structure of molecules determines how they function at a molecular scale, which determines the properties of the object they make up. (1.4)
- Organisms can have different proteins in their cells for a particular feature. (1.5)

Application of key concepts to problem

- Model what determines silk flexibility using the paper Modeling Tool (1.4)
- Use the Sim to make and test predictions about the effects of changing protein shapes (1.5)
- Discuss new evidence and claims (1.5)

Explanation that students can make to answer the Chapter 1 Question

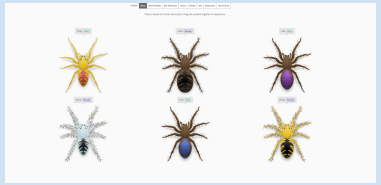
The spiders in this family must have different proteins for silk flexibility in their cells. Variation in traits can be caused by variation in protein molecules within individuals' cells. Protein molecules' structures affect their function and the way they connect to other molecules. Spider silk is made of proteins, and connections between these molecules affect silk flexibility.

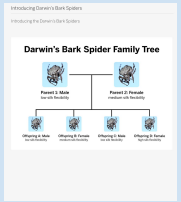
Gathering evidence

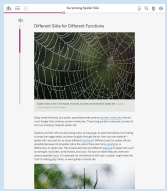
Traits and Reproduction 1.3

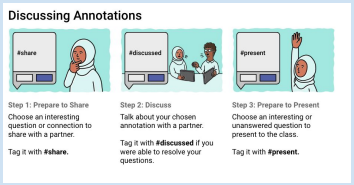
Chapter Question: Why do traits for silk flexibility vary within this family of Darwin's bark spiders?

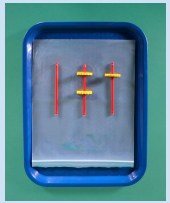
Investigation Question: What determines an organism's traits at the molecular scale?







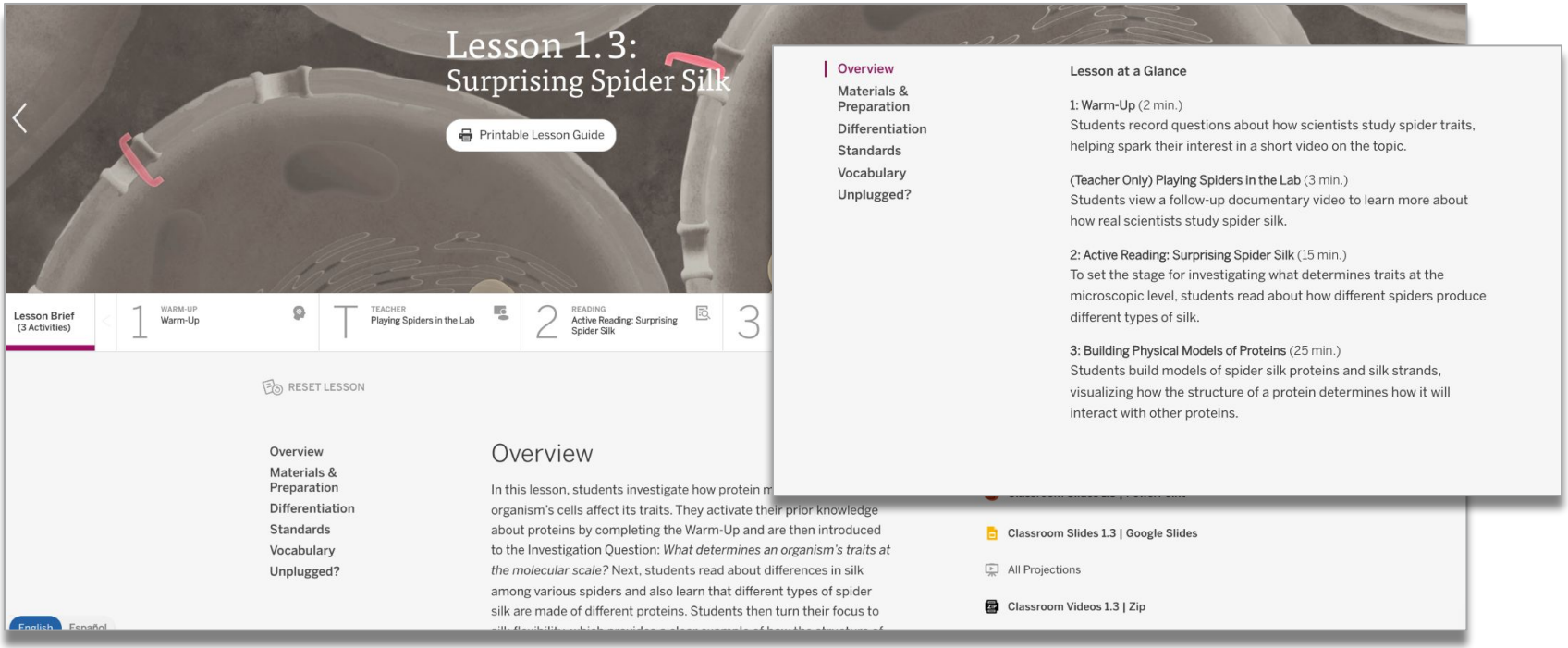




What have students figured out so far?

Traits and Reproduction 1.3

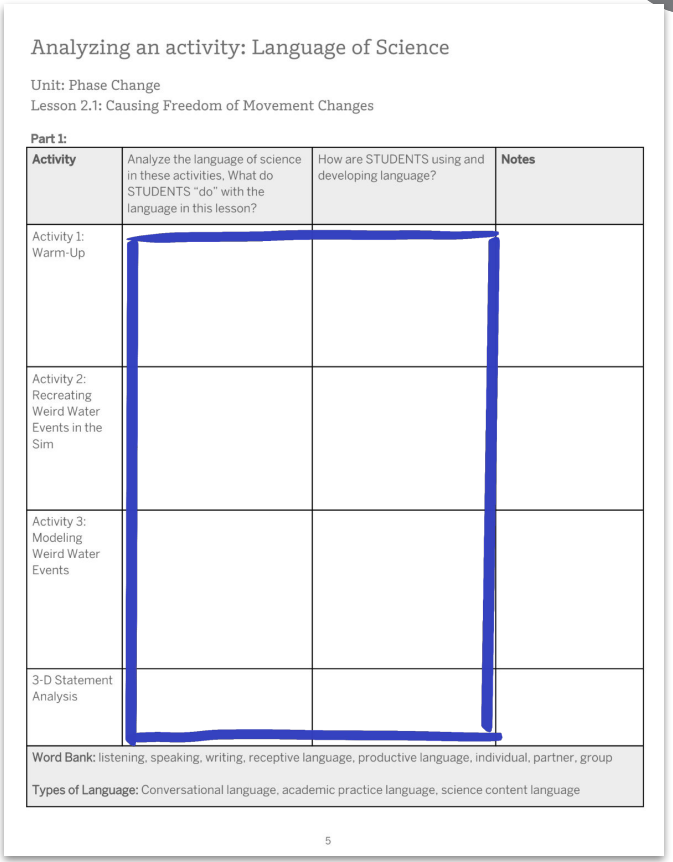
In the Lesson brief, read the Lesson at a Glance section.



Considering language demands

Pg. 5

- What will students “do” with language in this lesson? (*receptive or productive)*
- What types of language will support students in engaging with the lesson?



Analyzing an activity: Language of Science

Unit: Phase Change
Lesson 2.1: Causing Freedom of Movement Changes

Part 1:

Activity	Analyze the language of science in these activities. What do STUDENTS “do” with the language in this lesson?	How are STUDENTS using and developing language?	**Notes**
Activity 1: Warm-Up			
Activity 2: Recreating Weird Water Events in the Sim			
Activity 3: Modeling Weird Water Events			
3-D Statement Analysis			

Word Bank: listening, speaking, writing, receptive language, productive language, individual, partner, group

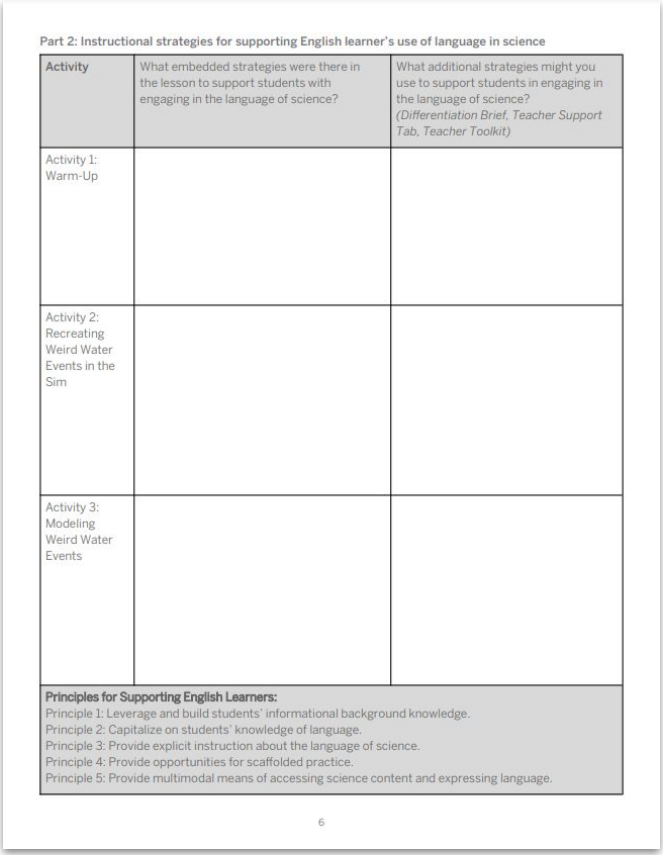
Types of Language: Conversational language, academic practice language, science content language

5

Reflecting with students in mind

Strategies and supports

As you go through the lesson, think about what embedded or additional strategies were used to support engaging in the language of science?



Part 2: Instructional strategies for supporting English learner's use of language in science

Activity	What embedded strategies were there in the lesson to support students with engaging in the language of science?	What additional strategies might you use to support students in engaging in the language of science? *(Differentiation Brief, Teacher Support Tab, Teacher Toolkit)*
Activity 1: Warm-Up		
Activity 2: Recreating Weird Water Events in the Sim		
Activity 3: Modeling Weird Water Events		

Principles for Supporting 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 language.

6

Language demands

The 3-D Statement can help focus us in on the goal of the lesson.

- Using a model to support an explanation of a phenomenon
- Communicating their ideas through the model (*productive)*
- Cause and effect language

Students build and analyze physical models of spider silk strands of varying flexibility to investigate how the structure of proteins determines their function (structure and function)—how they connect to form more flexible or less flexible spider silk.

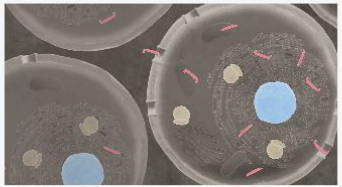
Practices Disciplinary Core Ideas Crosscutting Concepts

Traits and Reproduction

Chapters

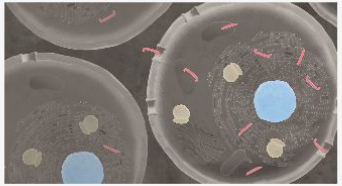
Chapter 1: Exploring Variation in Spider Silk

LESSON 1.1
Pre-Unit Assessment

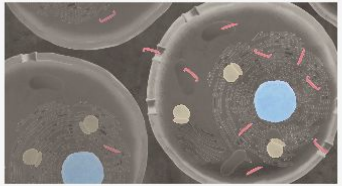


LESSON 1.2
Introducing Spider Silk Research

LESSON 1.3
Surprising Spider Silk



LESSON 1.4
Observing Proteins and Variation



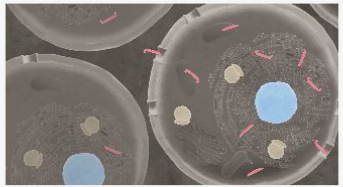
LESSON 1.5
Investigating Proteins and Traits

Traits and Reproduction

Chapters

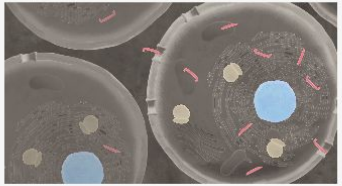
Chapter 1: Exploring Variation in Spider Silk

LESSON 1.1
Pre-Unit Assessment

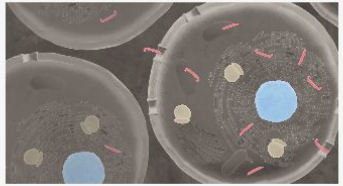


LESSON 1.2
Introducing Spider Silk Research

LESSON 1.3
Surprising Spider Silk

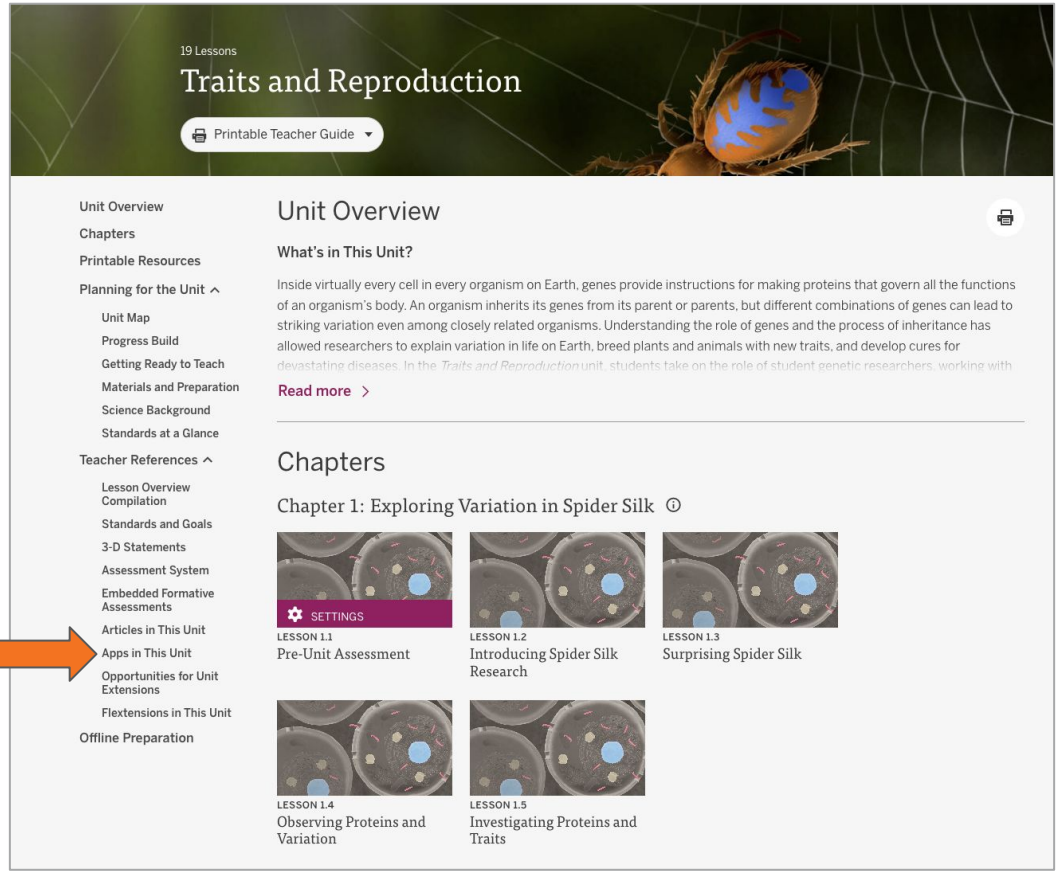


LESSON 1.4
Observing Proteins and Variation

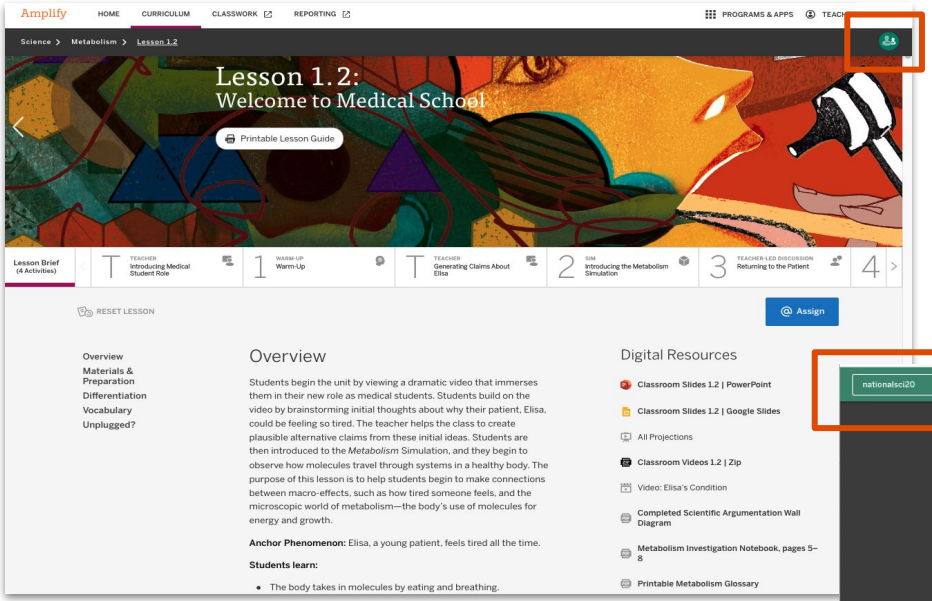


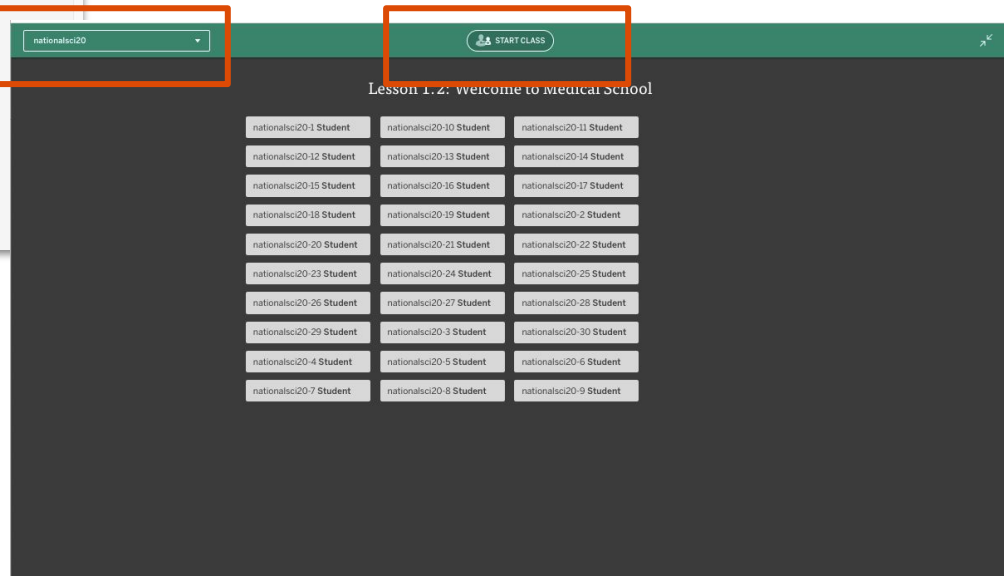
LESSON 1.5
Investigating Proteins and Traits

Traits and Reproduction

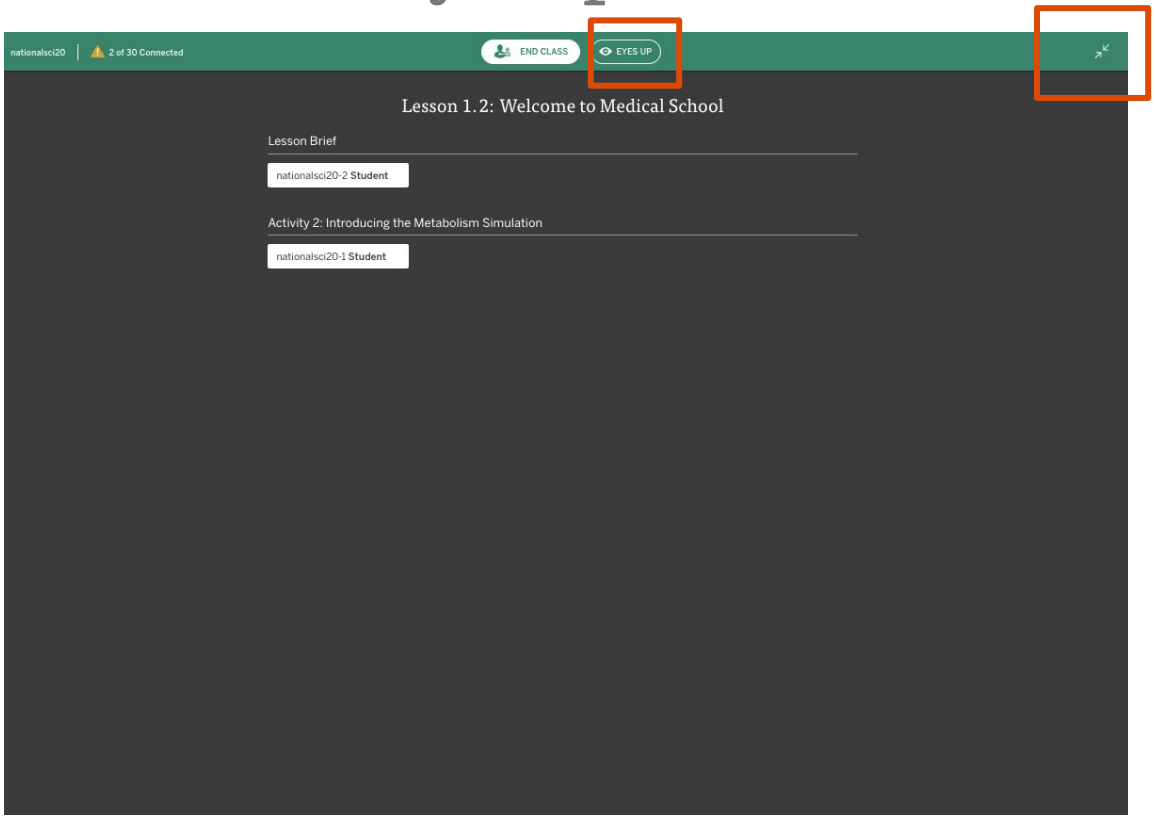


Student status screen: Start Class





Student Status screen: Eyes up



Darwin's Bark Spider Claims

Question: Why do traits for silk flexibility vary within this family of Darwin's bark spiders?

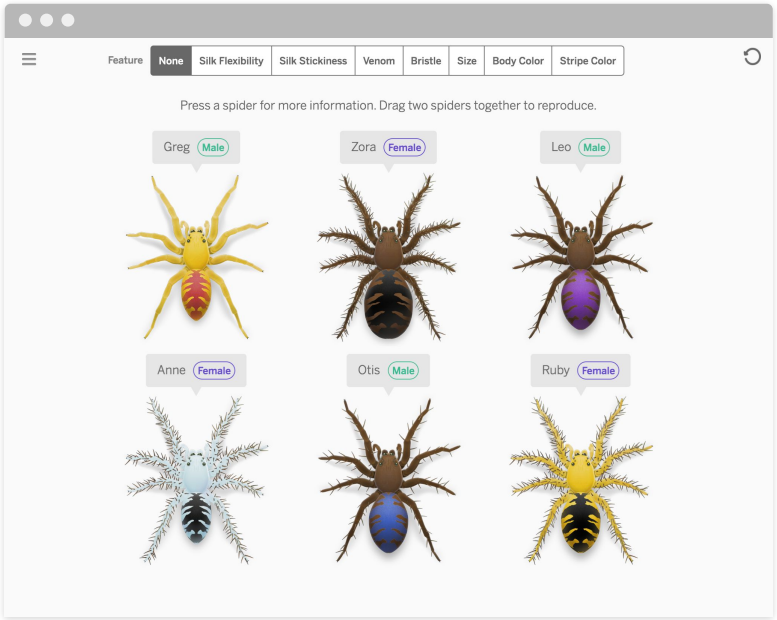
Claim 1: The offspring have **mutations** that affect their traits.

Claim 2: The offspring's traits depend on **which parent the offspring received more traits from**.

Claim 3: The offspring received **different combinations of traits from their parents**.

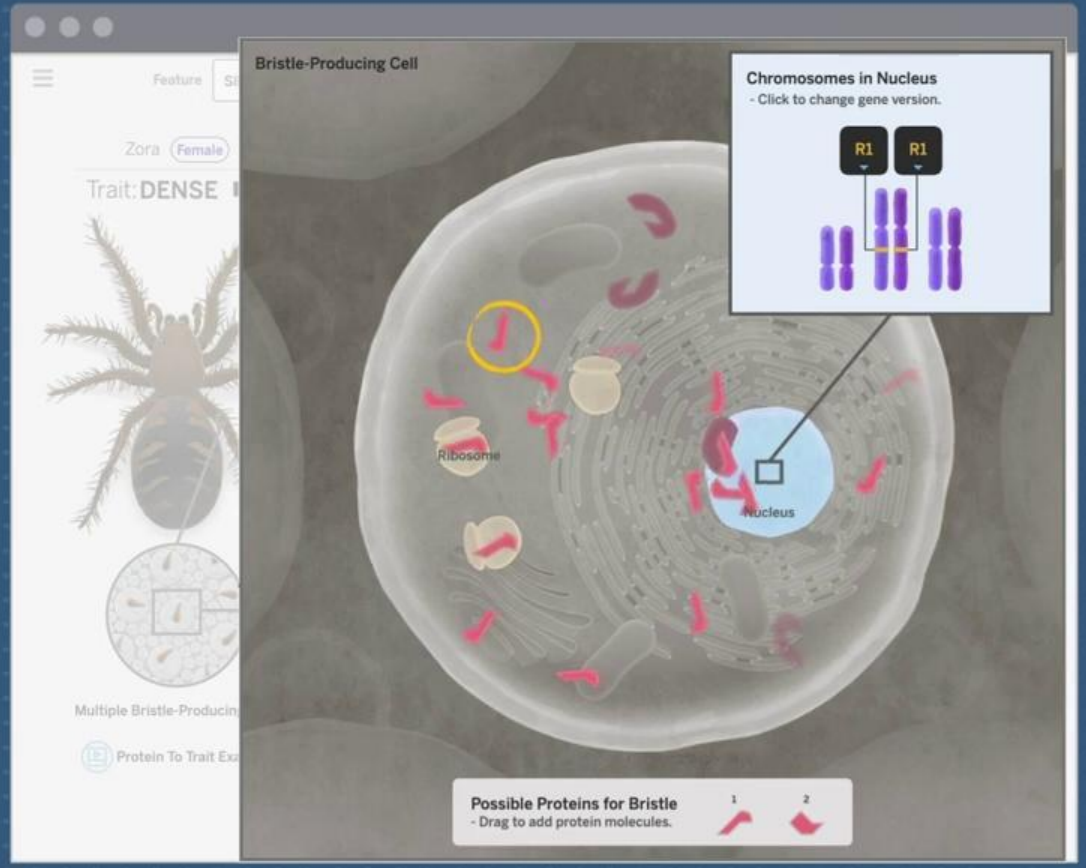
These are **claims** about why the trait for silk flexibility varies within the spider family.

We'll return to these claims as we learn more about traits in this unit.



Throughout this unit, we will be using the *Traits and Reproduction* **Simulation** to help us learn more about **variation in the traits** of spiders.

Here's a zoomed-in view of one cell showing the **protein molecules** inside.

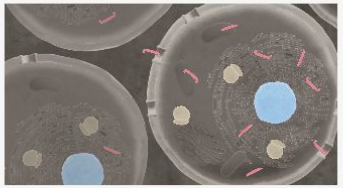


Traits and Reproduction

Chapters

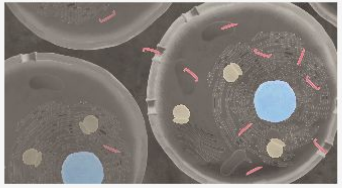
Chapter 1: Exploring Variation in Spider Silk

LESSON 1.1
Pre-Unit Assessment

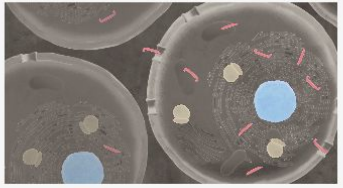


LESSON 1.2
Introducing Spider Silk Research

LESSON 1.3
Surprising Spider Silk



LESSON 1.4
Observing Proteins and Variation



LESSON 1.5
Investigating Proteins and Traits

Traits and Reproduction

Materials for Lesson 1.3

For the Classroom Wall

Key Concept: The function of a protein molecule depends on its structure and how it interacts with other protein molecules.

Vocabulary Card: function, protein molecule, structure

For the Class:

- Masking tape*
- Annotation tracker*
- K'NEX Intermediate Math and Geometry Kit+
- Optional: 1 sheet of chart paper
- Optional: 1 marker

Each Group of Four Students

- 9 K'NEX red rods
- 9 K'NEW green or yellow connectors
- 2 plastic bags

For Each Student

- 1 Copy Modeling Protein Molecules student sheet*
- Optional: printed copy of the *Surprising Spider Silk* article
- Optional: Traits and Reproduction Investigation Notebook, pages 11-15

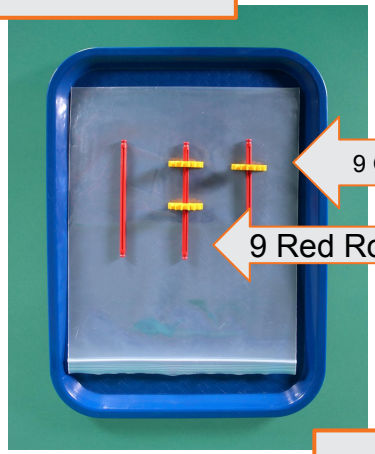
Digital Tools

- *Surprising Spider Silk* article set in the Amplify Library

Student Materials Needed for lesson 1.3

Groups of 4 Students

2 Plastic Bags



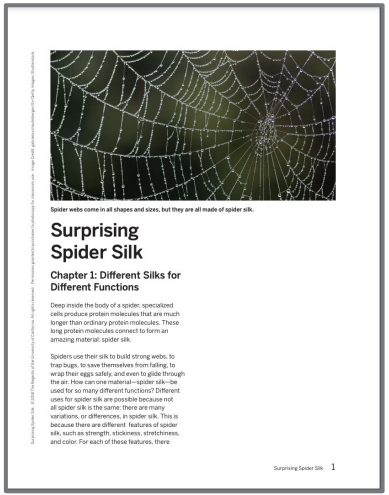
9 Green or Yellow Connectors

9 Red Rods

For Each Student

Digital or Print Versions

- Article
- Investigation Notebook



Spider webs come in all shapes and sizes, but they are all made of spider silk.

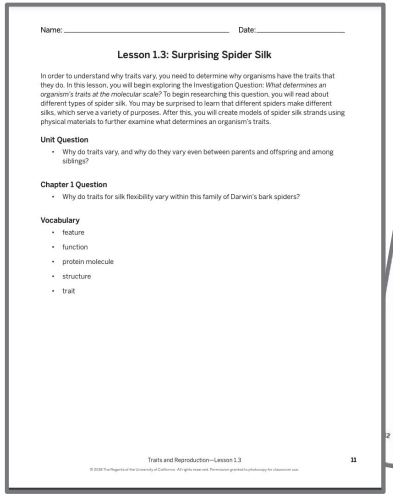
Surprising Spider Silk

Chapter 1: Different Silks for Different Functions

Deep inside the body of a spider, specialized cells produce protein molecules that are much longer than ordinary protein molecules. These long protein molecules connect to form an amazing material: spider silk.

Spiders use their silk to build strong webs, to trap bugs, to save themselves from falling, to wrap their eggs safely, and even to glide through the air. How can one material—spider silk—be used for so many different functions? Different uses for spider silk are possible because not all spider silk is the same: there are many variations, or differences, in spider silk. This is because there are different features of spider silk, such as strength, stickiness, stretchiness, and color. For each of these features, there

Surprising Spider Silk 1



Name: _____ Date: _____

Lesson 1.3: Surprising Spider Silk

In order to understand why traits vary, you need to determine why organisms have the traits that they do. In this lesson, you will begin exploring the Investigation Question: *What determines an organism's traits at the molecular scale?* To begin researching this question, you will read about different types of spider silk. You may be surprised to learn that different spiders make different silks, which serve a variety of purposes. After this, you will create models of spider silk strands using physical materials to further examine what determines an organism's traits.

Unit Question

- Why do traits vary, and why do they vary even between parents and offspring and among siblings?

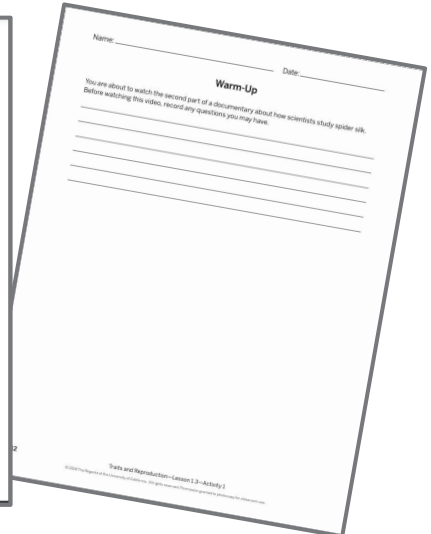
Chapter 1 Question

- Why do traits for silk flexibility vary within this family of Darwin's bark spiders?

Vocabulary

- feature
- function
- protein molecule
- structure
- trait

Traits and Reproduction—Lesson 1.3 11



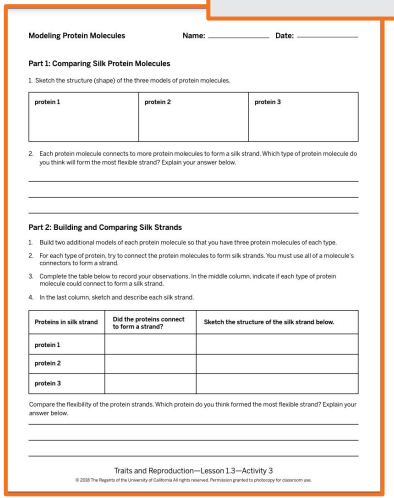
Name: _____ Date: _____

Warm-Up

You are about to watch the second part of a documentary about how scientists study spider silk. Before watching this video, record any questions you may have.

Traits and Reproduction—Lesson 1.3—Activity 1

Modeling Protein Molecules



Modeling Protein Molecules Name: _____ Date: _____

Part 1: Comparing Silk Protein Molecules

1. Sketch the structure (shape) of the three models of protein molecules.

protein 1	protein 2	protein 3

2. Each protein molecule connects to more protein molecules to form a silk strand. Which type of protein molecule do you think will form the most flexible strand? Explain your answer below.

Part 2: Building and Comparing Silk Strands

1. Build two additional models of each protein molecule so that you have three protein molecules of each type.
2. For each type of protein, try to connect the protein molecules to form silk strands. You must use all of a molecule's connectors to form a strand.
3. Complete the table below to record your observations. In the middle column, indicate if each type of protein molecule could connect to form a silk strand.
4. In the last column, sketch and describe each silk strand.

Proteins in silk strand	Did the proteins connect to form a strand?	Sketch the structure of the silk strand below.
protein 1		
protein 2		
protein 3		

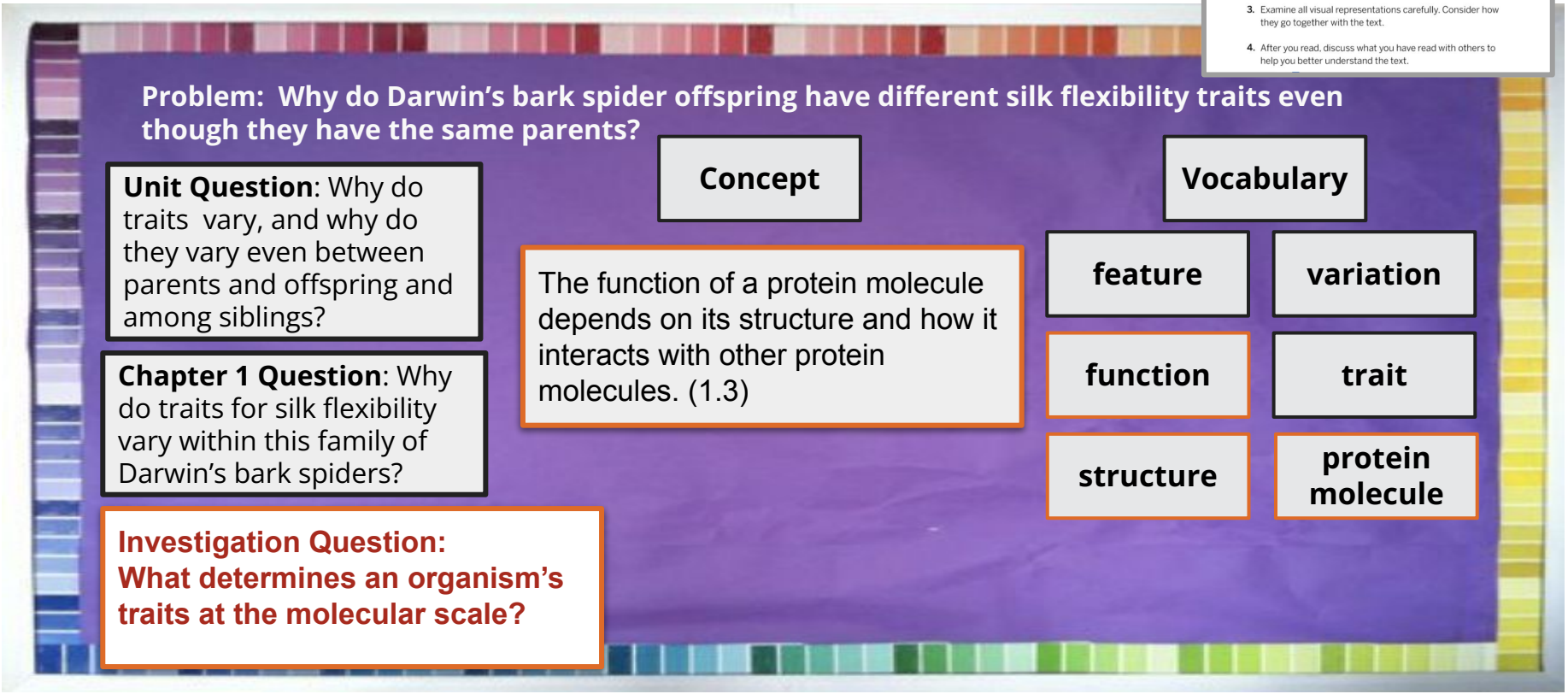
Compare the flexibility of the protein strands. Which protein do you think formed the most flexible strand? Explain your answer below.

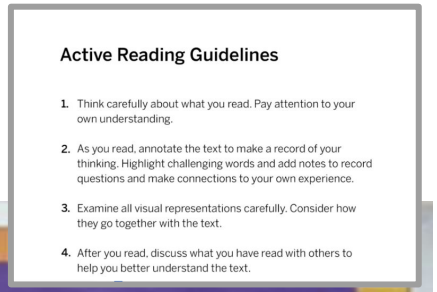
Traits and Reproduction—Lesson 1.3—Activity 3

Amplify.

Traits and Reproduction

Classroom Wall





Active Reading Guidelines

1. Think carefully about what you read. Pay attention to your own understanding.
2. As you read, annotate the text to make a record of your thinking. Highlight challenging words and add notes to record questions and make connections to your own experience.
3. Examine all visual representations carefully. Consider how they go together with the text.
4. After you read, discuss what you have read with others to help you better understand the text.

Traits and Reproduction

Differentiation

1. Strategic Partnering
2. Extended Teacher Modeling either with a small group or pairs
    a. Model what to do when you don’t understand part of what you’ve read.
    b. Model how to record a question as you are annotating.

Traits and Reproduction

Lesson 1.3: Surprising Spider Silk

AmplifyScience

5 MIN

Activity 1

Warm-Up

Warm-Up

You are about to watch the second part of a documentary about how scientists study spider silk. Before watching this video, record any questions you may have.

Students can work on the Activity DIGITALLY or in PRINT

In the last lesson, we watched a video featuring a real scientist who studies **spider traits.**

We will now watch a follow-up video about how scientists study **spider silk.**

Any questions or comments about the video we just viewed?

Activity 2

Active Reading: Surprising Spider Silk

Remember that we are investigating differences in the **silk flexibility trait** of a spider family.

In the previous lesson, we investigated differences in **traits** by observing the **cells** of different spiders in the Sim.

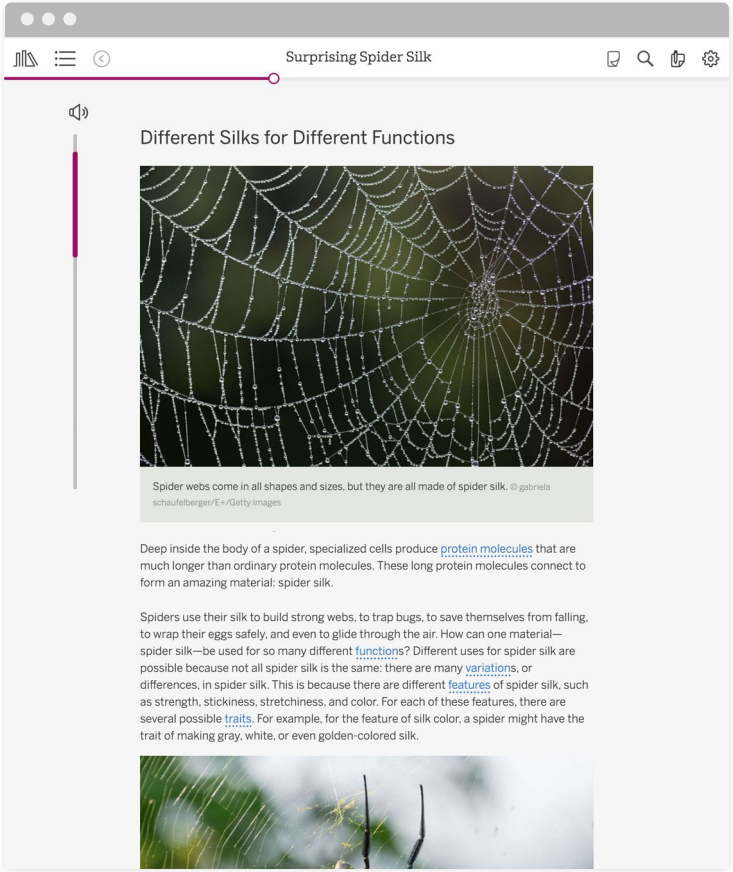
Today, we will be investigating this question:

Investigation Question:
What determines an organism's traits at the molecular scale?

Investigation Question:
What determines an organism's traits at the molecular scale?

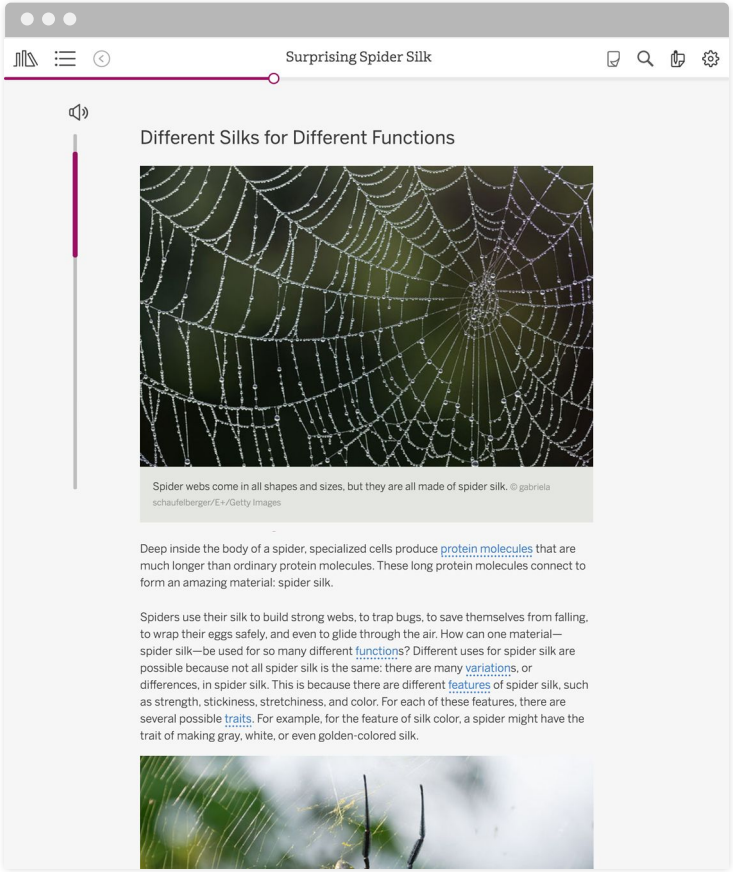
What does the word *molecular* mean?
What are some examples from the Simulation activity in the last lesson?

To understand where an organism's traits come from, we are going to zoom in to cells to see what is happening at a molecular scale—the scale of molecules.



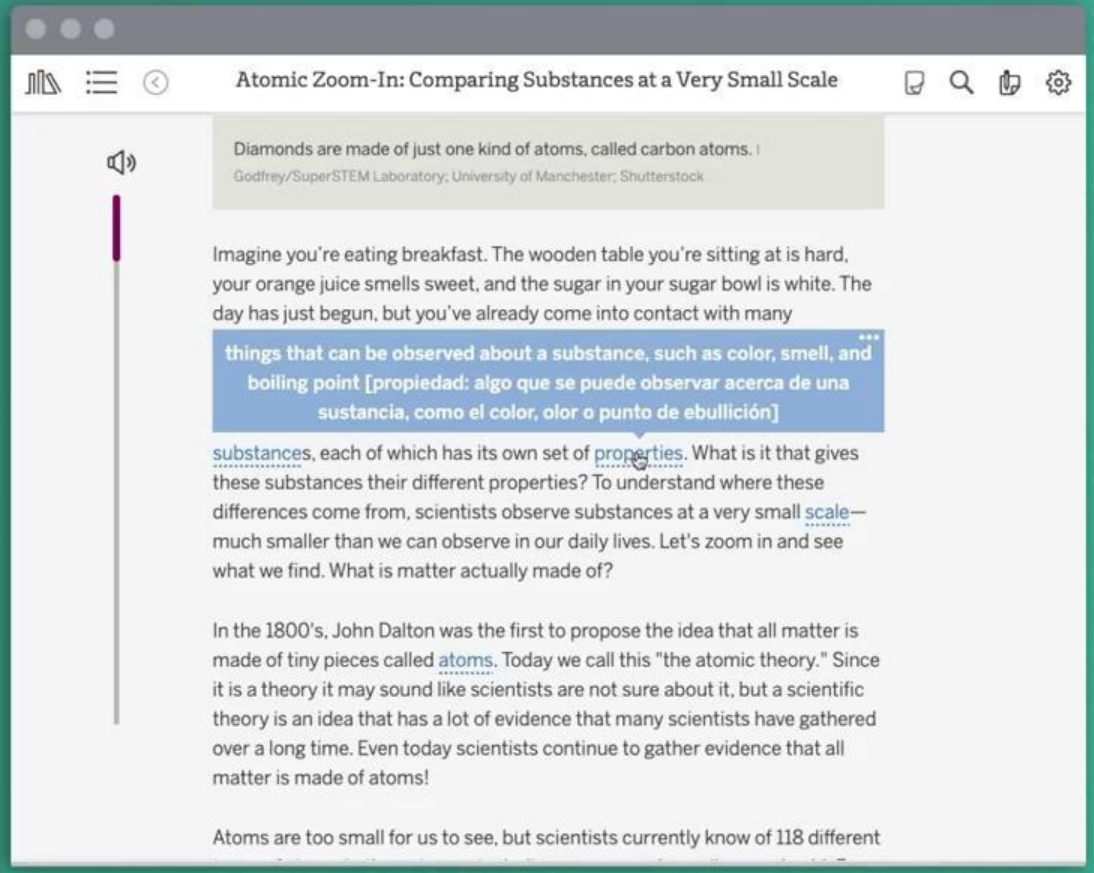
Today, you are going to **read** a short article that will help you understand some of the important things that scientists already know about **variation** in spider silk.

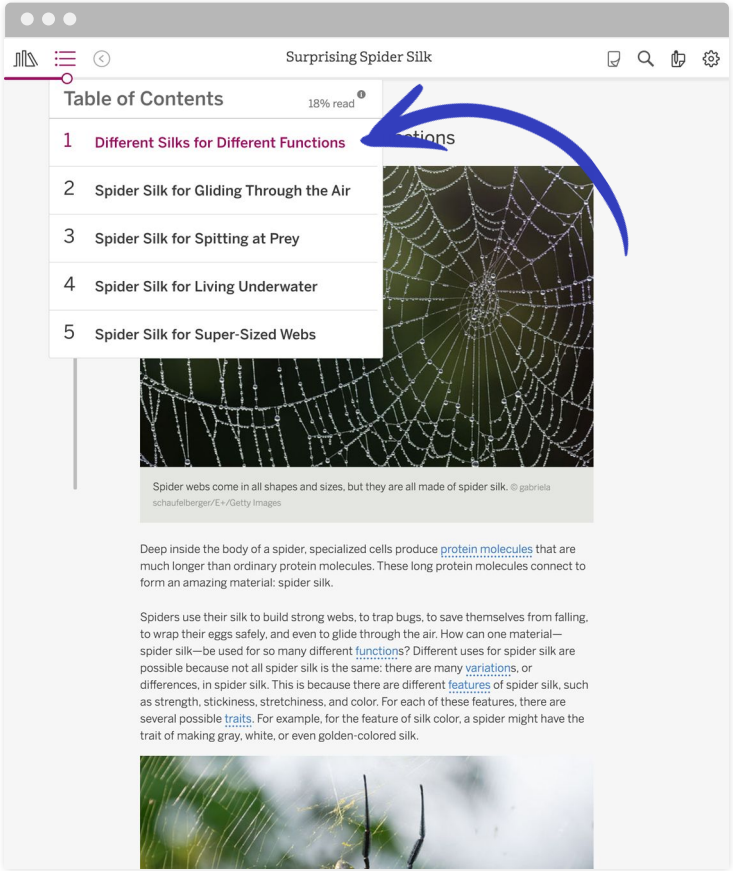
1. You will read only once instead of twice.
2. Use the annotation strategies .
3. Discuss your annotations with a partner.



First, let’s review how to use the features of the Amplify Library.

When in scroll view, you'll see words that are **underlined** in **blue**. These are **Reveal Words**. When you press them, a **definition box** rolls up.



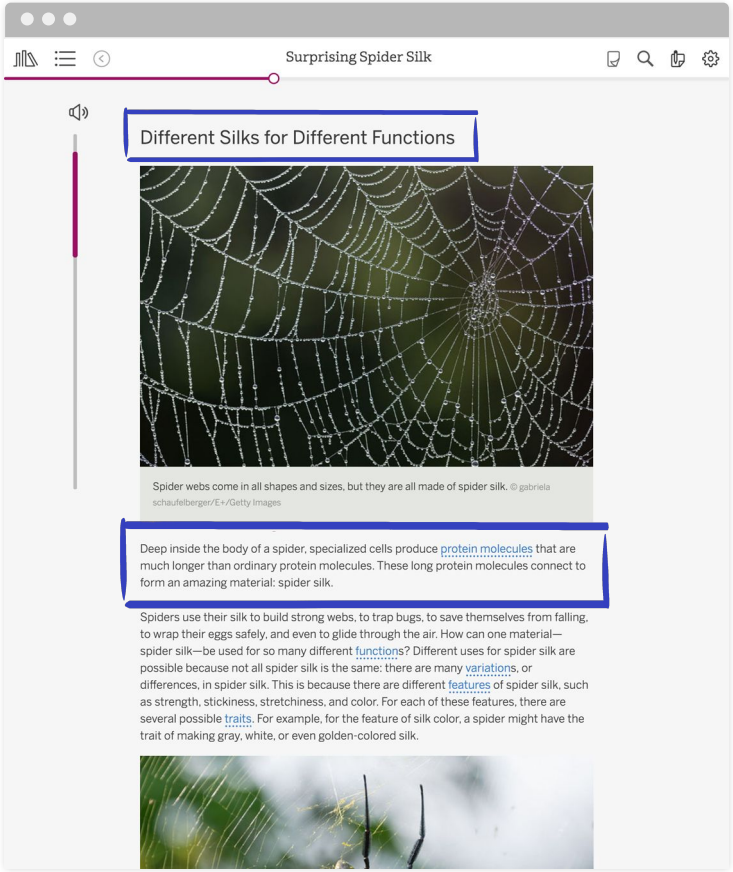


You'll select one of four articles to **read and annotate** independently. Partners should read the same article so you can **share your annotations.** First, let's read the introduction together.

Different Silks for Different Functions

Spider webs come in all shapes and sizes, but they are all made of spider silk. © gabriela schaufelberger/E+/Getty Images

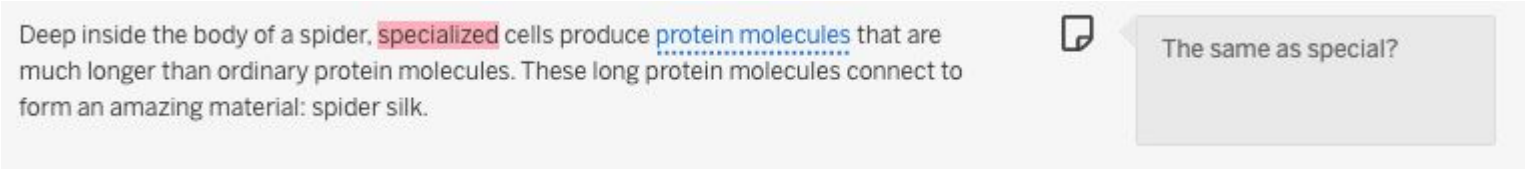
Deep inside the body of a spider, specialized cells produce protein molecules that are much longer than ordinary protein molecules. These long protein

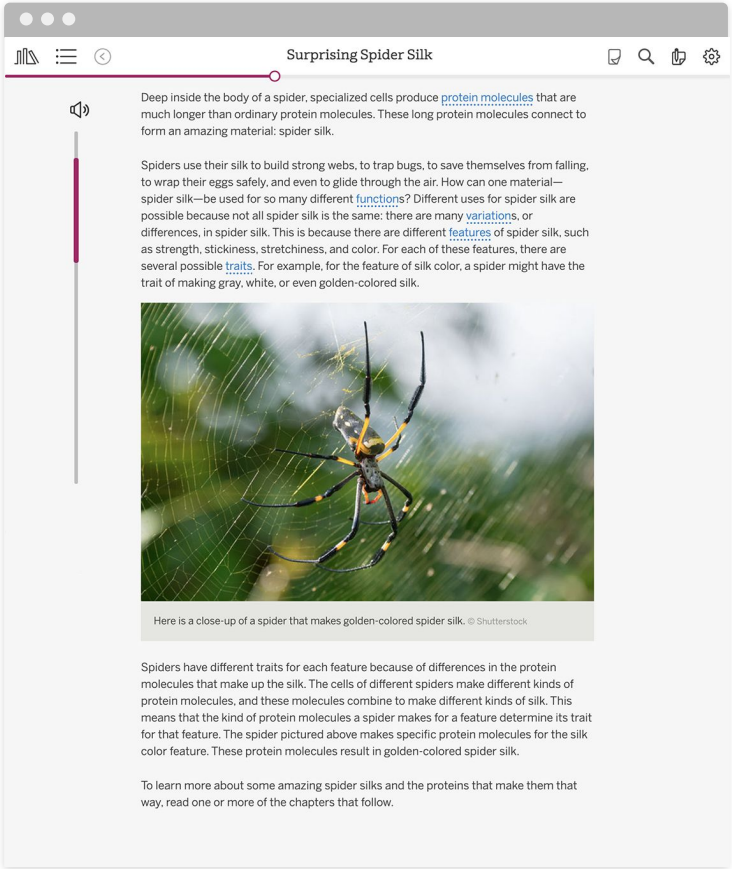


I'll read the **title** and the **first sentence** of the introduction out loud.

The word *specialized* is **unfamiliar.**

I can highlight it and leave a note so I remember to discuss it with a partner later.





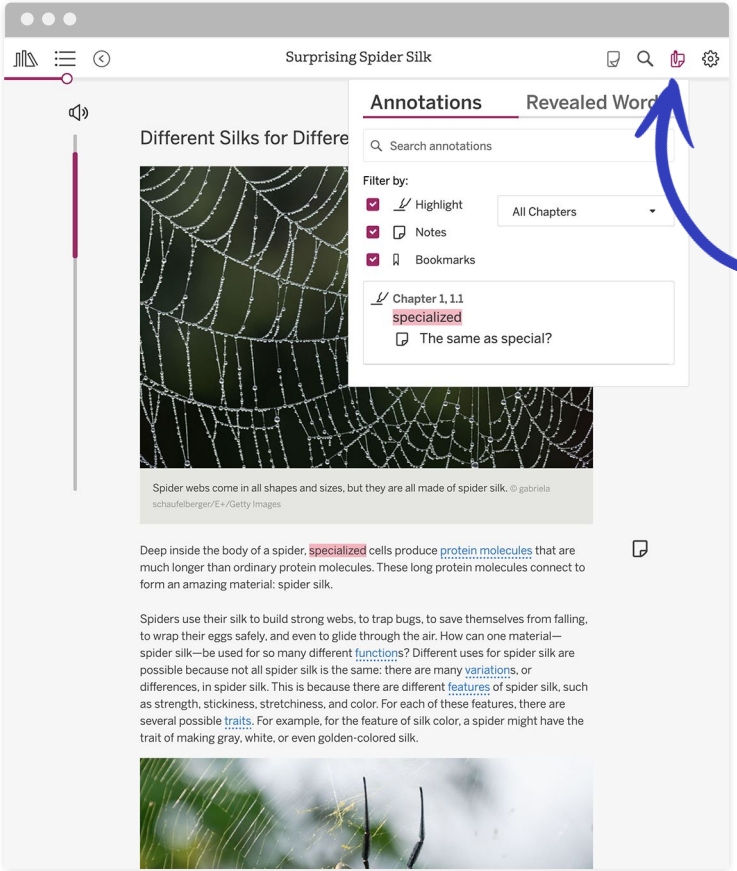
Let’s finish reading the introduction together.

Active Reading: Surprising Spider Silk

1. Open the *Surprising Spider Silk* article set. You can also find this article in your Digital Resources.
2. With your partner, discuss which article you would like to read. You should both select the same one.
3. Read and annotate, preparing to discuss with your partner.

Active Reading Guidelines

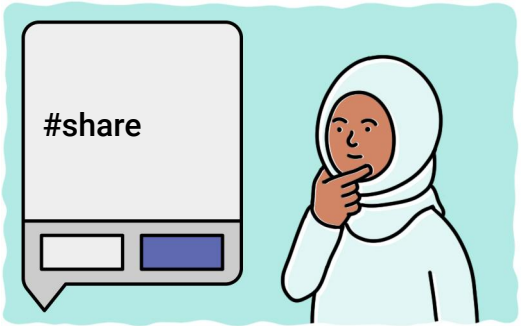
1. Think carefully about what you read. Pay attention to your own understanding.
2. As you read, annotate the text to make a record of your thinking. Highlight challenging words and add notes to record questions and make connections to your own experience.
3. Examine all visual representations carefully. Consider how they go together with the text.
4. After you read, discuss what you have read with others to help you better understand the text.



Next, you will look over your annotations and choose some to discuss.

Let’s talk about the different hashtags you’ll use to select your annotations.

Discussing Annotations



Step 1: Prepare to Share

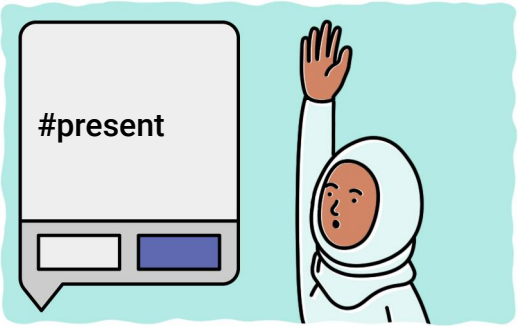
Choose an interesting question or connection to share with a partner.

Tag it with **#share.**

Step 2: Discuss

Talk about your chosen annotation with a partner.

Tag it with **#discussed** if you were able to resolve your questions.



Step 3: Prepare to Present

Choose an interesting or unanswered question to present to the class.

Tag it with **#present.**

Let’s discuss your annotations.

What **interesting** or **unanswered questions** do you still have about the article?

What **connections** did you make to the article?

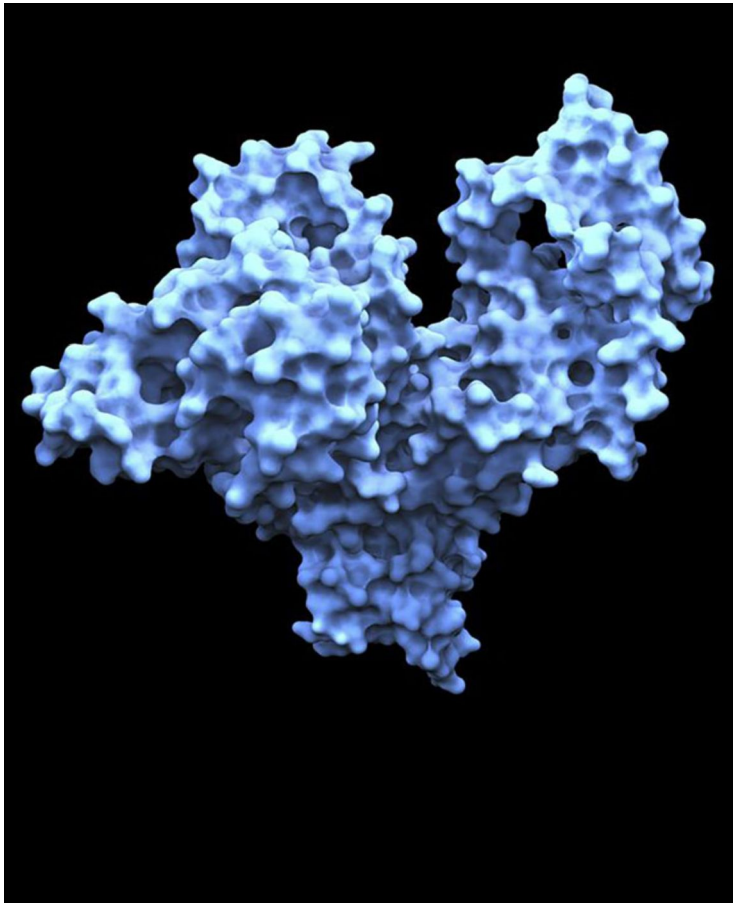
The **protein molecules** that make up the silk allow the spiders to do many different **behaviors** that can increase the odds of survival and reproduction.

These behaviors include ways of catching prey, moving, and protecting their eggs and young.

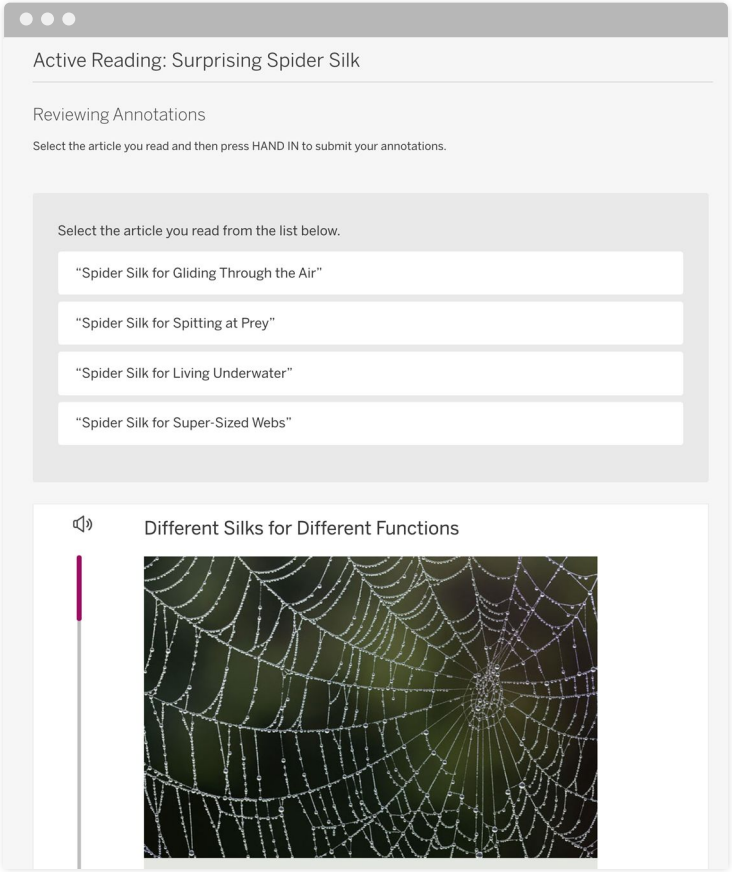
Vocabulary

protein
molecule

a type of large molecule that performs important functions inside organisms



This **model** of a protein looks different than the model in the Sim. It shows the more realistic, three-dimensional shape of a protein.



Choose the article you read and **review** your annotations.

25 MIN

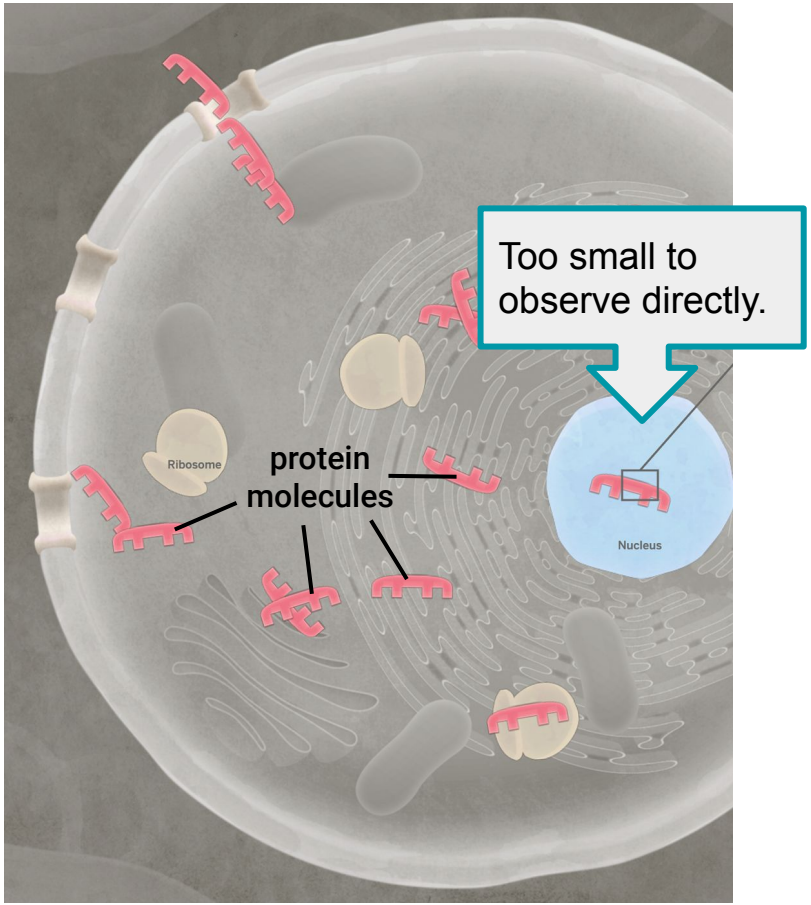
Activity 3

Building Physical Models of Proteins

You just read about the types of silk that different spiders can make. Now, we'll use a **model** to learn how protein molecules determine silk flexibility in Darwin's bark spiders.

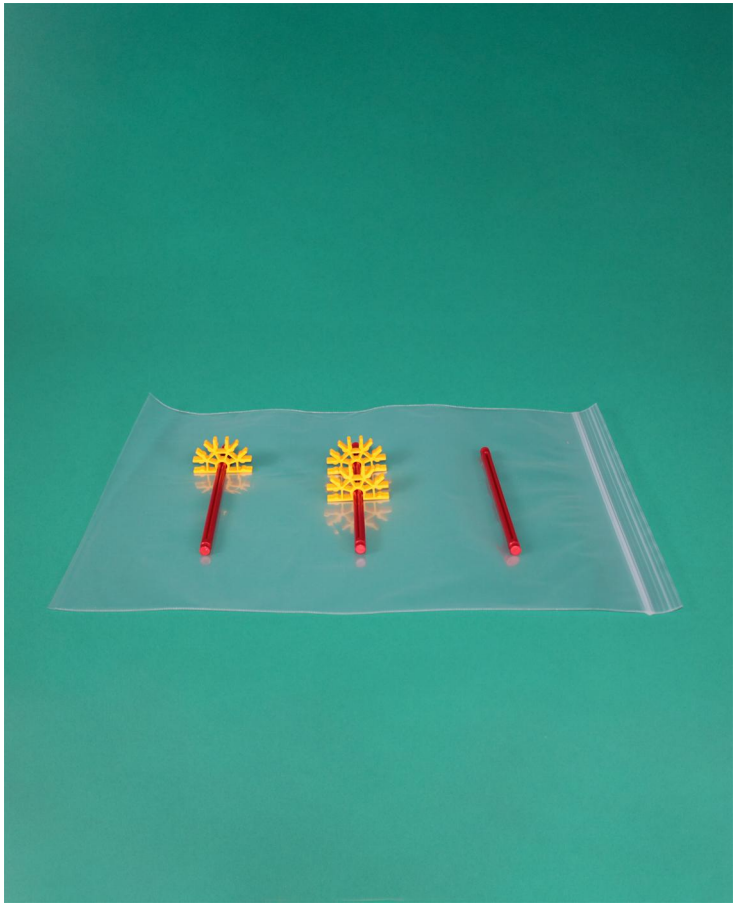
Remember, we are investigating this question:

Investigation Question:
What determines an organism's traits at the molecular scale?



Scientists use **models** to represent things on the molecular scale, which are difficult to observe.

In the Sim, we saw this model of **protein molecules.**

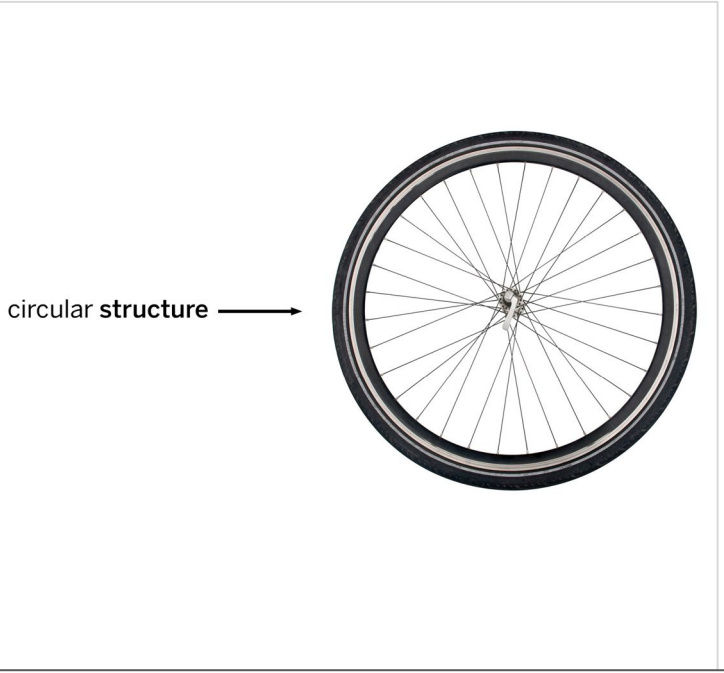


Today, we will use a **physical model** to learn more about the structure of protein molecules and how they connect to each other.

Vocabulary

structure

the way something is shaped or constructed



In science, when we describe the **structure** of an object, we describe its shape.

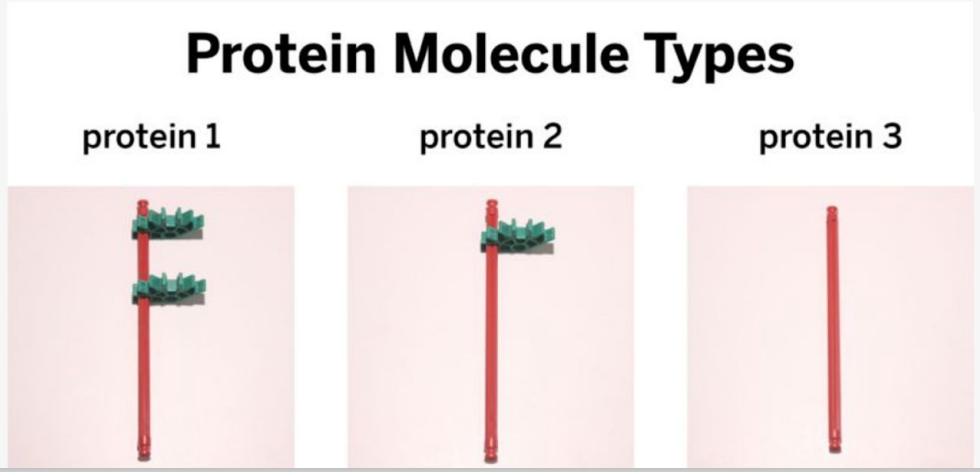
For example, this wheel has a circular structure.

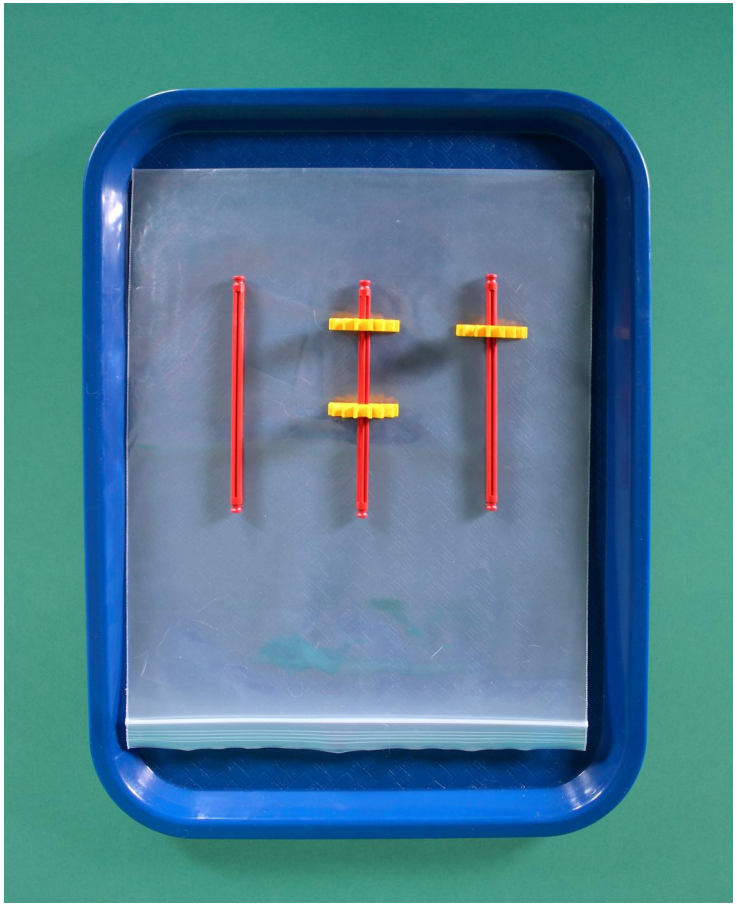
In today's activity, you will examine models of different spider silk protein molecules. You will describe their shapes and think about why they are shaped that way.

Building Physical Models of Proteins

Building Silk Strand Models

Follow the instructions on the Modeling Protein Molecules sheet. Spend a few minutes observing and describing protein molecule models. Then, build additional protein molecules and connect them to create models of spider silk strands.

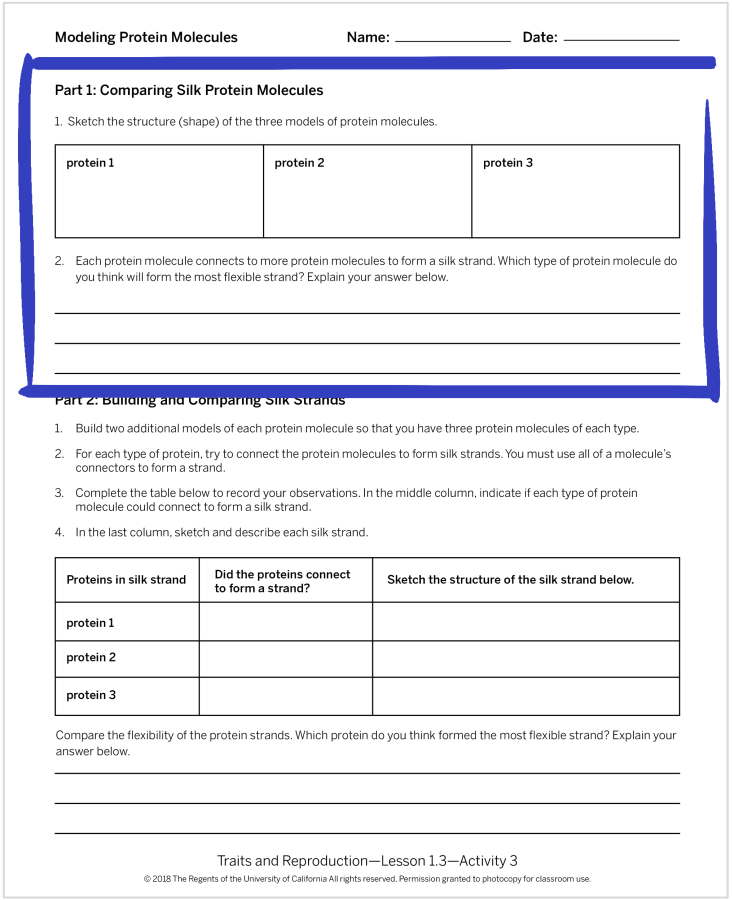




Each group will receive one bag containing **three models of silk protein molecules.**

You will **discuss** ideas as a group and **record** your ideas independently.

Page 14-15 of the Student Investigation Notebook



Modeling Protein Molecules Name: _____ Date: _____

Part 1: Comparing Silk Protein Molecules

1. Sketch the structure (shape) of the three models of protein molecules.

protein 1	protein 2	protein 3

2. Each protein molecule connects to more protein molecules to form a silk strand. Which type of protein molecule do you think will form the most flexible strand? Explain your answer below.

Part 2: Building and Comparing Silk Strands

1. Build two additional models of each protein molecule so that you have three protein molecules of each type.
2. For each type of protein, try to connect the protein molecules to form silk strands. You must use all of a molecule's connectors to form a strand.
3. Complete the table below to record your observations. In the middle column, indicate if each type of protein molecule could connect to form a silk strand.
4. In the last column, sketch and describe each silk strand.

Proteins in silk strand	Did the proteins connect to form a strand?	Sketch the structure of the silk strand below.
protein 1		
protein 2		
protein 3		

Compare the flexibility of the protein strands. Which protein do you think formed the most flexible strand? Explain your answer below.

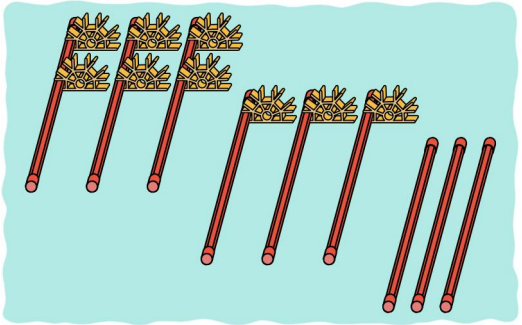
Traits and Reproduction—Lesson 1.3—Activity 3

Complete **Part 1**.

Discuss your ideas in your group but **record** your ideas on your own sheet.

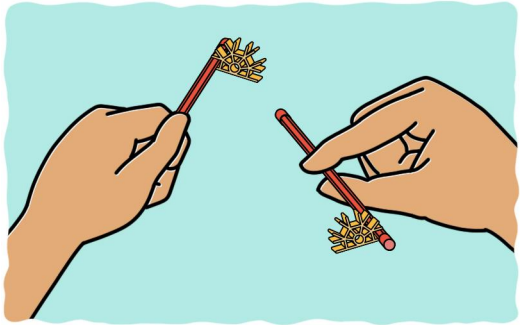
7 minutes

Part 2: Building and Comparing Silk Strands



Build

Build two additional models of each protein molecule so you have three protein molecules of each type.

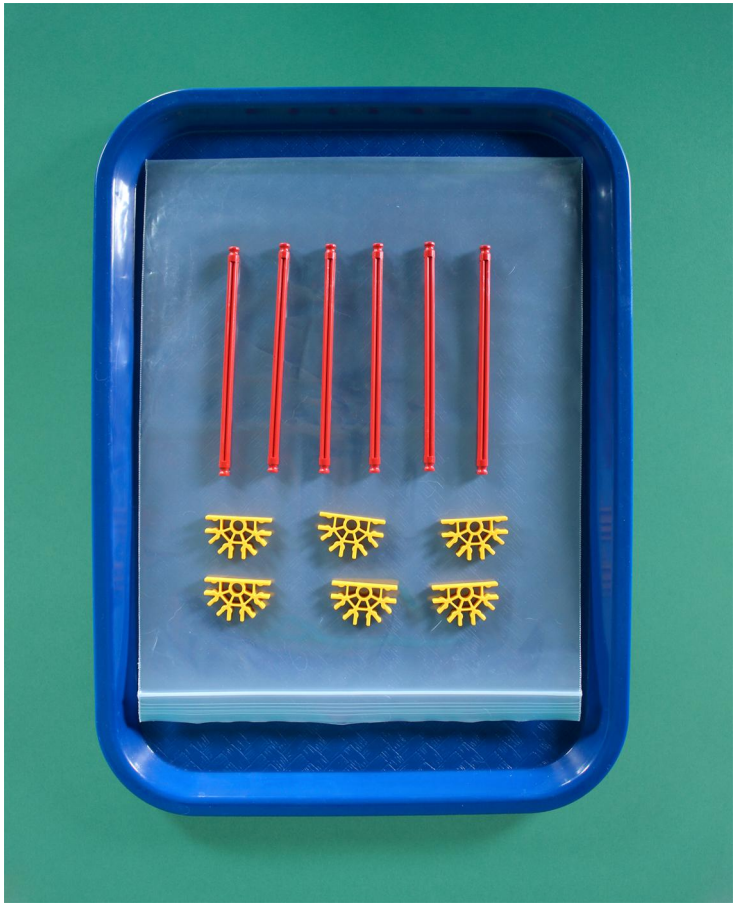


Connect

For each type of protein, **try to connect the protein molecules** to form silk strands. You must use all of a molecule's connectors to form a strand.

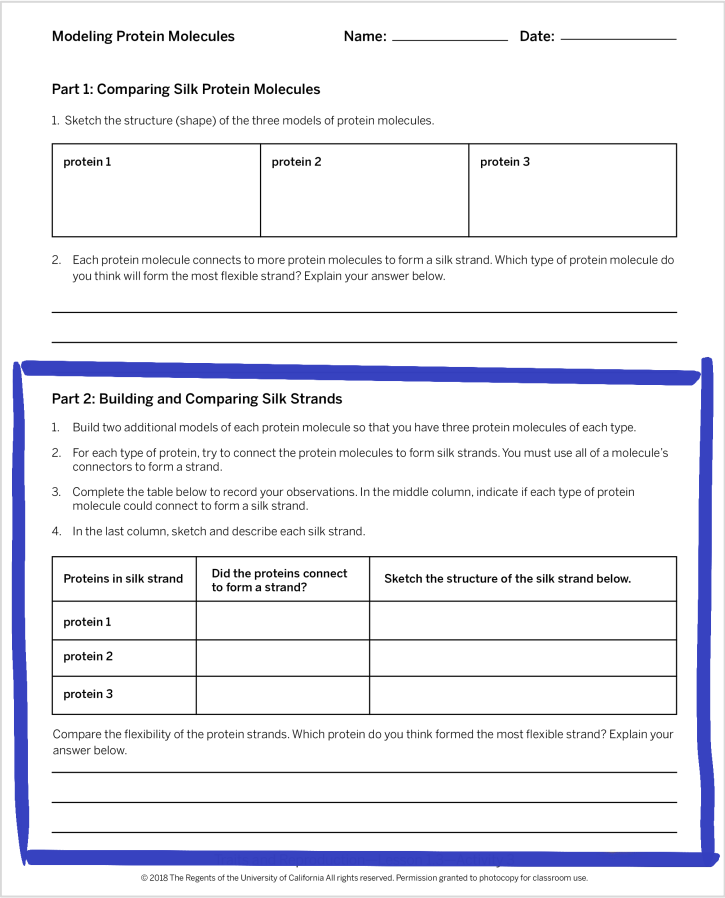
Record Observations

Complete the table. In the middle column, indicate if each type of protein molecule could form a silk strand. In the last column, sketch and describe each silk strand.



Each group will receive a second bag of **materials to build silk strands.**

You will **record** your observations in the data table and compare the flexibility of protein strands.



Modeling Protein Molecules **Name:** _____ **Date:** _____

Part 1: Comparing Silk Protein Molecules

1. Sketch the structure (shape) of the three models of protein molecules.

protein 1	protein 2	protein 3

2. Each protein molecule connects to more protein molecules to form a silk strand. Which type of protein molecule do you think will form the most flexible strand? Explain your answer below.

Part 2: Building and Comparing Silk Strands

1. Build two additional models of each protein molecule so that you have three protein molecules of each type.
2. For each type of protein, try to connect the protein molecules to form silk strands. You must use all of a molecule's connectors to form a strand.
3. Complete the table below to record your observations. In the middle column, indicate if each type of protein molecule could connect to form a silk strand.
4. In the last column, sketch and describe each silk strand.

Proteins in silk strand	Did the proteins connect to form a strand?	Sketch the structure of the silk strand below.
protein 1		
protein 2		
protein 3		

Compare the flexibility of the protein strands. Which protein do you think formed the most flexible strand? Explain your answer below.

Complete **Part 2**.

After you complete the table, remember to **record** your answer to the question about the flexibility of the strands.

10 minutes

Investigation Notebook **pgs 14–15**

Vocabulary

function

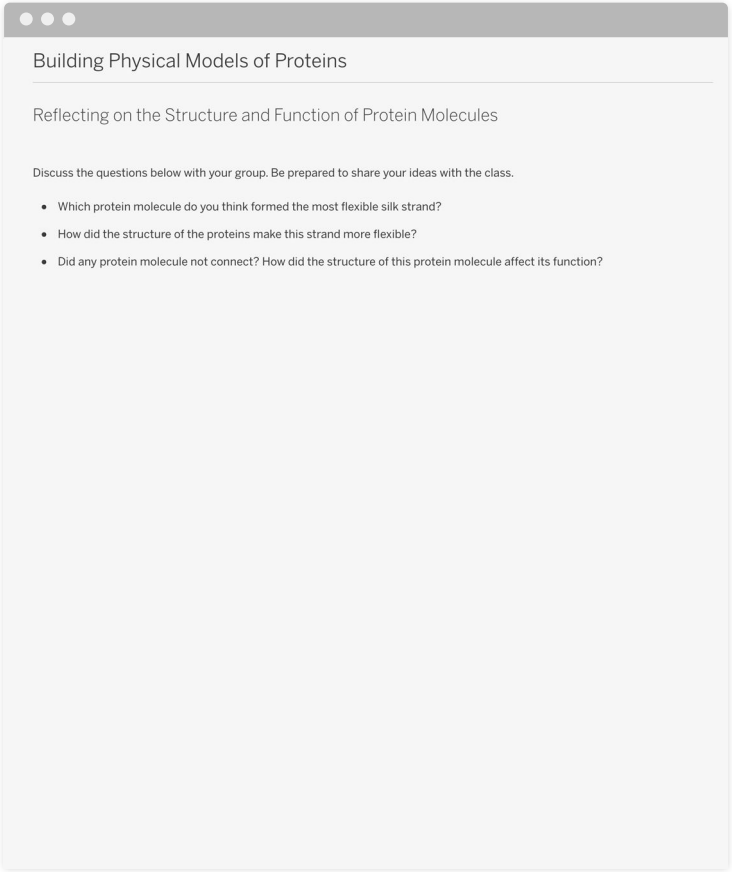
how something works

wheel's function:
to roll over the ground

A wheel illustrates both **structure** and **function.** Wheels roll across surfaces and can help move other objects. The structure of a wheel allows it to serve this function.

What did you notice about the **function** of the protein molecules in the model?

Did they all serve the same **function?**



Building Physical Models of Proteins

Reflecting on the Structure and Function of Protein Molecules

Discuss the questions below with your group. Be prepared to share your ideas with the class.

- Which protein molecule do you think formed the most flexible silk strand?
- How did the structure of the proteins make this strand more flexible?
- Did any protein molecule not connect? How did the structure of this protein molecule affect its function?

Discuss the questions with your group.

Be prepared to **share** your ideas with the class.

Key Concept

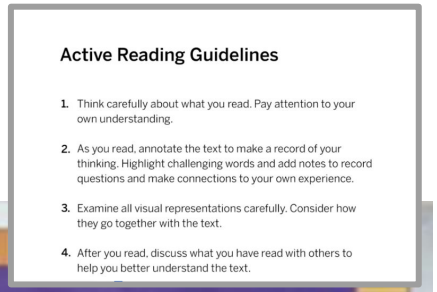
1. The function of a protein molecule depends on its structure and how it interacts with other protein molecules.

Keep one of each type of protein connected and **disassemble** the rest.

Place the proteins in one bag and the pieces in another bag.

Traits and Reproduction

Classroom Wall: End of Lesson 1.3



Problem: Why do Darwin's bark spider offspring have different silk flexibility traits even though they have the same parents?

Unit Question: Why do traits vary, and why do they vary even between parents and offspring and among siblings?

Chapter 1 Question: Why do traits for silk flexibility vary within this family of Darwin's bark spiders?

Investigation Question: What determines an organism's traits at the molecular scale?

Concept

Key Concept: The function of a protein molecule depends on its structure and how it interacts with other protein molecules.

Vocabulary

- function
- variation
- feature
- trait
- structure
- protein molecule

End of Lesson

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

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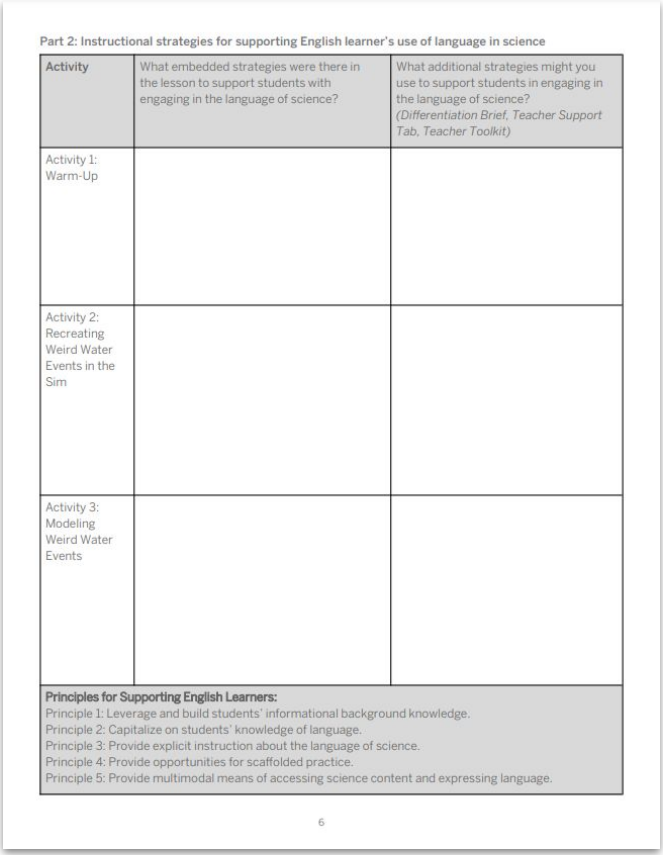
Reflecting with students in mind

Strategies and supports

What strategies were used to support engaging in the language of science?



Part 2: Instructional strategies for supporting English learner's use of language in science

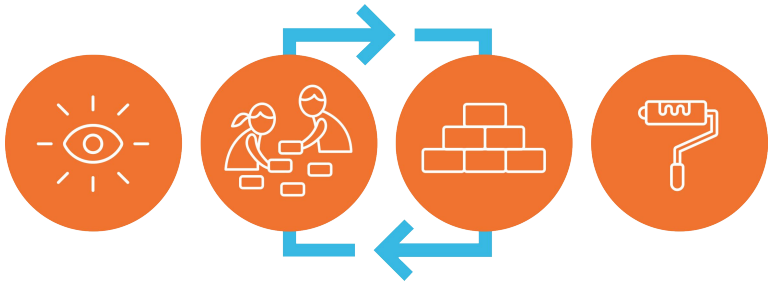
Activity	What embedded strategies were there in the lesson to support students with engaging in the language of science?	What additional strategies might you use to support students in engaging in the language of science? *(Differentiation Brief, Teacher Support Tab, Teacher Toolkit)*
Activity 1: Warm-Up		
Activity 2: Recreating Weird Water Events in the Sim		
Activity 3: Modeling Weird Water Events		

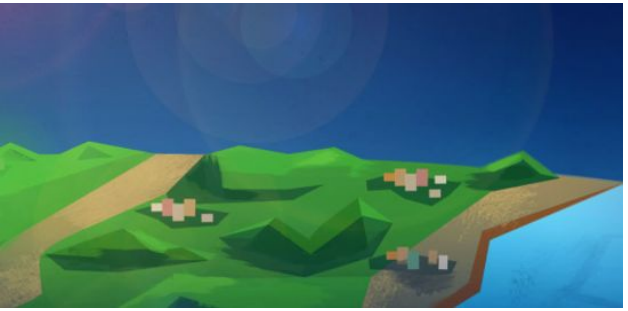
Principles for Supporting English Learners:
Principle 1: Leverage and build students' informational background knowledge.
Principle 2: Capitalize on students' knowledge of language.
Principle 3: Provide explicit instruction about the language of science.
Principle 4: Provide opportunities for scaffolded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

6

Strategies for engaging English learners

- Oral and visual support
- Multiple Meaning words
- Multimodal instruction
    - Do, Talk, Read, Write, Visualize
- Using different registers





Plan for the day

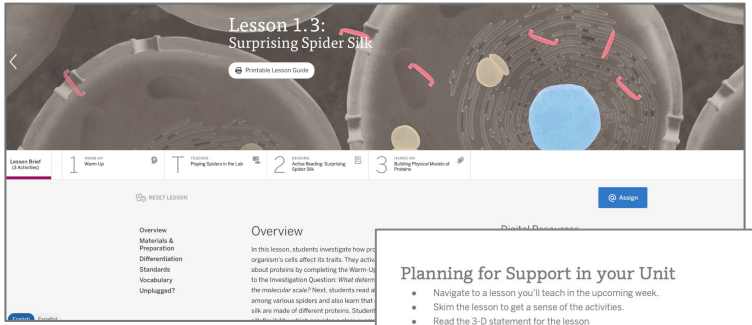
- Introduction
- Language of the Science Classroom
- Embedded and Additional Supports
- Experiencing a Scaffolded Lesson
- Planning for Supports
- Closing

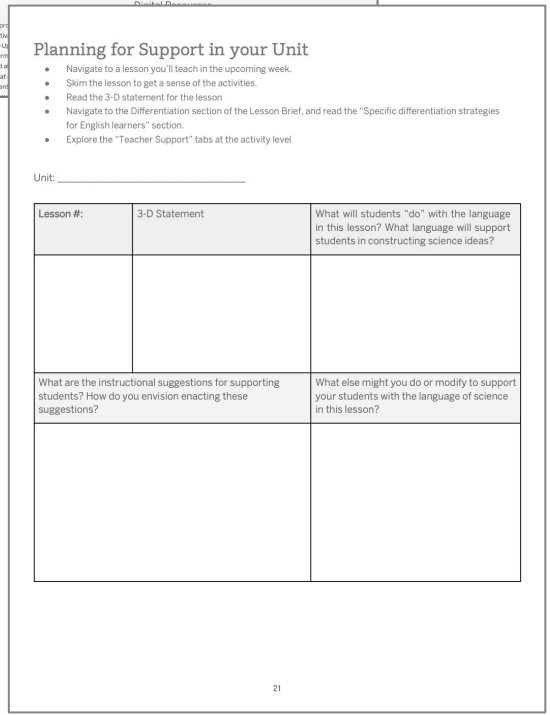
Work time

Pg. 20-21

- Navigate to the Differentiation section of the Lesson Brief, and read the “Specific differentiation strategies for English learners” section.
- Click through the activity tabs and explore any Teacher Support Notes
- Consider any additional supports from your own teacher toolkit

  Possible Suggestion: Download the classroom slides for your lesson and add an additional support from your Discourse Template resource.





Planning for Support in your Unit

- Navigate to a lesson you'll teach in the upcoming week.
- Skim the lesson to get a sense of the activities.
- Read the 3-D statement for the lesson
- Navigate to the Differentiation section of the Lesson Brief, and read the "Specific differentiation strategies for English learners" section.
- Explore the "Teacher Support" tabs at the activity level

Unit: _____

Lesson #:	3-D Statement	What will students "do" with the language in this lesson? What language will support students in constructing science ideas?
What are the instructional suggestions for supporting students? How do you envision enacting these suggestions?		What else might you do or modify to support your students with the language of science in this lesson?

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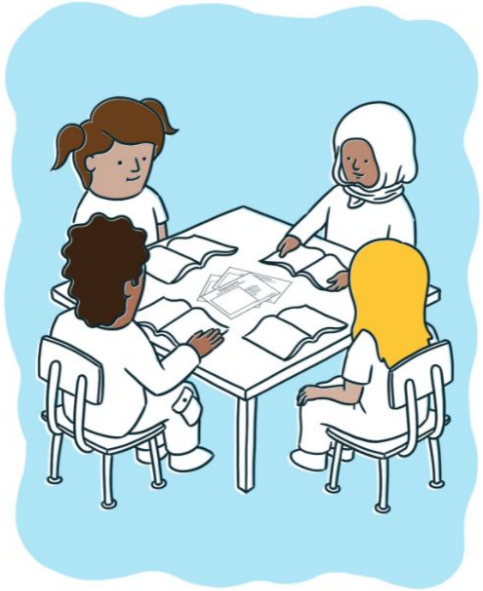
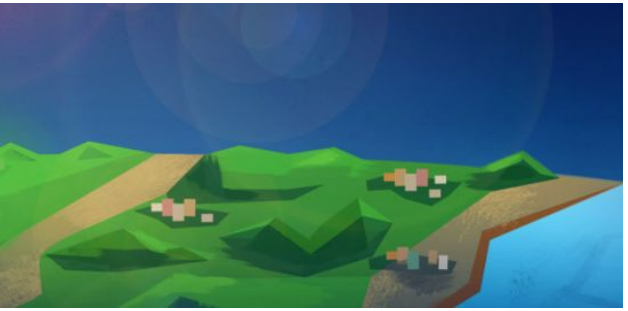
Share Out

Share the additional strategies and supports you chose for your lesson.





Plan for the day

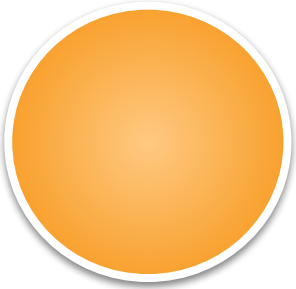
- Introduction
- Language of the Science Classroom
- Embedded and Additional Supports
- Experiencing a Lesson
- Planning for Supports
- Closing

Closing reflection

Think about your original goals for student outcomes

Based on our work today, share:

1-3 big points you're taking away from this session



A question or topic that's still circling in your mind

Something that's "squaring" (resonating) with you from this session

Overarching goals

- ☑ Describe the language and literacy demands in a lesson and their role in students developing science understanding
- ☑ Implement key strategies to promote English learners' academic language development and science understanding

Let's connect this goal to our students

Additional resources

Welcome, caregivers!

—

We hope you enjoy learning more about Amplify Science and what students are learning in science this year.

Para acceder a este sitio en español haga clic aquí.

Amplify welcomes you and your learner to the Science program for the new school year. We are very excited to

TOP RATED BY EDREPORTS

Grades 6-8

[Caregivers]

LAUSD Microsite- https://amplify.com/lausd-science

Welcome to Amplify Science!

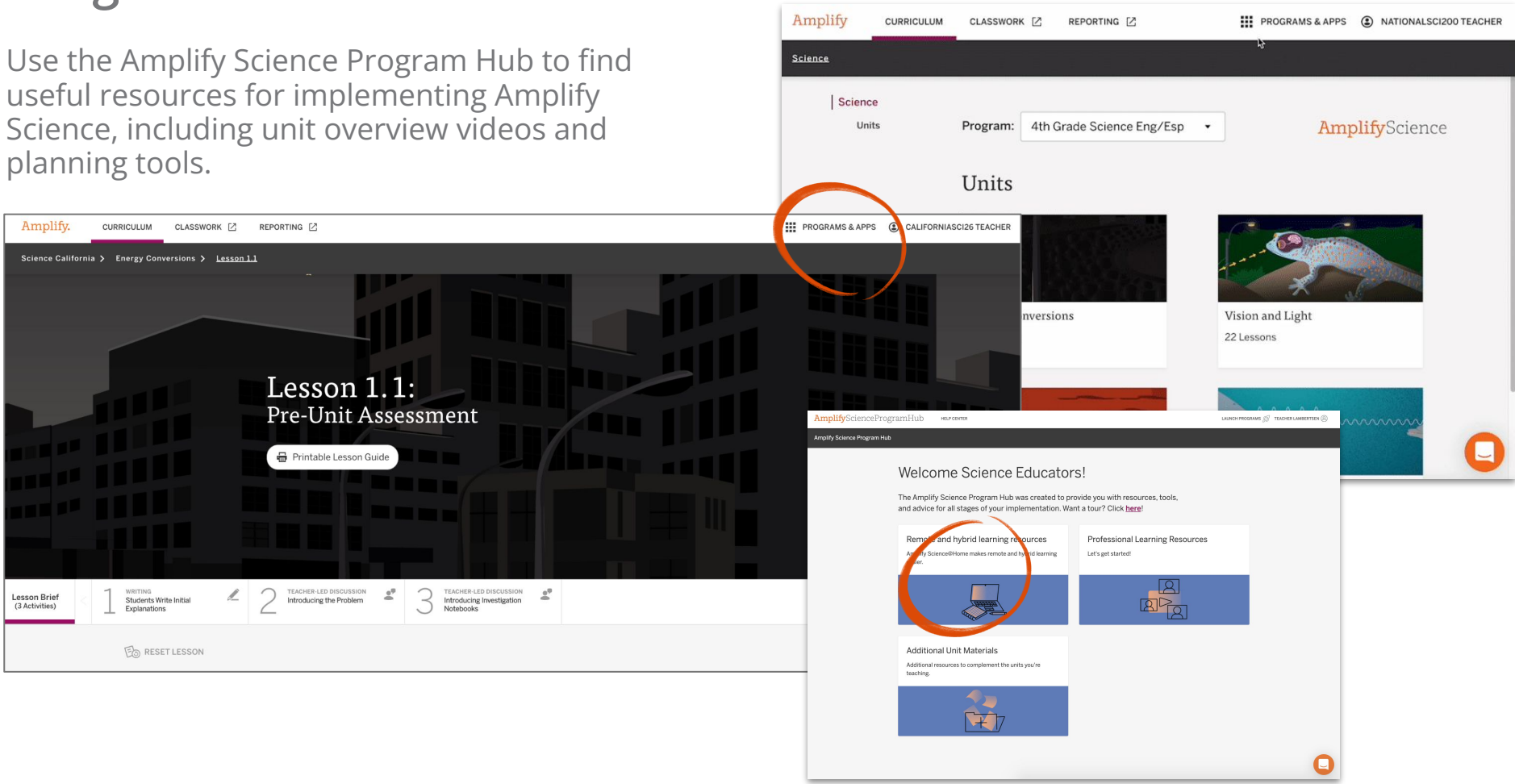
This site contains supporting resources designed for the LAUSD Amplify Science adoption for grades TK–8.

- Access the Amplify Science Program Hub (To help orient you to the new design, watch this video and view this reference guide.)
- Find out more about Amplify Science@Home
- Share the Caregiver Hub (Eng/Span) with your families
- For LAUSD ES Teachers- Amplify Science & Benchmark Advance Crosswalk
- Instructional guidance for a Responsive Relaunch of Amplify Science in 21-22

Click the button below to preview the digital Teacher's Guide, and check back for exciting updates to this site!

Program Hub

Use the Amplify Science Program Hub to find useful resources for implementing Amplify Science, including unit overview videos and planning tools.



Additional resources and ongoing support

Seek information specific to enrollment and rosters, technical support, materials and kits, and teaching support.

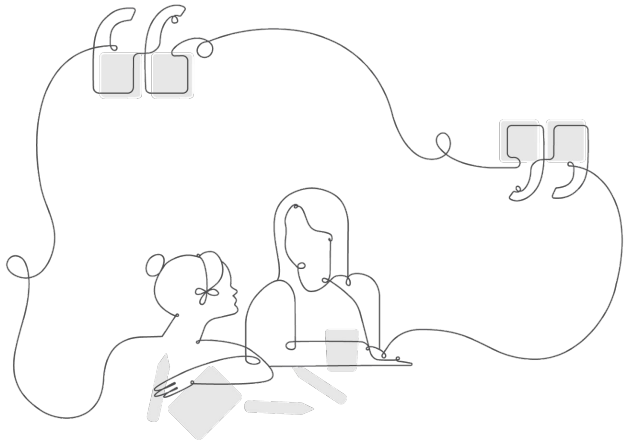
help@amplify.com

800-823-1969

Amplify Chat

Upcoming Professional Development!

Unpacking the Unit - with a focus on assessments



- December 10 (grades 6,7,8)

  Location: Virgil MS
  Time: 8:00-3:00

Your feedback matters!

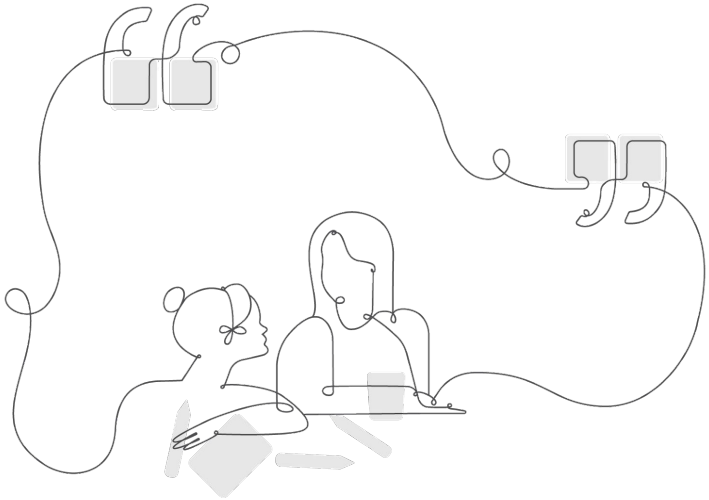
Survey

Facilitation

Session design

Final Question: Is there anything else you would like us to know?

- Curriculum
- Materials
- Enrollment and licensing
- And more!



Please provide feedback!

surveymonkey.com/r/AmpSciPD

Type:

Strengthen

Session title:

Supporting English language learners 6-8

Professional Learning Specialist name:

Insert name

(insert email, if you would like)