

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

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LMS App Center

The LMS App Center provides a catalog of District-approved digital content and learning tools (including digital components of adopted textbooks) that are available for classroom teachers and students to access within the learning management system, Schoology.

For information on District-approval policies and procedures, please visit: udpp.lausd.net.

- To search the full list of digital learning tools, click "Submit".
- To search by Publisher Name or Textbook Title, type in a word associated to your adopted publisher, then click "Submit".
- To narrow your search with filters such as Content Area, Grade Level, or Content Type, select from the dropdown menu, then click "Submit".

To learn more about using the LMS App Center, please refer to the following [video overview](#).

Publisher Name

Starts With

amplify

Content Area

All

Grade Level

All

Content Type

All

Textbook Title

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All Amplify Products

Grade Sync for MS Science

LMS App Center


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Amplify

Content Area: ELA
Grade Level: ES
Content Type: Supplemental
Integration Type: App (Left Navigation)
Purchase Type: District and School
[Getting Started Guide](#)
Other Info: School licenses required
mCLASS
CKLA
Amplify Reading
Amplify Science
Fractions

Amplify Classwork

Content Area: ELA
Grade Level: ES
Content Type: Supplemental
Integration Type: App (Left Navigation)
Purchase Type: District and School
[Getting Started Guide](#)
Other Info: School licenses required. This app is for teacher use only (install for Course Admins only)

Vendor Support Desk:
P: 800.823.1969
E: help@amplify.com
S: amplify.com/support/
Textbook Title(s): NA

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Grade sync from Classwork to Schoology

ACTIVITY

1. INDIVIDUAL
Selected Response Questions
Lesson 1

SUBMISSIONS

20/22

LAST SUBMISSION ↕

9:34am
Wed. 3/1/21

DUE DATE

11:59pm
Fri. 3/5/21

FEEDBACK

20
awaiting

STUDENT	STATUS	MC	GENERAL COMMENT	CUSTOM SCORE	FEEDBACK
				100	
Anthony Bryk	Handed In 3/5/21 9:31am	12/20		60/100	
Mihaly Csikszentmihalyi	In Progress	-		0/100	
Carol Dweck	Handed In 3/2/21 11:45am	16/20		80/100	
Jamie Escalante	Handed In 3/5/21 2:32pm	20/20		100/100	
Michelle Obama	Handed In 3/3/21 9:35am	15/20		75/100	
Seymour Papert	Handed In 3/5/21 4:15am	16/20		80/100	
Linda Roberts	Handed In 3/2/21 12:33am	16/20		80/100	
Dorothy Strickland	Handed In 3/2/21 10:15am	14/20		70/100	
Kenneth Keoh	Handed In 3/3/21 9:20am	12/20		60/100	

Sync with LMS

Last sync with LMS
3/7/21 8:20am

Reporting

Send all feedback

☐ Mark Incorrect
☐ Reveal Correct

2. INDIVIDUAL
Constructed Response
Lesson 1.2

22/22

10:19am
Tues. 2/28/21

11:59pm
Fri. 3/5/21

22
awaiting

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.

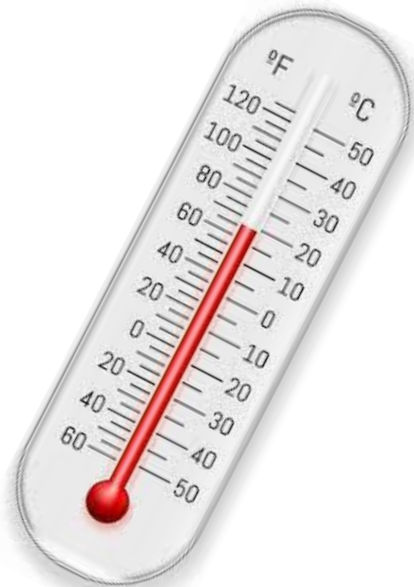
1 = Extremely Uncomfortable

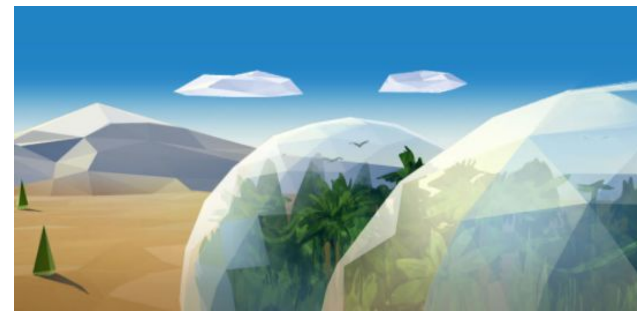
2 = Uncomfortable

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

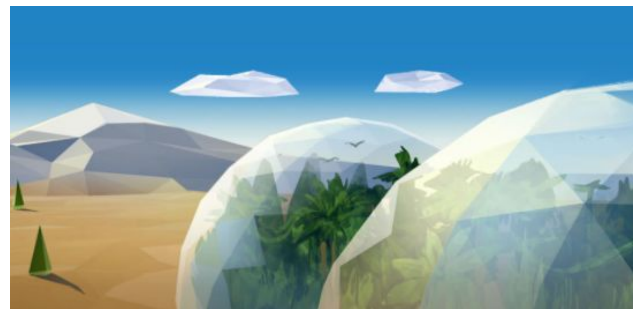
Use the provided spaces as a place for reflection throughout the session.

Session goals and student outcomes

What Connect the workshop goal(s) to an outcome you envision for your students.	Why Reflect on why you want this outcome for your students.	How 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.



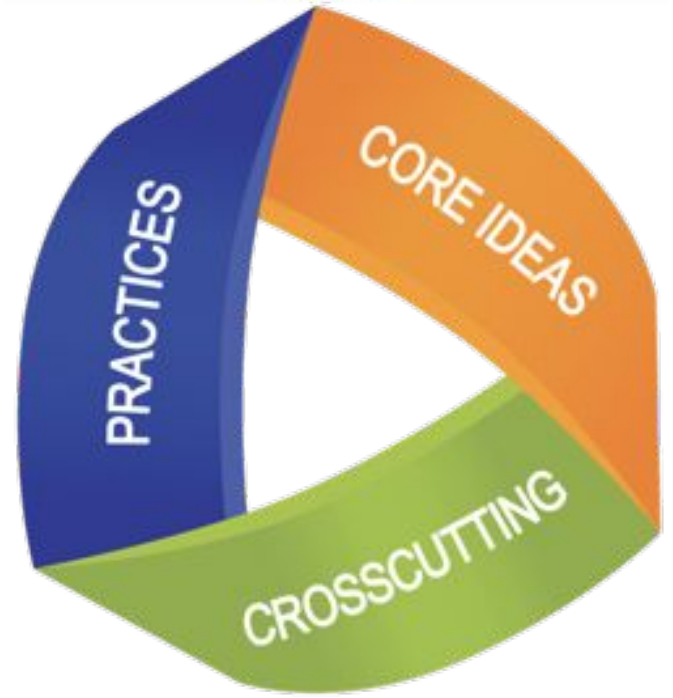
Plan for the day

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

NGSS - Three dimensional learning

Evaluate your knowledge

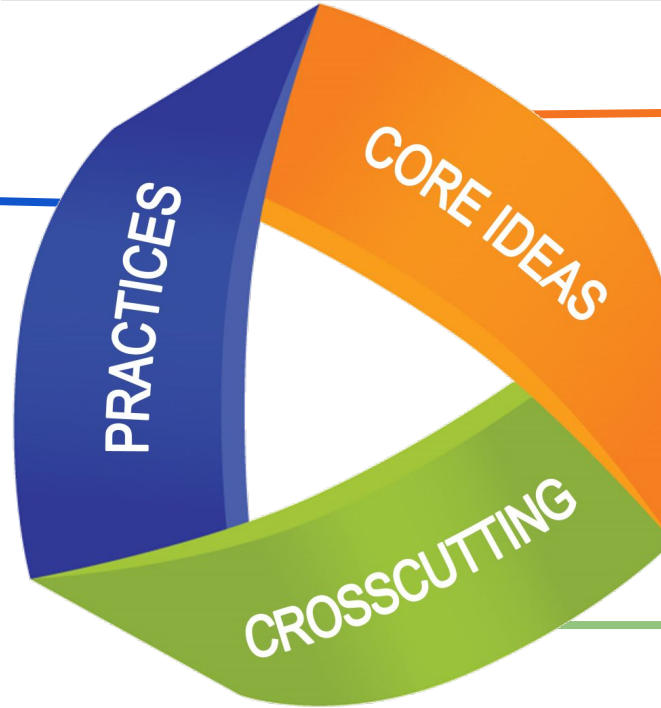
- On a scale of 0-5, how would you rate your familiarity with 3-D learning?



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

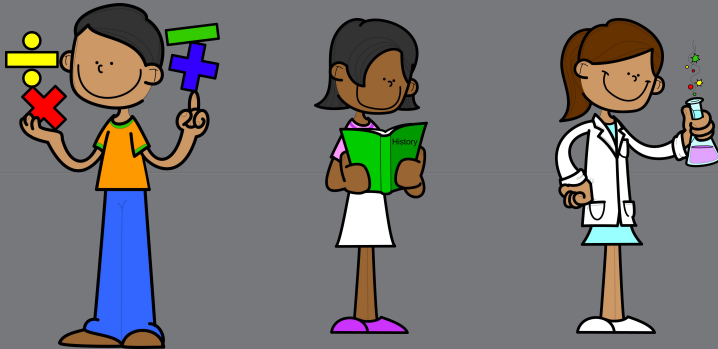
6. Constructing explanations (for science) and designing solutions (for engineering)

7. Engaging in argument from evidence

8. Obtaining, evaluating, and communicating information

Academic language proficiency

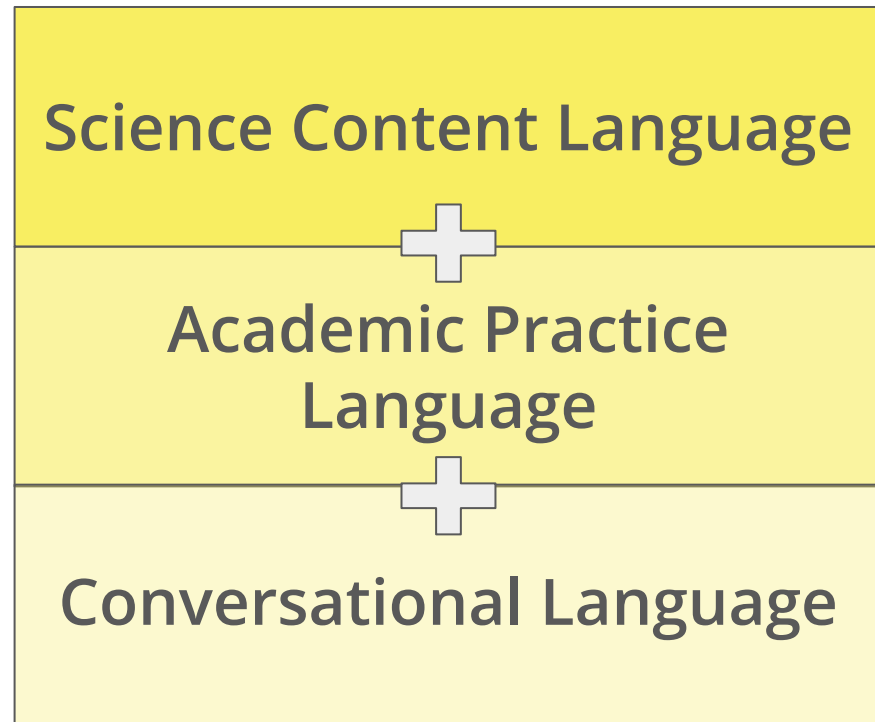
The ability to successfully use language for reading and writing and for accessing information in disciplinary content areas.



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

Words that are essential to understanding and talking about a particular topic: erosion, rock, fossil

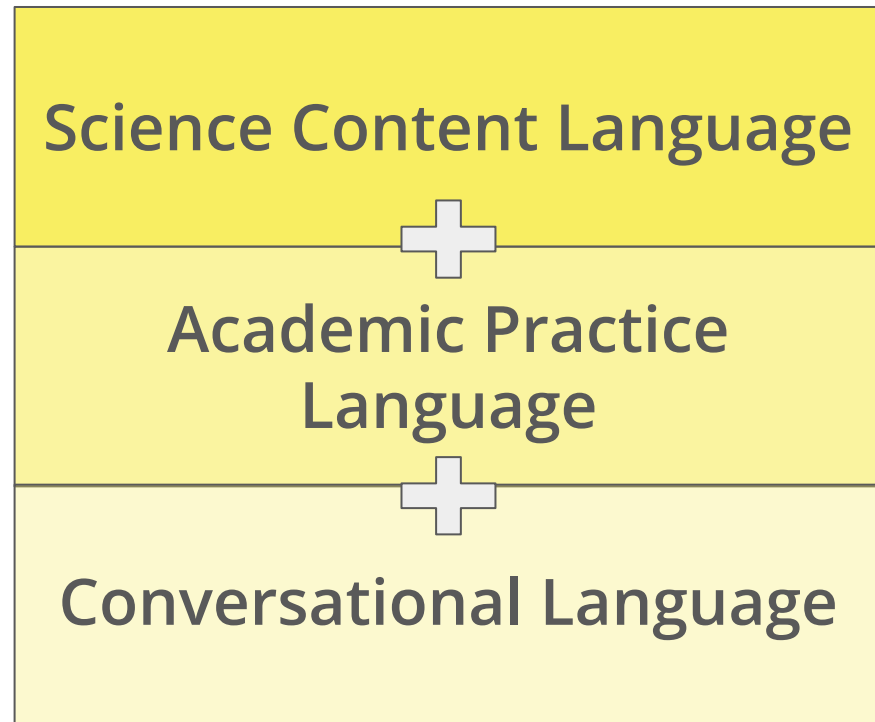
Words that are used across different domains of science and other disciplines: model, analyze, claim.

Conversational Language

Language acquisition

Language of Science

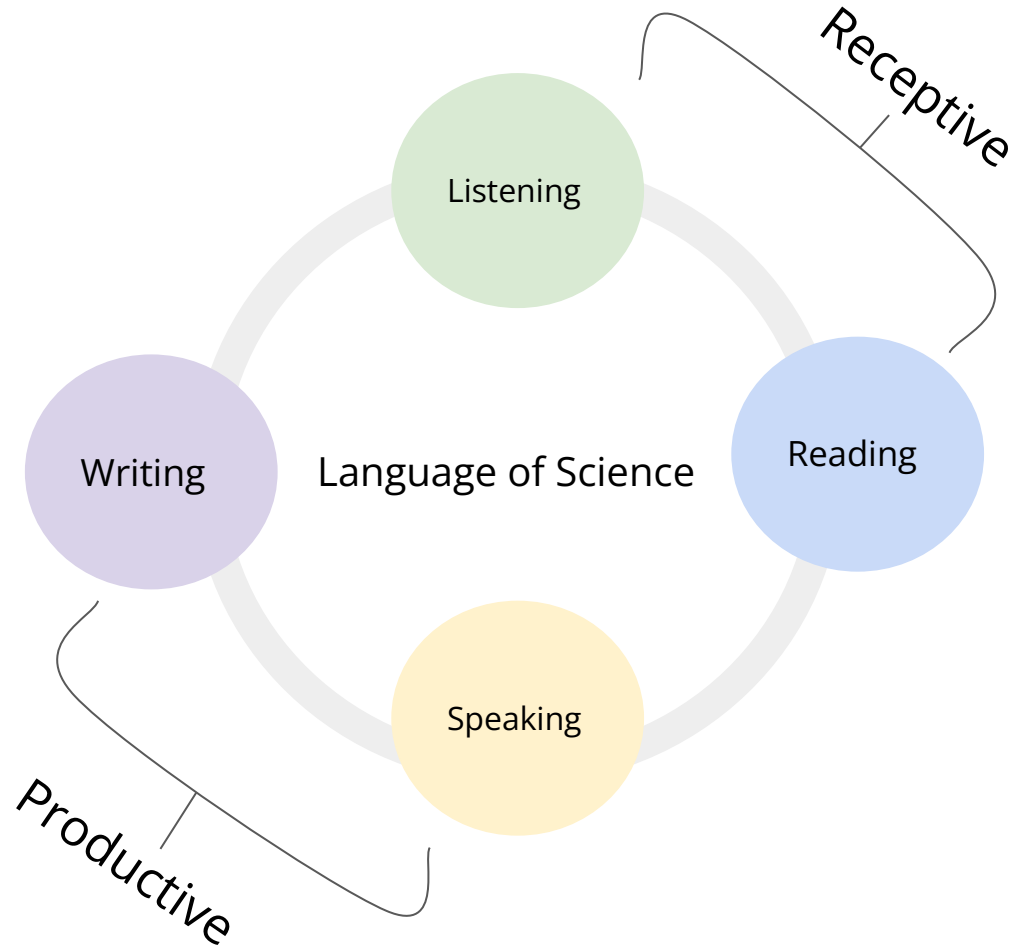
- Multimodal experiences with language
- Explicit instruction and practice
 - Embedded Supports
 - Additional Supports



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

Academic
Language
Proficiency

When students, especially ELs, engage with authentically “doing” specific things with language, both science learning and language learning are promoted.

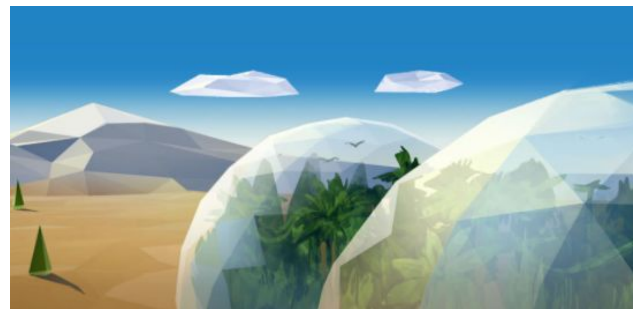
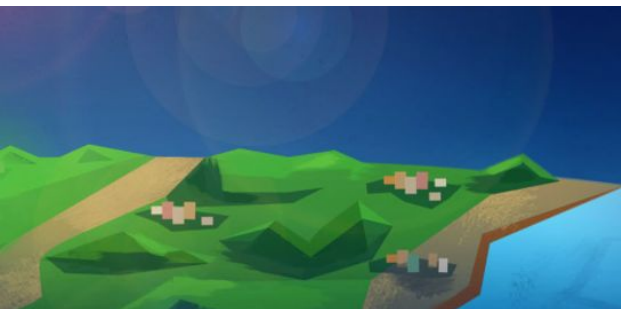
Science and
Engineering
Practices

Instructional
support

The science classroom is a language development opportunity,

Questions?





Plan for the day

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

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

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**.

Name: _____ Date: _____

Write and Share Routine: Student 2: Human Muscle Protein

Read the information below about the test conducted by Bay Medical Company. Then, answer the question.

The test: To understand if the ACTN3 protein affects running ability, researchers conducted a test. They recruited a group of competitive runners and measured the level of ACTN3 protein molecules each runner had in their bodies. Then, they had the runners participate in a sprint (a short-distance run) for 100 meters.

Average pace had half the amount of test.

determines running ability? Explain response.

Name: _____ Date: _____

Write and Share Routine: Student 1: Human Muscle Protein

Read the information below about the test conducted by Bay Medical Company. Then, answer the question.

The test: To understand if the ACTN3 protein affects running ability, researchers conducted a test. They recruited a group of competitive runners and measured the level of ACTN3 protein molecules each runner had in their bodies. Then, they had the runners participate in a sprint (a short-distance run). During the test, the runners sprinted as fast as they could for 100 meters.

Evidence: Scientists found that the runners who sprinted the fastest had the highest amount of ACTN3 protein molecules in their bodies.

Do you think that this evidence shows that the ACTN3 protein determines running ability? Explain your ideas using the words protein, trait, and feature in your response.



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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.

The screenshot shows a digital interface for a 'Warm-Up' activity. At the top, the title 'Warm-Up' is displayed next to an 'Assign' button. Below the title, a brief description states: 'Students analyze a claim and evidence to engage with the idea of isolating variables. (7 min)'. To the right of this text are icons for 'POLL' and 'INSTRUCTIONAL GUIDE'. The main content area is titled 'Evidence About Magnets' and contains a paragraph about a student named Barry who has claimed: 'Strong magnets repel and weak magnets attract.' Below this paragraph is a bullet point: 'Strong magnets repel and weak magnets attract.' and a prompt: 'Review Barry's evidence below and then answer the questions.' The evidence is presented in a table titled 'Barry's Evidence'. The table has two columns for 'strong magnet' and 'weak magnet', each with a visual representation of the magnet (a bar with a blue end and a red end). Below these are two rows for 'Test 1' and 'Test 2', each showing the 'Position of magnets before they were released' with a visual representation of the magnets. To the right of the table is a question: '1. Do you agree with Barry's claim?' with a dropdown menu.

Warm-Up Assign

Students analyze a claim and evidence to engage with the idea of isolating variables. (7 min) POLL INSTRUCTIONAL GUIDE

Evidence About Magnets







Barry, another student physicist, ran some tests on how magnets affect other magnets. Based on his evidence, Barry has claimed:

- Strong magnets repel and weak magnets attract.

Review Barry's evidence below and then answer the questions.

Barry's Claim: Strong magnets repel and weak magnets attract.

Barry's Evidence

	strong magnet	weak magnet
		
	Test 1	Test 2
Position of magnets before they were released	 	 

1. Do you agree with Barry's claim?

Embedded supports

Examples

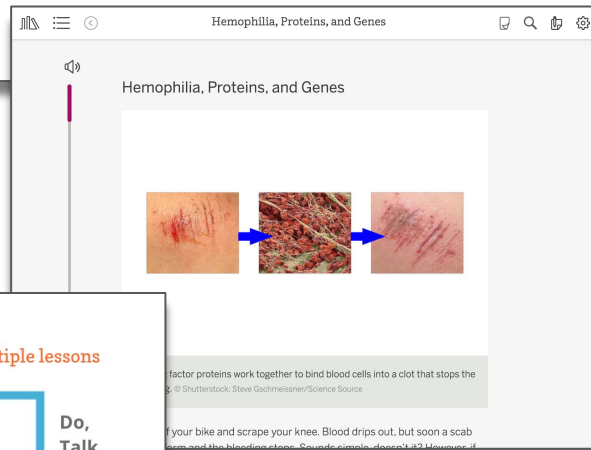
- Active Reading Guidelines
- Extended Teacher Modeling
- Multimodal Instruction

Traits and Reproduction: Lesson 2.1

Activity 2

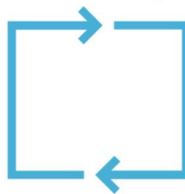
I will model **Active Reading**. I'll show you:

- how to **annotate** to show your thinking.
- some strategies you can use, such as asking questions and making connections.
- our focus strategy for this unit— **identifying challenging words or phrases**.



Multimodal learning

Gathering evidence over multiple lessons



Do,
Talk,
Read,
Write,
Visualize

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Embedded supports

Examples

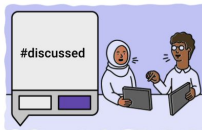
- Paired discussion using the Evidence Gradient
- Student to Student Discussion
 - To make sense of reading

Discussing Annotations



Step 1: Prepare to Share
Choose an interesting question or connection to share with a partner.

Tag it with **#share**.



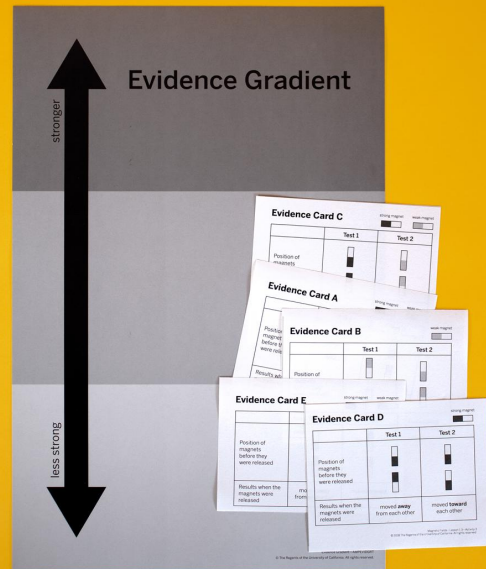
Step 2: Discuss
Talk about your chosen annotation with a partner.

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.

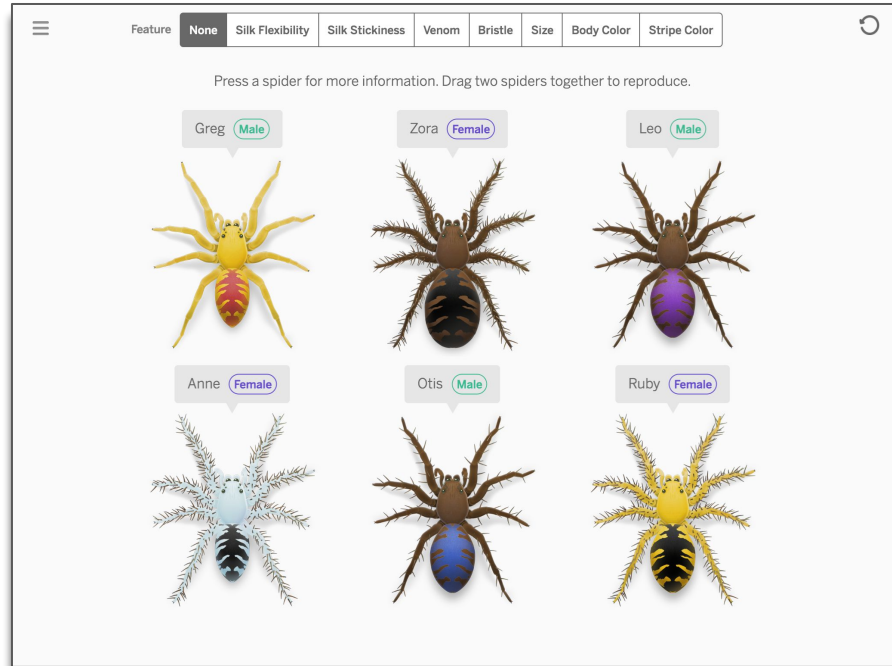
Tag it with **#present**.



Embedded supports

Examples

- Visual and digital models
- Visual Representations



Embedded supports

Examples

- Differentiated Activities
 - Day after the Critical Juncture

Traits and Reproduction: Lesson 3.5

Activity 3

Reading About Diseases

BLUE GROUP

Genes are the instructions for how to build a protein. Proteins are the molecules that do the work in a cell. Genes are the instructions for how to build a protein. Proteins are the molecules that do the work in a cell.

PURPLE GROUP

Genes are the instructions for how to build a protein. Proteins are the molecules that do the work in a cell. Genes are the instructions for how to build a protein. Proteins are the molecules that do the work in a cell.

GREEN GROUP

Genes are the instructions for how to build a protein. Proteins are the molecules that do the work in a cell. Genes are the instructions for how to build a protein. Proteins are the molecules that do the work in a cell.

You'll now build on what you saw in the Sim to help with Bay Medical Company's research.

Each group will get a different reading about diseases caused by genetic disorders.

Traits and Reproduction: Lesson 3.5

Activity 3

Reading About Diseases

GREEN GROUP

BLUE GROUP

PURPLE GROUP

Investigation Notebook: pgs 93–94

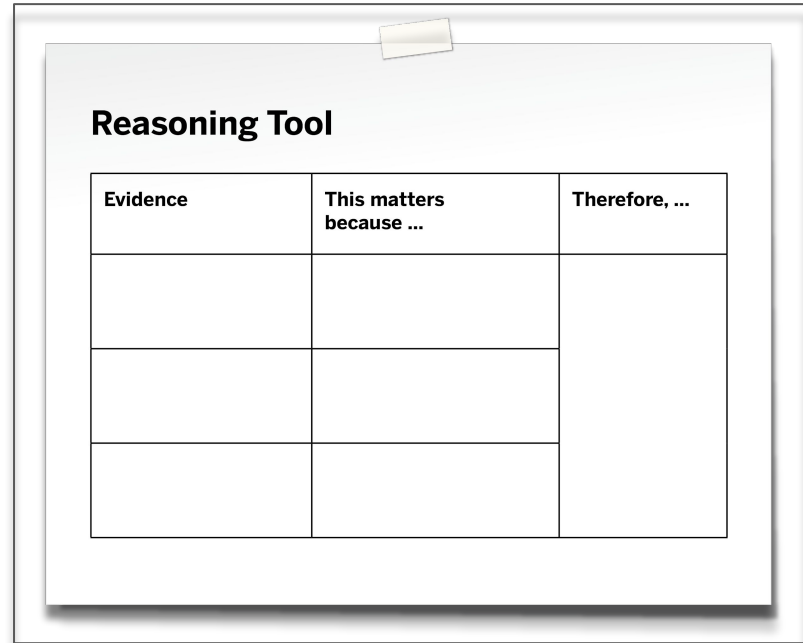
pg 89

pg 99

Embedded supports

Example

- Graphic Organizers



The graphic organizer is titled "Reasoning Tool" and is presented as a document with a yellow sticky note at the top. It contains a table with three columns: "Evidence", "This matters because ...", and "Therefore, ...". The table has three rows of empty cells for data entry.

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.

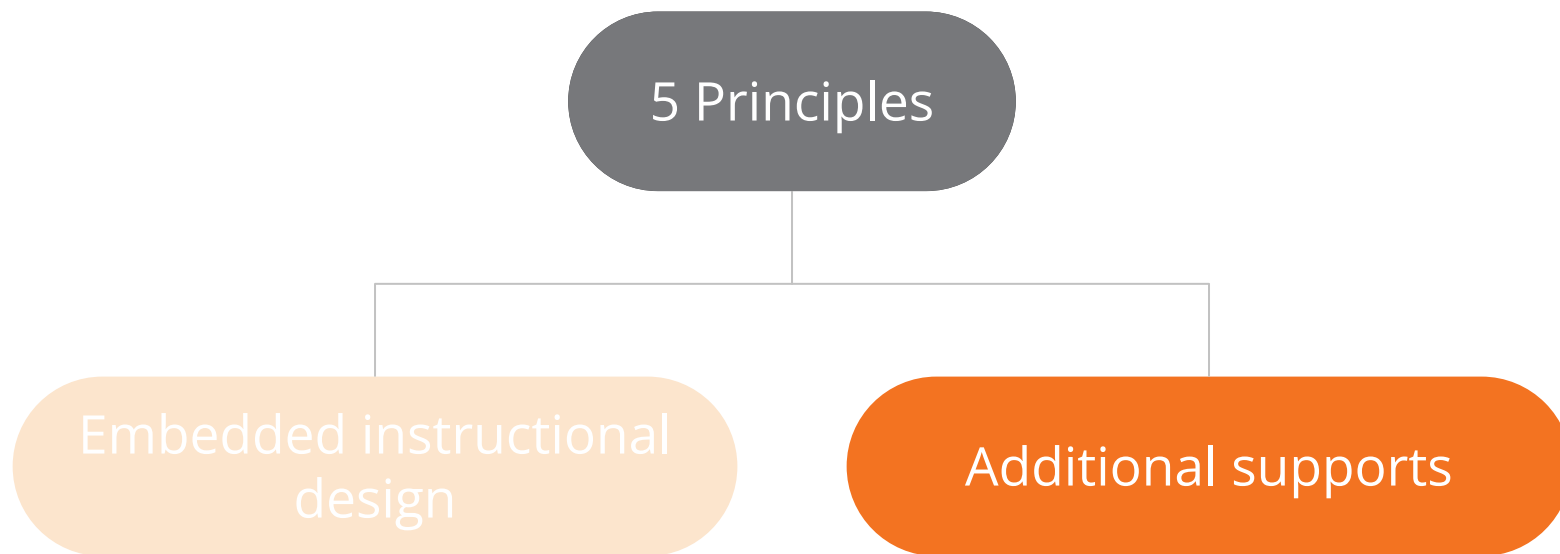
You might be convinced by your partner's argument, and you may change your minds about which claim is **most convincing**. That's okay. Scientists often change their minds.

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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

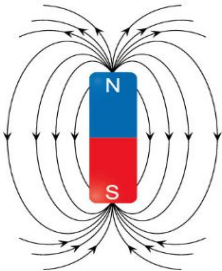
Earth's Geomagnetism

00:01 03:05

Compasses align with Earth's magnetic field. No matter where the compass is on Earth or which way you turn it, the needle always points north. This means the needle points in different directions at different places on Earth's surface. Shutterstock

2

Magnetic forces like those caused by Earth's geomagnetic field may seem mysterious. These forces act on objects at a distance, and we can't see or touch them. To help visualize magnetic forces, scientists model them using [magnetic field lines](#). These scientific [models](#) help scientists predict and explain how magnetic forces work. In a model of a single magnet, lines are drawn looping outward between opposite [magnetic poles](#).



In a model of a single magnet, magnetic field lines come out of the north side of the magnet, loop outward, and enter the south side of the magnet. Shutterstock

3

In a model with more than one magnet, the field lines are sometimes drawn connecting opposite poles on the magnets. These field lines help predict the direction of the forces pulling or pushing different

Overview

Students compare and contrast the magnetic fields of Earth and a bar magnet. They use a compass to determine the direction of the magnetic field lines. They also use a bar magnet to determine the direction of the magnetic field lines. They use a bar magnet to determine the direction of the magnetic field lines.

Lesson at a Glance

1: Multiple-Choice Questions
These multiple-choice questions assess students' understanding of the concepts covered in the lesson.

2: Written-Response Questions
These written-response questions assess students' understanding of the concepts covered in the lesson.

@ Assign

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

Specific Differentiation Strategies for English Learners

Strategic grouping. Strategies for strategic partnering are essential for English learners as they interact and develop their understanding of new content. Partners can help explain instructions to English learners, and English learners can then use English or their primary languages to explain their thinking to their partners. Considering how to pair students who are less proficient in English with partners that are supportive is an important adjustment you may want to make to this and other lessons.

Extended teacher modeling with pairs or small groups. Extended modeling of Active Reading with a small group of English learners can help them surface their questions and confusions about the text within a supportive environment. Before students read, choose a section of *Surprising Spider Silk* to read aloud with a small group of English learners, and model what to do when you don't understand part of what you've read. Think aloud as you model how to notice a break in your understanding and then reread this section slowly. Then, identify an idea you now understand more clearly, as well as an unfamiliar or confusing word or phrase. Model how to record a question as an annotation. Explain that you could talk to a partner about this question to help you understand the article better. Encourage students to use these strategies as they read and provide time for students to try them out on their own. After reading, you can provide additional time for the class or the smaller group you met with to share and discuss parts of the text they found confusing.

Providing additional support

Teacher Support notes

Reading: Systems

Student pairs read *Systems*, applying the synthesizing strategy as they read, then reflect on their new ideas as a class.(25 min)

EMBEDDED FORMATIVE ASSESSMENT

INSTRUCTIONAL GUIDE

Step-by-step

Teacher Support

My Notes

Instructional Suggestion

Supporting English Learners: Reading with a Purpose

Throughout this unit, there are additional resources that support English learners. Providing English learners with a focus for reading can help them concentrate their comprehension efforts on the most important ideas in a text. Before having students read *Systems*, use the section titles to preview the main ideas. Explain that reading section titles and headings can help students identify the most important ideas in a section of a book. Read aloud each of the titles and have students discuss the photos on each page in reference to the title for that section. For example, on pages 6–7, “Bicycle Parts,” ask students to point out and name each bicycle part shown in the photos. On page 12, “Systems Made of Systems,” ask students to point out the smaller system within the larger system of the bicycle. After previewing the book, let students know that when they read the whole book, they will learn more details about these main ideas.

Rationale

Literacy Note: Partner Reading

Throughout this unit, we suggest that students read the books with a partner. This allows students time to apply and practice the reading strategies they’re learning, keeps them focused on the task at hand, and provides opportunities for them to assist each other with reading. Of course, you can use any effective reading procedures you’ve already established with your class. Before

Providing additional

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)
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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

5 Principles for Supporting English Learners



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.

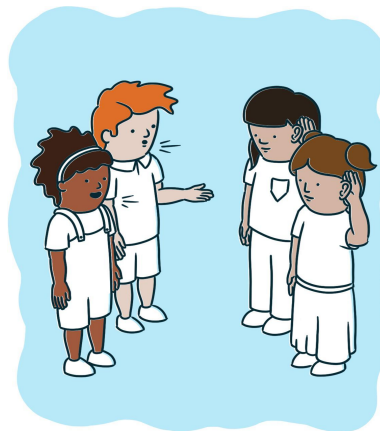
Principle 4: Provide opportunities for scaffolded practice.

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

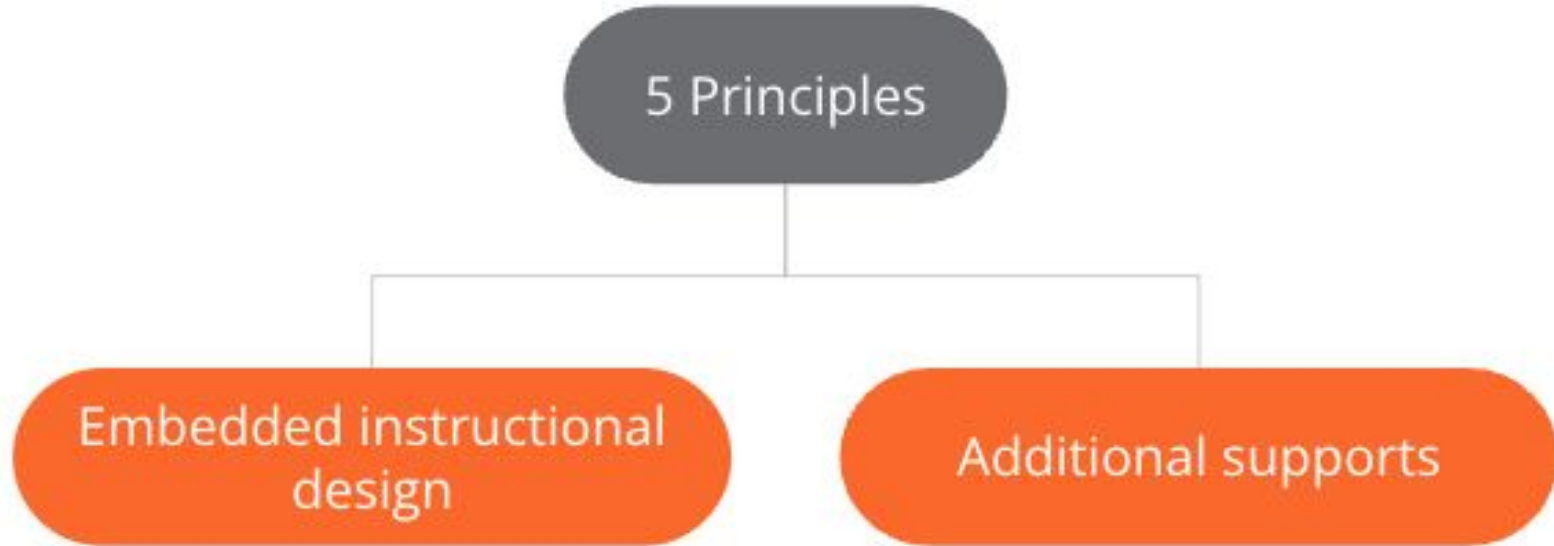
Let's Work

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

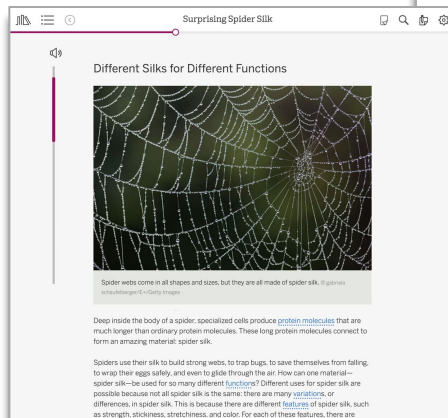


What are the embedded and additional supports that apply to each principle?



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

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



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.

Name: _____ Date: _____

Warm-Up

Read each of the statements in the **Anticipation Guide** below. If you agree with the statement, write "agree." If you disagree with the statement, write "disagree." Then, explain your choice for the first statement.

1. Each person in a family has the same traits. There are no differences in traits between parents and offspring or among siblings.
2. Traits, such as your hair or eye color, are determined by the proteins made by cells in your body.
3. There are two genes that decide each of your traits, and those two genes are always exactly alike.
4. An offspring cannot have a trait if neither of its parents have it.
5. All traits are determined by the experiences an organism has or the environment it lives in. For example, you will have the trait of being a strong swimmer if you swim a lot and live in or near the water.

Explain why you agree or disagree with the first statement: Each person in a family has the same traits. There are no differences in traits between parents and offspring or among siblings.

Principle 2: Capitalize on students' knowledge of language.

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

Specific Differentiation Strategies for English Learners

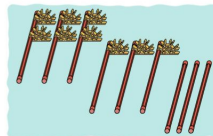
Response options. Some English learners may need additional support with writing. It may be appropriate for these students to express their understanding by using a combination of drawings/diagrams and words rather than purely written responses or by providing their responses orally.

Cognates. Many of the academic words that students will be learning over the course of this lesson and unit are Spanish cognates. Cognates are words in two or more different languages that sound and/or look the same or very nearly the same, and that have similar or identical meanings. You may decide to support students by keeping a running list on chart paper of cognates that students encounter in this unit, or by encouraging students to keep their own lists that they can refer to as needed. Cognates are especially rich linguistic resources to exploit for academic English language development and for biliteracy development.

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

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

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

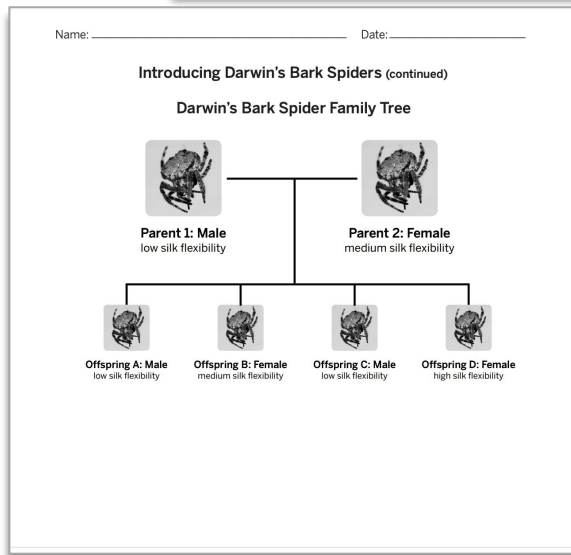
Complete the table. In the middle column, indicate if each type of protein molecule could form a silk strand. In the last column, sketch and describe each silk strand.

What Is a Scientific Argument?

1. It answers a question with a claim about the natural world.
2. It includes evidence to support the claim.
3. It uses scientific language.
4. It is written for an audience.

Principle 4: Provide opportunities for scaffolded practice.

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



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

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

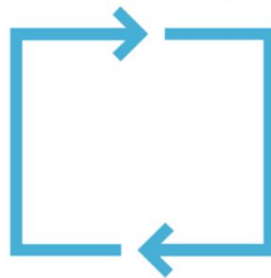


Principle 5: Provide multimodal means of accessing science content and expressing language.

- 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

Multimodal learning

Gathering evidence over multiple lessons



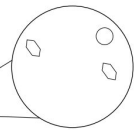

Do,
Talk,
Read,
Write,
Visualize

Traits and Reproduction Modeling Tool

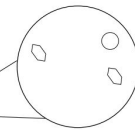

Name: _____ Date: _____

Silk Flexibility Model

Show how different protein molecules determine each spider's traits for the silk flexibility feature.

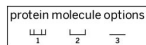


Spider A
high silk flexibility



Spider B
low silk flexibility

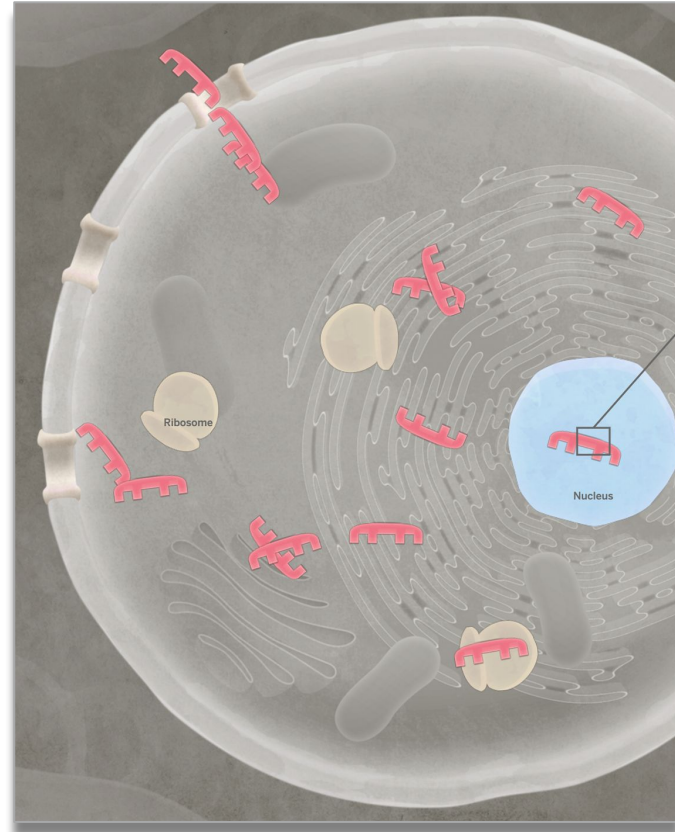
protein molecule options



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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.

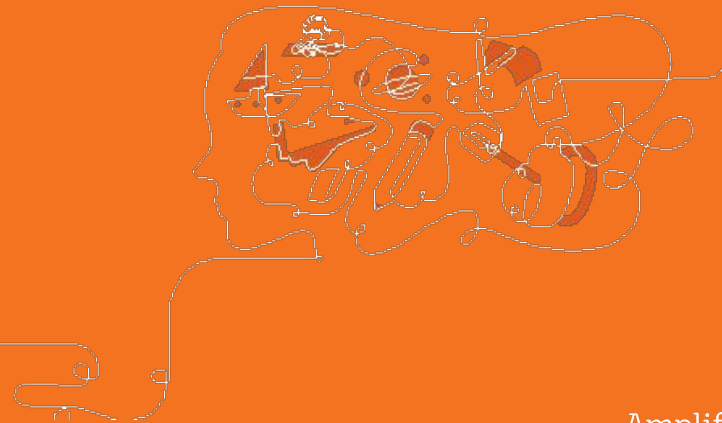
Instructional Suggestion

Providing More Experience: Visualizing Magnetic Fields

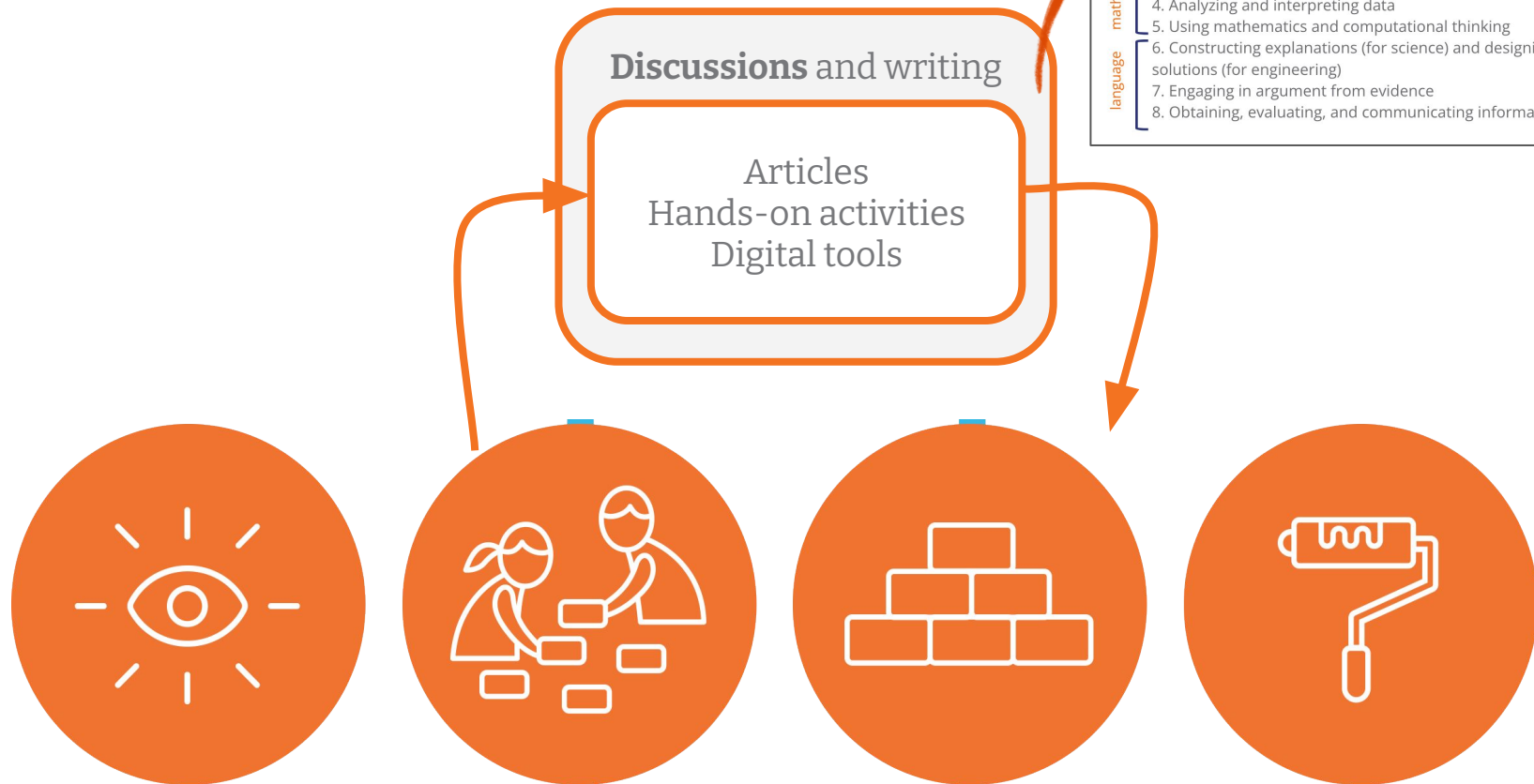
Although the representations of magnetic fields in this unit show magnetic fields as two-dimensional, real magnetic fields exist in three dimensions. You may want to conduct a simple demonstration for small groups of students to show a three-dimensional magnetic field.

- 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

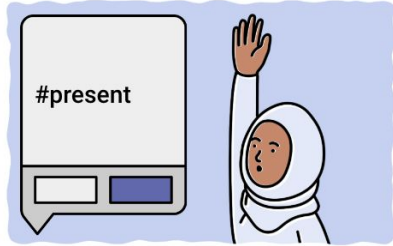
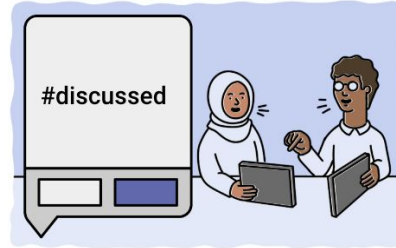
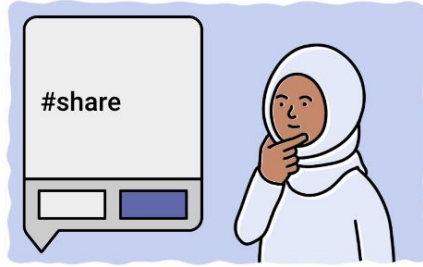


Discourse within Amplify Science



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.



Write and Share Routine: Student 1 Name: _____ Date: _____

Rock s

Write and Share Routine: Student 2 Name: _____ Date: _____

Prompt
What v
sample
expose
and thi
to ener

Ro

Write and Share Routine: Student 3 Name: _____ Date: _____

Pr
What v
sample
expose
and thi
to ener

Ro

Write and Share Routine: Student 4 Name: _____ Date: _____

Pr
What v
sample
expose
and thi
to ener

Word b

- ener
- mag
- meli
- sedi
- wea

Wo

•

•

•

•

Wo

• e

• r

• r

• s

• v

Teacher note:
consider replacing
with a screenshot of
an image from your
own unit/ handout

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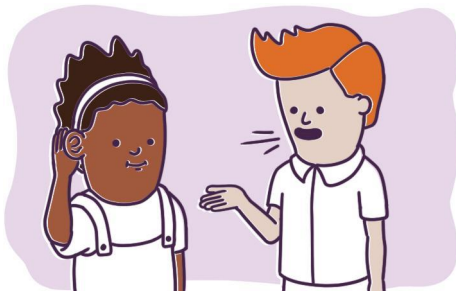
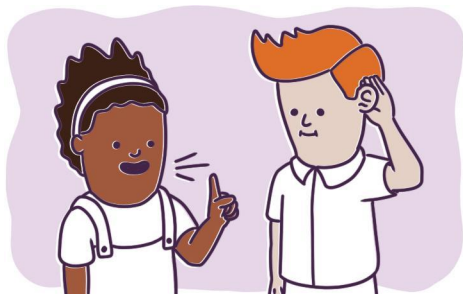
consider replacing
with a screenshot of
an image from your
own unit/ handout

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.

Discourse Routine Templates

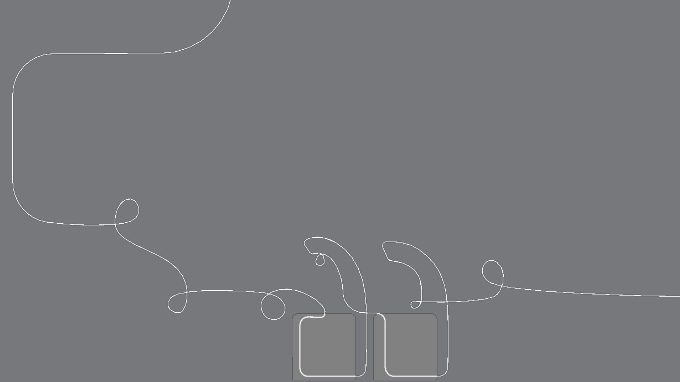
Discourse Routines



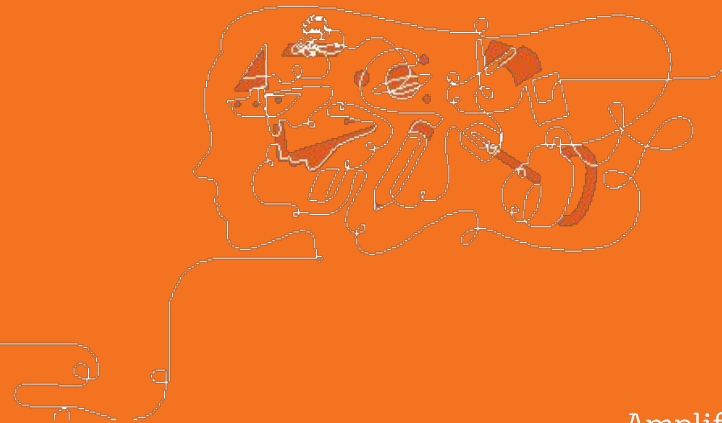
Discourse Routine Templates

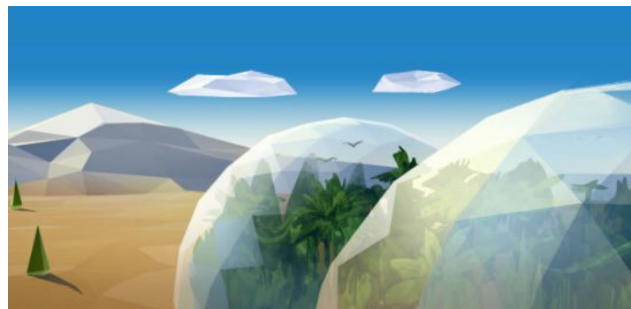
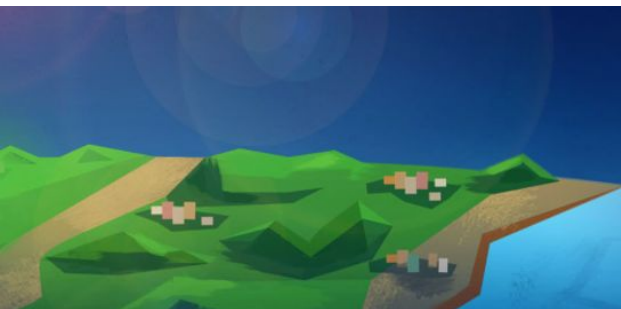
<https://bit.ly/3WtzCQs>

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

Integrated model*

Grade 6

- Launch:
Microbiome
- Metabolism
- Engineering Internship:
Metabolism
- **Traits and Reproduction**
- Thermal Energy
- Ocean, Atmosphere,
and Climate
- Weather Patterns
- Earth's Changing Climate
- Engineering Internship:
Earth's Changing Climate

Grade 7

- Launch:
Geology on Mars
- Plate Motion
- Engineering Internship:
Plate Motion
- Rock Transformations
- Phase Change
- Engineering Internship:
Phase Change
- Chemical Reactions
- Populations and Resources
- Matter and Energy
in Ecosystems

Grade 8

- Launch:
Harnessing Human Energy
- Force and Motion
- Engineering Internship:
Force and Motion
- Magnetic Fields
- Light Waves
- Earth, Moon, and Sun
- Natural Selection
- Engineering Internship:
Natural Selection
- Evolutionary History

AmplifyScience

authored by



THE LAWRENCE
HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

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Launch unit

- First unit
- 11 lessons

Core units

- Majority of units
- 19 lessons

Engineering Internships

- Two per year
- 10 lessons

Traits and Reproduction

19 Lessons

Traits and Reproduction

Printable Teacher Guide

Unit Overview

Chapters

Printable Resources

Planning for the Unit

Unit Map

Progress Build

Getting Ready to Teach

Materials and Preparation

Science Background

Standards at a Glance

Teacher References

Lesson Overview

Compilation

Standards and Goals

3-D Statements

Assessment System

Embedded Formative Assessments

Articles in This Unit

Apps in This Unit

Opportunities for Unit Extensions

Flextensions in This Unit

Offline Preparation

Unit Overview

What's in This Unit?

Inside virtually every cell in every organism on Earth, genes provide instructions for making proteins that govern all the functions of an organism's body. An organism inherits its genes from its parent or parents, but different combinations of genes can lead to striking variation even among closely related organisms. Understanding the role of genes and the process of inheritance has allowed researchers to explain variation in life on Earth, breed plants and animals with new traits, and develop cures for devastating diseases. In the *Traits and Reproduction* unit, students take on the role of student genetic researchers, working with

[Read more](#)

Chapters

Chapter 1: Exploring Variation in Spider Silk

SETTINGS

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

CORE Unit 4

TRAITS and REPRODUCTION

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.

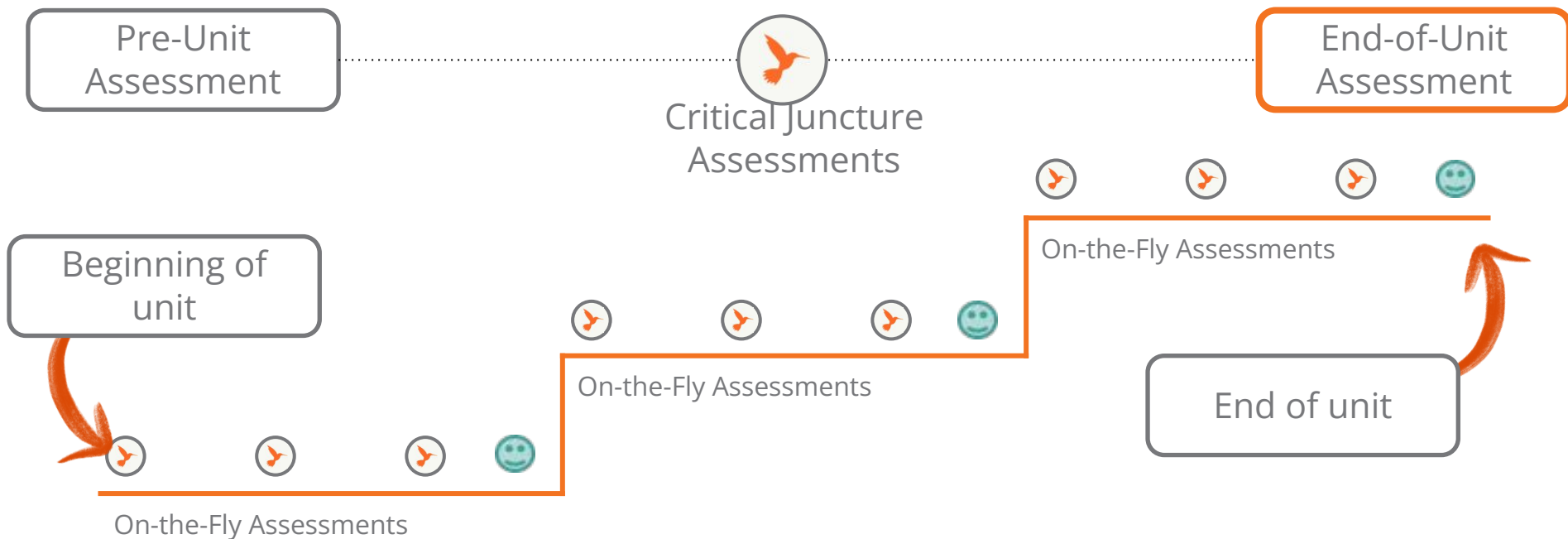
Level 2

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

Chapter 1 Question

Investigation Question

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to problem

Explanation that students can make to answer the Chapter 1 Question

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

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

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

- 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)

- 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)

- 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)

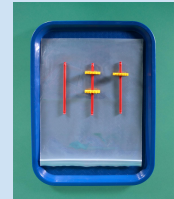
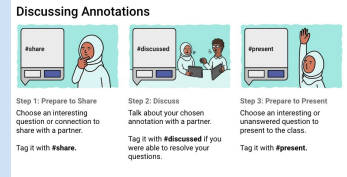
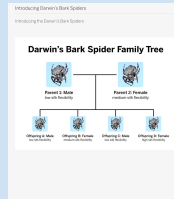
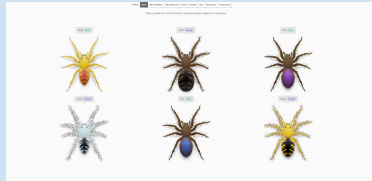
The spiders in this family must have different proteins for silk flexibility in their cells. Variation in traits can be caused by variation in protein molecules within individuals' cells. Protein molecules' structures affect their function and the way they connect to other molecules. Spider silk is made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

Lesson 1.3: Surprising Spider Silk

Printable Lesson Guide

Lesson Brief
(3 Activities)

1 WARM-UP
Warm-Up

TEACHER
Playing Spiders in the Lab

2 READING
Active Reading: Surprising
Spider Silk

3

RESET LESSON

Overview

Materials & Preparation

Differentiation

Standards

Vocabulary

Unplugged?

Overview

In this lesson, students investigate how protein molecules in an organism's cells affect its traits. They activate their prior knowledge about proteins by completing the Warm-Up and are then introduced to the Investigation Question: *What determines an organism's traits at the molecular scale?* Next, students read about differences in silk among various spiders and also learn that different types of spider silk are made of different proteins. Students then turn their focus to silk fibroin, which provides a microscopic view of how the structure of

Overview

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Lesson at a Glance

1: Warm-Up (2 min.)
Students record questions about how scientists study spider traits, helping spark their interest in a short video on the topic.

(Teacher Only) Playing Spiders in the Lab (3 min.)
Students view a follow-up documentary video to learn more about how real scientists study spider silk.

2: Active Reading: Surprising Spider Silk (15 min.)
To set the stage for investigating what determines traits at the microscopic level, students read about how different spiders produce different types of silk.

3: Building Physical Models of Proteins (25 min.)
Students build models of spider silk proteins and silk strands, visualizing how the structure of a protein determines how it will interact with other proteins.

Classroom Slides 1.3 | Google Slides

All Projections

Classroom Videos 1.3 | Zip

Considering language demands

- 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

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? <i>(Differentiation Brief, Teacher Support Tab, Teacher Toolkit)</i>
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.

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.

Traits and Reproduction

Chapters

Chapter 1: Exploring Variation in Spider Silk ⓘ



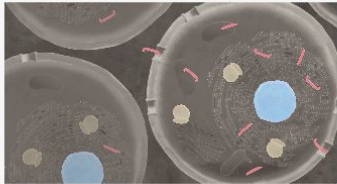
LESSON 1.1
Pre-Unit Assessment



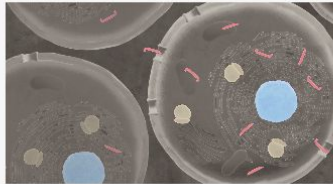
LESSON 1.2
Introducing Spider Silk
Research



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 ⓘ



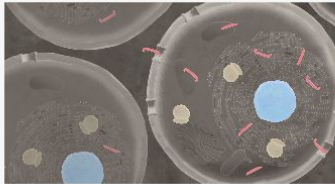
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Variation



LESSON 1.5
Investigating Proteins and
Traits

Traits and Reproduction

19 Lessons

Traits and Reproduction

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Read more

Chapters

Chapter 1: Exploring Variation in Spider Silk

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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

HOME
CURRICULUM
CLASSWORK
REPORTING
TEACH

Science > Metabolism > Lesson 1.2

Lesson 1.2:

Welcome to Medical School

Printable Lesson Guide

Lesson Brief (4 Activities)

TEACHER
Introducing Medical Student Role

1
WARM UP
Warm-Up

TEACHER
Generating Claims About Elisa

2
SIM
Introducing the Metabolism Simulation

TEACHER-LED DISCUSSION
Returning to the Patient

4 >

RESET LESSON

Assign

Overview:
Materials & Preparation
Differentiation
Vocabulary
Unplugged?

Overview

Students begin the unit by viewing a dramatic video that immerses them in their new role as medical students. Students build on the video by brainstorming initial thoughts about why their patient, Elisa, could be feeling so tired. The teacher helps the class to create plausible alternative claims from these initial ideas. Students are then introduced to the Metabolism Simulation, and they begin to observe how molecules travel through systems in a healthy body. The purpose of this lesson is to help students begin to make connections between macro-effects, such as how tired someone feels, and the microscopic world of metabolism—the body's use of molecules for energy and growth.

Anchor Phenomenon: Elisa, a young patient, feels tired all the time.

Students learn:

- The body takes in molecules by eating and breathing.

Digital Resources

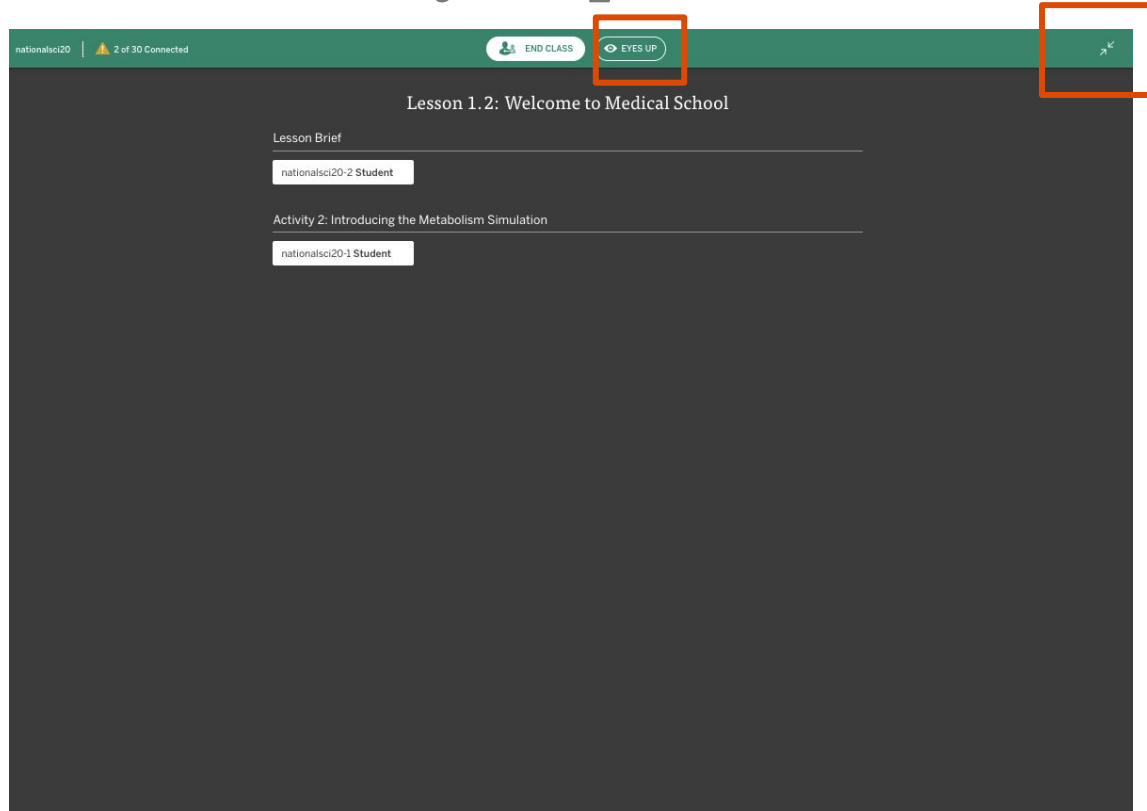
- Classroom Slides 1.2 | PowerPoint
- Classroom Slides 1.2 | Google Slides
- All Projections
- Classroom Videos 1.2 | Zip
- Video: Elisa's Condition
- Completed Scientific Argumentation Wall Diagram
- Metabolism Investigation Notebook, pages 5–8
- Printable Metabolism Glossary

nationalsci20

[START CLASS](#)

nationalsci20-1 Student	nationalsci20-30 Student	nationalsci20-11 Student
nationalsci20-12 Student	nationalsci20-13 Student	nationalsci20-14 Student
nationalsci20-15 Student	nationalsci20-36 Student	nationalsci20-17 Student
nationalsci20-18 Student	nationalsci20-19 Student	nationalsci20-2 Student
nationalsci20-20 Student	nationalsci20-21 Student	nationalsci20-22 Student
nationalsci20-23 Student	nationalsci20-24 Student	nationalsci20-25 Student
nationalsci20-26 Student	nationalsci20-27 Student	nationalsci20-28 Student
nationalsci20-29 Student	nationalsci20-3 Student	nationalsci20-30 Student
nationalsci20-4 Student	nationalsci20-5 Student	nationalsci20-6 Student
nationalsci20-7 Student	nationalsci20-8 Student	nationalsci20-9 Student

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?

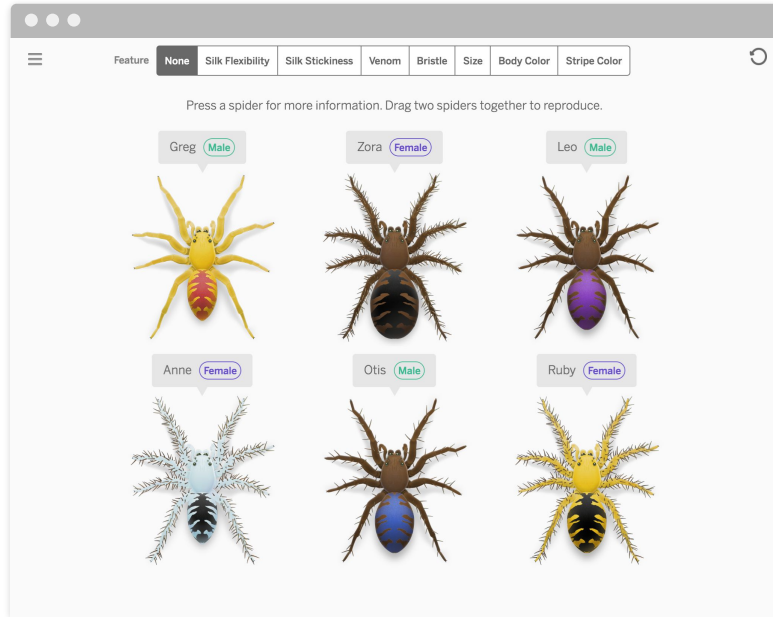
Claim 1: The offspring have **mutations** that affect their traits.

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**.

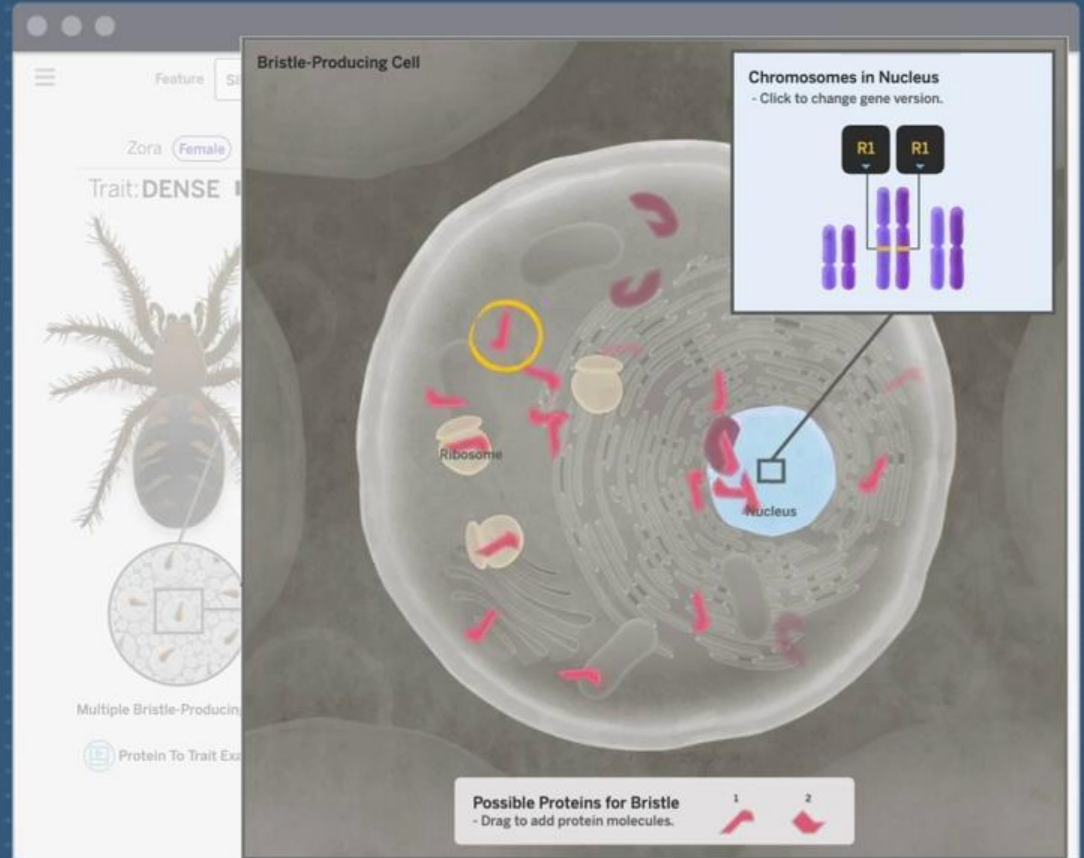
These are **claims** about why the trait for silk flexibility varies within the spider family.

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 ⓘ



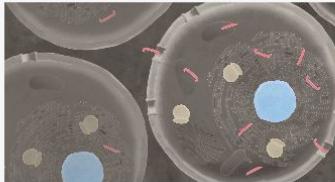
LESSON 1.1
Pre-Unit Assessment



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

For Each Student

Digital or Print Versions

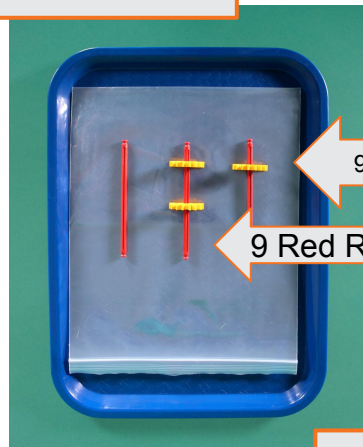
- Article
- Investigation Notebook

2 Plastic Bags



9 Green or Yellow Connectors

9 Red Rods



Modeling Protein Molecules

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

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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

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Name: _____ Date: _____

Modeling Protein Molecules

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

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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.

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

The function of a protein molecule depends on its structure and how it interacts with other protein molecules. (1.3)

Vocabulary

feature

variation

function

trait

structure

protein molecule

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.

A detailed microscopic image of a spider's silk gland. The central feature is a large, circular, blue nucleus. Surrounding it are numerous concentric, wavy lines representing the silk fibers. Several small, yellow, oval-shaped structures are scattered throughout the gland. Red, curved, hook-like structures are also visible, some attached to the outer edge of the gland and others within the fiber layers. The overall background is dark, highlighting the intricate internal structure of the silk gland.

Traits and Reproduction

Lesson 1.3: Surprising Spider Silk

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.

Surprising Spider Silk


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 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 are several possible [traits](#). For example, for the feature of silk color, a spider might have the trait of making gray, white, or even golden-colored silk.




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.

Surprising Spider Silk


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

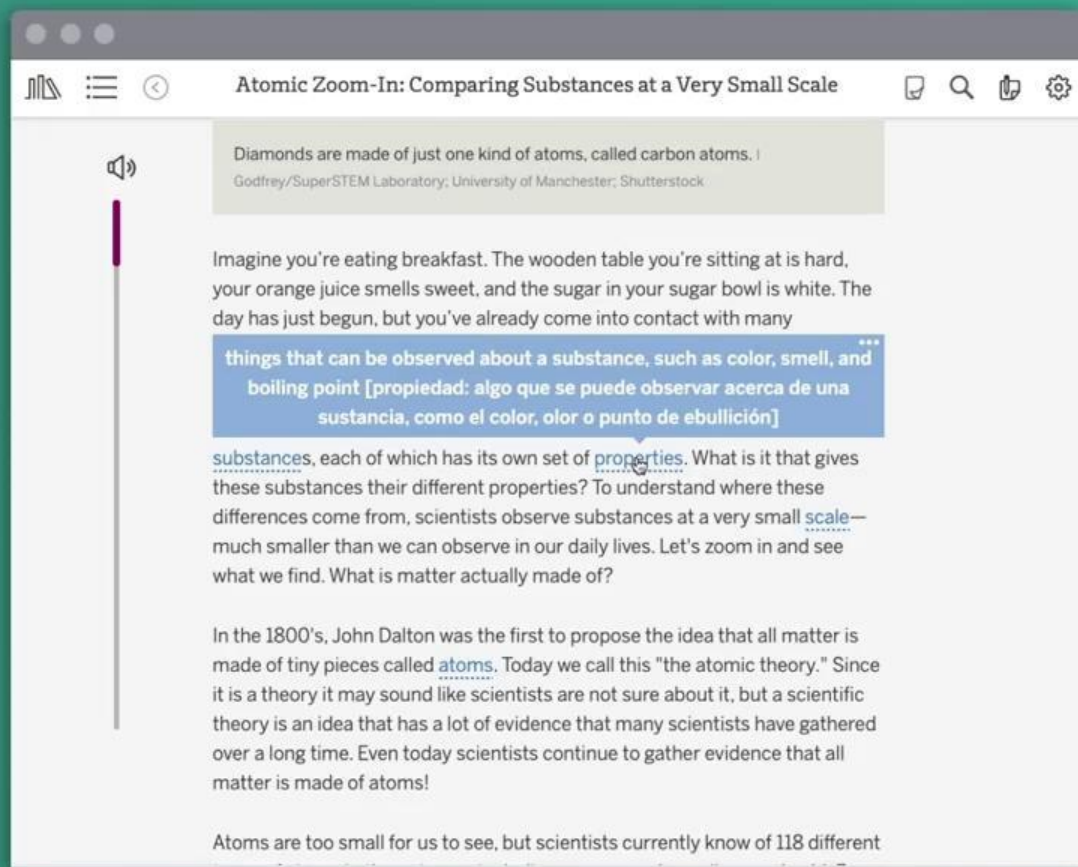
Deep inside the body of a spider, specialized cells produce [protein molecules](#) that are much longer than ordinary protein molecules. These long protein molecules connect to form an amazing material: spider silk.

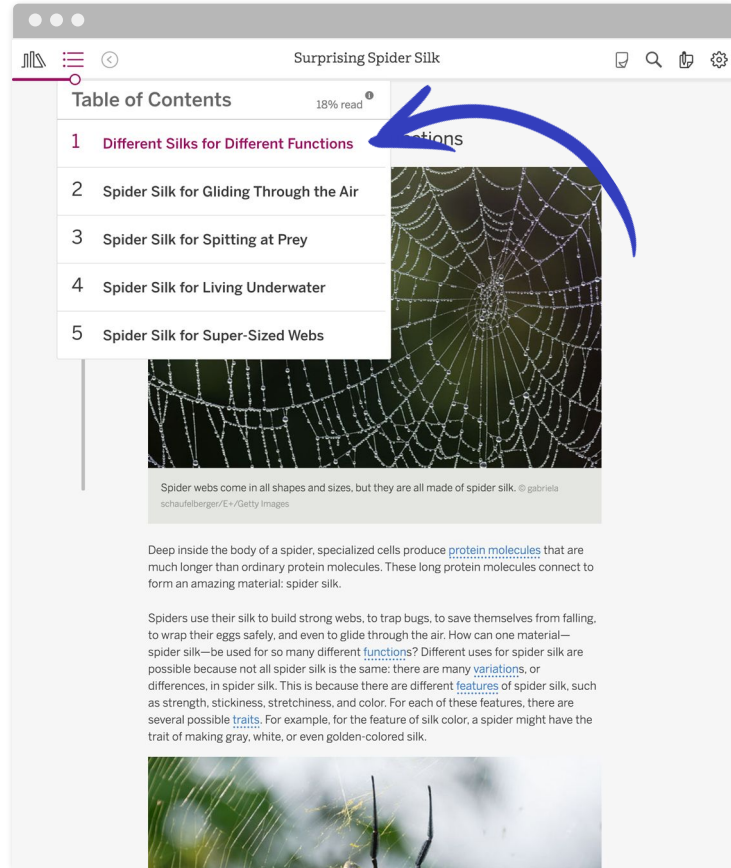
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First, let's review how to use the features of the Amplify Library.

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.





Surprising Spider Silk

18% read

1 Different Silks for Different Functions

2 Spider Silk for Gliding Through the Air

3 Spider Silk for Spitting at Prey

4 Spider Silk for Living Underwater

5 Spider Silk for Super-Sized Webs

Spider webs come in all shapes and sizes, but they are all made of spider silk. © gabriela schaufelberger/VE+/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 molecules connect to form an amazing material: spider silk.

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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.

Surprising Spider Silk

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

Surprising Spider Silk

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

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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.


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.



The same as special?

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 are several possible [traits](#). For example, for the feature of silk color, a spider might have the trait of making gray, white, or even golden-colored silk.



Here is a close-up of a spider that makes golden-colored spider silk. © Shutterstock

Spiders have different traits for each feature because of differences in the protein molecules that make up the silk. The cells of different spiders make different kinds of protein molecules, and these molecules combine to make different kinds of silk. This means that the kind of protein molecules a spider makes for a feature determine its trait for that feature. The spider pictured above makes specific protein molecules for the silk color feature. These protein molecules result in golden-colored spider silk.

To learn more about some amazing spider silks and the proteins that make them that way, read one or more of the chapters that follow.

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.



Surprising Spider Silk

Annotations Revealed Words

Search annotations

Filter by:

- ☒ Highlight
- ☒ Notes
- ☒ Bookmarks

All Chapters

Chapter 1, 1.1
specialized

The same as special?

Different Silks for Differ...

Spider webs come in all shapes and sizes, but they are all made of spider silk. @ gabiela 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 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 are several possible traits. For example, for the feature of silk color, a spider might have the trait of making gray, white, or even golden-colored silk.

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.

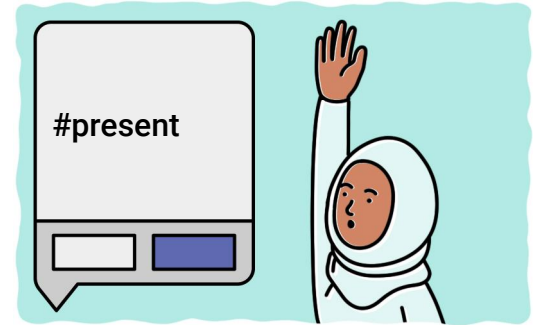
Tag it with **#share**.



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.

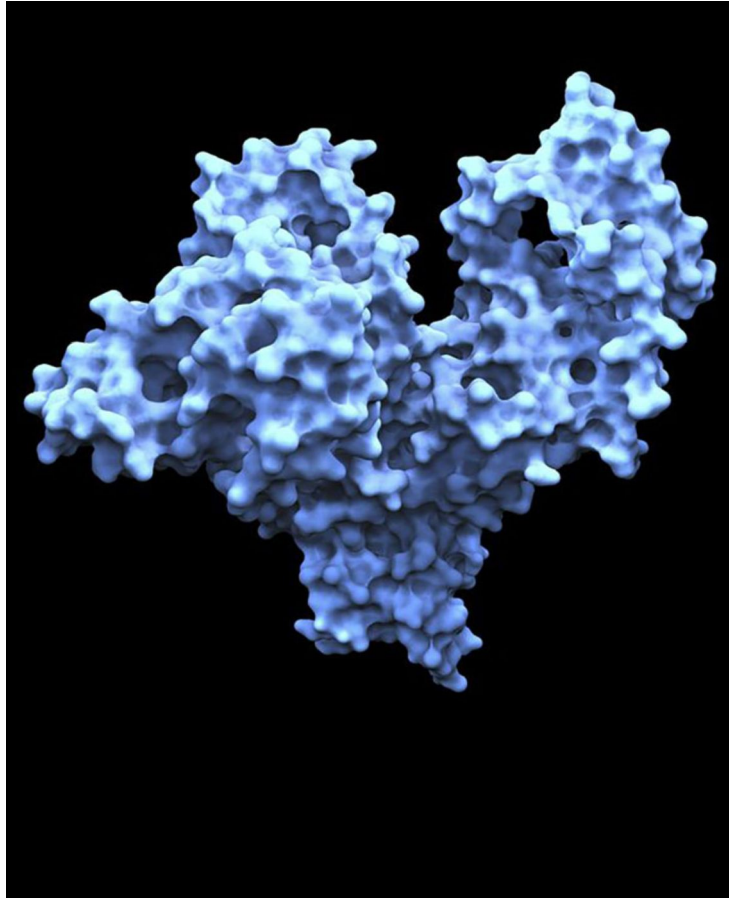
These behaviors include ways of catching prey, moving, and protecting their eggs and young.

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.

Active Reading: Surprising Spider Silk

Reviewing Annotations

Select the article you read and then press HAND IN to submit your annotations.

Select the article you read from the list below.


"Spider Silk for Gliding Through the Air"

"Spider Silk for Spitting at Prey"

"Spider Silk for Living Underwater"


"Spider Silk for Super-Sized Webs"

Different Silks for Different Functions



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

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Investigation Notebook **pg 13** 

Activity 3

Building Physical Models of Proteins



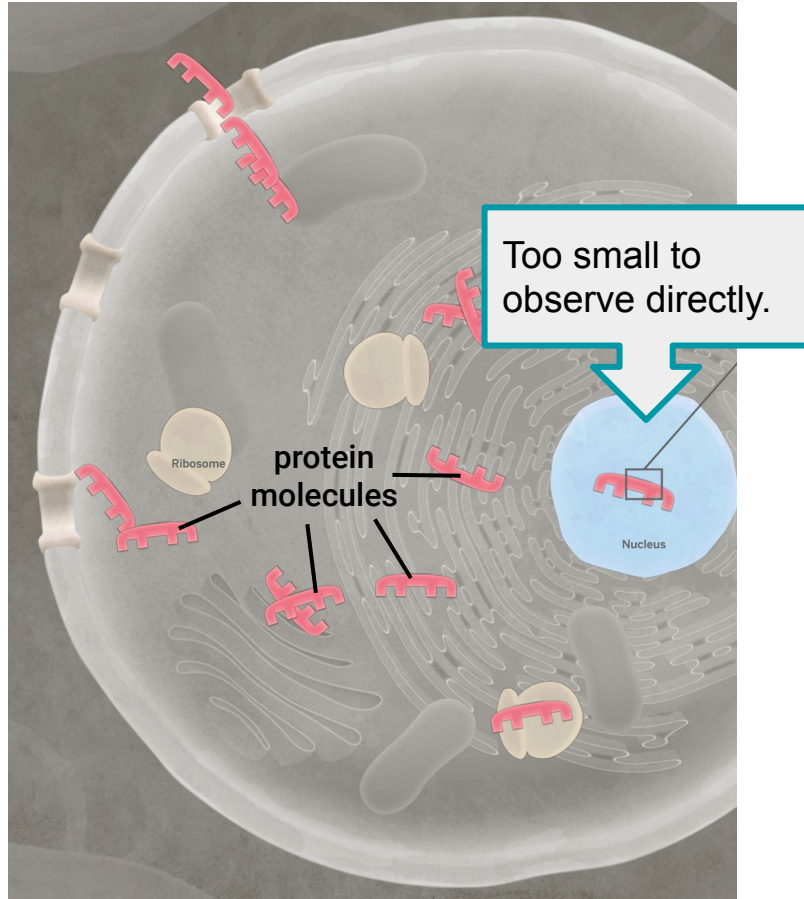


You just read about the types of silk that different spiders can make. Now, we'll use a **model** to learn how protein molecules determine silk flexibility in Darwin's bark spiders.

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

circular structure →



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

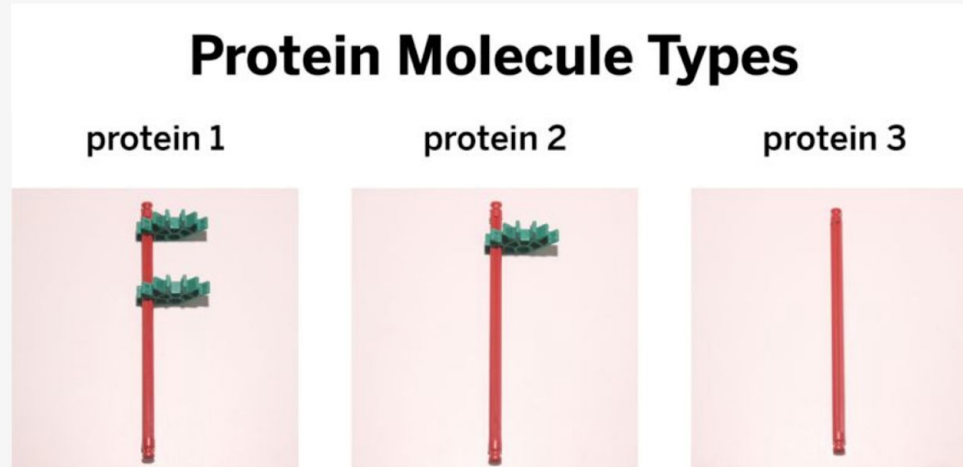
For example, this wheel has a circular structure.

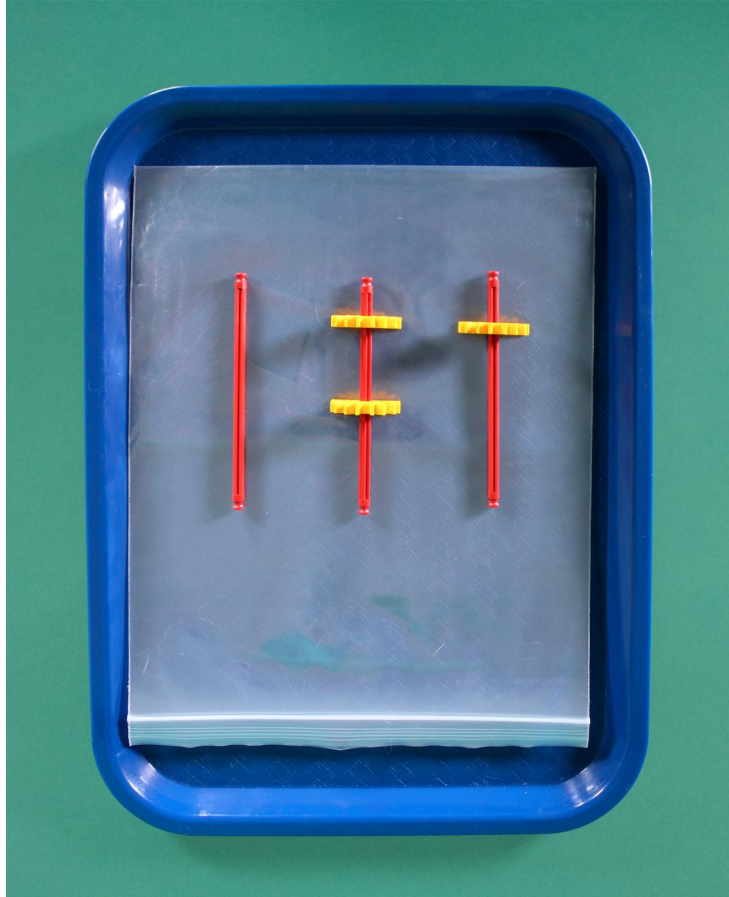
In today's activity, you will examine models of different spider silk protein molecules. You will describe their shapes and think about why they are shaped that way.

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



Complete Part 1.

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

7 minutes

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.

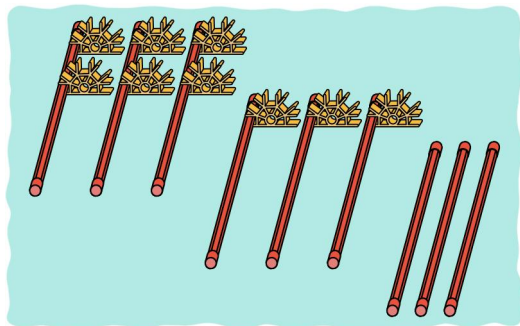
Proteins in silk strand	Did the proteins connect to form a strand?	Sketch the structure of the silk strand below.
protein 1		
protein 2		
protein 3		

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

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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.



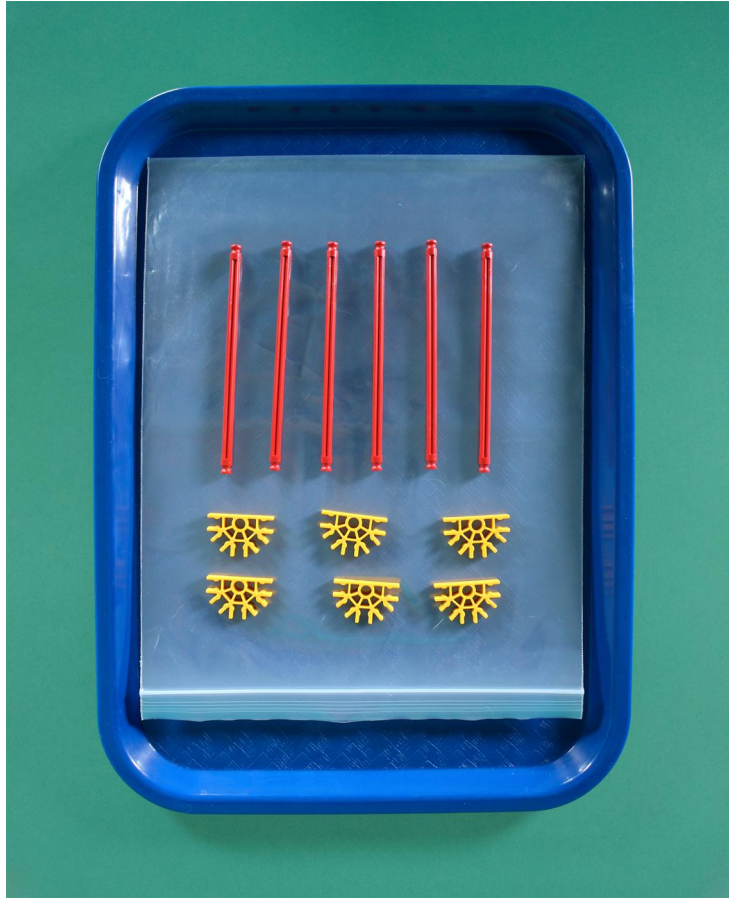
Connect

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.



Complete Part 2.

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

10 minutes

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

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

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

Active Reading Guidelines

1. Think carefully about what you read. Pay attention to your own understanding.
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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.

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? <i>(Differentiation Brief, Teacher Support Tab, Teacher Toolkit)</i>
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.

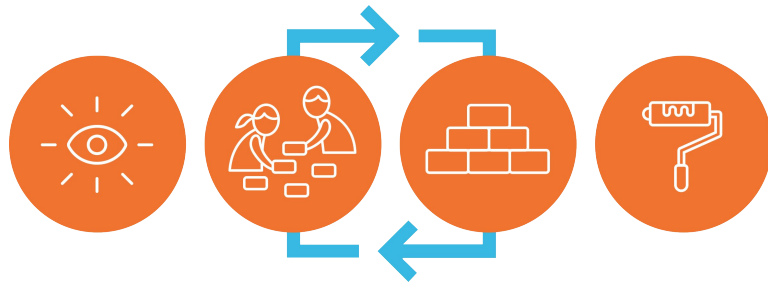
Principle 3: Provide explicit instruction about the language of science.

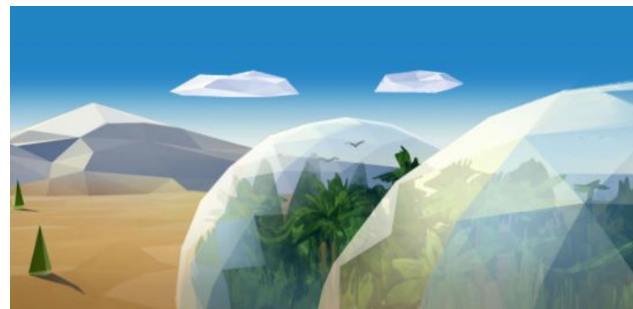
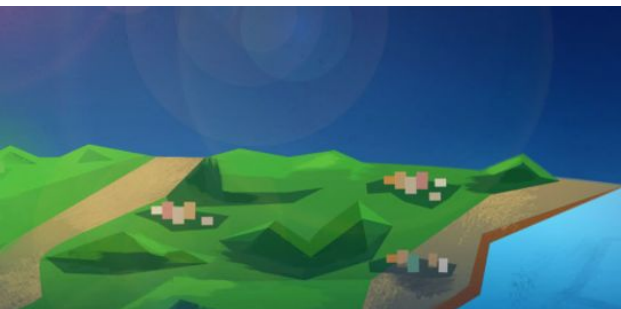
Principle 4: Provide opportunities for scaffolded practice.

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

Strategies for engaging English learners

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





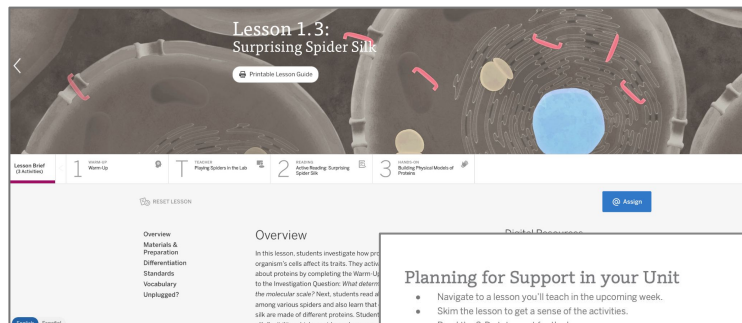
Plan for the day

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

Work time

- 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

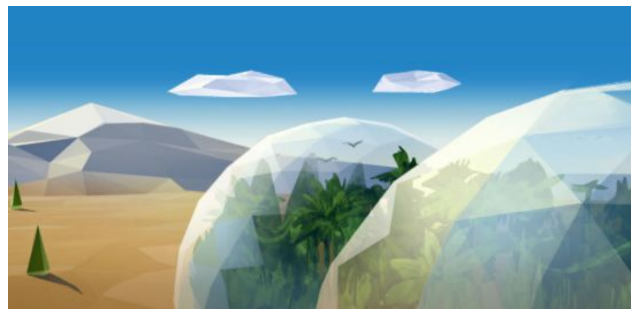
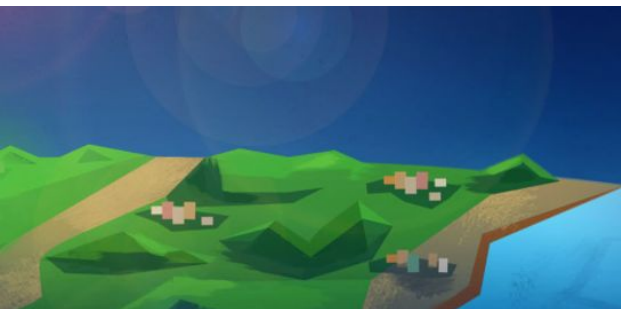
Unit: _____

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?

Share Out

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





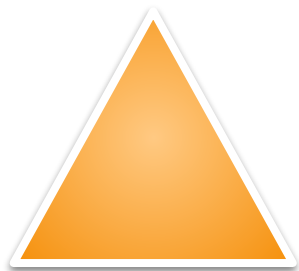
Plan for the day

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

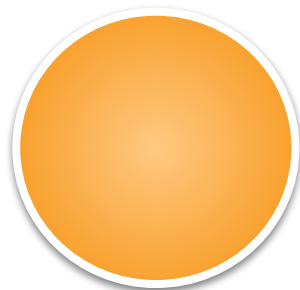
Closing reflection

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



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.

This screenshot shows the 'Lesson 1.1: Pre-Unit Assessment' page. The header includes the Amplify logo and navigation links for CURRICULUM, CLASSWORK, and REPORTING. The breadcrumb trail reads 'Science California > Energy Conversions > Lesson 1.1'. The main content area features a dark background with a cityscape illustration and the title 'Lesson 1.1: Pre-Unit Assessment'. A button labeled 'Printable Lesson Guide' is visible. At the bottom, a progress bar shows three steps: 'Lesson Brief (3 Activities)', '1 WRITING Students Write Initial Explanations', and '2 TEACHER-LED DISCUSSION Introducing the Problem'. A 'RESET LESSON' button is located at the bottom left.

This screenshot displays the 'Amplify Science Program Hub' interface. The top navigation bar includes links for CURRICULUM, CLASSWORK, and REPORTING, along with a 'PROGRAMS & APPS' icon and a user profile for 'NATIONALSCI200 TEACHER'. The main content area is titled 'Science' and 'Units', with a dropdown menu set to '4th Grade Science Eng/Esp'. A red circle highlights the 'PROGRAMS & APPS' icon in the top navigation bar. Below the navigation bar, there are several unit cards, including 'Inversions' and 'Vision and Light' (22 Lessons). A smaller inset window shows a 'Welcome Science Educators!' message, with a red circle highlighting the 'Remote and hybrid learning resources' section.

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



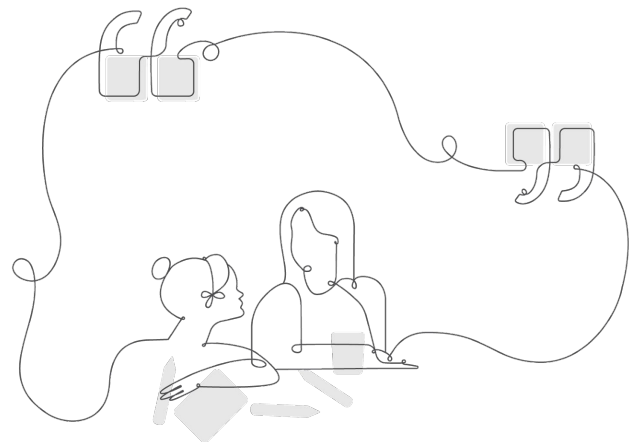
Upcoming Professional Development!

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!

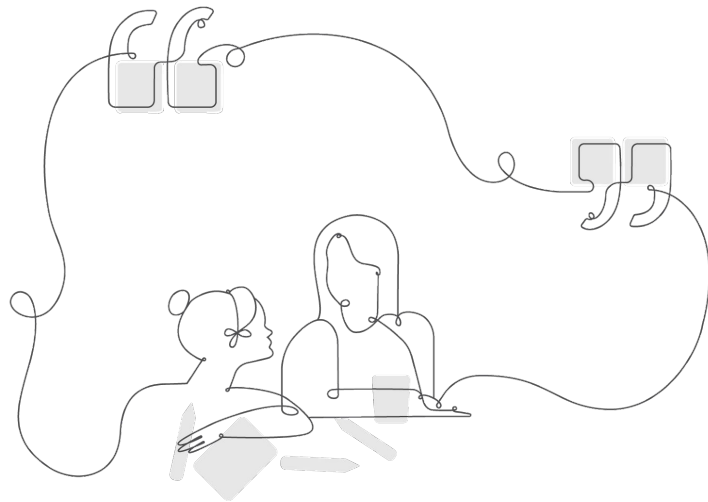
Survey

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)

