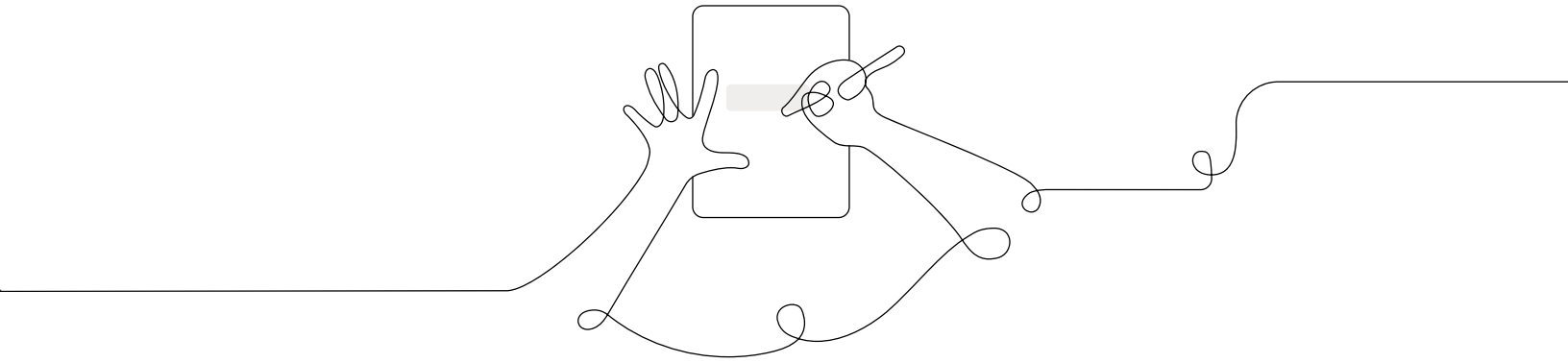
AmplifyScience

Participant Notebook

Grade 1: Animal and Plant Defenses
Unit 1 Unpacking for Hybrid Learning



Unit Guide resources

Once a unit is selected, select **JUMP DOWN TO UNIT GUIDE** in order to access all unit-level resources in an Amplify Science unit.

Planning for the unit

Unit Overview	Describes what's in each unit, the rationale, and how students learn across chapters
Unit Map	Provides an overview of what students figure out in each chapter, and how they figure it out
Progress Build	Explains the learning progression of ideas students figure out in the unit
Getting Ready to Teach	Provides tips for effectively preparing to teach and teaching the unit in your classroom
Materials and Preparation	Lists materials included in the unit's kit, items to be provided by the teacher, and briefly outlines preparation requirements for each lesson
Science Background	Adult-level primer on the science content students figure out in the unit
Standards at a Glance	Lists Next Generation Science Standards (NGSS) (Performance Expectations, Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts), Common Core State Standards for English Language Arts, and Common Core State Standards for Mathematics

Teacher references

Lesson Overview Compilation	Lesson Overview of each lesson in the unit, including lesson summary, activity purposes, and timing
Standards and Goals	Lists NGSS (Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts) and CCSS (English Language Arts and Mathematics) in the unit, explains how the standards are reached
3-D Statements	Describes 3-D learning across the unit, chapters, and in individual lessons
Assessment System	Describes components of the Amplify Science Assessment System, identifies each 3-D assessment opportunity in the unit
Embedded Formative Assessments	Includes full text of formative assessments in the unit
Books in This Unit	Summarizes each unit text and explains how the text supports instruction
Apps in This Unit	Outlines functionality of digital tools and how students use them (in grades 2-5)

Printable resources

Copymaster Compilation	Compilation of all copymasters for the teacher to print and copy throughout the unit
Investigation Notebook	Digital version of the Investigation Notebook, for copying and projecting
Multi-Language Glossary	Glossary of unit vocabulary in multiple languages
Print Materials (8.5" x 11")	Digital compilation of printed cards (i.e. vocabulary cards, student card sets) provided in the kit
Print Materials (11" x 17")	Digital compilation of printed Unit Question, Chapter Questions, and Key Concepts provided in the kit

Unit Map

How can a sea turtle survive in the ocean after being released by an aquarium?

Working in their role as marine scientists, students apply their understanding of plant and animal defense structures as they explain to aquarium visitors how a sea turtle or other sea animals at the aquarium could defend themselves from ocean predators once they are released back into the wild.

Chapter 1: How does Spruce the Sea Turtle do what she needs to do to survive?

Students figure out: Sea turtles have body parts that help them get food, air, and water. In the ocean, there are predators that might try to eat the sea turtle. To survive in the ocean, she needs to avoid being eaten by predators.

How they figure it out: By watching videos of animals eating, reading about animals catching their meals in the wild, watering a plant, and closely observing their partners chewing and swallowing, students figure out that living things (including humans) use their body structures to meet their needs. Students review the basic survival needs of organisms through a game and are introduced to a new idea: to survive, animals and plants must avoid being eaten by other animals.

Chapter 2: How can Spruce the Sea Turtle survive where there are sharks?

Students figure out: The sea turtle has a shell and camouflage that enable her to defend herself from predators. The shell is hard, so predators can't eat her when they try to bite her. The camouflage allows her to blend in with her habitat, which makes it hard for predators to see her.

How they figure it out: Students read to find out that animal and plant structures perform specific functions. They observe photographs and videos of animals and plants defending themselves using shells, spines, and camouflage, then create models explaining their ideas about how these defenses work. The chapter ends with a biomimicry workshop in which students, informed by real animal and plant defenses, design ways to protect the sea turtle's food.

Chapter 3: How can Spruce the Sea Turtle's offspring survive where there are sharks?

Students figure out: When the sea turtle has offspring, they will not look exactly alike, but they will grow up to have hard shells and camouflage, just like their parents. These structures allow them to defend themselves from predators in the same way that the mother sea turtle does. This is because offspring defend themselves in the same way their parents do.

How they figure it out: Students use evidence from photos to compare offspring to parent organisms, then role-play interactions between parents and offspring. They read to find out that many animals need their parents to survive while they are young, and that plants grow up without parental care.

Chapter 4: How can aquarium scientists explain animal defenses to visitors?

Students figure out: Models highlight the important parts of what we are trying to explain and help communicate ideas clearly. A model of sea turtle defenses should either show how a hard shell stops a predator from biting and eating a sea turtle or how camouflage makes a sea turtle difficult to see so predators cannot find and eat it. Models do not need to show the parts of a sea turtle that are not part of its defense.

How they figure it out: Students read about and evaluate a model of frog defenses for effectiveness and clarity. Keeping these criteria in mind, they design and build their own models that will communicate to visitors how one of four sea animals defends itself. Students showcase their ideas by explaining their models at an exhibition held for classroom visitors.

Progress Build

A Progress Build describes the way in which students' explanations of the central phenomenon should develop and deepen over the course of a unit. It is an important tool in understanding the design of the unit and in supporting students' learning. A Progress Build organizes the sequence of instruction, defines the focus of the assessments, and grounds inferences about students' understanding of the content, specifically at each of the Critical Juncture Assessments found throughout the unit. A Critical Juncture Assessment provides information to help guide decisions related to the instruction designed to address specific gaps in students' understanding. This document will serve as an overview of the *Animal and Plant Defenses: Spikes, Shells, and Camouflage* Progress Build. Since the Progress Build is an increasingly complex yet integrated explanation, we represent it below by including the new ideas for each level in bold. Depending on the standards for a given grade level, a unit may include additional supporting content; however, the Progress Build serves as the conceptual core of the unit.

In the *Animal and Plant Defenses* unit, students will learn to construct scientific explanations of why animals' and plants' offspring are able to survive in areas where there are animals that might eat them.

Prior knowledge (preconceptions): It is assumed students know that animals and plants are living things and can die if they do not get what they need. Students are expected to begin the unit with some ideas about plants' and animals' basic needs, such as light, water, and food, but they will have the opportunity to learn about a more comprehensive set of needs.

Progress Build Level 1: Avoiding Being Eaten

To survive, animals and plants must not be eaten by animals that try to eat them for food.

Progress Build Level 2: Structures for Defense

To survive, animals and plants must not be eaten by animals that try to eat them for food. **Many animals and plants have body structures with qualities that make them good for stopping animals from finding and/or eating them.**

Progress Build Level 3: Offspring's Structures

To survive, animals and plants must not be eaten by animals that try to eat them for food. Many animals and plants have body structures with qualities that make them good for stopping animals from finding and/or eating them. **Animals' and plants' offspring have similar, though not identical, structures to their parents that work in the same ways.**

Applying conceptual understanding to explain the phenomenon

Use ideas from the Progress Build and Unit Map to make notes about the conceptual and explanatory builds in your unit.

	Science concepts	Explanation of the phenomenon
	Students figure out...	*So they can explain...*
Chapter 1	That sea turtles have body parts that help them get food, air, and water. In the ocean, there are predators that might try to eat the sea turtle.	That to survive in the ocean, she needs to use her body structures to survive. To survive in the ocean, she needs to avoid being eaten by predators.
Chapter 2	That the sea turtle has a shell and camouflage that enable her to defend herself from predators. The shell is so hard, that predators can't eat her when they try to bite her. Camouflage allows her to blend in with her habitat, and predators can't see her.	Spruce has body structures that function as defenses against being eaten by sharks. Spruce's shell can block a shark's sharp teeth from biting Spruce. Spruce's camouflage colors make it harder for sharks to see her.
Chapter 3	When the sea turtle has offspring, they will not look exactly alike, but they will grow up to have hard shells and camouflage, just like their parents. These structures allow them to defend themselves from predators in the same way that the mother sea turtle does.	That when the offspring grow up they have hard shells and camouflage, just like their parents. Sea turtle offspring survive on their own without help from their parents.
Chapter 4	A model of sea turtle defenses should either show how a hard shell stops a predator from biting and eating a sea turtle or how camouflage makes a sea turtle difficult to see so that predators cannot easily find it and eat it.	That models highlight the important parts of what we are trying to explain and help communicate ideas clearly.

Applying conceptual understanding to explain the phenomenon

Use ideas from the Progress Build and Unit Map to make notes about the conceptual and explanatory builds in your unit.

	Science concepts	Explanation of the phenomenon
	Students figure out…	*So they can explain…*
Chapter 1		
Chapter 2		
Chapter 3		
Chapter 4		
Chapter 5		

Amplify Science@Home resources reference

Use this guide to keep track of the different resources available for remote and hybrid learning.

Instructional materials: Click Remote and hybrid learning resources, then select your grade level from the dropdown menu. Select your unit.	
@Home Unit resources: These will appear when you select your unit.	
Teacher Overview	General information for teaching with @Home Units, planning information, chapter and lesson outlines
Lesson Index	Lists the original Amplify Science lessons associated with each @Home lesson, and the Investigation Notebook pages, copymasters, and print materials associated with the @Home Unit Student Sheets
Family Overview	Information to send home to families to help them support students with remote learning
Student lesson materials for @Home Units	Printable or digital lessons condensed to be about 30 minutes long. You can access compilations of all student materials for your unit, or select from individual lessons.
@Home Video resources: After selecting your grade level and unit, select the @Home Videos tab below your unit title.	
@Home Video links	Links to video lessons that include all activities from the original units. Lesson playlists are on YouTube, and they autoplay in a playlist form.
Additional remote and hybrid instructional materials: These can be accessed from the tabs below your unit title.	
Hands-on investigations support	Videos of every unit's hands-on activities (note, these videos also appear in the student lesson materials).
Read-aloud videos	Link to a YouTube playlist of read-aloud videos of all books in your unit.
Orientation and Tutorials: Click Remote and hybrid learning resources, then select your grade from the dropdown menu. Click Orientation and Tutorials. You'll not only find videos to help you use the resources, but also videos you can share with students and caregivers.	

Suggestions for synchronous time

The following are some ideas for making the most of synchronous time with your students. As a general rule, the best way to use your synchronous time is to provide students opportunities to talk to one another, or to observe or visualize things they could not do independently.

Online synchronous time	Notes
Online discussions: It's worthwhile to establish norms and routines for online discussions in science to ensure equity of voice, turn-taking, etc. **Digital tool demonstrations:** You can share your screen and demonstrate, or invite your students to share their screen and think-aloud as they use a Simulation or other digital tool. **Interactive read-alouds**: Screen share a digital book or article, and pause to ask questions and invite discussion as you would in the classroom. **Shared Writing:** This is a great opportunity for a collaborative document that all your students can contribute to. **Co-constructed class charts:** You can create digital charts, or create physical charts in your home with student input.	

Questioning Strategies for Grades K–1

Overview of the Role of Open-Ended Questioning

Repeated opportunities for students to listen to and speak with others are essential for promoting deep thinking and learning in science. Meaningful teacher-initiated questions create a rich context for promoting open-ended student dialogue and discussion. The *Science Framework for California Public Schools* explains that "Simply providing opportunities to talk is not enough. Effective questioning can scaffold student thinking" (*California Science Framework*, 2016, Chapter 11, p. 21). The Framework suggests that "Teacher-initiated questions are key to helping students expand their communication, reasoning, arguments, and representation of ideas in science" (*California Science Framework*, 2016, Chapter 11, p. 21). The types of questions that teachers pose are instrumental in supporting student understanding. The Framework calls for more open-ended teacher questioning that "prompts and facilitates students' discourse and thinking" and less teacher questioning that prompts "students to seek a confirmatory right answer" (*California Science Framework*, 2016, Chapter 11, p. 6).

The Amplify Science Teacher's Guide is infused with opportunities for students to discuss their developing ideas in response to open-ended prompts. Questions to promote student thinking and discussion are purposefully built into the Teacher's Guide instructional steps and Teacher Support notes that surround all our hands-on and reading activities. In addition, all units include discourse routines (e.g., Shared Listening, Think-Draw-Pair-Share, Write and Share, Word Relationships) that provide opportunities for students to use focal unit vocabulary as they think and talk with partners and the class about their understanding of key science content and practices. Many of the On-the-Fly Assessment suggestions provided throughout each unit offer open-ended follow-up questions that can be used to probe student thinking and formatively assess student understanding of the content. In addition, each unit includes multiple opportunities for students to respond to open-ended questions through additional modalities (e.g., in writing, with diagrams, through a kinesthetic model).

While the prompts embedded in each of the opportunities mentioned above provide fertile ground for student discussion, continued use of flexible, open-ended questions is invaluable for assessing students' knowledge and skills, promoting student-to-student discourse, and guiding student learning. A collection of grade-appropriate questions follows that can be used for these purposes. You will also find a list of activity types included within the Amplify Science curriculum that are particularly conducive to the use of these questions. You may choose to print out these questions and activity types for reference throughout your instruction.

Open-Ended Questions to Facilitate Student Thinking and Discourse

Questions to assess students' knowledge and skills:

- Why do you think X?
- How did you (or Could we) figure that out?
- What are you wondering?
- What questions do you have?
- Can you give an example of X?

Questions to promote student-to-student discourse:

- Do you agree or disagree with (that idea)? Why?
- Can you add to what (name of student) shared?

Questions to guide student learning:

- What did you notice?
- What else do we need to figure out?
- How are X and Y similar/different?
- What does this remind you of?

Activity Types Within the Amplify Science Curriculum That Are Especially Suited for Additional Teacher Questioning

The activity types listed below are student-centered and often contain prompts for pairs or small groups of students to use to discuss content or to vet evidence together. As you circulate through the classroom during these activities, you can use the open-ended questions to assess students' knowledge and skills, promote student-to-student discourse, and guide student learning.

- Hands-on activities
- Partner browsing of unit texts
- Discussion before/during/after reading unit texts
- Discussion of photographs and videos
- Discourse routine: Shared Listening
- Card activities (e.g., sorting, sequencing)

Lesson planning with @Home Units

Day Monday	Day Tuesday
Minutes for science: 30	**Minutes for science:** 30
Lesson or part of lesson: @Home Lesson 1 slides 1-21 **Purpose or big idea:** Students are introduced to the problem and their role as aquarium scientists. They will discuss, write, and draw what animals need to survive.	**Lesson or part of lesson:** @Home Lesson 1 slides 22-32 **Purpose or big idea:** Students will be introduced to the survival game.
Students will... -observe various sky images and discuss how they are different during the daytime and the nighttime. - be introduced to the Unit Question. - be introduced to their role as Sky Scientists. - be introduced to the problem we will help solve.	**Teacher will...** -Introduce the unit problem and the science role as aquarium scientists.. -lead a discussion on what animals need to survive and how animals meet those survival needs. -introduce the Student Sheet, where they will draw and label their findings.
Students will... -discuss the content from the images they observed in previous lesson about the survival of the porcupine. -consider the Investigation Question. -individually play the Survival Game with cards provided in the Student sheets, or interact with the @Home Video for this activity	**Teacher will...** -review student role and problem. -review content of animal survival-the porcupine in the forest. -introduce the Investigation Question. -teach students the rules of how to play the "Survival Game".
Additional notes:	**Additional notes:** -Make an instructional decision on how the class will play the game. • Will they participate with their own cards or play by watching the @Home Video 1.1, activity 3 & 4

Lesson planning with @Home Units

Day _____		**Day _____**	
Minutes for science: _____		**Minutes for science: _____**	
Lesson or part of lesson: **Purpose or big idea:**		**Lesson or part of lesson:** **Purpose or big idea:**	
Students will…	**Teacher will…**	**Students will…**	**Teacher will…**
Additional notes:		**Additional notes:**	

Notes