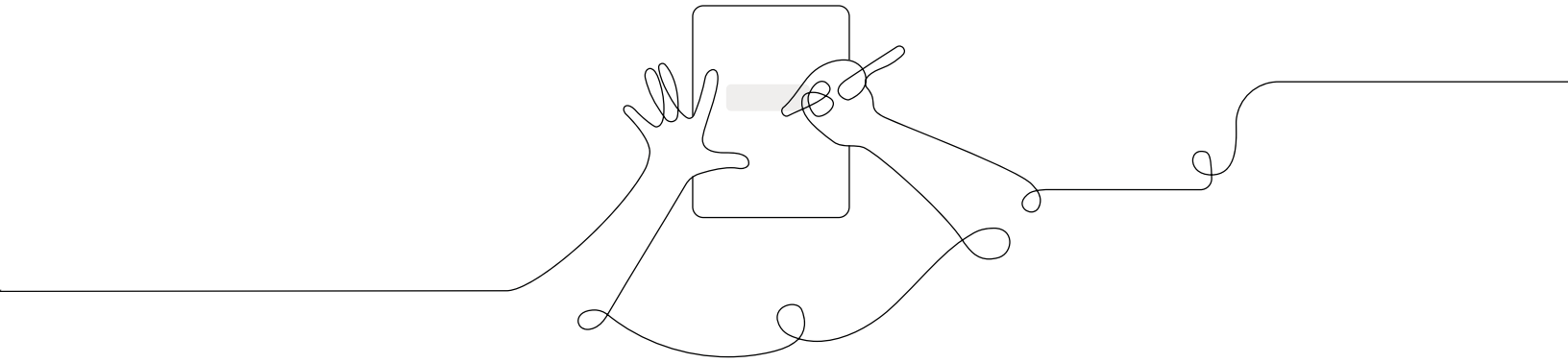
AmplifyScience

Participant Notebook

Grade 3: Environments and Survival
Unpacking the Phenomenon



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

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 guides the instruction designed to address specific gaps in students' understanding. This document will serve as an overview of the *Environments and Survival* 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.

In the *Environments and Survival* unit, students will learn to construct scientific explanations about why the grove snails with banded shells are more likely to survive today than the grove snails with yellow shells, and why the snails with yellow shells were more likely to survive in the past.

Prior knowledge (preconceptions): Students are expected to have had previous opportunities to think about the needs of different organisms and the relationship between meeting needs and survival. Students are also likely to have had experiences thinking about different traits of organisms. While these ideas are not necessary for students to participate fully in the unit, having exposure to these ideas will prepare students well for what they will be learning.

Progress Build Level 1: When it is easier for organisms to meet their needs in an environment, they are more likely to survive.

Organisms are more likely to survive in a given environment when it is easier for them to meet their needs (water, food, and avoiding predators) and less likely to survive when it is harder for them to meet those needs.

Progress Build Level 2: There can be adaptive and non-adaptive traits in a population.

Organisms are more likely to survive in a given environment when it is easier for them to meet their needs (water, food, and avoiding predators) and less likely to survive when it is harder for them to meet those needs. **Organisms in a population can have different traits. In an environment, some traits can make it easier for organisms to meet their needs and survive, and other traits can make it harder for organisms to meet their needs and survive.**

Progress Build Level 3: What is adaptive can change when the environment changes.

Organisms are more likely to survive in a given environment when it is easier for them to meet their needs (water, food, and avoiding predators) and less likely to survive when it is harder for them to meet those needs. Organisms in a population can have different traits. In an environment, some traits can make it easier for organisms to meet their needs and survive, and other traits can make it harder for organisms to meet their needs and survive. **When an environment changes, traits that used to be adaptive may become non-adaptive, and organisms with those traits will be less likely to survive than they were before. Organisms cannot decide to change their traits.**

Unit Map

How can learning about how grove snails survive help engineers design effective solutions to problems?

In their role as biomimicry engineers, students figure out how the traits of grove snails affect their survival in different environments. They apply that understanding as they explore other organisms, their traits, and the likelihood of survival in different environments. Students then design effective solutions to the problem of invasive plant removal using the structural traits of giraffes as inspiration.

Chapter 1: Why are the snails with yellow shells not surviving well?

Students figure out: In a specific snail population, the snails with yellow shells are less likely to survive because it is harder for them to avoid song thrush birds in their environment. Organisms are more likely to survive if they can meet their needs in their environment, and avoiding predators is one of those needs. The snails with yellow shells are less able to avoid being eaten by the birds, so they are less likely to survive.

How they figure it out: Students imagine that they are different organisms and consider whether they will be able to survive in different environments. They read a book about how earthworms meet their needs for survival and collect data in a board game to understand why organisms are more likely or less likely to survive in different environments. After analyzing data about the snails' environment, they write their first scientific explanation.

Chapter 2: Why are the snails with banded shells more likely to survive than the snails with yellow shells?

Students figure out: Snails with banded shells are more likely to survive because their shells blend in with the environment. The snails live in an environment with brown grass, so it's harder for birds to see snails with banded shells. Another reason snails with banded shells are more likely to survive is that banded shells are stronger than yellow shells. Since birds need to crack the shell in order to eat the snail, snails with the stronger banded shells are more likely to survive.

How they figure it out: Students explore variation in traits within a species and use a physical model to collect data about how different traits affect whether organisms can meet their needs for survival in their environment. They read a book about animal mouth structures and investigate fossil structures so they can make inferences about the function of these structures. Students analyze new data from the snails' environment and write an explanation about why banded-shell snails are more likely to survive. They conclude the chapter by planning a design inspired by their knowledge of grove snails' adaptive traits.

Chapter 3: Why were snails with yellow shells more likely to survive in their environment 10 years ago?

Students figure out: Snails with yellow shells were more likely to survive in the past because their yellow color was an adaptive trait in their former environment. That area used to be sandy, so the snails with yellow shells blended in against the yellow sand. When the environment changed from sandy to brown grass, the yellow color became a non-adaptive trait; it is easier for birds to see the yellow snails against the brown grass.

How they figure it out: Students receive new data about changes in the snails' environment. They engage in a classroom model to explore how the survival of organisms with different traits is affected by changes in the organisms' environment. They read about examples of environmental changes and how each change determined which organisms were likely to survive. Students create models and address the misconception that organisms can decide to change their traits. They write explanations about why snails with yellow shells were more likely to survive.

Chapter 4: How can engineers use what they learn from organisms' traits to design solutions?

Students figure out: Through the practice of biomimicry, engineers observe different organisms to understand the functions of their traits and get ideas that can help them design solutions to problems. They make a design, test it to see how well it meets the design criteria, and revise the design to make it better.

How they figure it out: Students respond to a design challenge where they apply their understanding of how structures allow organisms to carry out different functions. They read about engineers who use biomimicry to design a robot that is inspired by cockroach traits. Students then design a robot for removing invasive plants that is inspired by giraffe traits. Students plan and build design prototypes, test them with a physical model and a digital app, and revise their designs. Students present an evidence-based argument about how well their designs meet the criteria.

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		

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.	

Notes