

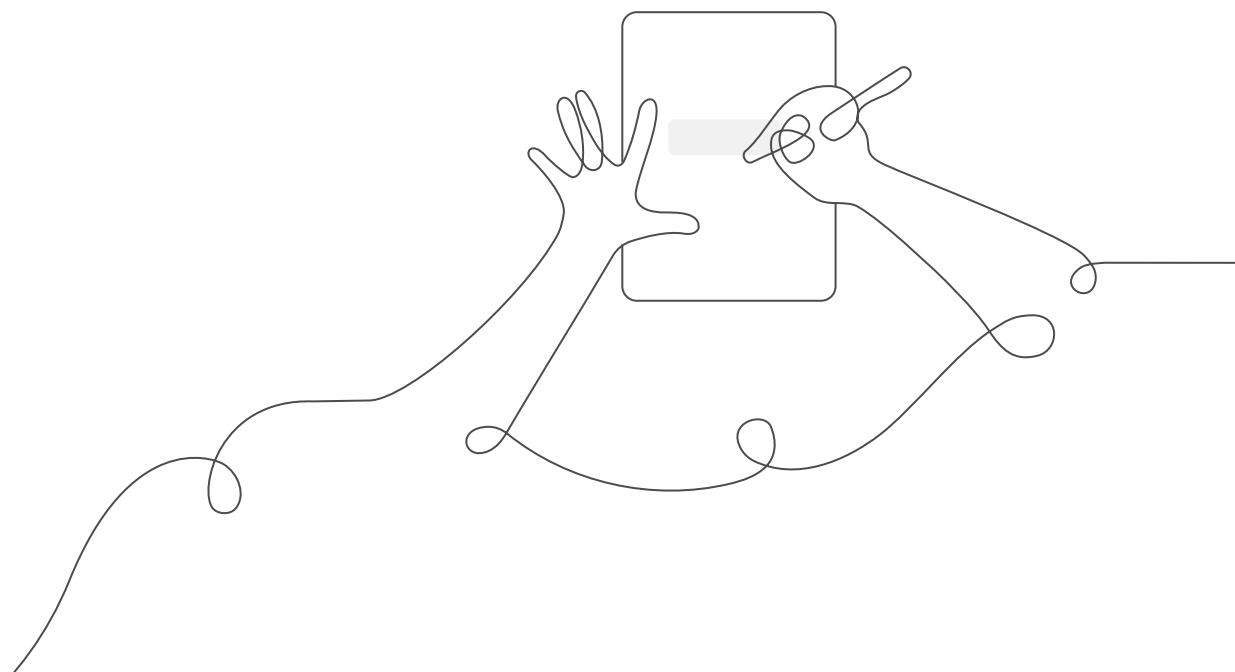
# Unit Summaries

## NGSS Standards Alignment

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# Kindergarten

## Amplify Science unit name and summary

### Pushes and Pulls

#### Designing a Pinball Machine

Students play the roles of pinball machine engineers as they explore the effects of pushes and pulls on the motion of an object. They conduct tests in their own prototypes (models) of a pinball machine, contributing to the design of a class pinball machine.

## NGSS performance expectations addressed

### K-PS2-1

- PS2.A: Forces and Motion
- PS2.B: Types of Interactions
- PS3.C: Relationship Between Energy and Forces

### K-PS2-2

- PS2.A: Forces and Motion
- ETS1.A: Defining Engineering Problems

### K-2-ETS1-1

- ETS1.A: Defining Engineering Problems

### K-2-ETS1-2

- ETS1.B: Designing Possible Solutions

### K-2-ETS1-3

- ETS1.C: Optimizing the Design Solution

# Grade 1

## Amplify Science unit name and summary

### Light and Sound

#### Puppet Theater Engineers

In their roles as light and sound engineers, students investigate cause and effect relationships to learn about the nature of light and sound. They apply what they learn to design shadow scenery and sound effects for a puppet show.

## NGSS performance expectations addressed

### 1-PS4-1

- PS4.A: Wave Properties

### 1-PS4-2

- PS4.B: Electromagnetic Radiation

### 1-PS4-3

- PS4.B: Electromagnetic Radiation

### 1-PS4-4

- PS4.C: Information Technologies and Instrumentation

### K-2-ETS1-1

- ETS1.A: Defining Engineering Problems

### K-2-ETS1-2

- ETS1.B: Developing Possible Solutions

### K-2-ETS1-3

- ETS1.C: Optimizing the Design Solution

### Spinning Earth

#### Investigating Patterns in the Sky

As emerging space scientists, students figure out how to explain why it is never the same time of day for a grandmother who lives in Asia as it is for her grandson in the United States when she calls him. Students record, organize, and analyze observations of the sun and other sky objects as they look for patterns and make sense of the cycle of daytime and nighttime.

### 1-ESS1-1

- ESS1.A: The Universe and Its Stars

### 1-ESS1-2

- ESS1.B: Earth and the Solar System

# Grade 1

## Amplify Science unit name and summary

### Animal and Plant Defenses

#### Spikes, Shells, and Camouflage

Students play the roles of marine scientists. In their roles, students apply their understanding about plant and animal defense structures to explain to concerned visitors to an aquarium how a sea turtle at the aquarium can be released and will be able to defend herself and her offspring from predators in the ocean.

## NGSS performance expectations addressed

### 1-LS1-1

- LS1.A: Structure and Function
- LS1.D: Information Processing

### 1-LS1-2

- LS1.B: Growth and Development of Organisms

### 1-LS3-1

- LS3.A: Inheritance of Traits
- LS3.B: Variation of Traits

### K-2-ETS1-1

- ETS1.A: Defining Engineering Problems

### K-2-ETS1-2

- ETS1.B: Developing Possible Solutions

# Grade 2

## Amplify Science unit name and summary

### Changing Landforms

#### The Disappearing Cliff

Students play the roles of Earth scientists as they attempt to figure out what caused a rock cliff to change shape over time. They use models to investigate the erosion of rock and the formation of sand.

## NGSS performance expectations addressed

### 2-ESS1-1

- ESS1.C: The History of Planet Earth

### 2-ESS2-1:

- ESS2.A: Earth Materials and Systems

### 2-ESS2-2:

- ESS2.B: Plate Tectonics and Large-scale System Interactions

### 2-ESS2-3:

- ESS2.C: The Roles of Water in Earth's Surface Processes

### K-2-ETS1-1:

- ETS1.A: Defining Engineering Problems

### Properties of Materials

#### Designing Glue

As glue engineers, students use engineering design practices to create a glue for use at their school. They conduct tests that yield quantifiable results, graph their data, analyze and interpret results, and then use that evidence to iteratively design a series of glue mixtures, each one better than the one before.

### 2-PS1-1

- PS1.A: Structure and Properties of Matter

### 2-PS1-2:

- PS1.A: Structure and Properties of Matter

### 2-PS1-3:

- PS1.A: Structure and Properties of Matter

### 2-PS1-4:

- PS1.B: Chemical Reactions

### K-2-ETS1-1:

- ETS1.A: Defining Engineering Problems

### K-2-ETS1-2:

ETS1.B: Developing Possible Solutions

### K-2-ETS1-3:

- ETS1.C: Optimizing the Design Solution

# Grade 2

## Amplify Science unit name and summary

### Plant and Animal Relationships

#### Investigating Systems in a Bengali Forest

In their roles as plant scientists working at the Bengal Tiger Reserve, students work to figure out why there are no new Chalta trees growing in this part of the forest. Students investigate what the Chalta tree needs to survive, and collect and analyze qualitative and quantitative data to solve the mystery.

## NGSS performance expectations addressed

### 2-LS2-1

- LS2.A: Interdependent Relationships in Ecosystems

### 2-LS2-2:

- LS2.A: Interdependent Relationships in Ecosystems

### 2-LS4-1:

- LS4.D: Biodiversity and Humans: Biodiversity and Humans

### 2-ESS2-2:

- ESS2.B: Plate Tectonics and Large-Scale System Interactions

# Grade 3

## Amplify Science unit name and summary

### Balancing Forces

#### Investigating Floating Trains

In their roles as consulting scientists, students are challenged to figure out how a floating train works in order to explain it to the citizens of the fictional city of Faraday. They apply ideas about non-touching forces as well as balanced and unbalanced forces.

## NGSS performance expectations addressed

### 3-PS2-1

- PS2.A: Forces and Motion
- PS2.B: Types of Interactions

### 3-PS2-2

- PS2.A: Forces and Motion

### 3-PS2-3

- PS2.B: Types of Interactions

### 3-PS2-4

- PS2.B: Types of Interactions

### 3-5-ETS1-1

- ETS1.A: Defining Engineering Problems

### 3-5-ETS1-2

- ETS1.B: Developing Possible Solutions

# Grade 3

## Amplify Science unit name and summary

### Weather and Climate

#### Establishing an Orangutan Colony

As weather scientists for a nature conservation group, students determine which of four fictional islands will be the best location for an orangutan reserve. They analyze and interpret weather data in order to compare and construct arguments about the weather patterns for a particular location in the world over a given span of time.

## NGSS performance expectations addressed

### 3-ESS2-1

- ESS2.D: Weather and Climate

### 3-ESS2-2

- ESS2.D: Weather and Climate

### 3-ESS3-1

- ESS3.B: Natural Hazards

### 3-LS4-3

- LS4.C: Adaptation

### 3-5-ETS1-1

- ETS1.A: Defining Engineering Problems

### 3-5-ETS1-2

- ETS1.B: Developing Possible Solutions

### 3-5-ETS1-3

- ETS1.B: Developing Possible Solutions
- ETS1.C: Optimizing the Design Solution



# Grade 3

## Amplify Science unit name and summary

### Environments and Survival

#### Snail Trait Biomimicry

As engineers that specialize in biomimicry, designing structures that are modeled on organisms in the natural world, students investigate the adaptive traits of the Grove Snail population, and use what they learn to design a protective shell to transport endangered sea turtle eggs.

## NGSS performance expectations addressed

### 3-LS4-1

- LS4.A: Evidence of Common Ancestry and Diversity

### 3-LS4-2

- LS4.B: Natural Selection

### 3-LS4-3

- LS4.C: Adaptation

### 3-LS4-4

- LS4.D: Biodiversity and Humans: Biodiversity and Humans

### 3-5-ETS1-1

- ETS1.A: Defining Engineering Problems

### 3-5-ETS1-2

- ETS1.B: Developing Possible Solutions

### 3-5-ETS1-3

- ETS1.B: Developing Possible Solutions
- ETS1.C: Optimizing the Design Solution

### Inheritance and Traits

#### Variation in Wolves

Students play the roles of wildlife biologists working in Greystone National Park, as they study two wolf packs and are challenged to figure out why an adoptive wolf in one of the packs has the traits it does. Students investigate variation between and within different species, inherited and acquired traits, and conclude the unit by writing an explanation of the origin of the adoptive wolf's traits for the visitors in Greystone National Park.

### 3-LS1-1

- LS1.B: Growth and Development of Organisms

### 3-LS2-1

- LS2.D: Social Interactions and Group Behavior

### 3-LS3-1

- LS3.A: Inheritance of Traits
- LS3.B: Variation of Traits

### 3-LS3-2

- LS3.A: Inheritance of Traits
- LS3.B: Variation of Traits

# Grade 4

## Amplify Science unit name and summary

### Energy Conversions

#### Blackout in Ergstown

Students play the roles of systems engineers for Ergstown, a fictional town that experiences frequent blackouts. They explore reasons why an electrical system can fail, choose new energy sources and energy converters for the town, and use evidence to explain why their choices will make the town's electrical system more reliable.

## NGSS performance expectations addressed

### 4-PS3-1

- PS3.A: Definitions of Energy

### 4-PS3-2:

- PS3.A: Definitions of Energy
- PS3.B: Conservation of Energy and Energy Transfer

### 4-PS3-3:

- PS3.A: Definitions of Energy
- PS3.B: Conservation of Energy and Energy Transfer
- PS3.C: Relationship Between Energy and Forces

### 4-PS3-4:

- PS3.B: Conservation of Energy and Energy Transfer
- PS3.D: Energy in Chemical Processes in Everyday Life

### 4-ESS3-1:

- ESS1.C: The History of Planet Earth

### 4-ESS3-2:

- ESS2.B: Plate Tectonics and Large-Scale System Interactions

### 3-5-ETS1-1:

- ETS1.A: Defining Engineering Problems

### 3-5-ETS1-2:

- ETS1.B: Developing Possible Solutions

### 3-5-ETS1-3:

- ETS1.B: Developing Possible Solutions
- ETS1.C: Optimizing the Design Solution

# Grade 4

## Amplify Science unit name and summary

### Waves, Energy, and Information

#### Investigating How Dolphins Communicate

In their roles as marine scientists, students work to figure out how mother dolphins communicate with their calves. They investigate how sound travels and learn about how to look for and to create patterns of communication.

## NGSS performance expectations addressed

### 4-PS3-2

- PS3.A: Definitions of Energy
- PS3.B: Conservation of Energy and Energy Transfer

### 4-PS3-3

- PS3.A: Definitions of Energy
- PS3.B: Conservation of Energy and Energy Transfer
- PS3.C: Relationship Between Energy and Forces

### 4-PS4-1

- PS4.A: Wave Properties

### 4-PS4-3

- PS4.C: Information Technologies and Instrumentation

### 4-ESS3-2

- ESS3.B: Natural Hazards

### 4-LS1-2

- LS1.D: Information Processing

### 3-5-ETS1-2

- ETS1.B: Developing Possible Solutions

### 3-5-ETS1-3

- ETS1.B: Developing Possible Solutions
- ETS1.C: Optimizing the Design Solution

# Grade 4

## Amplify Science unit name and summary

## NGSS performance expectations addressed

### Earth's Features

#### Mystery in Desert Rocks Canyon

Playing the roles of geologists, students help the National Park Service explain what a particular boney-looking rock is, how it formed, and how it came to be in its current location at the bottom of Desert Rocks National Park. Then they explain to park visitors how the canyon where they're doing their research was formed.

#### 4-ESS1-1

- ESS1.C: The History of Planet Earth

#### 4-ESS2-1

- ESS2.A: Earth Materials and Systems
- ESS2.E: Biogeology

#### 4-ESS2-2

- ESS2.B: Plate Tectonics and Large-Scale System Interactions

#### 4-ESS3-2:

- ESS3.B: Natural Hazards

### Vision and Light

#### Investigating Animal Eyes

As wildlife biologists, students work to figure out why a local population of geckos has decreased since the construction of a new stadium. Students consider the bright lights of the stadium and use a computer simulation to investigate the relationship of light and vision, specifically the sensitivity of different animals' eyes to light, and make a recommendation for mitigating the situation.

#### 4-PS4-2

- PS4.B: Electromagnetic Radiation

#### 4-LS1-1

- LS1.A: Structure and Function

#### 4-LS1-2

- LS1.D: Information Processing

# Grade 5

## Amplify Science unit name and summary

### Modeling Matter

#### The Chemistry of Food

As food scientists working in a lab for a large food production company, students take on two work assignments, one related to food safety and one related to creation of a new food product. In so doing, they figure out that the properties of materials are related to the properties of the nanoparticles that make up those materials.

## NGSS performance expectations addressed

### 5-PS1-1

- PS1.A: Structure and Properties of Matter

### 5-PS1-2

- PS1.A: Structure and Properties of Matter
- PS1.B: Chemical Reactions

### 5-PS1-3

- PS1.A: Structure and Properties of Matter

### 5-PS1-4

- PS1.A: Structure and Properties of Matter

### 3-5-ETS1-2

- ETS1.B: Developing Possible Solutions

### Patterns of Earth and Sky

#### Analyzing Stars on Ancient Artifacts

In their roles as astronomers, students investigate an artifact found on an archeological dig that seems to show patterns in the daytime and nighttime sky. Using a computer simulation of stars, physical models, and a reference text, students figure out how the position of stars around the Earth, and the spin and orbit of the Earth, cause us to see daily and yearly patterns of stars.

### 5-PS2-1

- PS2.B: Types of Interactions

### 5-ESS1-1

- ESS1.A: The Universe and Its Stars

### 5-ESS1-2

- ESS1.B: Earth and the Solar System

# Grade 5

## Amplify Science unit name and summary

### The Earth System

#### Investigating Water Shortages

As water resource engineers, students figure out what caused a water shortage on the east side of a fictional island, East Ferris, and work to design a solution to the problem. Applying their knowledge of water distribution and analyzing the flow of water between the hydrosphere, atmosphere, and geosphere, students communicate the nature of the problem and possible solutions to the people of East Ferris.

## NGSS performance expectations addressed

### 5-ESS2-1

- ESS2.A: Earth Materials and Systems

### 5-ESS2-2

- ESS2.C: The Roles of Water in Earth's Surface Processes

### 5-ESS3-1

- ESS3.C: Human Impacts on Earth Systems: Human Impacts on Earth Systems

### 5-PS1-1

- PS1.A: Structure and Properties of Matter

### 5-PS1-2

- PS1.A: Structure and Properties of Matter
- PS1.B: Chemical Reactions

### 5-PS1-3

- PS1.A: Structure and Properties of Matter

### 5-PS1-4

- PS1.A: Structure and Properties of Matter

### 5-LS2-1

- LS2.A: Interdependent Relationships in Ecosystems
- LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

### 3-5-ETS1-1

- ETS1.A: Defining Engineering Problems

### 3-5-ETS1-2

- ETS1.B: Developing Possible Solutions

### 3-5-ETS1-3

- ETS1.B: Developing Possible Solutions
- ETS1.C: Optimizing the Design Solution

# Grade 5

## Amplify Science unit name and summary

### Grade 5: Ecosystem Restoration

#### Matter and Energy in a Rainforest

Students engage as ecologists as they figure out why the plants and animals in a failing Costa Rican rainforest ecosystem aren't growing and thriving. Growing a terrarium, using physical models, and investigating how matter and energy flow with a computer model, students solve the mystery and create a plan for rainforest restoration.

## NGSS performance expectations addressed

### 5-LS1-1

- LS1.C: Organization for Matter and Energy Flow

### 5-LS2-1

- LS2.A: Interdependent Relationships in Ecosystems
- LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

### 5-ESS3-1

- ESS3.C: Human Impacts on Earth Systems: Human Impacts on Earth Systems

### 5-PS1-1

- PS1.A: Structure and Properties of Matter

### 5-PS1-4

- PS1.A: Structure and Properties of Matter

### 5-PS3-1

- PS3.D: Energy in Chemical Processes in Everyday Life

### 3-5-ETS1-1

- ETS1.A: Defining Engineering Problems

### 3-5-ETS1-2

- ETS1.B: Developing Possible Solutions

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