AmplifyScience

Grade 4 Hands-on activities

authored by THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Hands-on investigation

Hands-on learning is at the heart of Amplify Science, and is integrated into every unit. Each hands-on activity provides clear instructions for the teacher, while providing easily accessible materials in unit-specific kits.

With Amplify Science, students actively participate in science, acting like scientists and engineers as they gather evidence, think critically, solve problems, and communicate their claims.

This document will walk you through an overview of the materials provided for an entire unit, and then focus on one particular activity in that unit to give you a sense of the role hands-on investigation plays in the instruction.

Table of contents

Grade 4

Energy Conversions

Students embody the role of systems engineers for Ergstown, a fictional town that experiences frequent blackouts. They explore reasons why an electrical system can fail, consider the advantages of new energy sources and energy converters for the town, and use evidence to explain why their proposed changes to the electrical system will make the town's electricity more reliable.

Materials in this unit

Quantity	Description
9	bags, plastic, small, self-sealing
9	buzzers, 1.5V–3V
1	cherry pitter
125	cups, plastic, 2 oz.*
18	fan blades, plastic
1	lamp, clamp
9	LEDs, bicolor, 2 pin
1	lightbulb, incandescent, 150-watt
18	motors, 3V
125	plates, plastic, small*
9	solar panels, 3V
400	sticks, craft*
1	wire, two-conductor, spool, 25 feet
20	wire, with clip leads
1	wire cutter/stripper
6	cherries* Δ
1	fan, electric Δ
1	marker, wide tip, black Δ
3	measuring cups, 1-cup capacity each Δ
10	paper, chart, sheets* Δ
1	paper towels, roll* Δ
2	pitchers, 1–2 quart capacity Δ
10	scissors Δ
1	stapler Δ
9	tape, masking, rolls* □ Δ
1	tub, plastic □ Δ

*** consumable item**
□ included in starter kit
Δ items provided by the teacher

Elementary School Starter Kit

Amplify Science also offers a starter kit for purchase, which includes general science materials needed to conduct most hands-on activities for all units in the curriculum. Starter kit items can fulfill some teacher-provided materials needed for each unit.

Example activity

Introducing the Electrical Grid

In Lesson 4.2 of *Energy Conversions*, students reread and discuss an article from the book *Blackout!*, a text that describes failures of real-world electrical systems. Students next observe a failed electrical system composed of a solar panel, two wires, and a fan attached to a motor. As a class, they work together to fix the system, and then analyze how energy is transferred through the system.

Example activity materials

For the classroom wall

- 2 vocabulary cards: electrical grid, transfer

For the class

- 8 meters (25 feet) of two-conductor wire
- 1 wire cutters/strippers
- 1 motor with fan attachment
- 1 solar panel
- 4 cables with alligator clips
- 1 clamp lamp
- 1 light bulb

Unit print materials

Each unit's kit includes print materials for the classroom:

- **Chapter Questions**
- **Key Concepts**
- **Vocabulary**
- **Unit Questions**
- **18 copies of each student book:**

  Systems

  Blackout!

  It's All Energy

  Sunlight and Showers

  Energy Past and Present

Vision and Light

As wildlife biologists, students work to figure out why a local population of geckos has decreased since the construction of a new highway through the Philippine rainforest. Students consider the bright lights of the highway and use a digital simulation to investigate the relationship between light and vision, specifically the sensitivity of different animals' eyes to light. At the end of the unit, they make a recommendation for mitigating the situation.

Materials in this unit

Quantity	Description
9	bag, small muslins
18	bags, plastic, gallon-size
36	bags, plastic, sandwich-size
36	balls, soft foam
1	binder clips, large, box of 12
36	canisters, film
36	cardboard boxes*
1	cinnamon stick
2	containers, plastic, with lids
57	cup, plastic, 9oz.
1	faux fur, piece
1	garlic powder, container*
4	hook-and-loop dots, beige, packs of 200*
3	hook-and-loop strip, 3/4" wide, 5' rolls*
72	pipe cleaners*
720	pom-poms, yellow*
9	probability cubes (dice)
9	tape, masking, 1" wide, rolls
4	yarn, skeins*
9	optional: blindfolds Δ
1	box cutte Δ
1	cardboard, scrap Δ
3	chart paper, sheets* Δ
90	dry beans Δ
1	marker, wide tip Δ
9	markers, set of 8 colors Δ
1	paper, construction, black, 8.5 x 11 sheet* Δ
72	paper, construction, various colors, 8.5 x 11 sheets* Δ
54	paper clips Δ
1	pink eraser Δ
1	salt, table, teaspoon* Δ
9	scissors, small Δ
1	stapler Δ
1	tape, masking, roll* □ Δ
1	teaspoon Δ
9	trays, plastic □ Δ

* **consumable item**
□ **included in starter kit**
Δ **items provided by the teacher**

Example activity

Building Vision Models

In Lessons 4.4 and 4.5 of *Vision and Light*, students work in groups to plan and build physical models representing an eye with high-sensitivity light receptors and an eye with low-sensitivity light receptors. They choose materials and decide how they will use them to demonstrate the function of the various structures that are key in animal vision. Then, they plan how they will use their models to show how different animals see in bright light and in low light.

Example activity materials

For each pair of students

- **1 cardboard box**
- **1 bag of Vision Model materials (from Lesson 4.4):**

  20 yellow-pom poms

  20 hook-and-loop dots

  5" strip of hook-and-loop fastener

  2 pipe cleaners

  2 feet of yarn

  set of Thought Bubble for Vision Model cards, clipped together

  4 sheets of colored construction paper Δ

  1 foam ball

  markers

  masking tape

For each student

- ***Vision and Light*** **Investigation Notebook (pages 86–87)**

Δ **items provided by the teacher**

Unit print materials

Each unit's kit includes print materials for the classroom:

- **Chapter Questions**
- **Key Concepts**
- **Vocabulary**
- **Unit Questions**
- **18 copies of each student book:**

  Crow Scientist

  I See What You Mean

  Handbook of Animal Eyes

  Investigating Animal Senses

  Seeing Like a Shrimp and Smelling Like a Snake

Earth's Features

As geologists, students help the National Park Service explain what a particular mystery fossil is, how it formed, and how it came to be in its current location at the bottom of a canyon in Desert Rocks National Park. Then they explain to park visitors how the canyon where they are doing their research formed.

Materials in this unit

Quantity	Description
18	conglomerate rock
6	gravel, cups*
2	plaster of paris, powdered dry mix, 4.5 lb box*
29	plastic cups, 16 oz, clear
54	plastic cups, 3 oz, clear
1	plastic spoons, pack of 48
7	sand, cups*
9	sandstone rock
1	Stream Table Erosion Kit
3	books Δ
1	cup or jar, clear Δ
18	lenses, hand, plastic □ Δ
1	marker, permanent, black Δ
1	marker, wide-tip Δ
1	masking tape, roll* □ Δ
1	measuring cup Δ
18	newspaper, sheets* Δ
45	paper clips Δ
18	paper towels* Δ
1	paper, 5 different colors, package Δ
6	paper, chart, sheets* Δ
9	pencils Δ
1	pitcher
1	spoon, wooden
6	towels
9	trays, plastic □ Δ
–	water*

*** consumable item**
□ included in starter kit
Δ items provided by the teacher

Example activity

Sedimentary Rock Formation Model

In Lesson 1.5 of *Earth's Features*, students create a physical model showing how sedimentary rock forms, using sand, gravel, and plaster of paris. They evaluate the model for what aspects of sedimentary rock formation they are able to represent and what aspects they cannot show well with their models. In Lesson 2.3, students revise their models, adding a new layer to show how a different kind of sedimentary rock could form.

Example activity materials

For the class

- Class Sedimentary Rock Formation Model
- Plaster
- water Δ

For each group of four students

- 1 large cup with gravel
- 1 large cup with sand

Δ items provided by the teacher

Unit print materials

Each unit's kit includes print materials for the classroom:

- **Chapter Questions**
- **Key Concepts**
- **Vocabulary**
- **Unit Questions**
- **18 copies of each student book:**

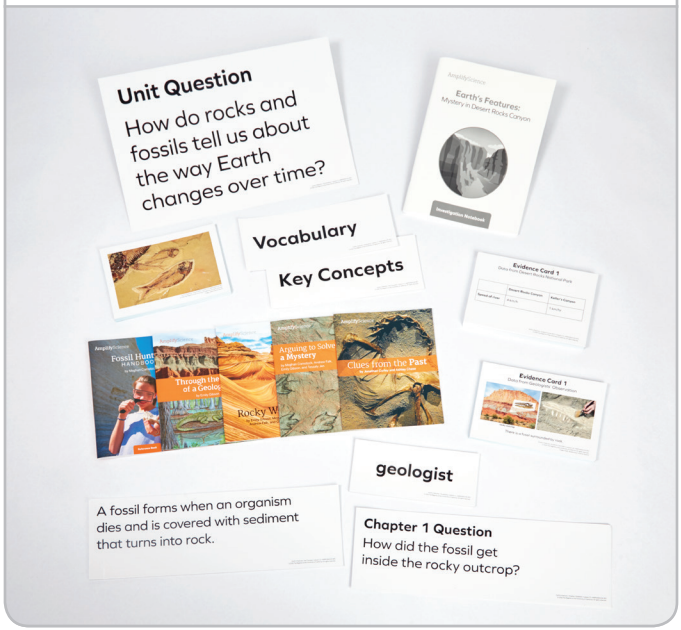
  Rocky Wonders

  Clues from the Past

  Fossil Hunter's Handbook

  Arguing to Solve a Mystery

  Through the Eyes of a Geologist



Waves, Energy, and Information

In their role 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.

Materials in this unit

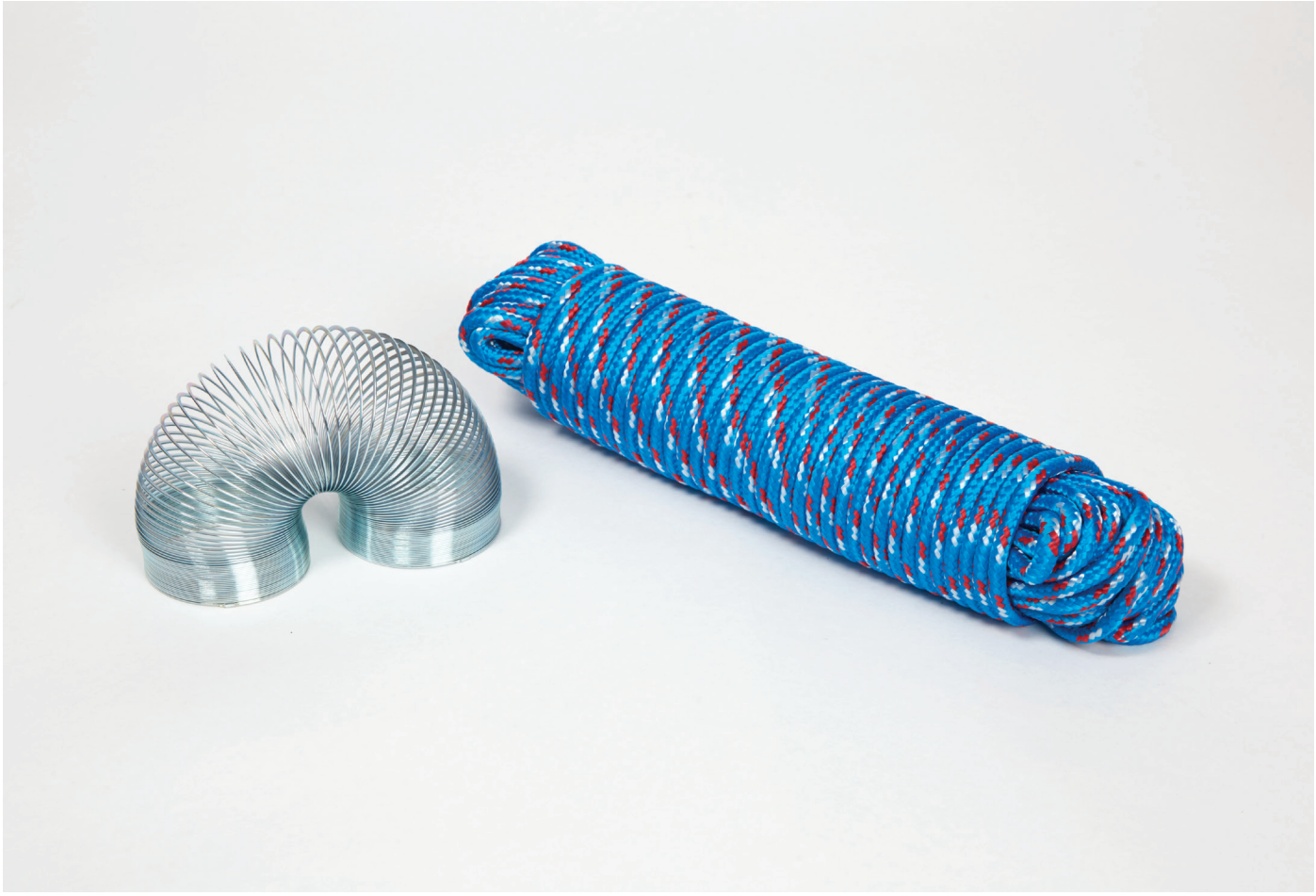
Quantity	Description
1	rope, 100 feet
9	Slinkys®, metal
80	straws, straight, plastic*
1	marker, black Δ
18	nickels Δ
5	paper, chart, sheets* Δ
54	pennies Δ
19	scissors Δ
1	stapler Δ
1	tape, masking, roll* □ Δ

* **consumable item**
□ **included in starter kit**
Δ **items provided by the teacher**

Example activity

Exploring Waves

In Lesson 1.2 of *Waves, Energy, and Information*, students have been investigating the phenomenon of dolphins sending signals underwater. Students learn that sound travels as a wave. To understand how the dolphins are able to communicate, students set out to learn about what waves are. Students make waves using ropes and Slinkys® in order to observe their motion and discover that they move in patterns.



Example activity materials

For each group of four students

- 1 rope
- 1 Slinky®

For each student

- *Waves, Energy, and Information* Investigation Notebook (pages 5–7)

Unit print materials

Each unit's kit includes print materials for the classroom:

- **Chapter Questions**
- **Key Concepts**
- **Vocabulary**
- **Unit Questions**
- **18 copies of each student book:**

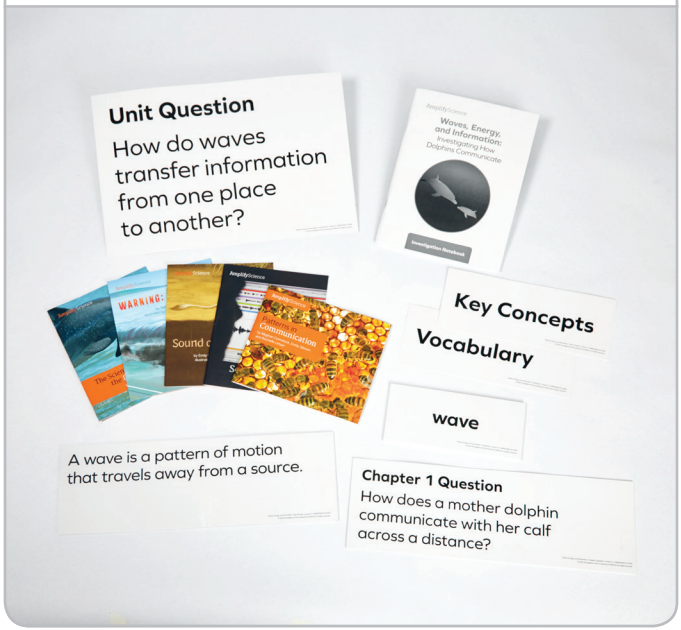
  Seeing Sound

  Warning: Tsunami!

  Sound on the Move

  Patterns in Communication

  The Scientist Who Cracked the Dolphin Code



Go to **amplify.com/sciencek5**
for a list of all materials in each kit.

Amplify.

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

AMP-SS-4-HOAP