

Amplify Science

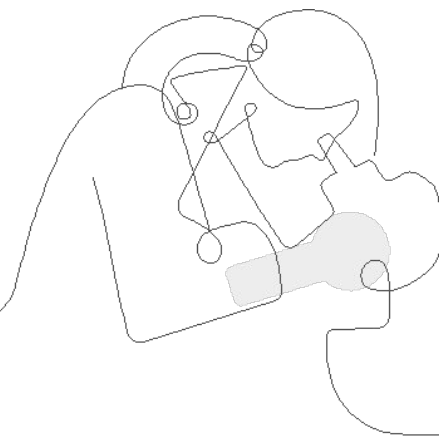
Energy Conversions Unit Deep Dive

Grade 4

LAUSD

Date: September, 2023

Presented by



Opening Reflection

What are your goals for student outcomes as a result of attending this professional workshop?

Participant Notebook

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.

Name

Amplify Facilitator

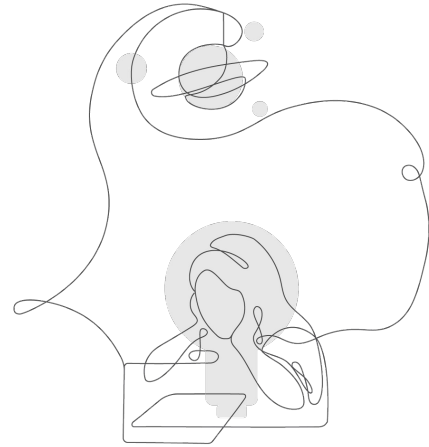
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-
-

[Insert Photo]

For an easy way to do it:

- Right click on this image.
- Click “Replace Image.”
- Choose how you’ll upload your image.
- Reposition your photo if necessary.

Please write your name on the index card.



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

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.

Today's Logistics



- Lunch break from 11:30 - 12:30
- The day ends at 3:00
- Please be sure to sign in
- Bathrooms
- Parking lot for questions or concerns
- If you need to stand, feel free to but please stay engaged



Schoolology



[← Back to Schoolology Home Page](#)

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, Schoolology.

For information on District-approval policies and procedures, please visit: [udipplausd.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

Content Area All

Grade Level All

Content Type All

Textbook Title Starts With

All Amplify Products



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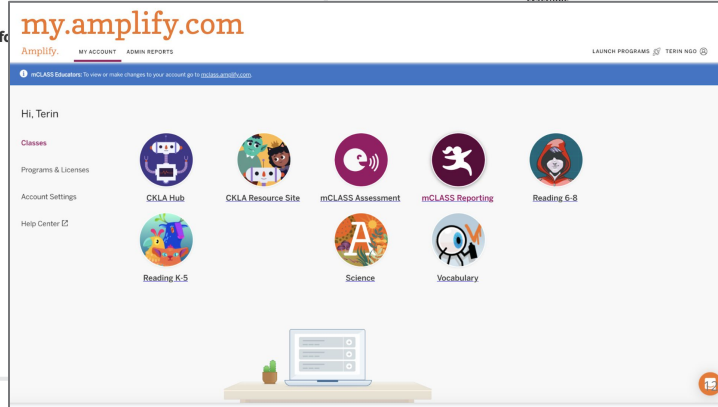
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[← Search Again](#)

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
Creative

Vendor Support Desk:
P: 800.823.9969
E: help@amplify.com
S: amplify.com/support/
Textbook Title(s):
NA



Vendor Support Desk:
P: 800.823.9969
E: help@amplify.com
S: amplify.com/support/
Textbook Title(s):
NA

op is for
only)

Join Amplify Science Schoology Group

To join Amplify Science Schoology
ES Group: W4PK-W466-63F5B

Logging in (demo account)

Safari or Chrome

1. Go to **learning.amplify.com**
2. Select **Log in with Google**
3. If you're already logged in with other Google accounts, click **Use another account**
4. Enter teacher demo account credentials
 - **californiasci__@pd.tryamplify.net**
 - Password: **AmplifyNumber1**

Steps 1-2

Welcome to **Amplify**

G Log In with Google

C Log In with Clever

A. Log In with Amplify

SSO login

Step 3

Choose an account to continue to Amplify Curriculum Delivery Application

T Teacher Lambertsen
t.lambertsen@tryamplify.net

S Sophia Lambertsen
slambertsen@amplify.com

U Use another account

To continue, Google will share your name, email address, language preference, and profile picture with Amplify Curriculum Delivery Application. Before using this app, you can review Amplify Curriculum Delivery Application's [privacy policy](#) and [terms of service](#).

Step 4

Sign in to continue to Amplify Curriculum Delivery Application

Email or phone

Forgot email?

To continue, Google will share your name, email address, language preference, and profile picture with Amplify Curriculum Delivery Application. Before using this app, you can review Amplify Curriculum Delivery Application's [privacy policy](#) and [terms of service](#).

Create account Next

Hi Teacher

nationalsci20@pd.tryamplify.net

Enter your password

☐ Show password

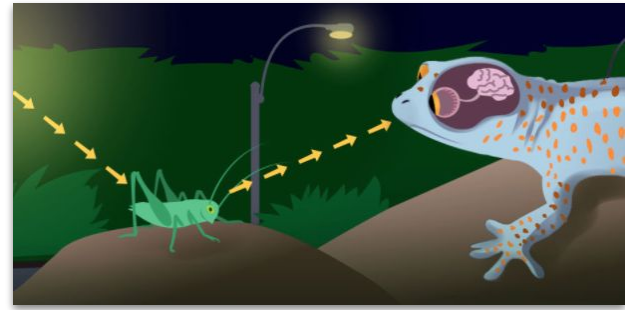
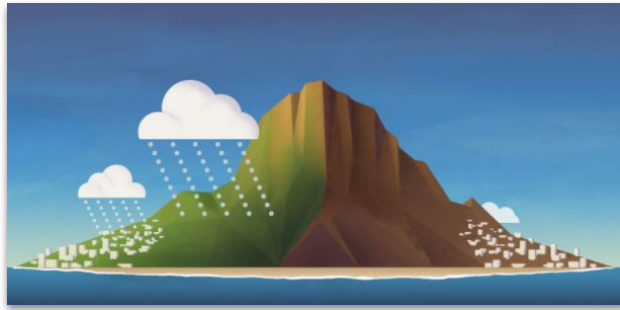
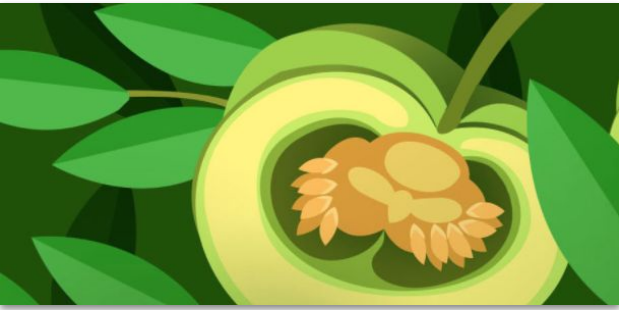
To continue, Google will share your name, email address, language preference, and profile picture with Amplify Curriculum Delivery Application. Before using this app, you can review Amplify Curriculum Delivery Application's [privacy policy](#) and [terms of service](#).

Forgot password? Next

LAUSD SUMMER INSTITUTE 2023

Session 1 Unit 1 Deep Dive





Plan for the day

- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Digging into Chapter 2
- Planning
- Closing

Ice Breaker!

Who do we have in the room today?

- Name & School
- Have you taught Amplify Science before and if so, for how long?
- What are your goals for student outcomes after attending this student workshop today?



Navigation Temperature Check

Rate yourself on your comfort level accessing Amplify Science materials and navigating a digital curriculum.

1 = Extremely Uncomfortable

2 = Uncomfortable

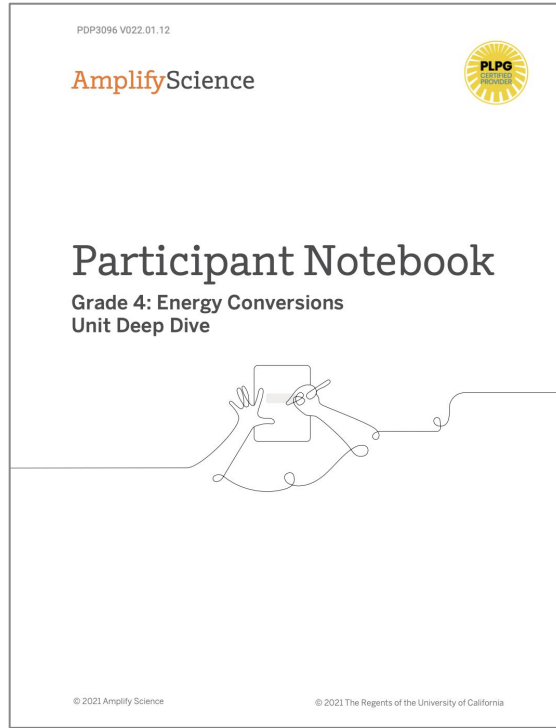
3 = Mild

4 = Comfortable

5 = Extremely Comfortable

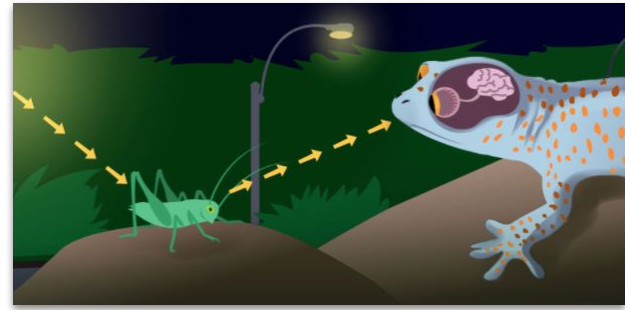
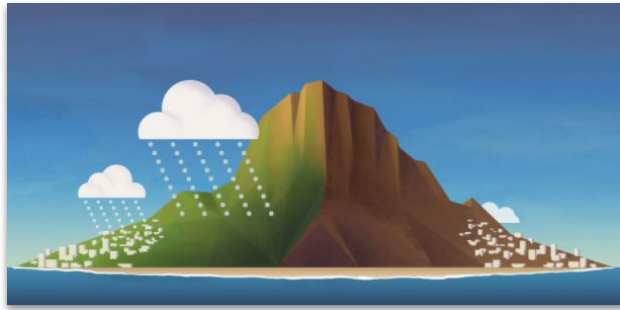
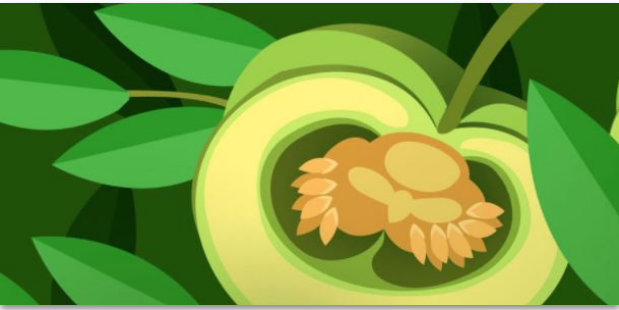


Participant Notebook



Hardcopy and digital

<https://bit.ly/45UpkwS>



Plan for the day

- Introduction and framing
- **Unit Internalization**
- Digging into Chapter 1
- Model Lesson
- Digging into Chapter 2
- Planning
- Closing

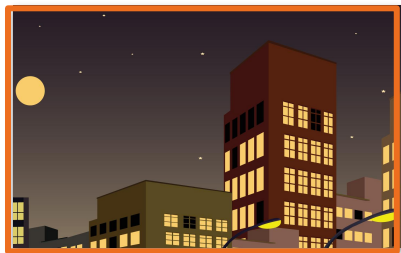
Goals for the day:

By the end of the day, you will:

- ❑ Experience how all the instructional components fit together in the context of the unit
- ❑ Gain a deeper understanding of the purposeful sequencing of each activity and lesson within a chapter
- ❑ Become more familiar with multimodal instruction and how it provides multiple at bats to support student success
- ❑ Use the Amplify curriculum and resources to prepare to teach



Year at a Glance: Grade 4

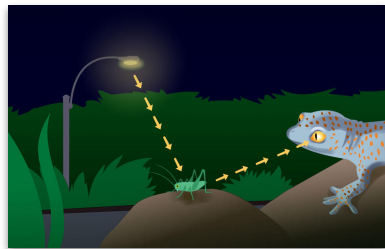


Energy Conversions

Domain: Physical Science

Unit type: Engineering Design

Student role: System engineers

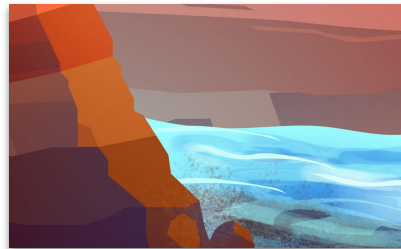


Vision and Light

Domain: Life Science

Unit type: Investigation

Student role: Conservation biologists

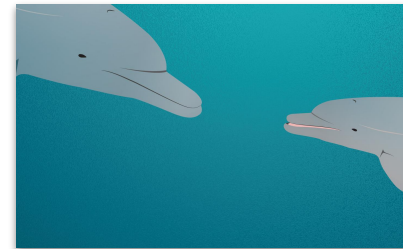


Earth's Systems

Domain: Earth and Space Science

Unit type: Argumentation

Student role: Geologists



Waves, Energy, and Information

Domain: Physical Science

Unit type: Modeling

Student role: Marine scientists

Unit Overview



Phenomenon based learning



Phenomenon-based learning and teaching

A scientific phenomenon is an **observable event** that occurs in the universe that we can use science ideas to explain or predict.

Comparing topics and phenomena

Topic-based	Phenomenon-based
Ocean habitats	A sea turtle can survive in an ocean habitat where sharks live

Comparing topics and phenomena

A shift in science instruction

from learning about
(like a student)



to figuring out
(like a scientist)

Phenomena-based Instruction

Inquire like a scientist.

Think like a scientist.

Quantify like a scientist.

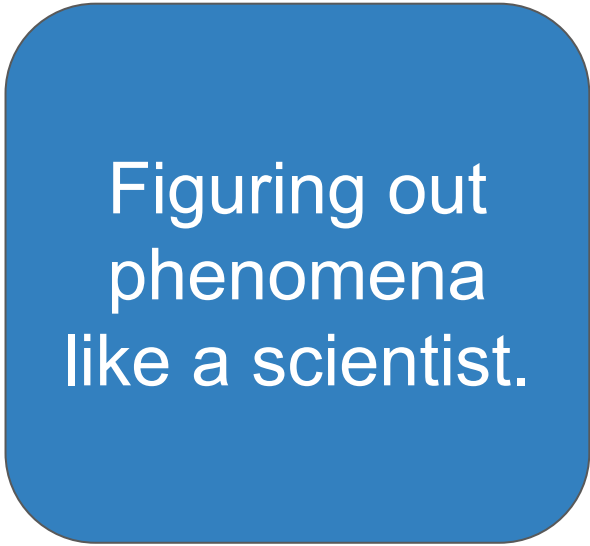
Read like a scientist.

Talk like a scientist.

Write like a scientist.

Critique like a scientist.

Argue like a scientist.



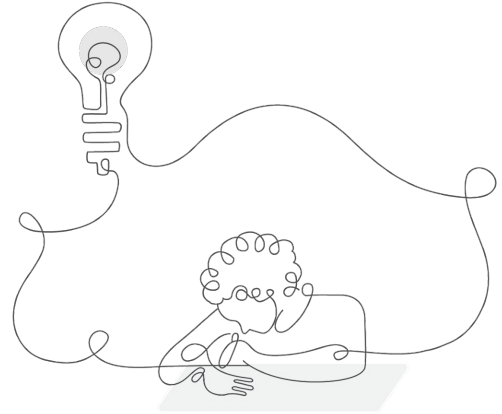
Figuring out
phenomena
like a scientist.

Previewing the unit

Introducing the phenomenon

Amplify Science units are designed around complex phenomena that drive student learning through the unit.

Let's look at the phenomenon, or observable event, students will figure out in your unit.





Energy Conversions

Grade 4

The unit we're beginning is called *Energy Conversions: Blackout in Ergstown*.

In this unit, you will **investigate why blackouts occur and come up with solutions to prevent them.**

Ergstown



This picture shows a town we'll call Ergstown.



What do you **see** in the picture?

Ergstown: a Few Moments Later



This is an image of the same town just a few moments later.



How is this picture different?

What do you think is going on in the picture?

Ergstown: Later That Night



What do you notice in this picture?



To: Systems Engineers

From: Mayor Joules, Ergstown City Hall

Subject: Improvements to the Electrical System

Recently, Ergstown has been experiencing frequent blackouts. Blackouts can be dangerous and inconvenient, so I need a team to figure out how the electrical system can be improved.

Before the team can begin to solve this problem, it will first need to figure out why the blackouts have been happening. I would like to receive updates as the team discovers possible causes of the blackouts and as the team comes up with ideas about how to improve the electrical system.

The town of Ergstown will be very grateful to anyone who can help us solve our blackout problem!

Amplify Science

Anchoring phenomenon

- Complex and rich
- Drives learning through a whole unit
- Specific and observable
- Relatable at students' developmental level



Unit Overview



Unit level internalization		
Anchor phenomenon		Student role
3-dimensional learning students engage with to explain the anchor phenomenon:		
DCl: What scientists want to know	SEPs: What scientists do	CCCs: How scientists think
Learning that occurs in Chapter 1	Learning that occurs in Chapter 2	
Learning that occurs in Chapter 3	Learning that occurs in Chapter 4	
Science Background: Key understandings and preconceptions		

Energy Conversions



Problem: Why does Ergstown keep having blackouts?

Role: Systems Engineers

A power failure is a real-life lesson in how much our society relies on electrical energy. Through this unit, students will better understand the parts of the electrical system and how vital it is to modern life.

Coherent Storylines



Chapter 1: What happened to the electrical system the night of the...

6 Lessons



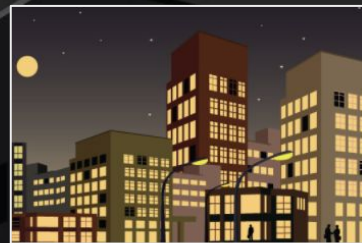
Chapter 2: What makes the devices in Ergstown output or fail to output...

4 Lessons



Chapter 3: Where does the electrical energy for the devices in Ergstown...

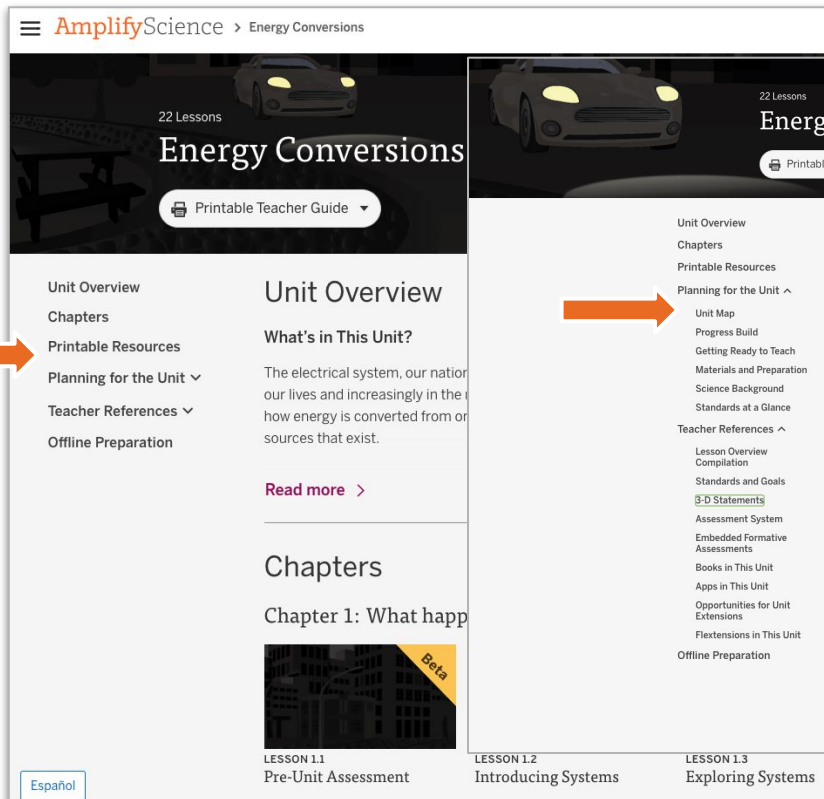
6 Lessons



Chapter 4: How does energy get to the devices all over Ergstown?

6 Lessons

Navigating to the Unit Map



AmplifyScience > Energy Conversions

22 Lessons

Energy Conversions

Printable Teacher Guide

- Unit Overview
- Chapters
- Printable Resources
- Planning for the Unit
- Teacher References
- Offline Preparation

Unit Overview

What's in This Unit?

The electrical system, our nation's lives and increasingly in the home, how energy is converted from one form to another and the sources that exist.

[Read more](#)

Chapters

Chapter 1: What happened to the electrical system the night of the Ergstown blackout?

LESSON 1.1 Pre-Unit Assessment

LESSON 1.2 Introducing Systems

LESSON 1.3 Exploring Systems

- 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
 - 8-D Statements
 - Assessment System
 - Embedded Formative Assessments
 - Books in This Unit
 - Apps in This Unit
 - Opportunities for Unit Extensions
 - Flextensions in This Unit
- Offline Preparation

Unit Map

Why does Ergstown keep having blackouts?

Students take on the role of systems engineers for Ergstown, a fictional town that experiences frequent blackouts, and explore the reasons why an electrical system can fail. Students apply what they learn to choosing new energy sources and energy converters for the town, and then they prepare arguments for why their design choices will make the town's electrical system more reliable.

Chapter 1: What happened to the electrical system the night of the Ergstown blackout?

Students figure out: The devices stopped working in Ergstown because they weren't able to get electrical energy from the electrical system. To convert energy to light, heat, motion, or sound, devices need to be plugged into the wall and receive electrical energy. During the blackout, the devices weren't getting this electrical energy.

How they figure it out: Students investigate several different systems, including a simple circuit powered by a solar cell. They review evidence from the blackout and make an argument about what they think caused the blackout.

Chapter 2: What makes the devices in Ergstown output energy or fail to output energy?

Students figure out: Energy isn't created or destroyed. Devices can convert electrical energy to light, heat, motion, or sound when they get electrical energy because these are all forms of energy. When all the devices were running, they caused a blackout. The devices needed more energy from the electrical system than was available. Either the town was using too many devices, or the devices were not energy efficient. If more energy is needed from the electrical system than is available, a blackout can occur.

How they figure it out: Using the *Energy Conversions* Simulation, students explore different ways to convert energy from one form to another. They consider the relationship between the amount of energy used and the amount of energy in the electrical system. Finally, students write their first argument for how to solve the problem of blackouts in Ergstown.

Chapter 3: Where does the electrical energy for the devices in Ergstown come from?

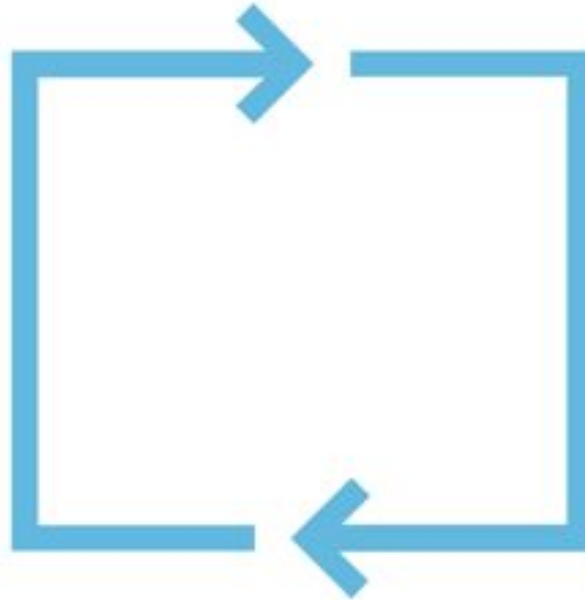
Students figure out: Electrical energy that comes through the electrical grid must have a source and a source converter. There are many possible sources, such as fossil fuels, wind, water, and sunlight. Each source has a converter that changes the energy form of the source to electrical energy. Energy use in Ergstown could have caused a blackout if there wasn't enough energy coming from the source, there weren't enough source converters to convert energy from the source, or the source converters were broken.

Amplify Science Approach



Multimodal instruction

For each key concept, students w
with evidence in varied modalities



**Do,
Talk,
Read,
Write,
Visualize**

Unit Anchor Phenomenon

Problem students work to solve

Chapter-level Anchor Phenomenon

Chapter 1 Question

Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to the problem

Explanation that students can make to answer the Chapter 1 Question

Energy Conversions: Blackout in Ergstown

Ergstown has frequent blackouts.
Why does Ergstown keep having blackouts?

There was a blackout in Ergstown.
What happened to the electrical system the night of the Ergstown blackout?

What is a system? (1.2, 1.3)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

- Observe a simple system (1.2)
- Read *Systems* (1.2)
- Build a simple electrical system (1.3)
- Discuss parts and functions of a system (1.3)

- A system is a collection of interacting parts that work together. Each part in the system plays a role to perform an overall system function. (1.3)

- Observe and write about forms of energy in the Ergstown subway (1.6)

The devices stopped working in Ergstown because they weren't able to get electrical energy from the electrical system. When devices work, they output light, heat, motion, or sound. These are forms of energy. During the blackout, the devices weren't getting electrical energy.

What can electrical energy in a system be used for? (1.4, 1.5)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

- Find electrical energy in the Sim (1.4)
- Build simple electrical systems and observe various types of energy outputs (1.5)
- Read about forms of energy in *It's All Energy* (1.5)
- Write about ideas from the reading and hands-on investigation (1.5)

- Light, motion, sound, and thermal energy are all forms of energy. You can observe evidence of these different forms as outputs of electrical devices. (1.5)

Do



Talk



Read



Write



Visualize



Navigating to the Coherence Flowchart

The screenshot displays the AmplifyScience website interface for the 'Energy Conversions' unit. An orange arrow points to the 'Printable Resources' link in the left sidebar. Another orange arrow points from the 'Printable Resources' section to the 'Coherence Flowcharts' link in the 'Printable Resources' list. The 'Coherence Flowcharts' link is highlighted with a red box.

AmplifyScience > Energy Conversions

22 Lessons

Energy Conversions

Printable Teacher Guide

- Unit Overview
- Chapters
- Printable Resources**
- Planning for the Unit
- Teacher References
- Offline Preparation

Unit Overview

What's in This Unit?

The electrical system, our nation's... our lives and increasingly in the new... how energy is converted from one fo... sources that exist.

[Read more >](#)

Chapters

Chapter 1: What happen

Beta

LESSON 1.1 Pre-Unit Assessment

LESSON 1.2 Introducing Systems

LESSON 1.3 Exploring Systems

Printable Resources

- 3-D Assessment Objectives
- Copymaster Compilation
- Eliciting and Leveraging Students' Prior Knowledge, Personal Experiences, and Cultural Backgrounds
- Investigation Notebook
- NGSS Information for Parents and Guardians
- Print Materials (11" x 17")
- Possible Responses
- Coherence Flowcharts**
- Crosscutting Concept Tracker
- Flextension Compilation
- Multi-Language Glossary
- Print Materials (8.5" x 11")
- Unit Materials

Unit Map

Why does Ergstown keep having blackouts?

Students take on the role of systems engineers for Ergstown, a fictional town that experiences frequent blackouts, and explore the reasons why an electrical system can fail. Students apply what they learn to choosing new energy sources and energy converters for the town, and then they prepare arguments for why their design choices will make the town's electrical system

[Read more >](#)

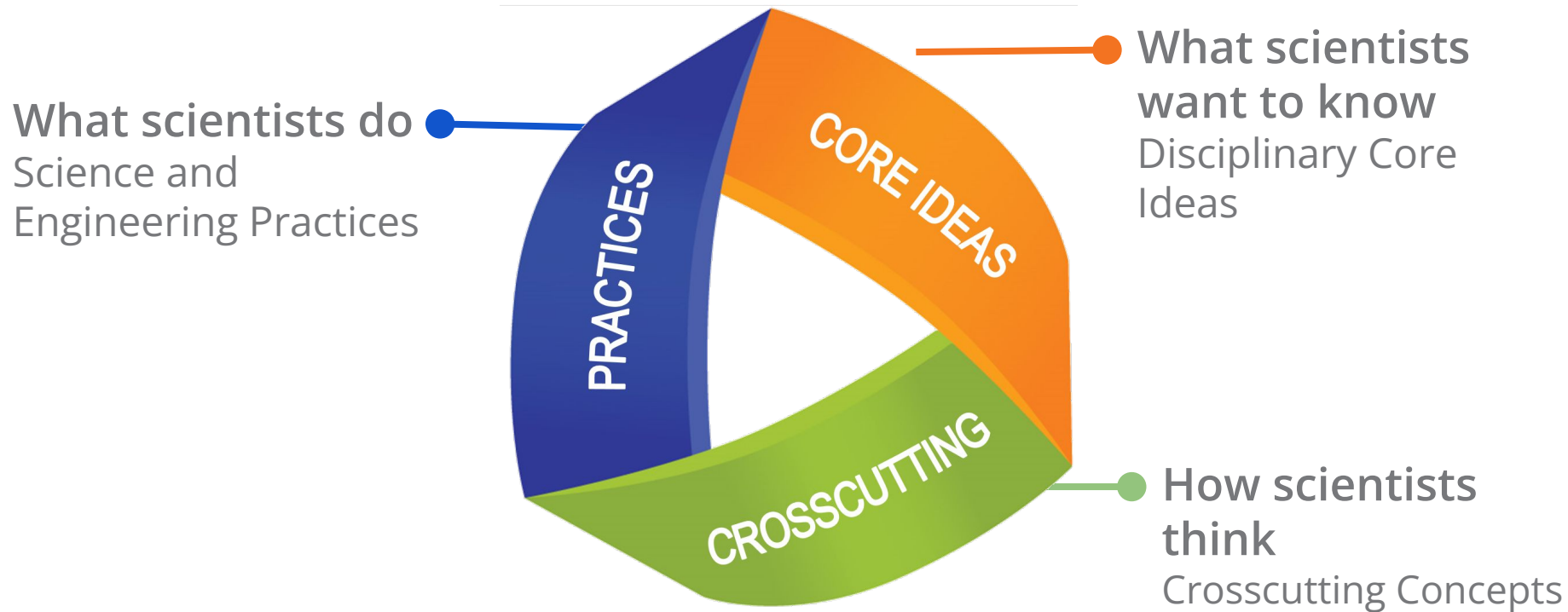
Progress Build

A Progress Build describes the way in which students' explanations of the central phenomena 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 is the differentiated instruction designed to address specific gaps in students' understanding. This document will

[Read more >](#)

Patterns of Earth and Sky & NGSS

Using 3-D teaching and learning for figuring out phenomena



Navigating to the 3-D Statements

AmplifyScience > Energy Conversions

22 Lessons

Energy Conversions

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Unit Overview

What's in This Unit?

The electrical system, our lives and increasing how energy is converted sources that exist.

[Read more >](#)

Chapters

Chapter 1: What happened to the electrical system the night of the blackout?

[LESSON 1.1 Pre-Unit Assessment](#)

[Español](#)

3-D Statements

Key

Practices Disciplinary Core Ideas Crosscutting Concepts

Unit Level

Students investigate—through firsthand experiences, a digital model, and by obtaining information by reading—how electrical systems convert and transfer energy (systems and system models, energy and matter). They use what they learn to design, test, and evaluate improvements to cause the electrical system to be more reliable, even during natural hazards and to make arguments based on evidence for the best improvements (cause and effect).

Chapter Level

Chapter 1: What happened to the electrical system the night of the blackout?

Students obtain information about electrical systems and the different forms of input and output energy (systems and system models; energy and matter) by reading and by using a digital model. They then apply what they have learned about systems and energy (systems and system models; energy and matter) to explain what might have caused the problem with the electrical system (cause and effect).

Chapter Targeted 3-D Learning Objectives

These objectives are formatively assessed across the chapter [see assessment guidance locations noted]

DCI: PS3.B: Conservation of Energy and Energy Transfer

- PS3.B-E1: Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. [OTFA 4; OTFA 5]
- PS3.B-E3: Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. [OTFA 3]

SEP: Obtaining, Evaluating, and Communicating Information

- INFO-E1: Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence. [OTFA 1]

LESSON 1.1 Pre-Unit Assessment

LESSON 1.4 Electrical Energy

Forms of Energy

Writing an Argument About the Blackout

Disciplinary Core Ideas: **Energy Conversions**

Life Science	Physical Science
LS1: From Molecules to Organisms: Structures and Processes	PS1: Matter and Its Interactions
LS2: Ecosystems: Interactions, Energy, and Dynamics	PS2: Motion and Stability: Forces and Interactions
LS3: Heredity: Inheritance and Variation of Traits	PS3: Energy ✓
LS4: Biological Evolution: Unity and Diversity	PS4: Waves and Their Applications in Technologies for Information Transfer
Earth & Space Science	Engineering & Technology
ESS1: Earth's Place in the Universe	ETS1: Engineering Design ✓
ESS2: Earth's Systems	ETS2: Links Among Engineering, Technology, Science, and Society
ESS3: Earth and Human Activity ✓	

Science and Engineering Practices **Energy Conversions**

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 ✓

Crosscutting Concepts: **Energy Conversions**



Crosscutting Concepts

1. Cause and Effect
2. Structure and Function
3. System and System Models ✓
4. Scale, Proportion and Quantity
5. Stability and Change
6. Energy and Matter ✓
7. Patterns

Energy Conversions: 3D Statements

3-D Statements

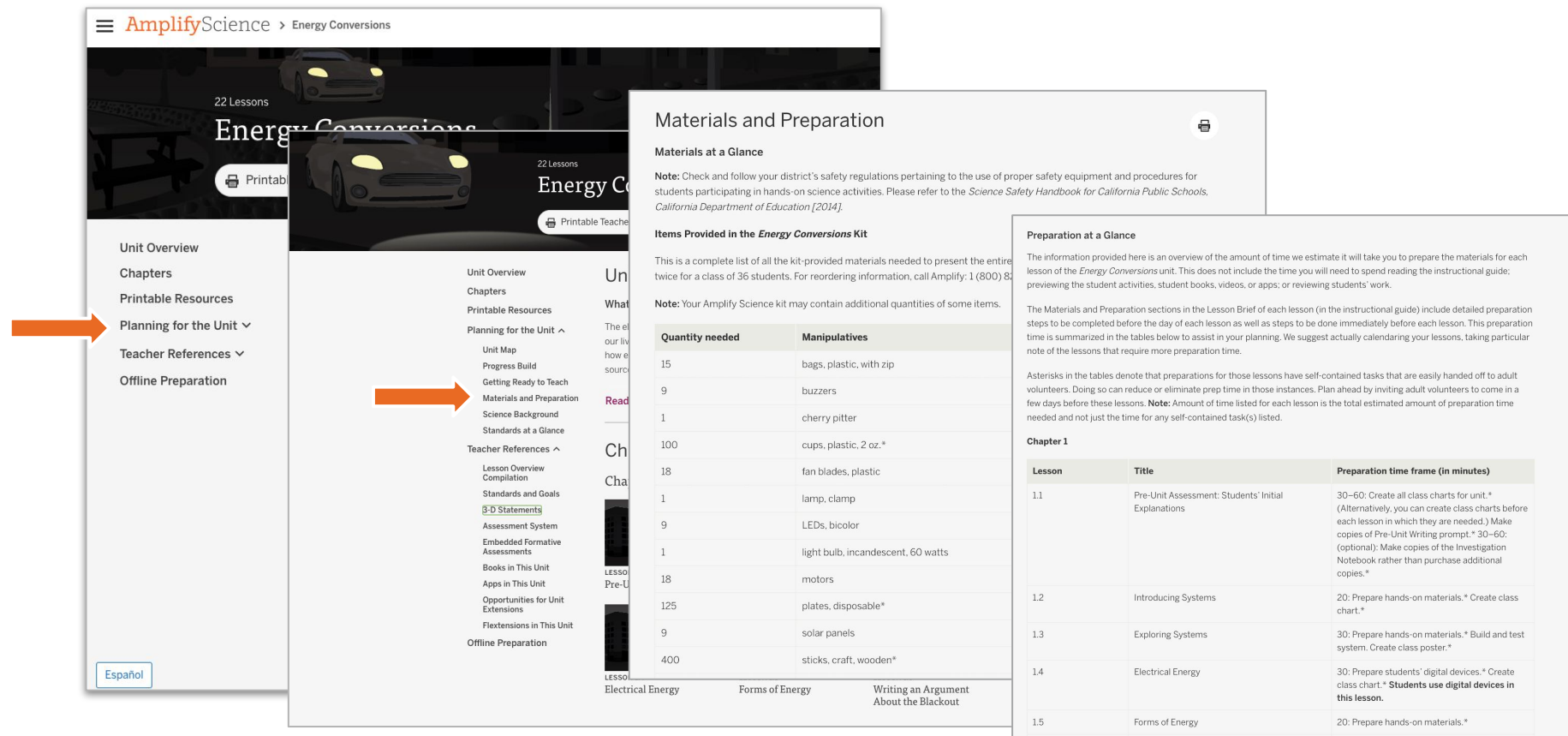
Key

Practices Disciplinary Core Ideas Crosscutting Concepts

Unit Level

Students investigate—through firsthand experiences, a digital model, and by obtaining information by reading—how electrical systems convert and transfer energy (systems and system models, energy and matter). They use what they learn to design, test, and evaluate improvements to cause the electrical system to be more reliable, even during natural hazards and to make arguments based on evidence for the best improvements (cause and effect).

Navigating to Materials and Preparation



AmplifyScience > Energy Conversions

22 Lessons

Printable Teacher Resources

Unit Overview

Chapters

Printable Resources

Planning for the Unit ▾

Teacher References ▾

Offline Preparation

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

Books in This Unit

Apps in This Unit

Opportunities for Unit Extensions

Flextensions in This Unit

Offline Preparation

Materials and Preparation

Materials at a Glance

Note: Check and follow your district's safety regulations pertaining to the use of proper safety equipment and procedures for students participating in hands-on science activities. Please refer to the *Science Safety Handbook for California Public Schools, California Department of Education [2014]*.

Items Provided in the *Energy Conversions* Kit

This is a complete list of all the kit-provided materials needed to present the entire unit twice for a class of 36 students. For reordering information, call Amplify: 1 (800) 831-4273.

Note: Your Amplify Science kit may contain additional quantities of some items.

Quantity needed	Manipulatives
15	bags, plastic, with zip
9	buzzers
1	cherry pitter
100	cups, plastic, 2 oz.*
18	fan blades, plastic
1	lamp, clamp
9	LEDs, bicolor
1	light bulb, incandescent, 60 watts
18	motors
125	plates, disposable*
9	solar panels
400	sticks, craft, wooden*

Preparation at a Glance

The information provided here is an overview of the amount of time we estimate it will take you to prepare the materials for each lesson of the *Energy Conversions* unit. This does not include the time you will need to spend reading the instructional guide: previewing the student activities, student books, videos, or apps; or reviewing students' work.

The Materials and Preparation sections in the Lesson Brief of each lesson (in the instructional guide) include detailed preparation steps to be completed before the day of each lesson as well as steps to be done immediately before each lesson. This preparation time is summarized in the tables below to assist in your planning. We suggest actually calendaring your lessons, taking particular note of the lessons that require more preparation time.

Asterisks in the tables denote that preparations for those lessons have self-contained tasks that are easily handed off to adult volunteers. Doing so can reduce or eliminate prep time in those instances. Plan ahead by inviting adult volunteers to come in a few days before these lessons. **Note:** Amount of time listed for each lesson is the total estimated amount of preparation time needed and not just the time for any self-contained task(s) listed.

Chapter 1

Lesson	Title	Preparation time frame (in minutes)
1.1	Pre-Unit Assessment: Students' Initial Explanations	30–60: Create all class charts for unit.* (Alternatively, you can create class charts before each lesson in which they are needed.) Make copies of Pre-Unit Writing prompt.* 30–60: (optional): Make copies of the Investigation Notebook rather than purchase additional copies.*
1.2	Introducing Systems	20: Prepare hands-on materials.* Create class chart.*
1.3	Exploring Systems	30: Prepare hands-on materials.* Build and test system. Create class poster.*
1.4	Electrical Energy	30: Prepare students' digital devices.* Create class chart.* Students use digital devices in this lesson.
1.5	Forms of Energy	20: Prepare hands-on materials.*

Electrical Energy

Forms of Energy

Writing an Argument About the Blackout

Explore or review the key planning documents

Spend a few more minutes exploring or reviewing the documents on the Unit Landing Page.

The screenshot shows the AmplifyScience website interface for the 'Energy Conversions' unit. At the top, the navigation bar includes the AmplifyScience logo and a breadcrumb trail 'Energy Conversions'. Below this is a hero section with a dark background featuring a car and a city street at night. It displays '22 Lessons' and the unit title 'Energy Conversions' in large white text. A button labeled 'Printable Teacher Guide' with a printer icon is positioned below the title. To the left of the main content is a sidebar menu with links: 'Unit Overview', 'Chapters', 'Printable Resources', 'Planning for the Unit' (with a dropdown arrow), 'Teacher References' (with a dropdown arrow), and 'Offline Preparation'. The main content area starts with the 'Unit Overview' section, which includes the heading 'What's in This Unit?' and a paragraph about the electrical system. Below this is a 'Read more' link with a right-pointing arrow. The 'Chapters' section follows, with the heading 'Chapter 1: What happened to the electrical system the night of the black...'. Below the chapter heading are three lesson cards, each with a 'Beta' badge in the top right corner. The first card is 'LESSON 1.1 Pre-Unit Assessment', the second is 'LESSON 1.2 Introducing Systems', and the third is 'LESSON 1.3 Exploring Systems'. At the bottom left of the page is a small blue button labeled 'Español'.

AmplifyScience > Energy Conversions

22 Lessons

Energy Conversions

Printable Teacher Guide

- Unit Overview
- Chapters
- Printable Resources
- Planning for the Unit ▾
- Teacher References ▾
- Offline Preparation

Unit Overview

What's in This Unit?

The electrical system, our nation's network for producing and delivering electricity from suppliers to consumers, is a critical part of our lives and increasingly in the news. Understanding this critical system provides a unique context for studying how energy is converted from one form to another, how it can be transferred from place to place, and the various sources that exist.

[Read more >](#)

Chapters

Chapter 1: What happened to the electrical system the night of the black...

Beta

LESSON 1.1
Pre-Unit Assessment

Beta

LESSON 1.2
Introducing Systems

Beta

LESSON 1.3
Exploring Systems

Español

Explaining the phenomenon: Science Concepts

A stylized, dark illustration of a city at night. Several tall buildings with many windows are visible. A large, bright yellow sun or moon is in the upper left sky. A few small stars are scattered in the dark sky. In the foreground, there are streetlights and a car with its headlights on.

Unit Question: How does the electrical system work?

Navigating to the Lesson Overview Compilation

The image shows a digital interface for a unit titled "Patterns of Earth and Stars". The main header indicates "22 Lessons". A sidebar on the left lists navigation options: Unit Overview, Chapters, Printable Resources, Planning for the Unit, Teacher References, and Offline Preparation. An orange arrow points from the "Teacher References" link to a detailed view of the "Lesson Overview Compilation".

Unit Overview

What's in This Unit?

Humans have been observing the Paleolithic Era. Records that date back to the Paleolithic Era show patterns of movement of the Moon and stars over millennia. Archaeoastronomers have found evidence that ancient people and can be carved or built from stone.

[Read more](#)

Chapters

Chapter 1: Why don't we see a lot of stars during the daytime?

Lesson Overview Compilation

Lessons in This Unit

Chapter 1 Lessons

- Lesson 1.1: Pre-Unit Assessment
- Lesson 1.2: Earth and Stars in Space
- Lesson 1.3: How Big Is Big? How Far Is Far?
- Lesson 1.4: Distances to the Stars
- Lesson 1.5: Investigating Size and Distance
- Lesson 1.6: The Brightness of Starlight
- Lesson 1.7: Explaining When We See Stars

Chapter 2 Lessons

- Lesson 2.1: Observing Patterns
- Lesson 2.2: The Daily Pattern
- Lesson 2.3: What We See as We Spin
- Lesson 2.4: Which Way Is Up?
- Lesson 2.5: How Does Up Change?
- Lesson 2.6: Explaining the Effects of Earth's Spin

Chapter 3 Lessons

- Lesson 3.1: Stars Through the Year
- Lesson 3.2: Modeling Earth's Orbit
- Lesson 3.3: Seeing Stars for a Year
- Lesson 3.4: Dog Days of Summer
- Lesson 3.5: Modeling Constellations over Time
- Lesson 3.6: End-of-Unit Assessment

Chapter 4 Lessons

- Lesson 4.1: Star Scientist
- Lesson 4.2: Planning Investigations
- Lesson 4.3: Students' Investigations of Constellations or Stars

Chapters at a Glance

Unit Question

Why do we see different stars at different times?

Chapter 1: Why don't we see a lot of stars in the daytime?

Chapter Question

Why don't we see a lot of stars during the daytime?

Explaining the phenomenon: Science Concepts

A stylized, dark illustration of a city at night. In the upper left, a large yellow sun or moon is visible against a dark sky with a few small stars. The city features several tall, dark buildings with many windows. In the foreground, a car with its headlights on is driving on a street, and a street lamp is visible. The overall tone is dark and atmospheric.

Unit Question: How does the electrical system work?

What **science concepts** do you think students need to understand in order to **explain the phenomenon**?

Navigating to the Progress Build

AmplifyScience > Energy Conversions

22 Lessons

Energy Conversions

Printable Teacher Guide

Unit Overview

Chapters

Printable Resources

Planning for the Unit

Teacher References

Offline Preparation

Unit Overview

What's in This Unit?

The electrical system, our lives and increasingly how energy is converted sources that exist.

[Read more](#)

Chapters

Chapter 1: What

LESSON 1.1
Pre-Unit Assessment

Progress Build

A Progress Build describes the way in which students' explanations of the central phenomena 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 is the differentiated instruction designed to address specific gaps in students' understanding. This document will serve as an overview of the *Energy Conversions: Blackout in Ergstown* 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 *Energy Conversions* unit, students will learn to construct scientific explanations of what could have caused a blackout and caused devices to stop working.

Prior knowledge (preconceptions): Students are likely to recognize that many familiar devices need electricity to function. Students will also likely recognize the idea that there is a source of electricity for those devices, but what that source is, how it functions, or how it relates to the device will likely still be mysterious. While neither of these ideas are 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: Devices work by converting electrical energy to another form.

Devices work by converting electrical energy to another form (motion, light, thermal, sound). They only work when they are plugged in because energy must be supplied to be converted. The electrical system gets a certain amount of energy. If devices in the system need more energy than is going into the system, then the devices will not function.

Progress Build Level 2: Energy must be supplied from a source and converted or there is no electrical energy available for devices to convert.

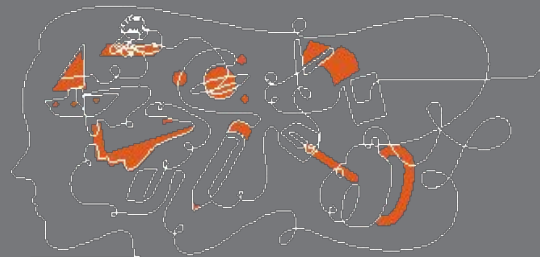
Devices work by converting electrical energy to another form (motion, light, thermal, sound). They only work when they are plugged in because energy must be supplied to be converted. The electrical system gets a certain amount of energy. If devices in the system need more energy than is going into the system, then the devices will not function. **Electrical energy is converted from a source—motion energy (wind, water, steam) is converted by a generator and light energy by solar panels. Energy has to come from somewhere, so energy must be supplied from a source and converted or there is no electrical energy available for devices to convert (the system does not function).**

Progress Build Level 3: Electrical energy can be transferred by wires connecting the source converter to the device.

Devices work by converting electrical energy to another form (motion, light, thermal, sound). They only work when they are plugged in because energy must be supplied to be converted. The electrical system gets a certain amount of energy. If devices in the system need more energy than is going into the system, then the devices will not function. Electrical energy is converted from a source—motion energy (wind, water, steam) is converted by a generator and light energy by solar panels. Energy has to come

Progress Build

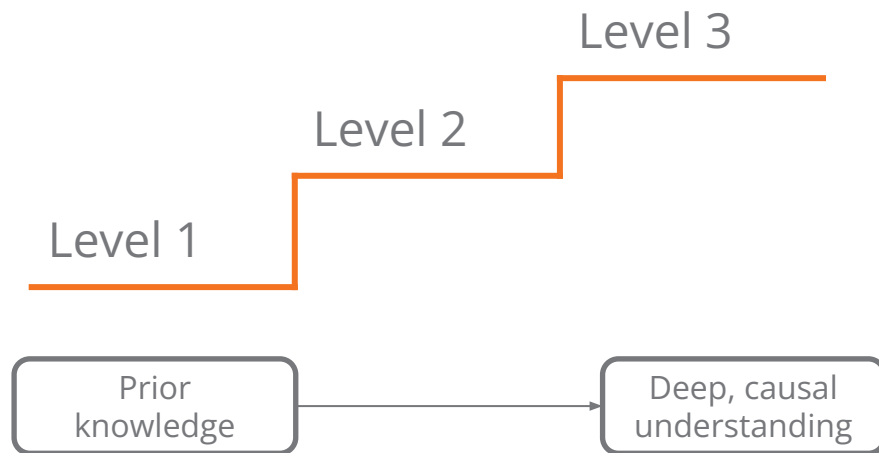
A Progress Build describes the way in which students' explanations of the central phenomenon should develop and deepen over the course of a unit. It is an important tool in understanding the design of the unit and in supporting students' learning. **A Progress Build organizes the sequence of instruction and defines the focus of the assessments.**



Unpacking the Progress Build

Understanding a unit's Progress Build will help you guide your students, address misconceptions, and avoid giving ideas away too early in the unit.

In this activity, you'll use the Progress Build.



Progress Build

Energy Conversions

Assumed prior knowledge (preconceptions): Students are likely to recognize that many familiar devices need electricity to function.

Level 1

Devices work by converting electrical energy to another form.

Level 2

Energy must be supplied from a source and converted or there is no electrical energy available for devices to convert.

Level 3

Electrical energy can be transferred by wires connecting the source converter to the device.

Unpacking the Progress Build

Group Work time

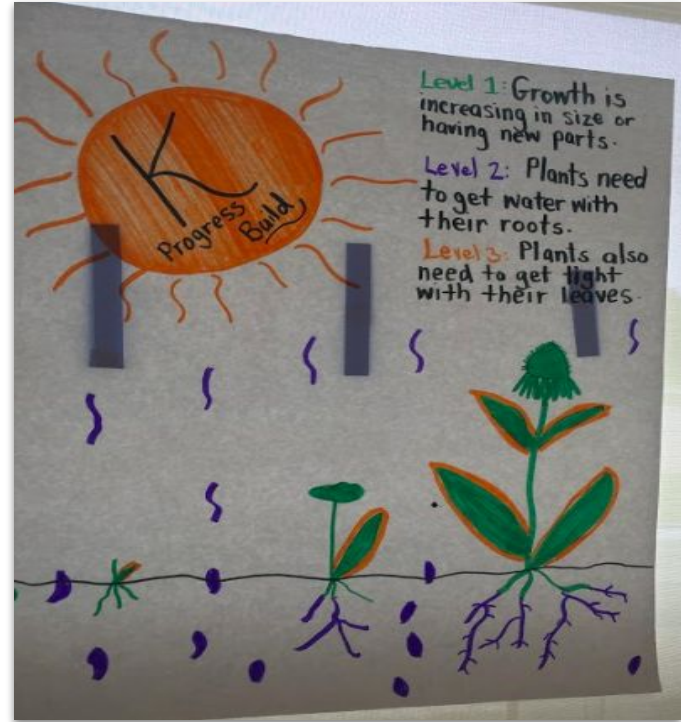
The purpose of this next work time is to understand what the levels of the Progress Build are in this unit, and reinforce understanding of its science concepts.



Progress Build analysis

Group work time

- With your group or partner, create a visual representation of all the levels of your unit's progress build.

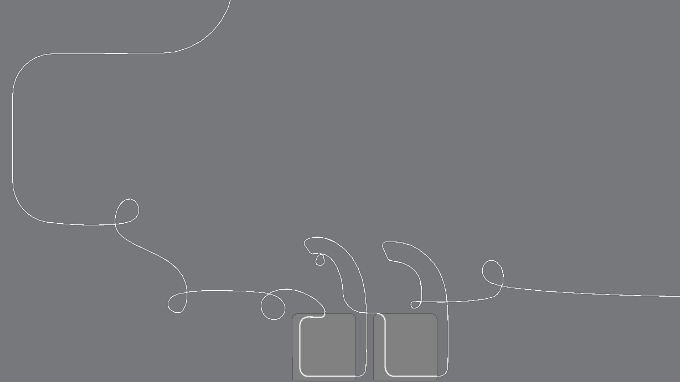


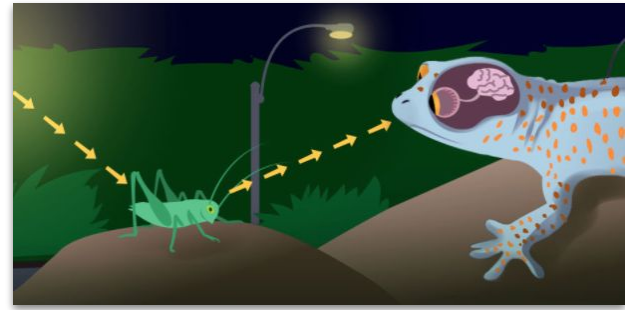
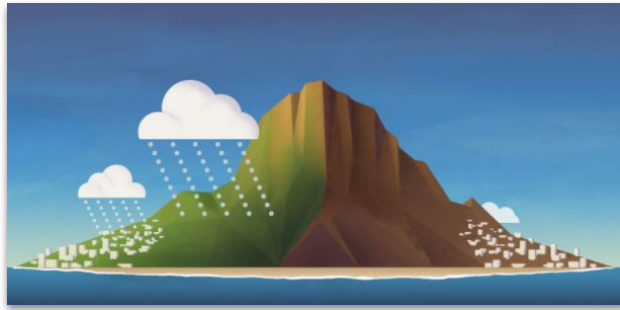
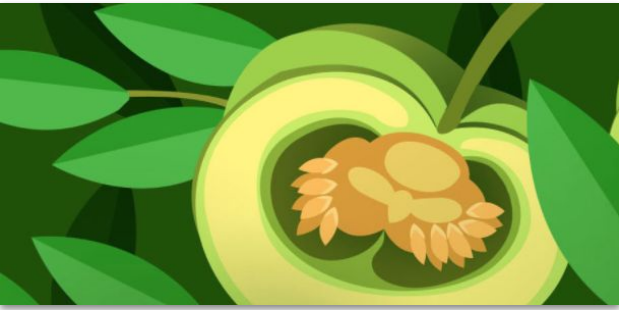
Progress Build analysis

Presentations



Questions?





Plan for the day

- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Digging into Chapter 2
- Planning
- Closing

Energy Conversions: Chapter 1

Chapters

Chapter 1: What happened to the electrical system the night of the blackout? ⓘ



LESSON 1.1
Pre-Unit Assessment



LESSON 1.2
Introducing Systems



LESSON 1.3
Exploring Systems



LESSON 1.4
Electrical Energy



LESSON 1.5
Forms of Energy



LESSON 1.6
Writing an Argument
About the Blackout

Digging in to Chapter 1

Group Work time

1. Form groups or pairs.
2. Each group will pick a lesson in Chapter 1 (1.1 - 1.4)
3. Chart the activities in the lesson.

Be sure to include:

- a. Purpose of lesson
- b. Modalities of each activity
- c. Vocabulary introduced
- d. Key Concepts introduced



Purpose of the lesson

Lesson 1.2: Introducing Systems

Printable Lesson Guide

1

TEACHER-LED DISCUSSION
Reflecting on the Unit Problem

2

TEACHER-LED DISCUSSION
Observing a Simple System

3

TEACHER-LED DISCUSSION
Introduction to Synthesizing

4

READING
Reading: Systems

RESET LESSON

Overview

Materials & Preparation

Differentiation

Standards

Vocabulary

Unplugged?

Overview

To begin to tackle the problem of designing improvements to the Ergstown electrical system, students first set out to understand what a system is. They observe a simple system—a cherry pitter—and identify its parts and their functions. To broaden students' understanding of systems, the teacher introduces the *Systems* book and the reading strategy of synthesizing. Students work in pairs to synthesize their prior knowledge, what they learned from the cherry pitter system demonstration, and what they are reading in the book in order to strengthen their understanding of what a system is. The purpose of this lesson is to introduce students to the concept of systems and to prepare them to investigate the electrical system, its parts, and their functions.

1

Unit Overview
Lesson 1.2: Introducing Systems

2

Anchor 1
Reflecting on the Unit Problem

3

Materials & Preparation
Anchor 2: Observing a Simple System
Anchor 3: Introduction to Synthesizing

4

Chapter 1: Systems
What is a system? How do we understand the world around us?

5

Anchor 4: Synthesizing
How do we understand the world around us?

6

Anchor 5: Synthesizing
How do we understand the world around us?

Grade 4 | Energy Conversions

Lesson 1.2: Introducing Systems

AmplifyScience

Lesson purpose: To introduce students to the concept of systems and to prepare them to investigate the electrical system, its parts, and their functions

Please refer to this lesson's Materials & Preparation section in the digital Teacher's Guide or the Print Teacher's Guide for information about preparing to teach this lesson, including any applicable safety notes. Below are links to resources used in this lesson.

[Systems](#)
[Completed: Cherry Pitter System Table](#)

All Projections

Partner Reading Guidelines

Cherry Pitter System table (Completed)

Optional: Chapter 1 Home Investigation: Blackout Interview copymaster

Classroom Slides

Lesson Brief

Modalities

Lesson at a Glance

1: Reflecting on the Unit Problem (5 min.)

To prepare to begin their investigations, students reflect on the unit problem and their role as systems engineers.

2: Observing a Simple System (15 min.)

As a first step toward building an understanding of how electrical systems work, students are introduced to an example of a simple system—a cherry pitter. Students observe the cherry pitter system to identify the parts of the system and their functions.

3: Introduction to Synthesizing (15 min.)

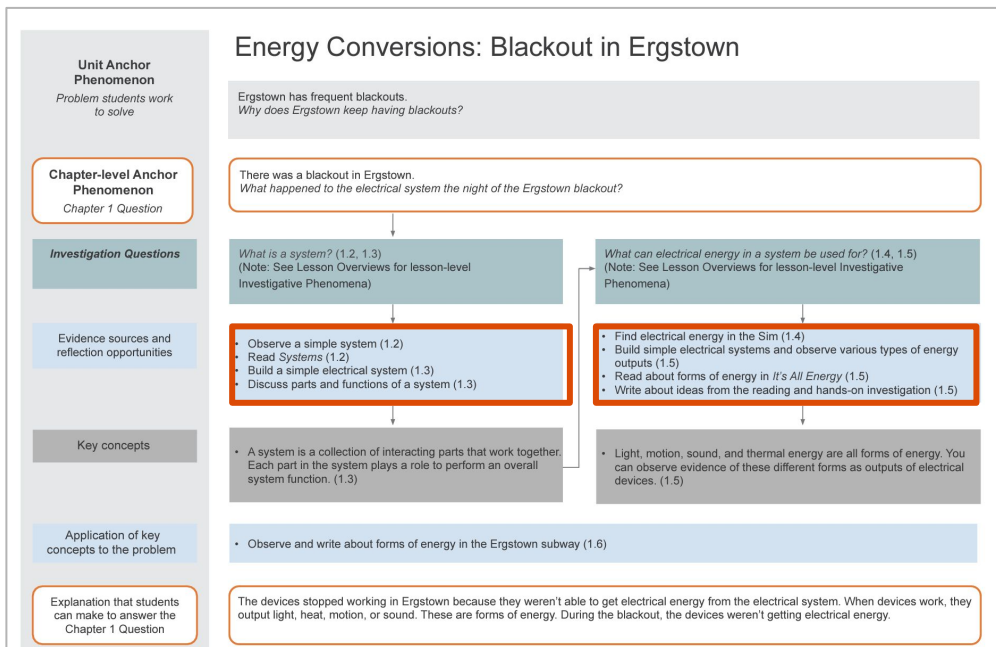
The teacher introduces *Systems*, then introduces and models the reading strategy of synthesizing in order to prepare students to synthesize as they read the book with a partner.

4: Reading: Systems (25 min.)

Partners read *Systems* and apply the synthesizing strategy to generate new ideas to help them answer the first Investigation Question: *What is a system?* Post-reading discussion provides students with an opportunity to hear the new ideas about systems that their classmates have generated. This activity also provides an On-the-Fly Assessment of students' developing ability to synthesize information as a reading strategy.

The Lesson Brief:
Lesson at a Glance

Energy Conversions: Blackout in Ergstown



Coherence
Flowchart

Vocabulary

Lesson 1.2: Introducing Systems

Printable Lesson Guide

1

TEACHER-LED DISCUSSION
Reflecting on the Unit Problem

2

TEACHER-LED DISCUSSION
Observing a Simple System

3

TEACHER-LED DISCUSSION
Introduction to Synthesizing

4

TEACHER-LED DISCUSSION
Synthesizing Systems

RESET LESSON

Overview

Materials & Preparation

Differentiation

Standards

Vocabulary

Unplugged?

Overview

To begin to tackle the problem of designing improved systems, students first set out to observe a simple system—a circuit. They identify its parts and their functions. To broaden their understanding of systems, the teacher introduces the reading strategy of synthesizing. Students synthesize their prior knowledge, what they learned from the circuit system demonstration, and what they are learning from the video in order to strengthen their understanding of what a system is. The purpose of this lesson is to introduce students to the concept of systems and to prepare them to investigate the electrical system, its parts, and their functions.

Blackout Interview copymaster

Materials & Preparation

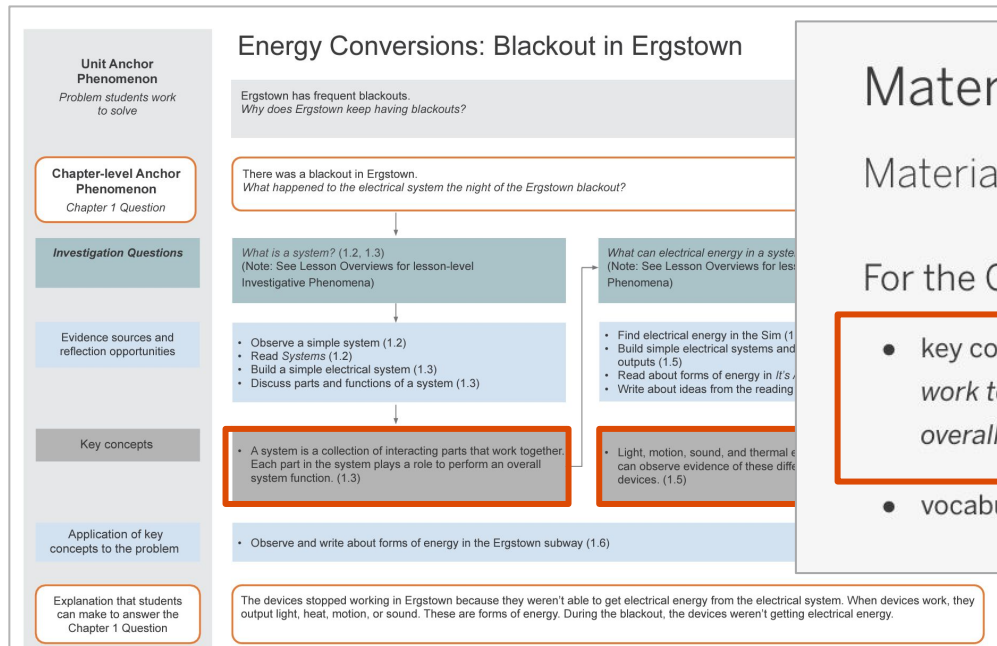
Materials

For the Classroom Wall

- Chapter 1 Question: *What happened to the electrical system the night of the Ergstown blackout?*
- vocabulary: *function, synthesize*

Lesson
Brief:

Key Concepts



Materials & Preparation

Materials

For the Classroom Wall

- key concept: *A system is a collection of interacting parts that work together. Each part in the system plays a role to perform an overall function.*
- vocabulary: *system*

Materials and Preparation

Coherence Flowchart

Digging in to chapter 1

Group Work time

1. Form groups of 2, 3, or 4
2. Each group will pick a lesson in Chapter 1 (1.1 - 1.7)
3. Chart the activities in the lesson. Be sure to include:
 - a. Purpose of lesson
 - b. Modalities of each activity
 - c. Vocabulary introduced
 - d. Key Concepts introduced



Presentations



Chapters

Chapter 1: What happened to the electrical system the night of the blackout? ⓘ



LESSON 1.1
Pre-Unit Assessment



LESSON 1.2
Introducing Systems



LESSON 1.3
Exploring Systems



LESSON 1.4
Electrical Energy

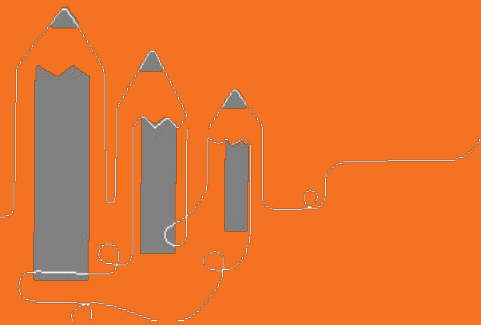


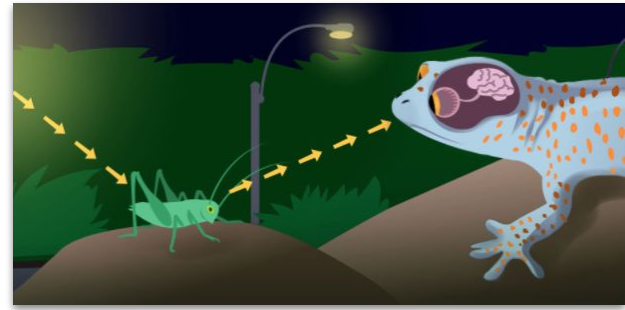
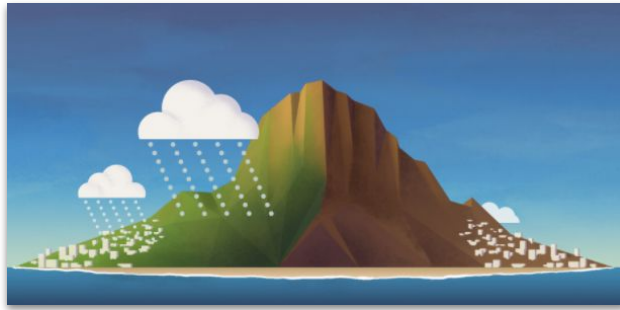
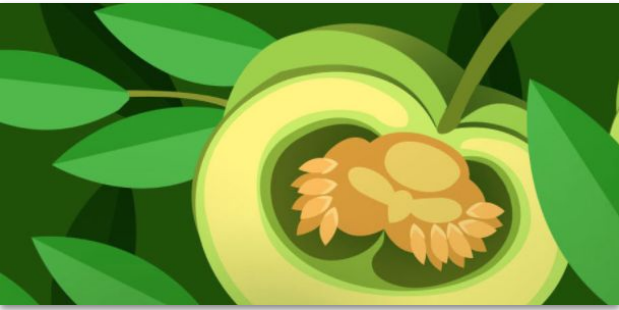
LESSON 1.5
Forms of Energy



LESSON 1.6
Writing an Argument
About the Blackout

Break





Plan for the day

- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- **Model Lesson**
- Digging into Chapter 2
- Planning
- Closing

Energy Conversions: Chapter 1

Chapters

Chapter 1: What happened to the electrical system the night of the blackout? ⓘ



LESSON 1.1
Pre-Unit Assessment



LESSON 1.2
Introducing Systems



LESSON 1.3
Exploring Systems



LESSON 1.4
Electrical Energy



LESSON 1.5
Forms of Energy



LESSON 1.6
Writing an Argument
About the Blackout

4 Easy Steps to teaching a lesson

DIRECTIONS:

1. Download the **Classroom Slides** for **Lesson 1.1** and review them.
2. Read the **Overview**.
3. Explore the **Materials & Preparation** document.
4. Read the **Differentiation** document.

The screenshot shows the interface for Lesson 1.1: Pre-Unit Assessment. At the top, the title "Lesson 1.1: Pre-Unit Assessment" is displayed. Below the title, there is a navigation bar with a "3" icon and the text "TEACHER-LED DISCUSSION Introducing Investigation Notebooks". The main content area is divided into three sections: Overview, Materials & Preparation, and Differentiation. The Overview section is currently selected and shows the title "Students' Initial Explanations" and a paragraph of text. The Materials & Preparation section is highlighted with a red arrow labeled "3". The Differentiation section is highlighted with a red arrow labeled "4". The Overview section is highlighted with a red arrow labeled "2". On the right side, there is a "DIGITAL RESOURCES" section with a list of resources. A red arrow labeled "1" points to the "Classroom Slides 1.1 | PowerPoint" resource. A "GENERATE PRINTABLE LESSON GUIDE" button is located in the top right corner.

Lesson 1.1:
Pre-Unit Assessment

3 TEACHER-LED DISCUSSION
Introducing Investigation
Notebooks

RESET LESSON

Overview
Materials & Preparation
Differentiation
Standards
Vocabulary
Unplugged?

Overview

Students' Initial Explanations

In this unit, students investigate what might cause an electrical system to fail, and they design solutions to improve the electrical system in order to reduce blackouts. In this Pre-Unit Assessment, students are presented with a simple illustration of a town and asked to explain why they think a lamp in one of the houses will not turn on. The explanations they provide in this lesson serve as a Pre-Unit Assessment for formative purposes, designed to reveal students' initial understanding of the unit's core content, both unit-specific science concepts and the crosscutting concept of Systems and Systems Models.

GENERATE PRINTABLE LESSON GUIDE

Digital Resources

- Classroom Slides 1.1 | PowerPoint
- Classroom Slides 1.1 | Google Slides
- All Projections
- Pre-Unit Writing: Explaining Why The Lamp Won't Turn On copymaster
- Assessment Guide: Interpreting Students' Pre-Unit Explanations About Why the Lamp Won't Turn On

Unit: Energy Conversions

Lesson: 1.5

Purpose: To introduce students to the concept that electrical devices convert energy from one form to another.

Materials and Preparation: Immediately Before the Lesson

On the board, write the Investigation Question if it was erased. Write: “What can electrical energy in a system be used for?”

Have on hand the following materials:

- i. materials for the classroom wall
- ii. bags of materials for simple electrical system activity
- iii. copies of *It's All Energy*
- iv. masking tape
- v. marker
- vi. *Energy Conversions* Investigation Notebook (pages 13–14)

Lesson 1.5 Differentiation

Science California > Energy Conversions > Lesson 1.5

Lesson 1.5: Forms of Energy

Printable Lesson Guide

Lesson Brief (4 Activities)

- 1 HANDS-ON: Electrical Systems with Different Energy Outputs
- 2 TEACHER-LED DISCUSSION: Introducing the Reference Book
- 3 READING: Reading About and Discussing Forms of Energy
- 4 WRITING: Synthesizing

RESET LESSON

Overview

Students investigate and read about different forms of energy. To begin, students build a simple electrical system and observe that different devices can have light, motion, or sound energy as an output energy. Next, student pairs are introduced to *It's All Energy* and explore the text features of this reference book. After the teacher models reading, student pairs read a brief section on different forms of energy. The teacher guides students as they synthesize information from the hands-on investigation and the reference book in order to draw conclusions about forms of energy. The purpose of this lesson is to introduce students to the concept that electrical devices convert energy from one form to another.

Digital Resources

- Classroom Set
- Classroom Set
- All Projections
- Energy Conversion pages 13-14
- Eliciting and Learning Knowledge, Pe
- Backgrounds

Specific Differentiation Strategies for English Learners

Designated English Language Development (ELD). Since this lesson calls for introducing new academic language, during Designated ELD, you can teach some important terms explicitly. See an example of a 7-step General Academic Vocabulary Instruction lesson plan, found in the CA ELA-ELD Framework, which provides details on how to implement such an approach.

Additional visual representations. English learners can often more easily access and recall science content through visual representations. You might consider providing additional visuals to illustrate the new terms *thermal energy*, *sound energy*, *motion energy*, and *light energy* introduced in this lesson. You can make simple labeled drawings on the board as you introduce the terms. You can also invite students to make drawings to illustrate the terms, and you can post these on the wall.

Strategic partnering. This lesson includes extended partner work as students build electrical systems with different outputs. Extended academic discourse that is equitable (that is, all students have an opportunity to engage) is critical for developing both language and content knowledge. Strategic partnering is essential for as students they develop their understanding of new content and core vocabulary. Therefore, consider carefully which partner to assign for each English learner in your class and assign a partner who has slightly higher English language skills than the student in question. Opportunities for English learners to engage in conversations that are slightly above their language-proficiency levels can accelerate second-language learning and increase students' confidence when engaging in science discourse. Try to assign each English Learner a partner who be likely to engage in an extended discussion and who will support their partner to participate equitably. We suggest you

Energy Conversions



Unit Question: How does the electrical system work?

Chapter 1 Question: What happened to the electrical system the night of the blackout?

Investigation Question: What is a system? What can electrical energy in a system be used for?

Key Concepts

#1. A system is a collection of interacting parts that work together. Each part in the system plays a role to perform an overall system function.

Vocabulary

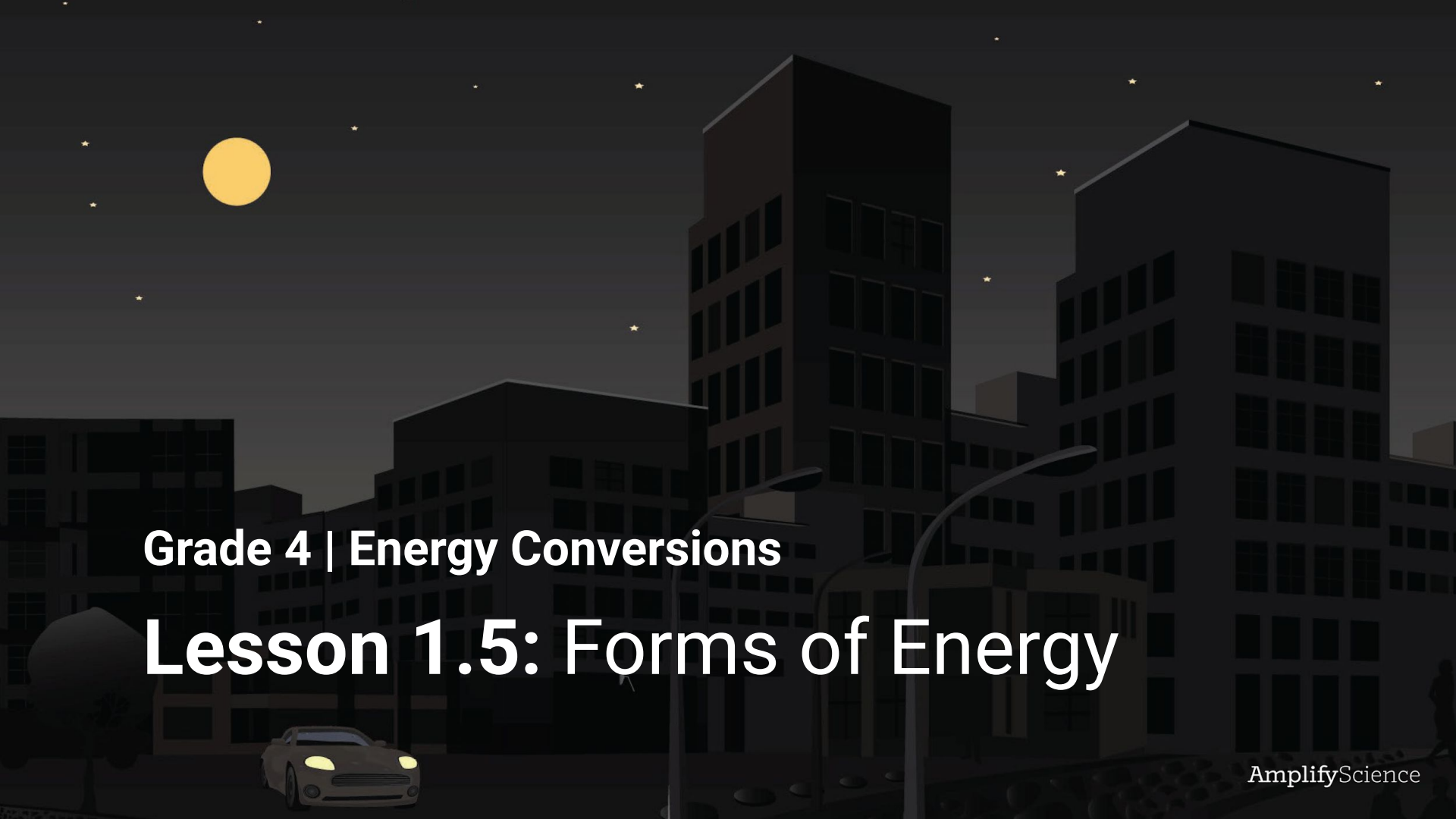
engineer

function

synthesize

system

electrical device

A stylized, dark illustration of a city at night. Several tall buildings with many windows are visible. A large, bright yellow sun or moon is in the upper left sky, surrounded by small stars. In the foreground, a car with its headlights on is parked on the left, and a street lamp is in the center. The overall tone is dark and moody.

Grade 4 | Energy Conversions

Lesson 1.5: Forms of Energy

Activity 1

Electrical Systems with Different Energy Outputs



Remember that we are investigating this question:

What can electrical energy in a system be used for?

Electrical System

Part: ?

Function:

Part: power plant

Function:

Part: wires

Function:

Part: electrical
devices

Function:

Electrical Safety Guidelines

- Only attach the clips to the electrical devices that are part of the lesson.
- Keep the moving fan away from your face.
- Keep all electrical investigation materials away from electrical outlets.
- Keep all electrical investigation materials away from water.

Scientists and engineers are careful to do their investigations in a safe way.

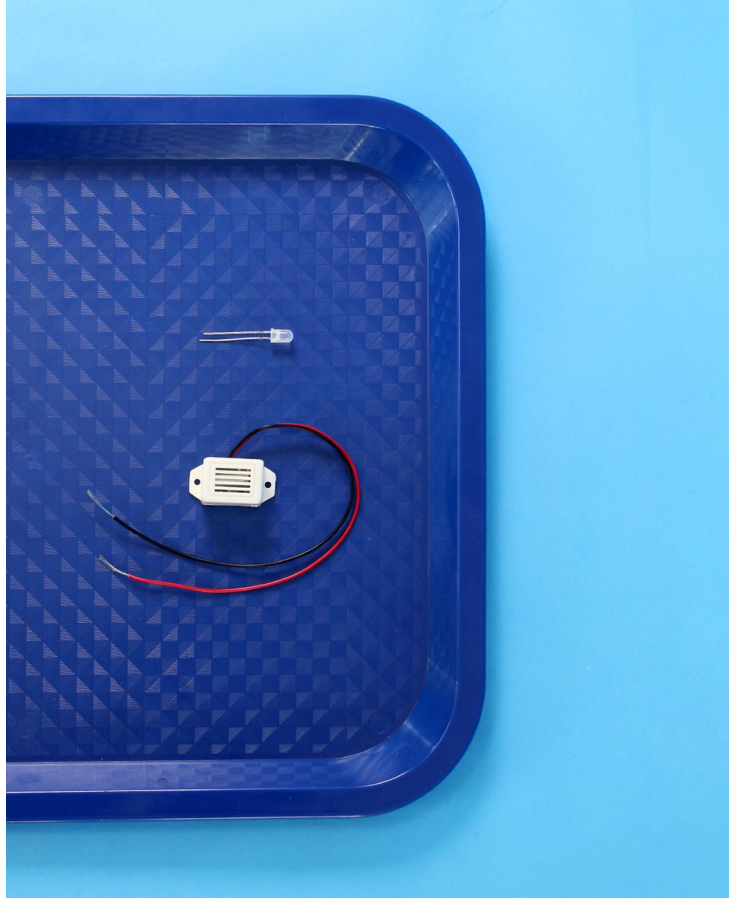




These are the parts you used to build a simple electrical system before.



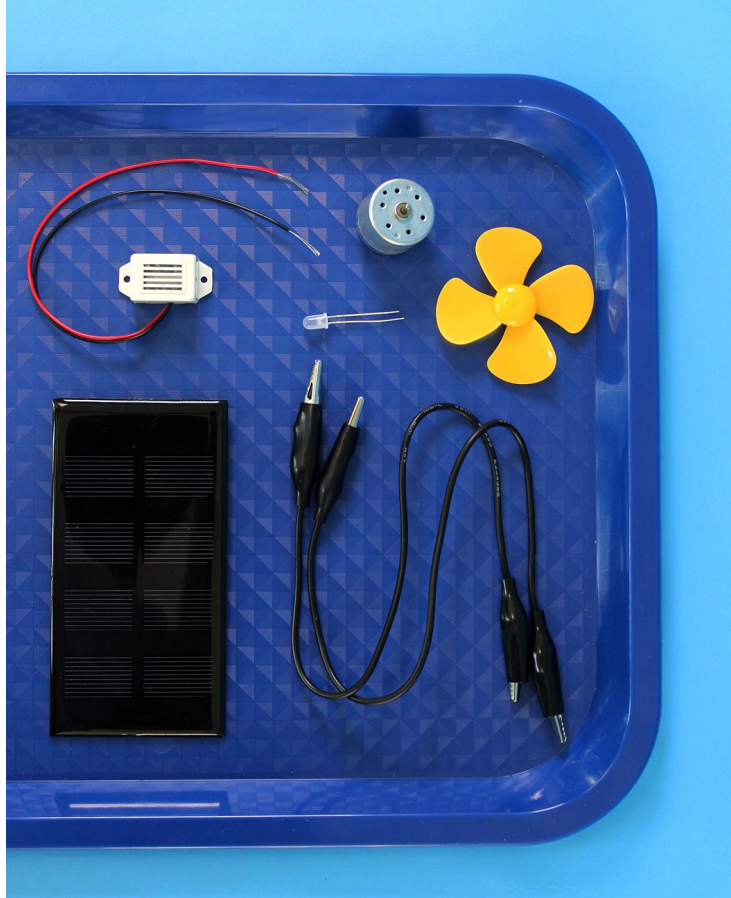
What's one way to put the parts together to **build a functioning system?**



You will be working with two new parts.



Your challenge today is
to build systems using
these **new parts**.

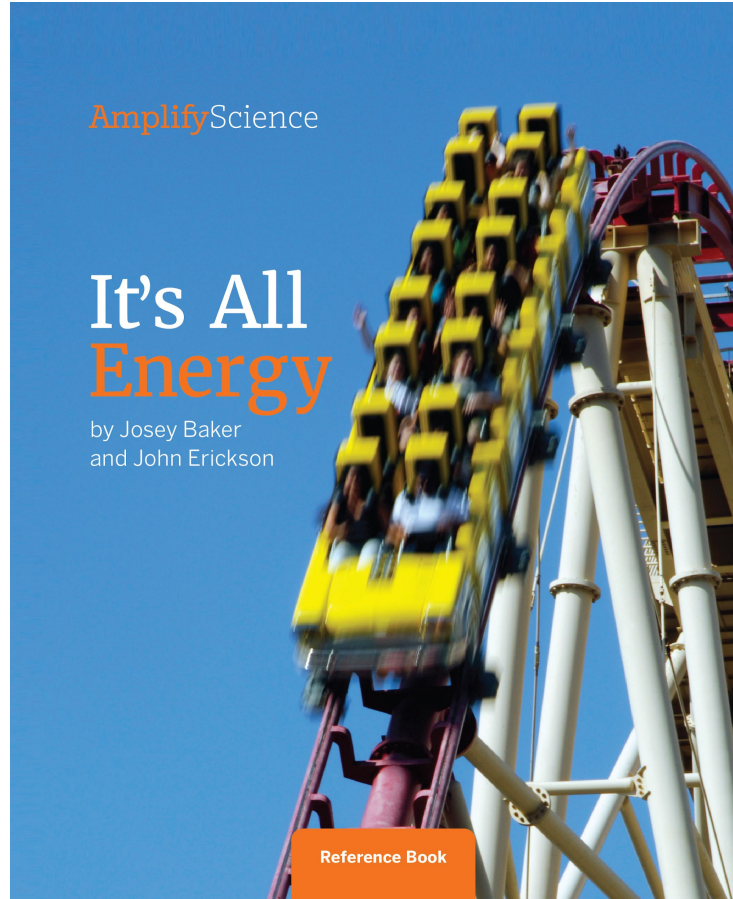


What happened once the systems were functioning?

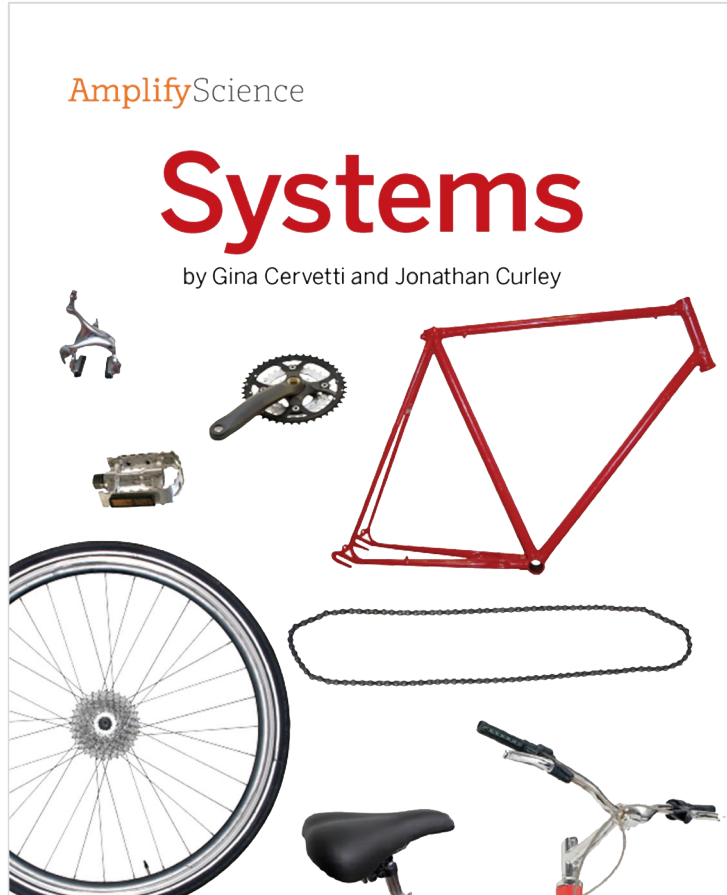
Activity 2

Introducing the Reference Book





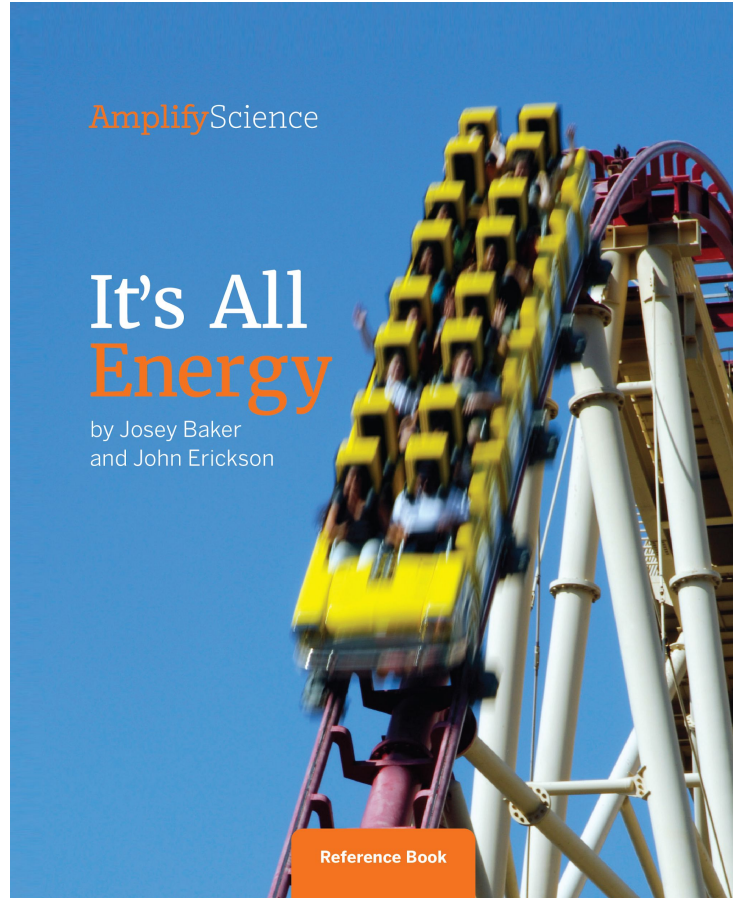
We're going to use this **reference book** to find out more about our Investigation Question: *What can electrical energy in a system be used for?*



Reference books have text features that are similar to the ones in *Systems*.



What **text features** do you remember from that book?



Flip through the book and look for all the different text features you can find.



What text features did you notice? How do you think those features might help you as you are reading?

Activity 3

Reading About and Discussing Forms of Energy



One important text feature is the table of contents.



Who can remind us what the purpose of the table of contents is?

Contents

What Is Energy?	4
Forms of Energy	6
Electrical Energy	8
Motion Energy	9
Sound Energy	10
Thermal Energy	11
Light Energy	12
Chemical Energy	13
Energy Converters	14
Electrical Devices	14
Source Converters	17
Other Energy Converters	23
Energy Sources	26
Fossil Fuels	28
Wind	30
Sun	32
Water	34
Nuclear Fuel	36
Geothermal	38
Biofuels	40
Transferring Energy	42
Fuel Trucks	42
Electrical Wires	43
Gas Pipelines	43
Hot Air, Hot Water, and Steam	44
Food	44
Sunlight	45
Collisions	45
Glossary	46
Index	47

Turn to page 3.



Which section will help you find out more about what energy is?

What Is Energy?

Energy makes things happen. Every time something starts moving, it is because of energy. Every time something makes a noise, it is because of energy. Every time something gets warmer, it is because of energy. People use energy when we talk, run, and think. In fact, every time we do anything, we use energy!



All of the things happening in these pictures are happening because of energy.





Based on what we've read so far, what can we say about what **energy** is?

Vocabulary



energy

the ability to make things move or change

Contents

What Is Energy?	4
Forms of Energy	6
Electrical Energy	8
Motion Energy	9
Sound Energy	10
Thermal Energy	11
Light Energy	12
Chemical Energy	13
Energy Converters	14
Electrical Devices	14
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Other Energy Converters	23
Energy Sources	26
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Sun	32
Water	34
Nuclear Fuel	36
Geothermal	38
Biofuels	40
Transferring Energy	42
Fuel Trucks	42
Electrical Wires	43
Gas Pipelines	43
Hot Air, Hot Water, and Steam	44
Food	44
Sunlight	45
Collisions	45
Glossary	46
Index	47

We want to know about **electrical energy**. The table of contents shows that the Electrical Energy page is part of a section called “Forms of Energy.” It starts on page 6.

Forms of Energy

The examples on these pages might look like a lot of different things, but they are really all showing just one thing—**energy**. All of these **forms** of energy can make things move or change. They all can be **converted** from the form they are in to any of the other forms. They are all energy.



Electrical energy powers this hair dryer. Anything that you can plug in uses electrical energy.



Motion is a form of energy. An airplane in the sky has **motion energy**. So does anything else that is moving.



Read about the different forms of energy on pages 6–7.

Forms of Energy

The examples on these pages might look like a lot of different things, but they are really all showing just one thing—**energy**. All of these **forms** of energy can make things move or change. They all can be **converted** from the form they are in to any of the other forms. They are all energy.



Electrical energy powers this hair dryer. Anything that you can plug in uses electrical energy.



Motion is a form of energy. An airplane in the sky has **motion energy**. So does anything else that is moving.

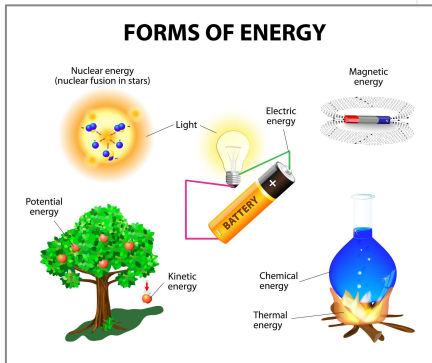


What does the book mean by “forms of energy”?

Vocabulary

form (of energy)

type or kind (of energy)



Motion energy, sound energy, light energy, and thermal energy are all forms of energy.

Electrical energy is another form of energy.

Vocabulary

electrical energy

the form of energy that is transferred through wires



Activity 4

Synthesizing



Name: _____ Date: _____

Synthesizing Ideas About Forms of Energy

1. Think about what you have learned about energy forms from the reference book and your experiences building simple electrical systems.
2. Record your ideas in the first two boxes.
3. Then, put the ideas together. Write a new understanding in box below the arrow.

Idea:

Source: *It's All Energy*

+

Idea:

Source: Building simple electrical systems

↓

New understanding:

Turn to page 14 of your notebooks.

Let's think about how we can use this graphic organizer to help us **synthesize** our ideas.

Name: _____ Date: _____

Synthesizing Ideas About Forms of Energy

1. Think about what you have learned about energy forms from the reference book and your experiences building simple electrical systems.
2. Record your ideas in the first two boxes.
3. Then, put the ideas together. Write a new understanding in box below the arrow.

Idea:

anything you can plug in uses electrical energy

Source: *It's All Energy*

+

Idea:

Source: Building simple electrical systems

↓

New understanding:

We read in *It's All Energy* that anything you can plug in uses electrical energy, so we could write that in the **first box** in the notebook.

Name: _____ Date: _____

Synthesizing Ideas About Forms of Energy

1. Think about what you have learned about energy forms from the reference book and your experiences building simple electrical systems.
2. Record your ideas in the first two boxes.
3. Then, put the ideas together. Write a new understanding in box below the arrow.

Idea: **anything you can plug in uses electrical energy**

Source: *It's All Energy*

+

Idea: 

Source: Building simple electrical systems

↓

New understanding:

The second box is for an idea from building our simple electrical systems.



What is something you learned about how these devices **use electrical energy**?

Name: _____ Date: _____

Synthesizing Ideas About Forms of Energy

1. Think about what you have learned about energy forms from the reference book and your experiences building simple electrical systems.
2. Record your ideas in the first two boxes.
3. Then, put the ideas together. Write a new understanding in box below the arrow.

Idea:

Source: *It's All Energy*

+

Idea:

Source: Building simple electrical systems

↓

New understanding:



Write an idea from the book and an idea from the electrical system you built. Then put the ideas together to create a new understanding.

Our Experiences

What We Think We Know

Let's connect what we learned to the experiences and ideas on our charts.



Does what you learned remind you of any of the **experiences** you shared? Have any of your **ideas** changed?

Name: _____ Date: _____

Synthesizing Ideas About Forms of Energy

1. Think about what you have learned about energy forms from the reference book and your experiences building simple electrical systems.
2. Record your ideas in the first two boxes.
3. Then, put the ideas together. Write a new understanding in box below the arrow.

Idea:

Source: *It's All Energy*

+

Idea:

Source: Building simple electrical systems

↓

New understanding:



Who would like to share
the **new understanding**
they came up with?

Key Concept

Light, motion, sound, and thermal energy are all forms of energy. You can observe evidence of these different forms as outputs of electrical devices.

End of Lesson



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HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

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Energy Conversions



Unit Question: How does the electrical system work?

Chapter 1 Question: What happened to the electrical system the night of the blackout?

Investigation Question: What is a system? What can electrical energy in a system be used for?

Key Concepts

#1. A system is a collection of interacting parts that work together. Each part in the system plays a role to perform an overall system function.

#2 Light, motion, sound, and thermal energy are all forms of energy. You can observe evidence of these different forms as outputs of electrical devices.

Vocabulary

engineer

function

synthesize

system

Electrical device

Electrical energy

energy

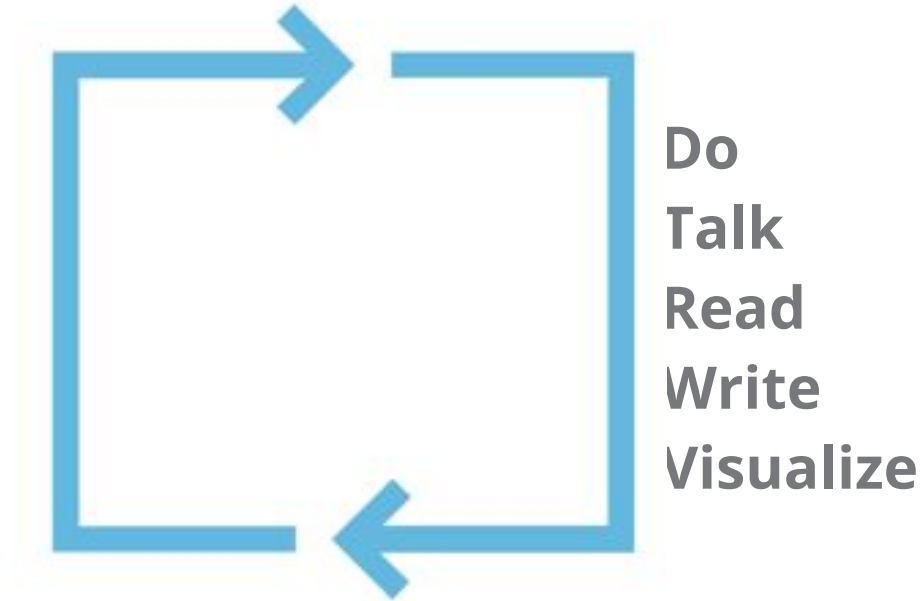
forms (of energy)

Energy Conversions



Throughout the unit, they **explore** reasons why an electrical system may fail. Through firsthand **experiences, discourse, reading, writing, and engaging with a digital simulation**, students make discoveries about the way electrical systems work. As they work to solve the problem of blackouts in Ergstown, students will **use and construct devices** that convert energy from one form to another, build an understanding of the electrical system, and learn to identify energy forms all around them.

Lesson 1.5 Multimodal learning



Energy Conversions Lesson 1.5

Do: Electrical systems with different energy outputs

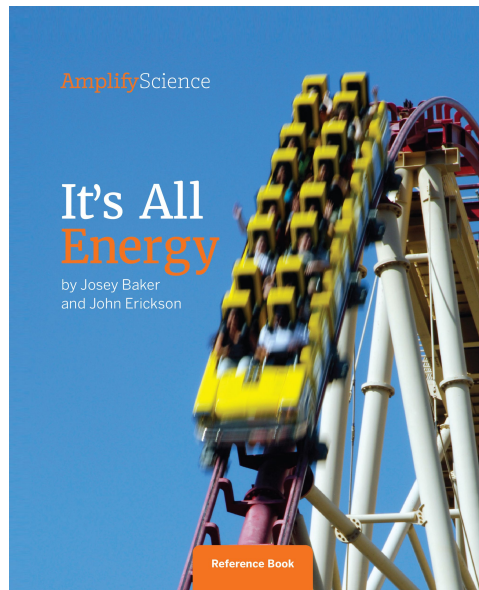
Students build simple electrical systems and observe electrical devices that have light, sound, or motion energy as energy outputs.



Energy Conversions Lesson 1.5

Read: It's All Energy

Students prepare to read and navigate the text independently, the teacher introduces the *It's All Energy* reference book,



Energy Conversions Lesson 1.5

Talk: Discuss text features

Students discuss text features from the reference book *It's All Energy*.



Energy Conversions Lesson 1.5

Write: Discuss forms of energy

Students synthesize information from the book and how their own lives are made possible because of energy.

Name: _____ Date: _____

Synthesizing Ideas About Forms of Energy

1. Think about what you have learned about energy forms from the reference book and your experiences building simple electrical systems.
2. Record your ideas in the first two boxes.
3. Then, put the ideas together. Write a new understanding in box below the arrow.

Idea:

Source: *It's All Energy*

+

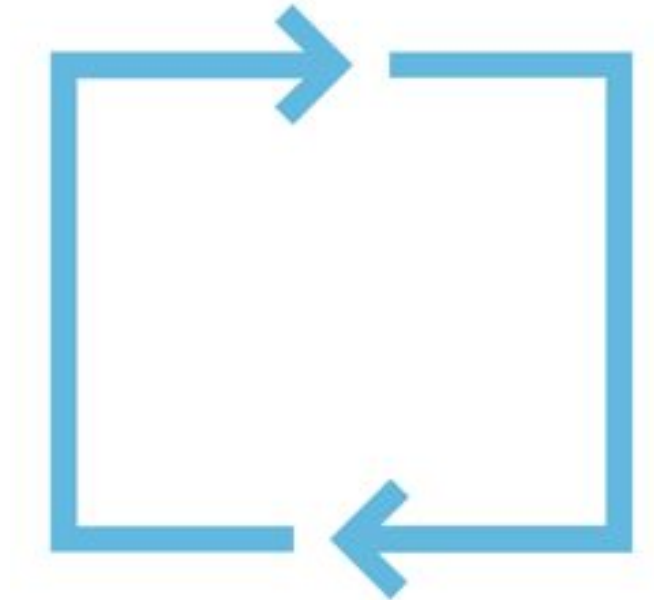
Idea:

Source: Building simple electrical systems

↓

New understanding:

Lesson 1.5 Multimodal learning



Do

Building an electrical system with different energy outputs

Talk

Talking discuss text features and forms of energy

Read

Reading about forms of energy

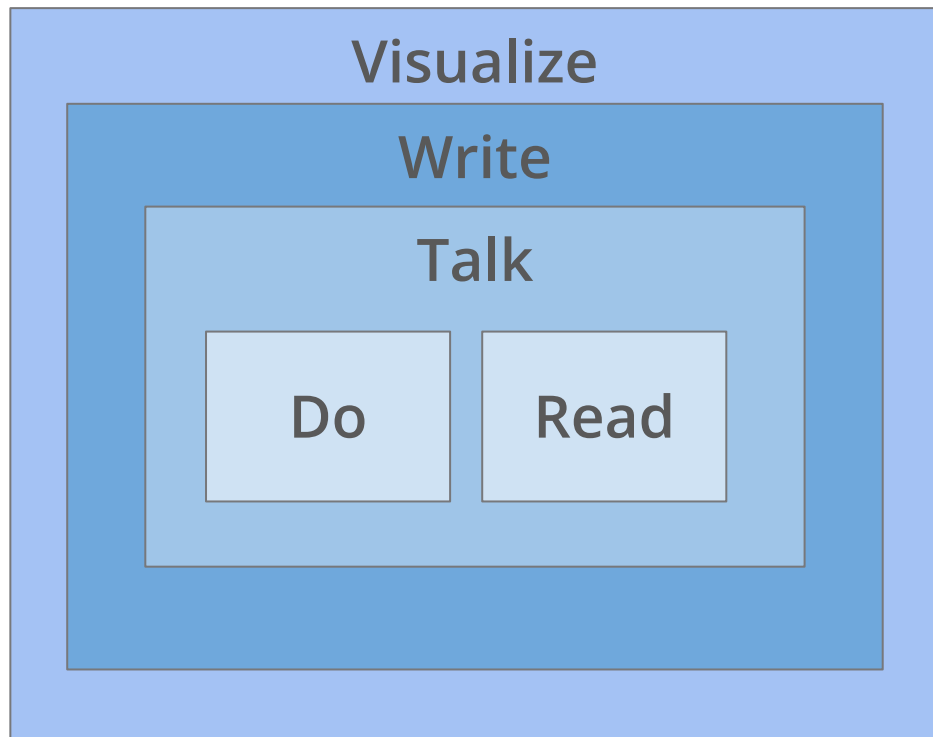
Write

Synthesizing information from the book and their own lives.

Visualize

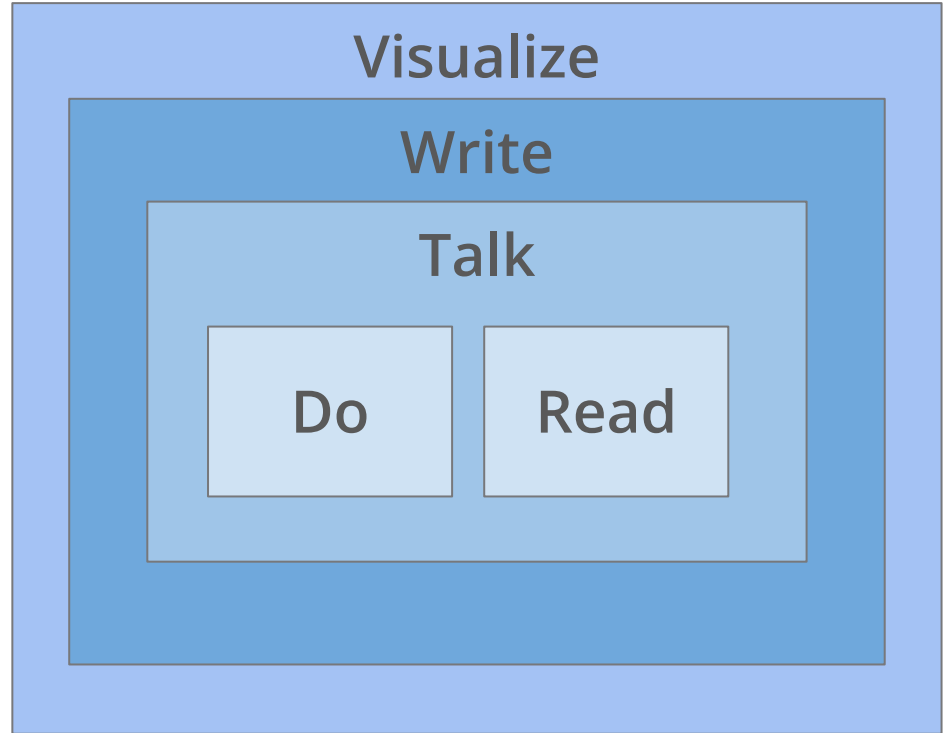
Multimodal instruction (multiple at bats)

Activities of different modalities are intentionally sequenced to support deep understanding of complex concepts.



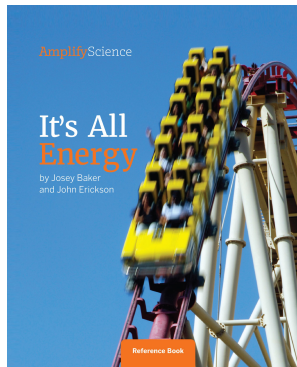
Reflection

How will multiple at-bats with multimodal evidence sources support diverse learners in your class to master complex science ideas?



Evidence sources work together

Teacher tip: Every evidence source plays an important role in student learning. Be sure to teach every activity in order!



Name _____ Date _____

Synthesizing Ideas About Forms of Energy

1. Think about what you have learned about energy forms from the reference book and your experiences building simple electrical systems.
2. Record your ideas in the first two boxes.
3. Then, put the ideas together. Write a new understanding in box below the arrow.

Idea	
Source: <i>It's All Energy</i>	

+

Idea	
Source: Building simple electrical systems	

↓

New understanding:	
--------------------	--

14 Energy Conversions—Lesson 1.5
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Energy Conversions: Chapter 1

Chapters

Chapter 1: What happened to the electrical system the night of the blackout? ⓘ



LESSON 1.1
Pre-Unit Assessment



LESSON 1.2
Introducing Systems



LESSON 1.3
Exploring Systems



LESSON 1.4
Electrical Energy



LESSON 1.5
Forms of Energy



LESSON 1.6
Writing an Argument
About the Blackout

Unit Anchor Phenomenon

Problem students work to solve

Chapter-level Anchor Phenomenon

Chapter 1 Question

Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to the problem

Explanation that students can make to answer the Chapter 1 Question

Energy Conversions: Blackout in Ergstown

Ergstown has frequent blackouts.
Why does Ergstown keep having blackouts?

There was a blackout in Ergstown.
What happened to the electrical system the night of the Ergstown blackout?

What is a system? (1.2, 1.3)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

- Observe a simple system (1.2)
- Read *Systems* (1.2)
- Build a simple electrical system (1.3)
- Discuss parts and functions of a system (1.3)

- A system is a collection of interacting parts that work together. Each part in the system plays a role to perform an overall system function. (1.3)

What can electrical energy in a system be used for? (1.4, 1.5)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

- Find electrical energy in the Sim (1.4)
- Build simple electrical systems and observe various types of energy outputs (1.5)
- Read about forms of energy in *It's All Energy* (1.5)
- Write about ideas from the reading and hands-on investigation (1.5)

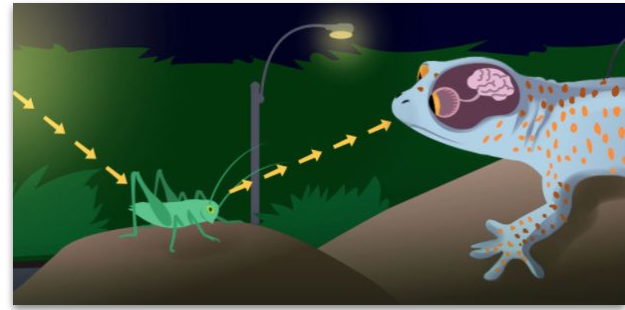
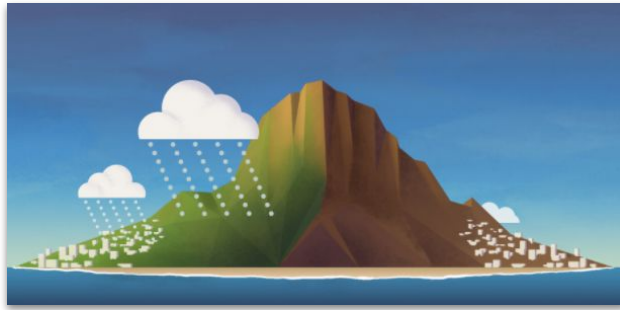
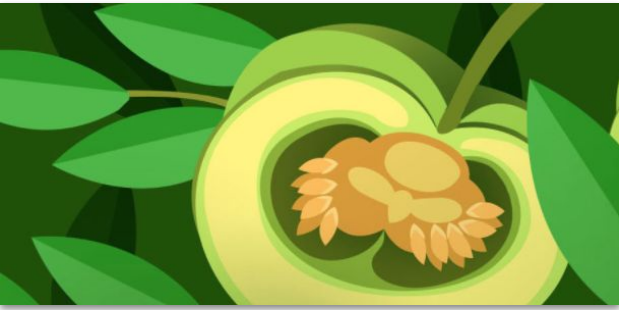
- Light, motion, sound, and thermal energy are all forms of energy. You can observe evidence of these different forms as outputs of electrical devices. (1.5)

- Observe and write about forms of energy in the Ergstown subway (1.6)

The devices stopped working in Ergstown because they weren't able to get electrical energy from the electrical system. When devices work, they output light, heat, motion, or sound. These are forms of energy. During the blackout, the devices weren't getting electrical energy.

Questions?





Plan for the day

- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Digging into Chapter 2
- Planning
- Closing

Energy Conversions: Chapter 2

Chapter 2: What makes the devices in Ergstown output or fail to output energy? ⓘ



LESSON 2.1
Energy Converters



LESSON 2.2
Energy Past and Present



LESSON 2.3
Energy in the System



LESSON 2.4
Design Arguments About
Devices

Digging into Chapter 2

Group Work time

1. In your group, pick a lesson in Chapter 2
2. Using the classroom slides, each group member will present an activity
3. Be prepared to **teach** at least 1 activity in the lesson.



Presentations



Chapter 2: What makes the devices in Ergstown output or fail to output energy? ⓘ



LESSON 2.1
Energy Converters



LESSON 2.2
Energy Past and Present



LESSON 2.3
Energy in the System



LESSON 2.4
Design Arguments About
Devices

Unit Anchor Phenomenon

Problem students work to solve

Chapter-level Anchor Phenomenon

Chapter 2 Question

Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to the problem

Explanation that students can make to answer the Chapter 2 Question

Energy Conversions: Blackout in Ergstown

Ergstown has frequent blackouts.
Why does Ergstown keep having blackouts?

During the blackout in Ergstown, all the lights and other electrical devices stopped working.
What makes the devices in Ergstown output energy or fail to output energy?

How do devices have so many different output energy forms when they are plugged into the same electrical system? (2.1, 2.2)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

- Read about energy converters in *It's All Energy* (2.1)
- Build electrical systems in the Sim (2.1)
- Use the sorting tool to identify input and output forms (2.2)
- Read *Energy Past and Present* (2.2)
- Write about ideas from the book and the hands-on investigation (2.2)

- Energy can change from one form to another form. One way energy can change is through an electrical device. (2.2)

Why would electrical devices stop converting energy? (2.3, 2.4)
(Note: See Lesson Overviews for lesson-level Investigative Phenomena)

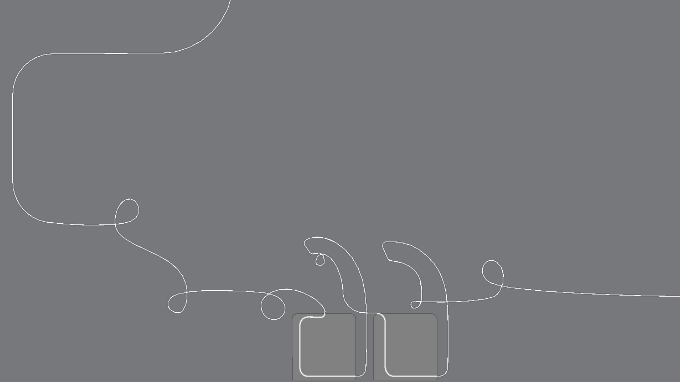
- Observe an electrical system with too many devices connected for the energy source to power (2.3)
- Observe a physical model of an electrical system (2.3)
- Test energy systems in the Sim (2.4)
- Gather evidence about LED lights from *It's All Energy* (2.4)

- Devices will not have energy to function if they need more energy from the system than is put into the system. (2.3)
- Engineers argue for one solution over others based on how well it meets criteria. (2.4)

- Categorize different possible changes to Ergstown's electrical system (2.3)
- Discuss criteria and solutions for Ergstown (2.3)
- Write a design argument about the best solution for Ergstown (2.4)

Energy isn't created or destroyed. When devices get electrical energy, they can convert it into light, heat, motion, or sound because these are all forms of energy. When all the devices were running, they caused a blackout. The devices needed more energy from the electrical system than was available. Either the town was using too many devices, or the devices were not energy-efficient enough. If more energy is needed from the electrical system than is available, a blackout can occur.

Questions?



Goals for the day:

By the end of the day, you will:

- ✓ Experience how all the instructional components fit together in the context of the unit
- ✓ Gain a deeper understanding of the purposeful sequencing of each activity and lesson within a chapter
- ✓ Become more familiar with multimodal instruction and how it provides multiple at bats to support student success
- ❑ Use the Amplify curriculum and resources to prepare to teach



(reminder: after lunch go to
auditorium)

LAUSD SUMMER INSTITUTE 2023

Session 2 (after lunch)
UCLA Center X Presentation

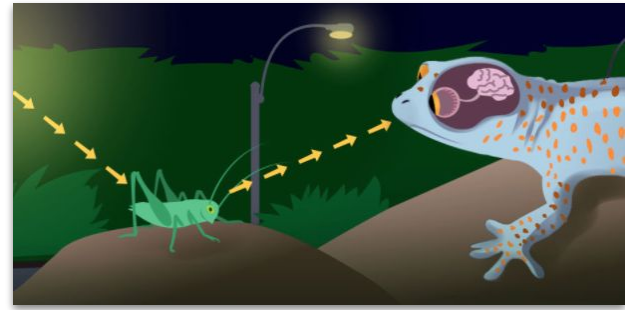
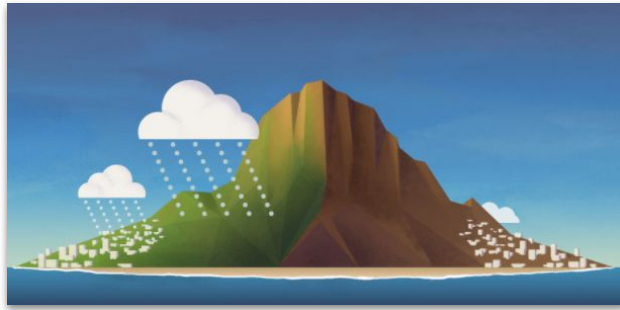
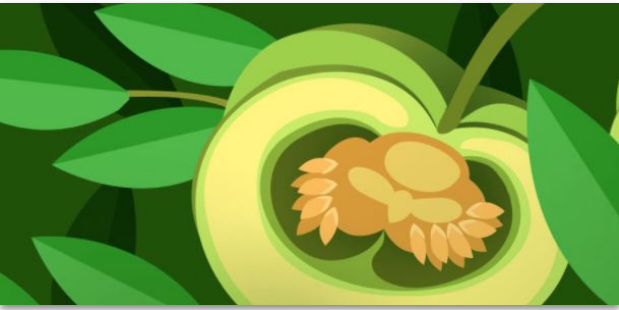


Lunch Break

LAUSD SUMMER INSTITUTE 2023

Session 3 Planning





Plan for the day

- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Digging into Chapter 2
- **Planning**
- Closing

Planning Resources Links

Amplify Science

Gr. 4 Energy Conversions

Participant Links

[G4 PN Energy Conversions Deep Dive](#) (pdf)

Planning Resources

[Gr. 4 Unit 1 Lesson Planning Slides](#) (forced copy)

[Gr. 4 Energy Conversions Completed Material Prep Doc](#) (forced copy)

[Gr. 4 Energy Conversions Chart List](#) (pdf)

[Gr. 4 Energy Conversions Investigation Questions](#) (pdf)

Other Resources

[Caregivers Site](#)

[Classroom Slides](#)

[Unit Guide Resources](#)



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

Planning time

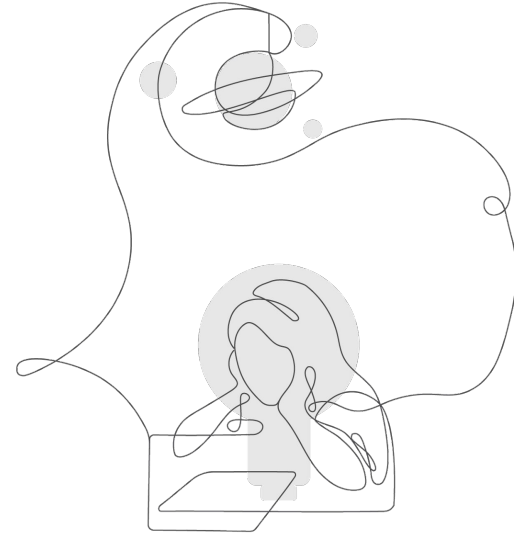
(Be prepared to share what you have been planning)

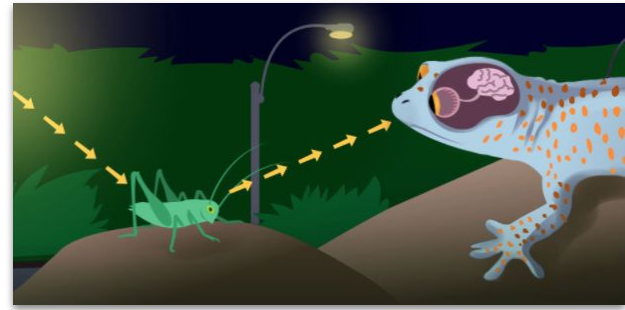
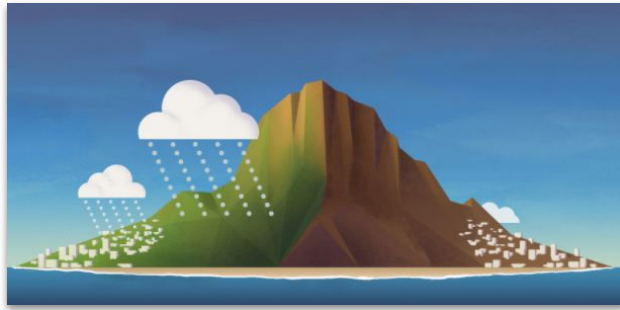
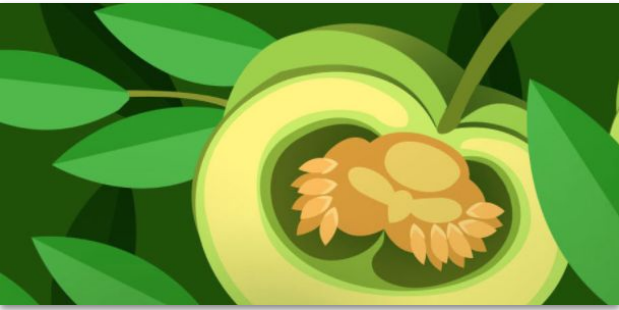
- Suggestions
 - Prep your charts
 - Read your unit's key documents
 - Familiarize yourself with the digital tools and sims
 - Familiarize yourself with the hands on activities
 - Preread the student texts
 - Download all the classroom slides for your unit and put in chapter folders
 - Review the differentiation in lessons and edit slides to meet the needs of your students.



Share Out

- Are you planning differently for the unit after our work today?
 - Have you made any additions to your planning?
 - Have you made any adjustments?





Plan for the day

- Introduction and framing
- Unit Internalization
- Digging into Chapter 1
- Model Lesson
- Digging into Chapter 2
- Planning
- Closing

Goals for the day:

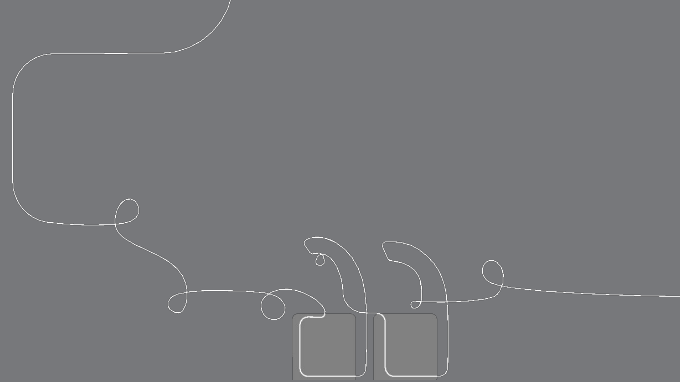
By the end of the day, you will:

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- ✓ Gain a deeper understanding of the purposeful sequencing of each activity and lesson within a chapter
- ✓ Become more familiar with multimodal instruction and how it provides multiple at bats to support student success
- ✓ Use the Amplify curriculum and resources to prepare to teach



Teaching science

“Science [is] both a body of knowledge and an evidence-based, model and theory building enterprise that continually extends, refines, and revises knowledge.”



Closing reflection

Based on our work today in Part 2, share:

Head: something you'll keep in mind

Heart: something you're feeling

Feet: something you're planning to do

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!

Additional resources and ongoing support

Customer Care

Seek information specific to enrollment and rosters, technical support, materials and kits, and teaching support, weekdays 7AM-10PM EST and weekends 10AM-6PM EST.



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Amplify Chat



Please provide feedback!

Type:

Strengthen

Session title:

Unit one deep dive

Professional Learning Specialist name:

Insert name

(insert email, if you would like)