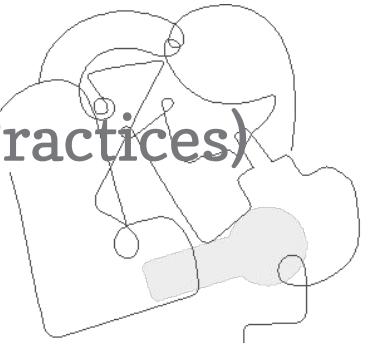
Amplify Science

Unit 1: Energy Conversions

(with a focus on Science & Engineering Practices)

Grade 4



School/District Name: LAUSD
Date: April, 2022
Presented by: Suzy Takeda

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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.

Navigation Temperature Check

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

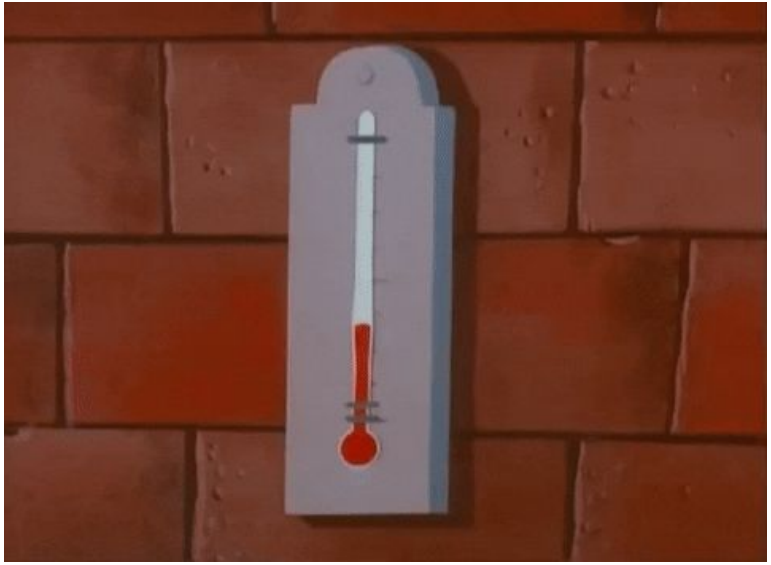
1 = Extremely Uncomfortable

2 = Uncomfortable

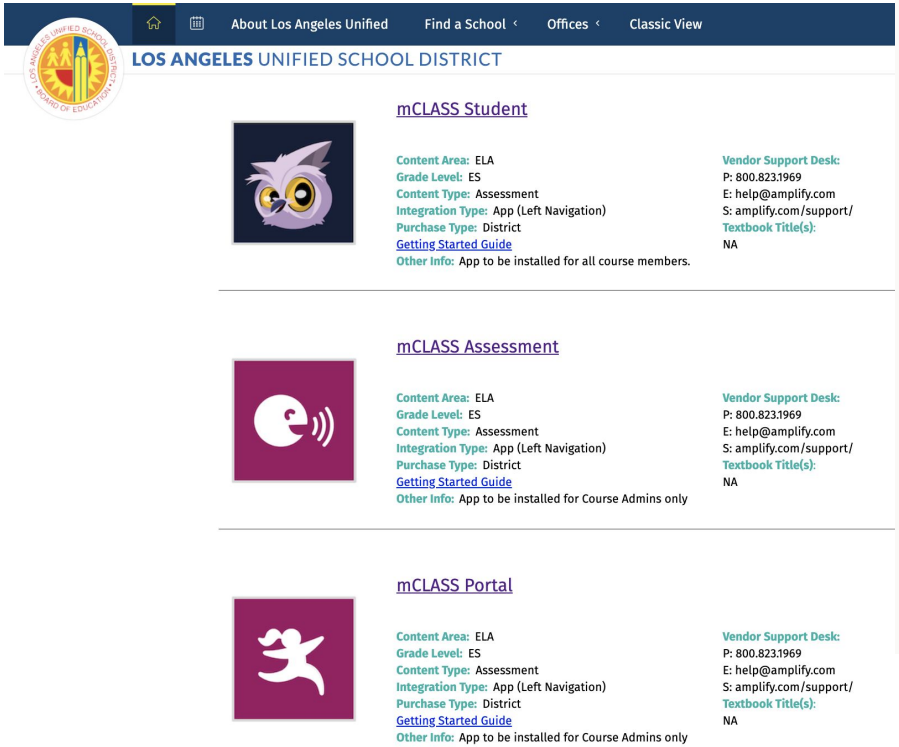
3 = Mild

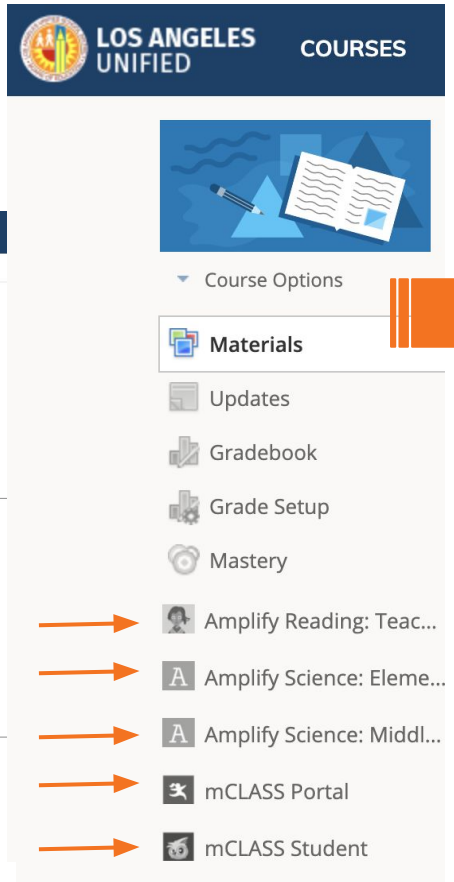
4 = Comfortable

5 = Extremely Comfortable

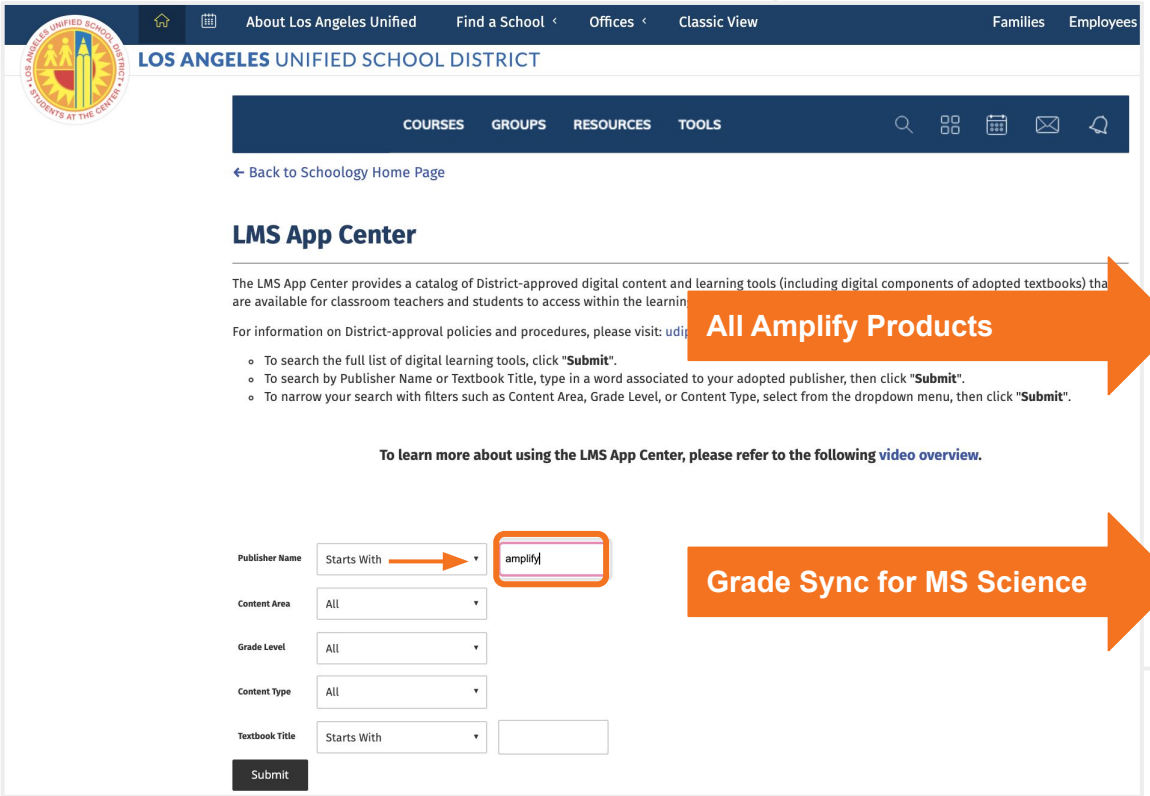


Last year's Amplify apps.



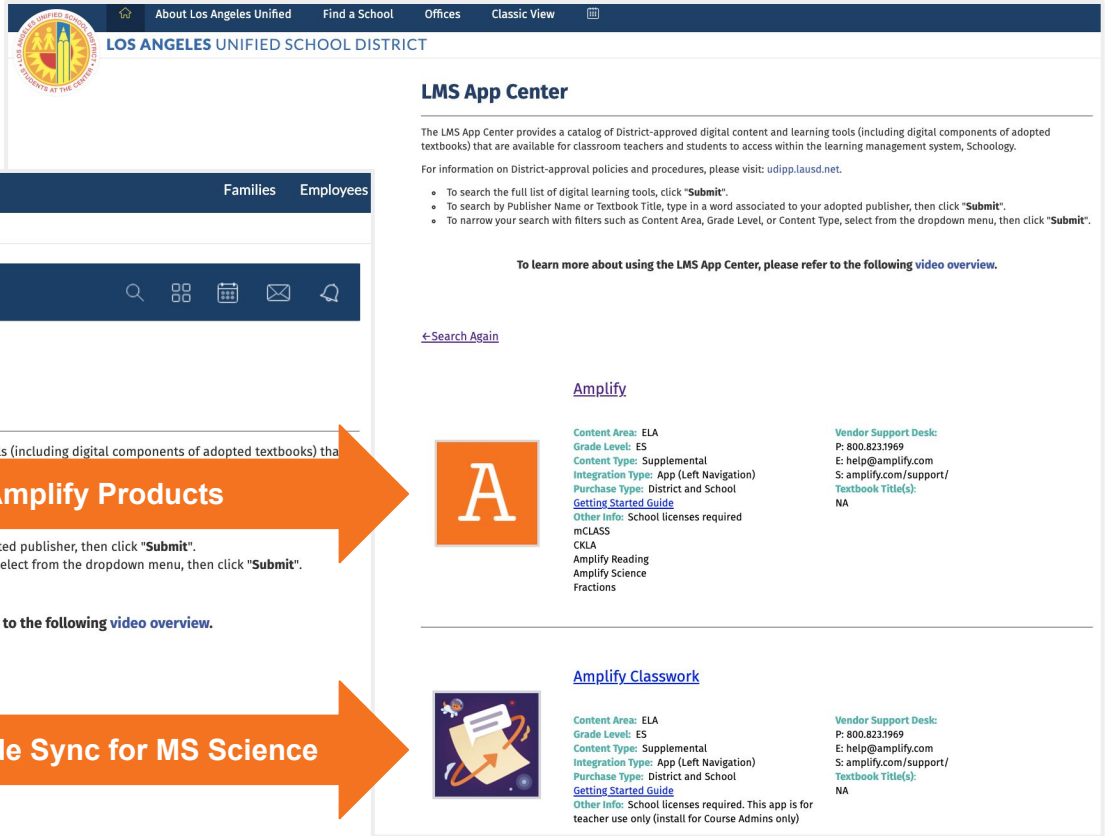


This year's app(s).



All Amplify Products

Grade Sync for MS Science



my.amplify.com

Amplify. MY ACCOUNT ADMIN REPORTS LAUNCH PROGRAMS TERIN NGO

mCLASS Educators: To view or make changes to your account go to mclass.amplify.com.

Hi, Terin

Classes

Programs & Licenses

Account Settings

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CKLA Hub

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mCLASS Assessment

mCLASS Reporting

Reading 6-8

Reading K-5

Science

Vocabulary

Amplify. on Schoology

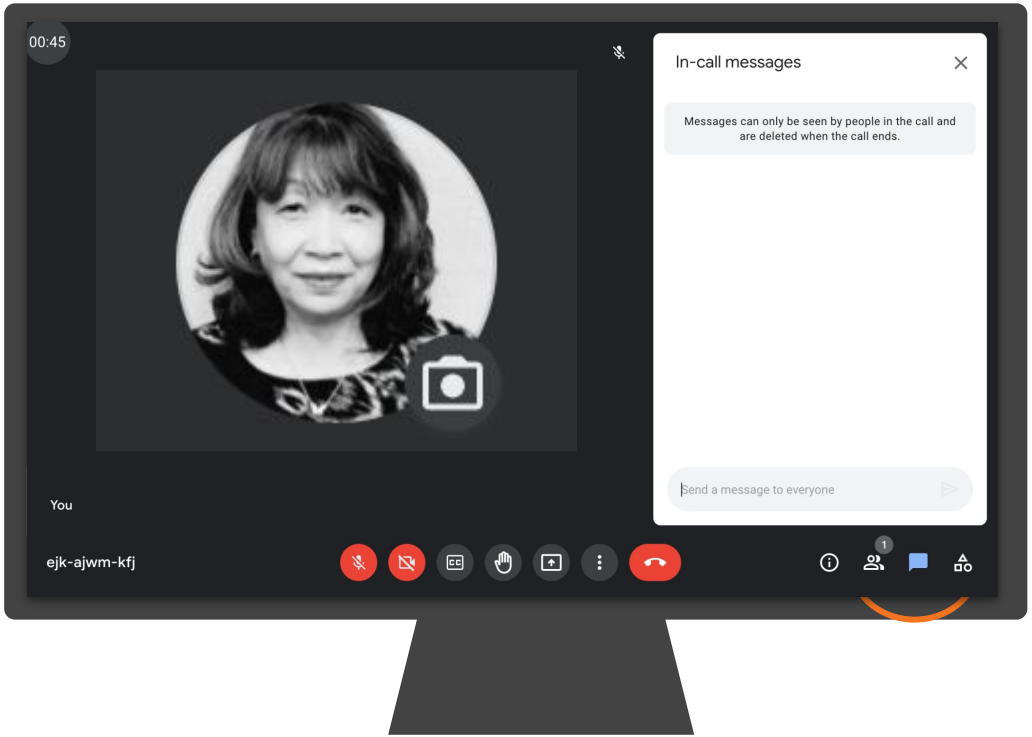
2021-2022

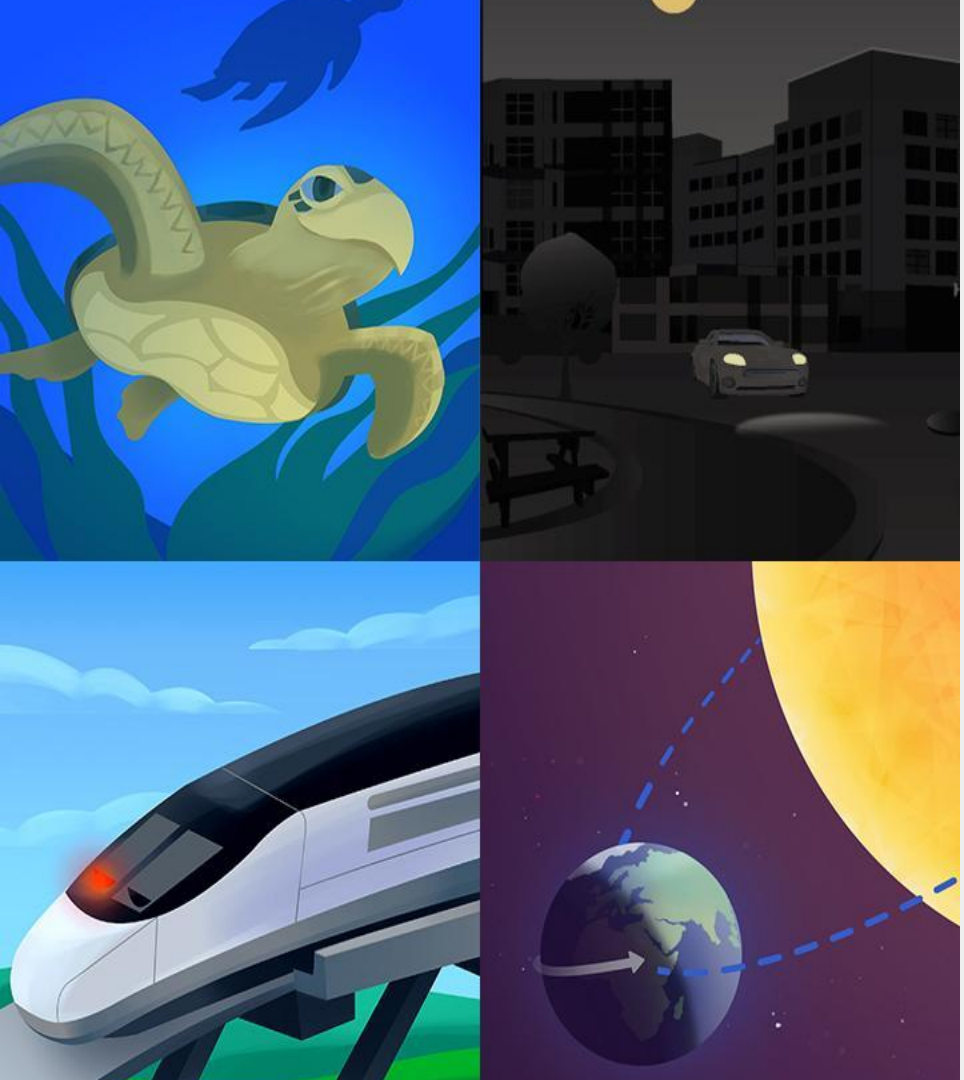
Schoology

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

Ice Breaker!

- **Question:** In the chat, share out a positive experience with your students using Amplify Science.





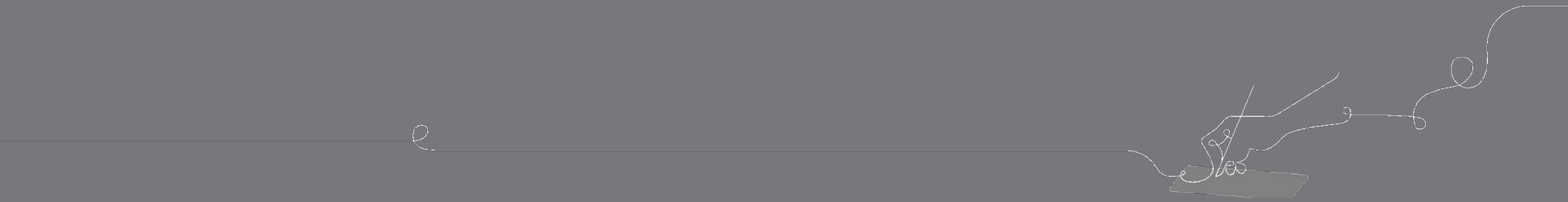
Plan for the day

- Framing
- Introducing the Unit
- Unit Internalization
- Identifying the Science and Engineering Practices at the unit and chapter level
- Science and Engineering Practices within a lesson
- Lesson Planning
- Closing

Overarching goals

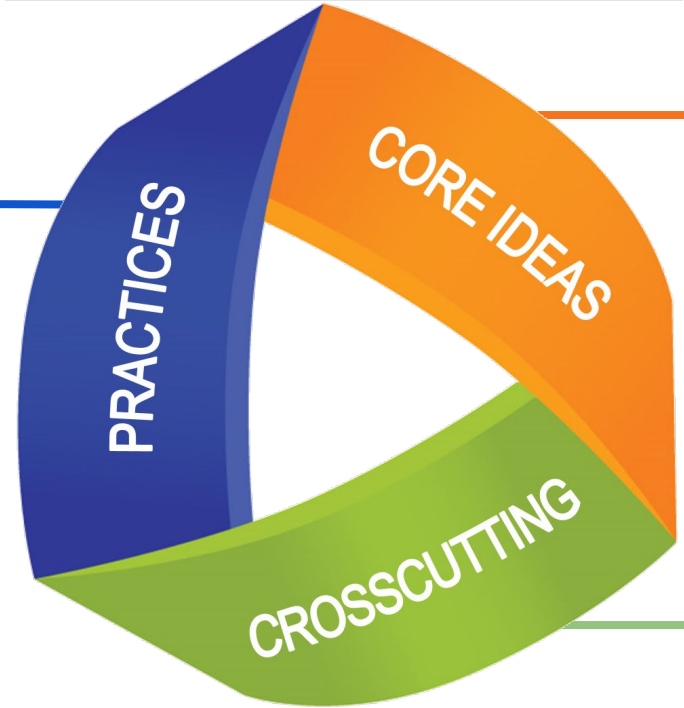
By the end of this workshop, you will be able to:

- ❑ Internalize the unit
- ❑ Identify the Science and Engineering Practices within the unit



Next Generation Science Standards

Designed to help students build a cohesive understanding of science



What scientists do

Science and Engineering Practices

What scientists want to know

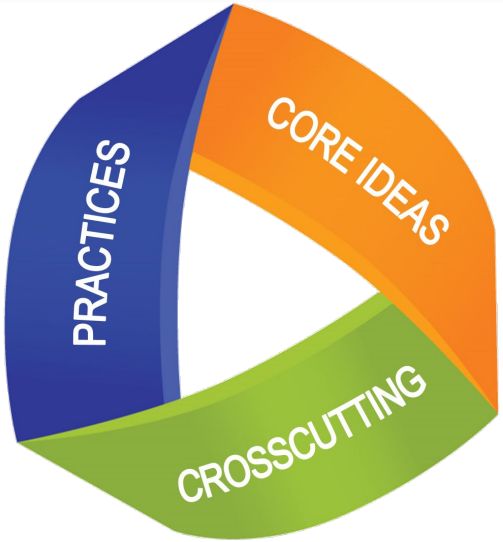
Disciplinary Core Ideas

How scientists think

Crosscutting Concepts

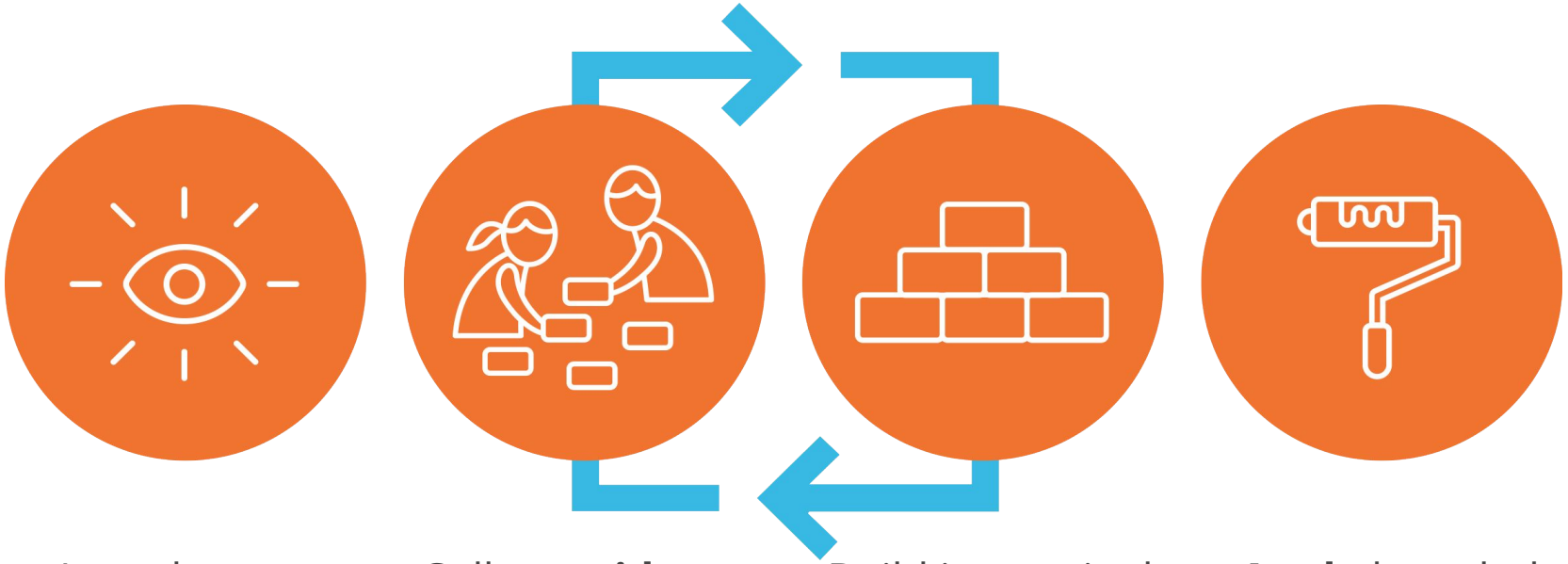
Next Generation Science Standards

Science and Engineering Practices



1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Amplify Science Approach



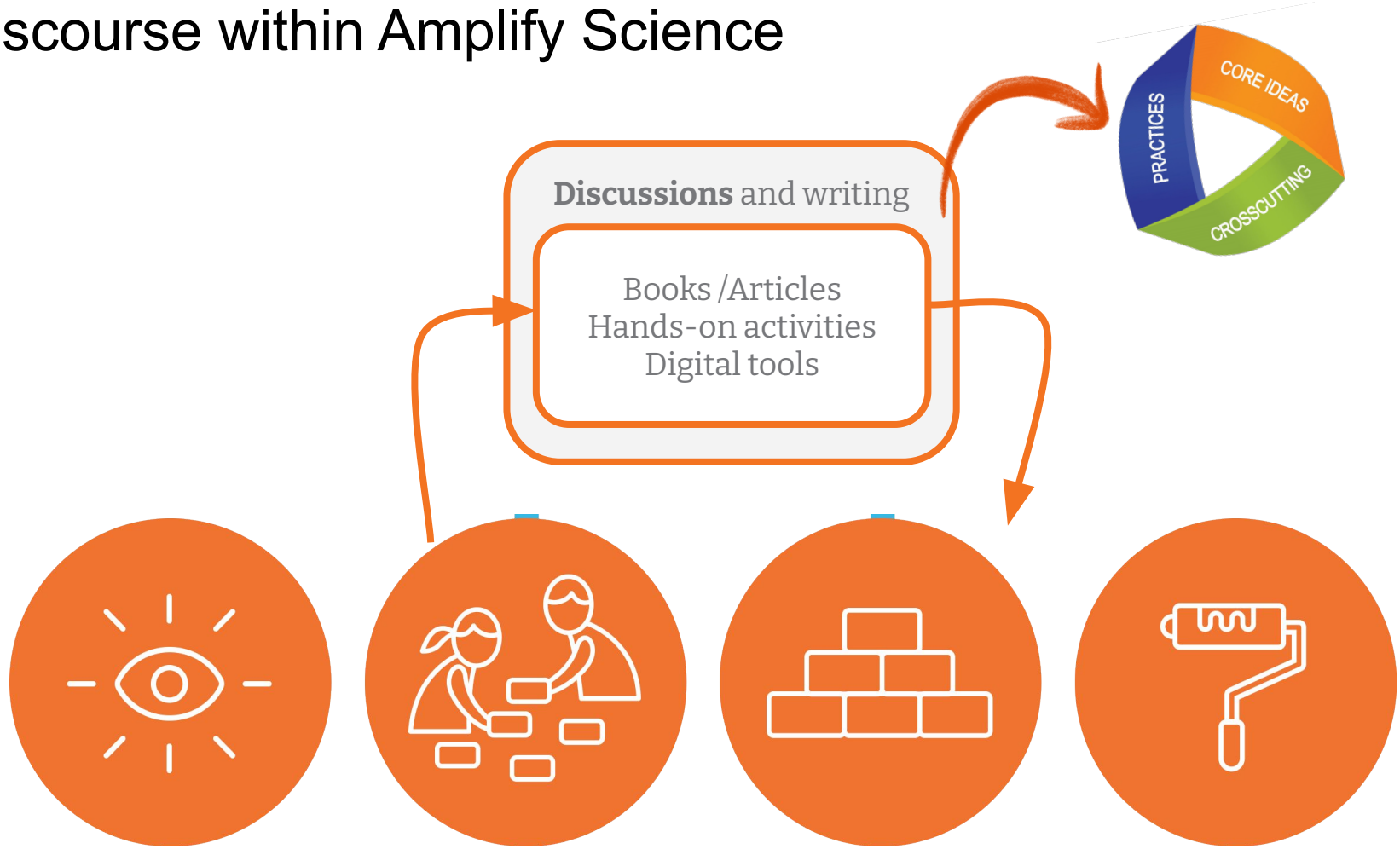
Introduce a **phenomenon** and a related problem

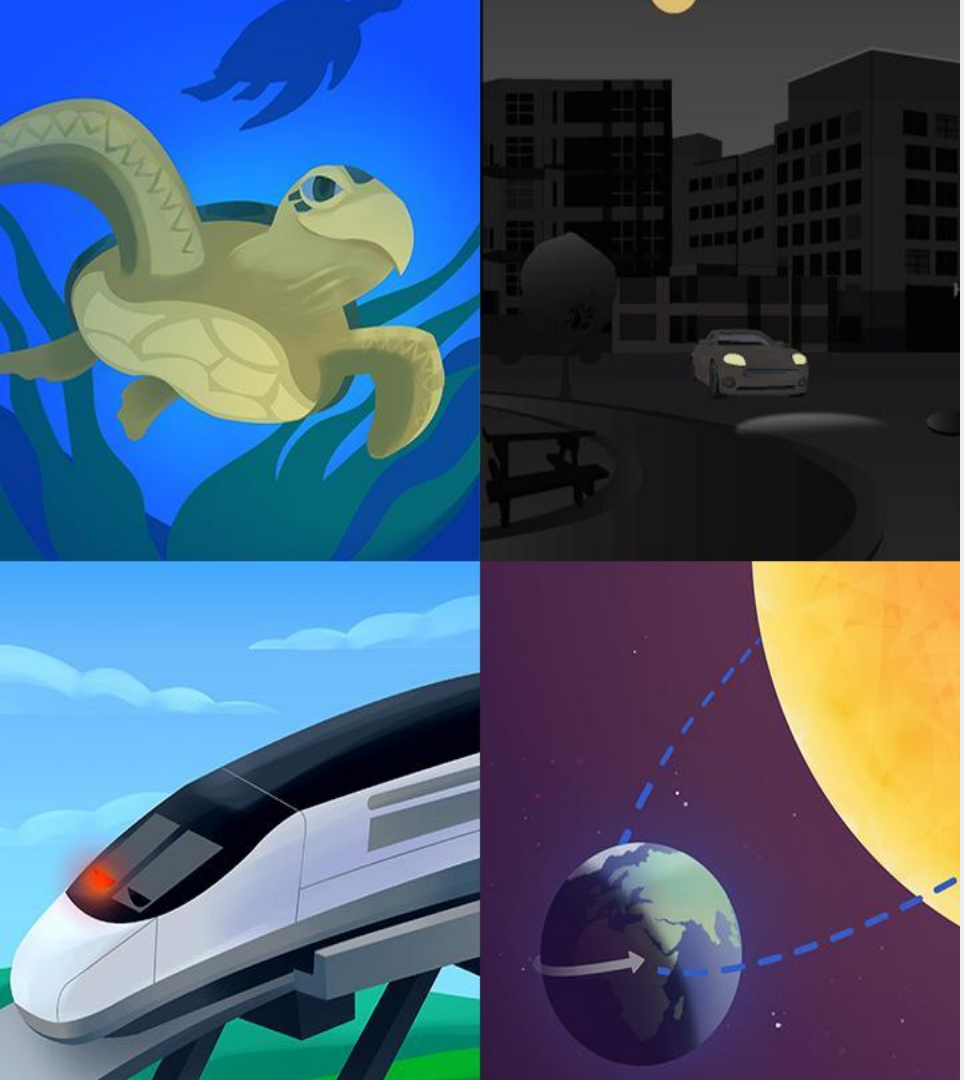
Collect **evidence** from multiple sources

Build increasingly complex **explanations**

Apply knowledge to solve a different problem

Discourse within Amplify Science





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15 MIN

Activity 2

Introducing the Problem

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?

Have you ever been in a blackout? What was it like?

Why might blackouts be a problem?

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!

Unit Question

How does the electrical system work?

Vocabulary

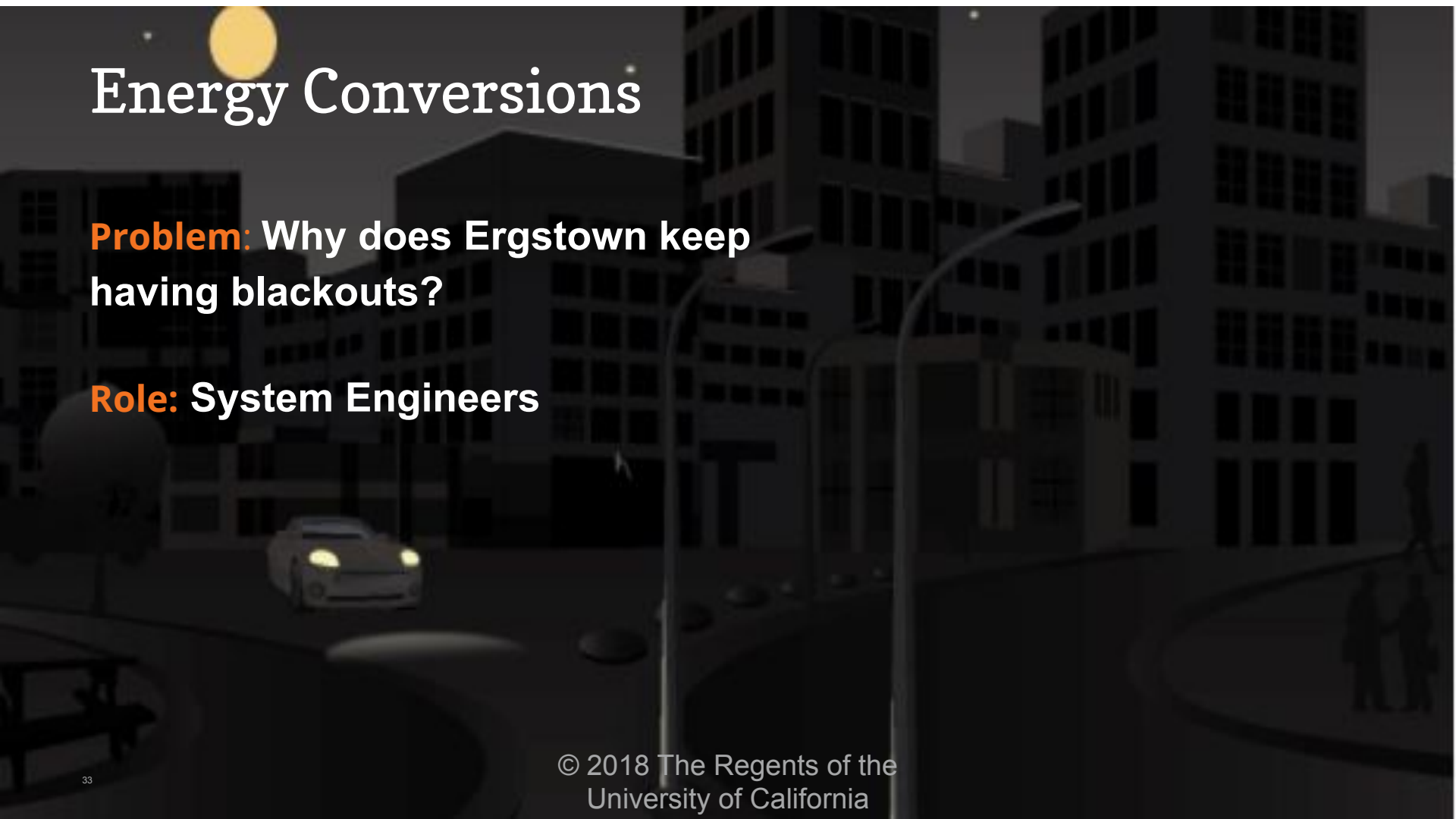
engineer

a person who uses science knowledge to design something in order to solve a problem

Energy Conversions

Problem: Why does Ergstown keep having blackouts?

Role: System Engineers



Energy Conversions

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 Ergstow...

6 Lessons

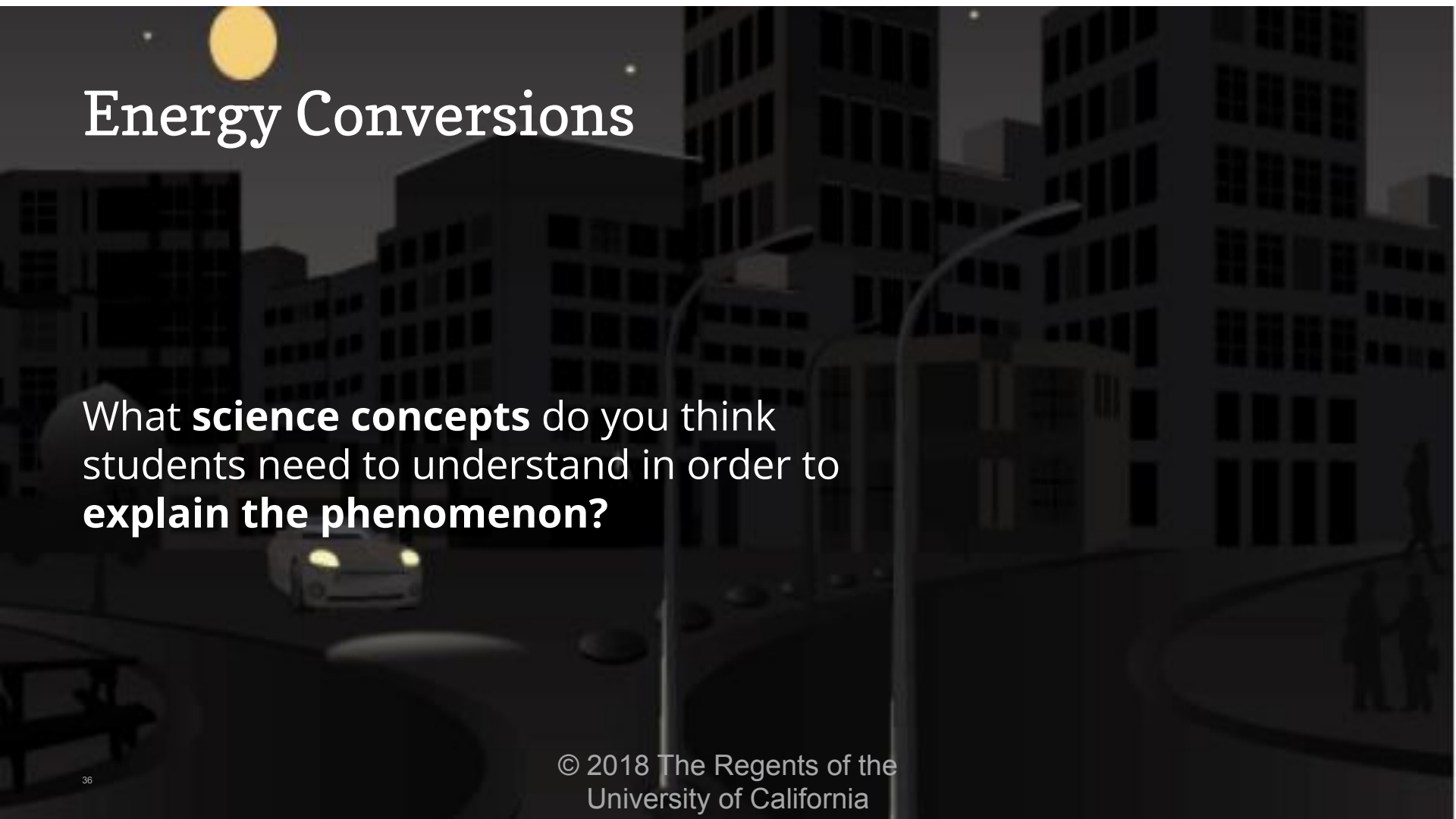
Chapter 4: How does energy get to the devices all over Ergstown?

6 Lessons

Energy Conversions

Unit Question: **How does the electrical system work?**

Energy Conversions



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

Energy Conversions, Progress Build

Assumed 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.

Level 1

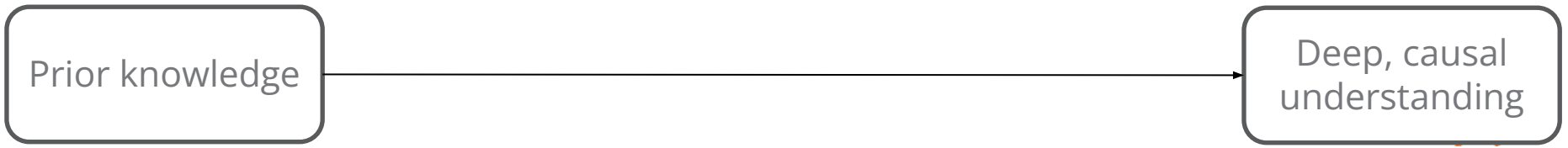
Devices work by converting electrical energy to another form.

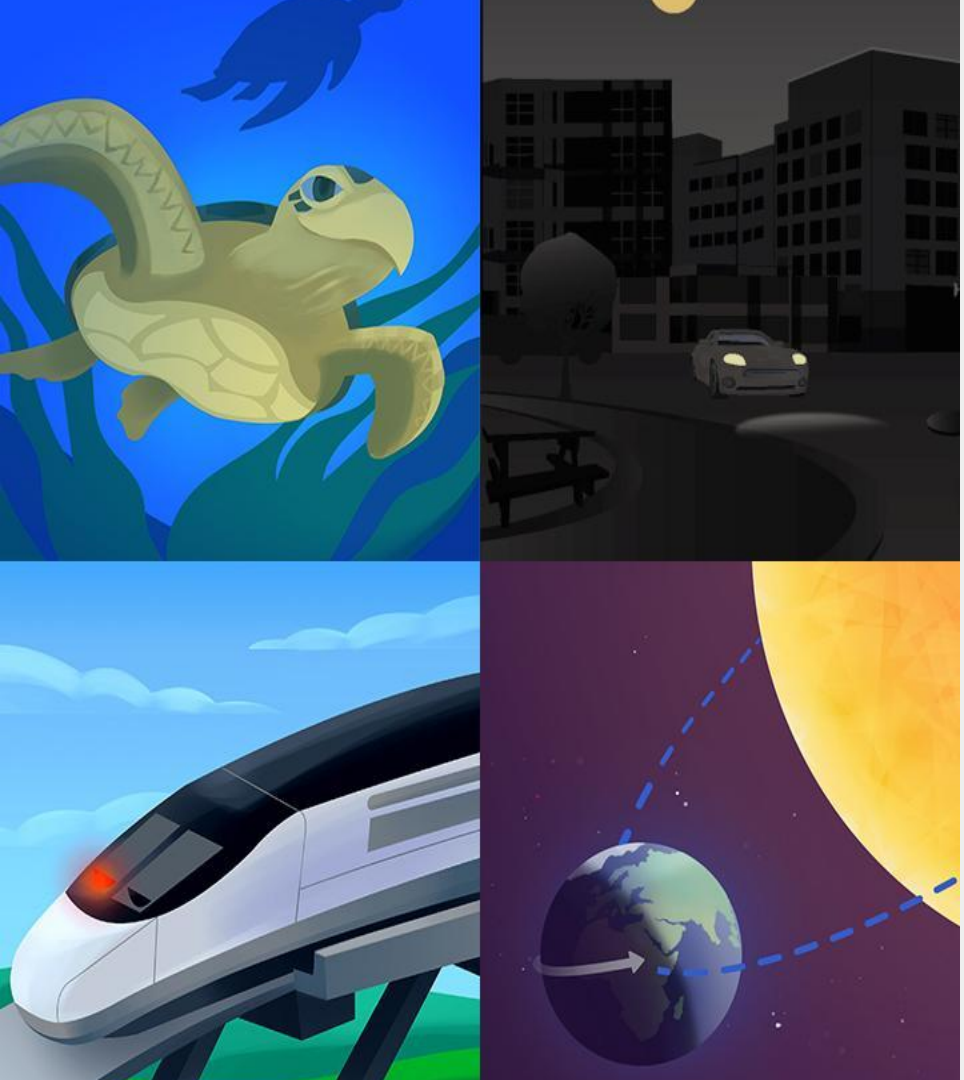
Level 2

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.





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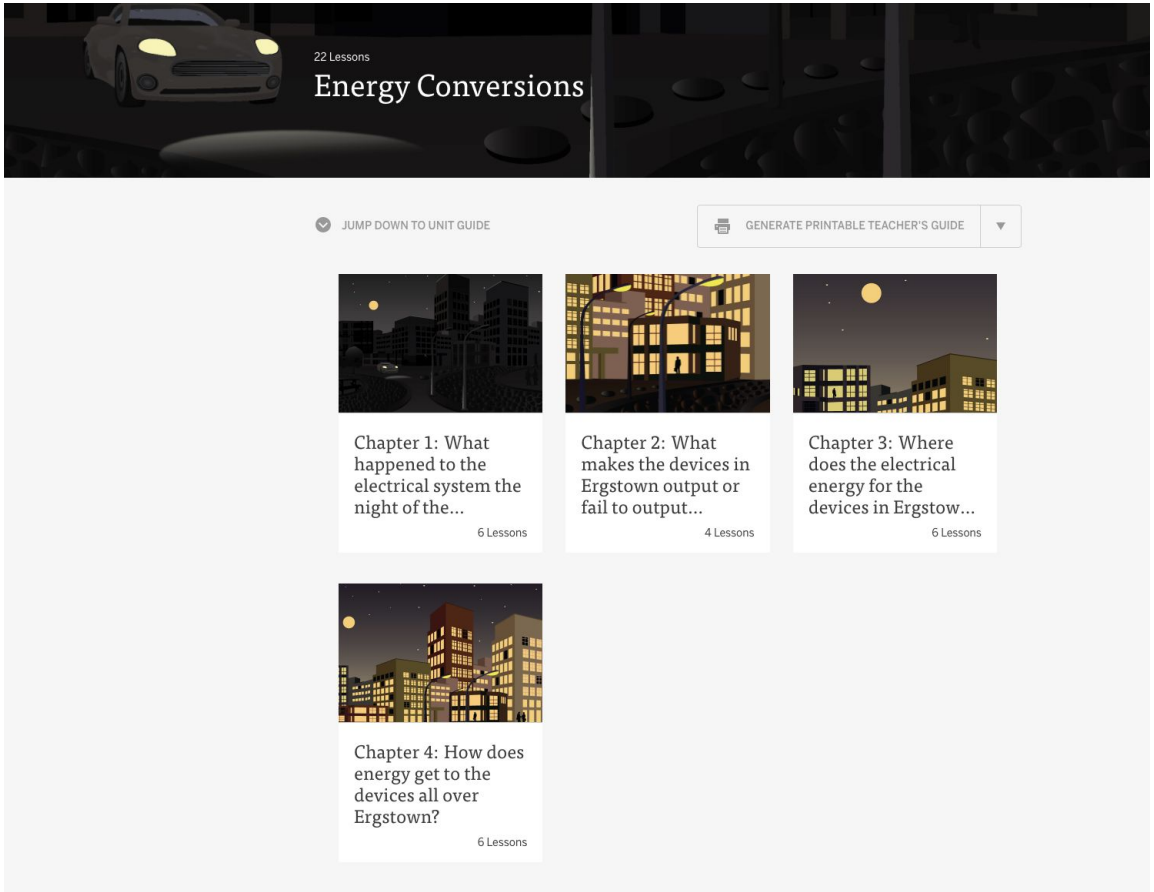
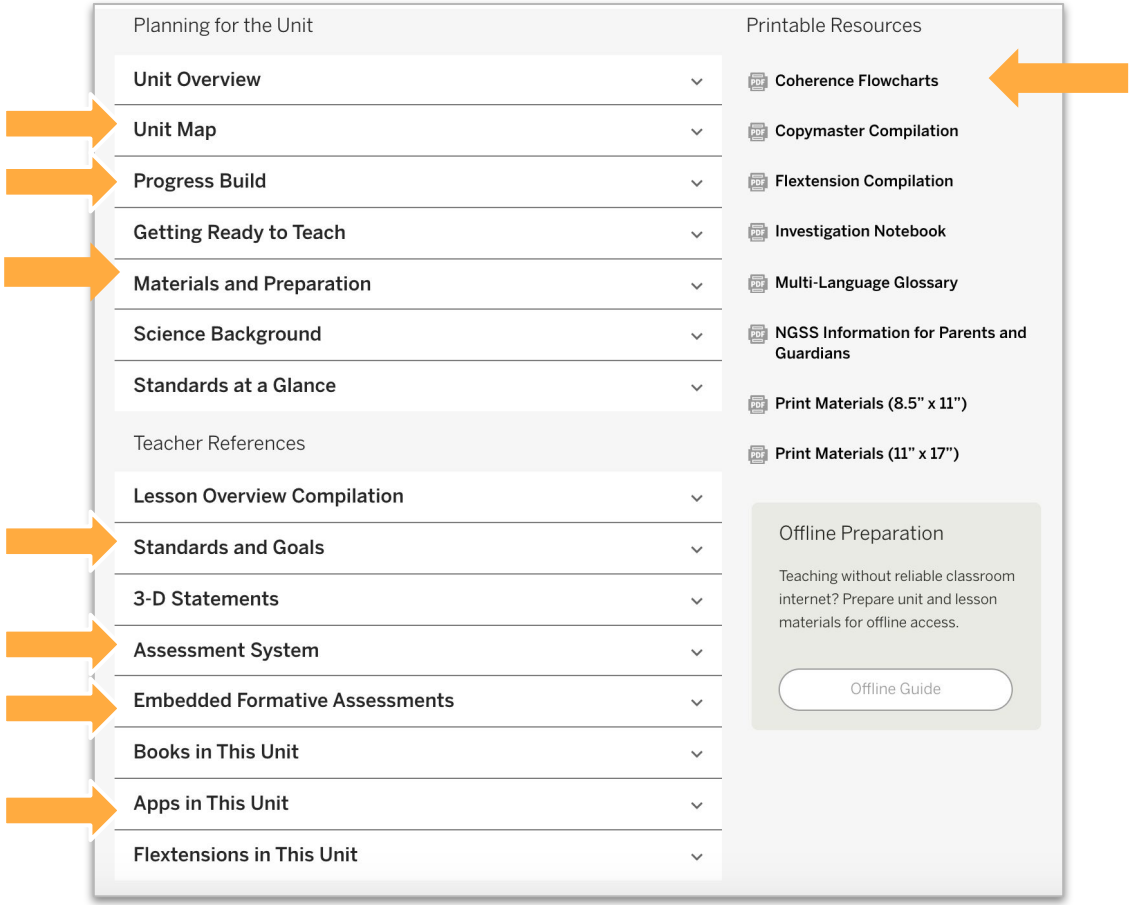
Navigate to the Unit Page



Key Unit Guide Documents for Planning



Core Unit Planning & Internalization

Unit Title: 1

Overview

[Resources: Unit Overview, Teacher's Guide, Coherence Flowchart, Unit Map, 3-D Statements]

What is the phenomenon/real-world problem students are investigating in your unit? 2	Student Role: 3
Unit Question: 4	Relationship between the Unit Phenomenon and Unit Question: 5
By the end of the unit, students figure out... 6	
How do students engage with three-dimensional learning to figure out the phenomenon/real-world problem in your unit? 7	

Unit Guide resources:
- Unit Overview
- Unit Map
- Coherence Flowchart

Unit Guide resources:
- Lesson Overview Compilation
- Unit Overview

Unit Guide resources:
- Unit Map

Unit Guide resources:
- 3D Statements at the Unit Level

Core Unit Planning & Internalization

Unit Title:	Energy Conversions

Overview

[Resources: Unit Overview, Teacher's Guide, Coherence Flowchart, Unit Map, 3-D Statements]

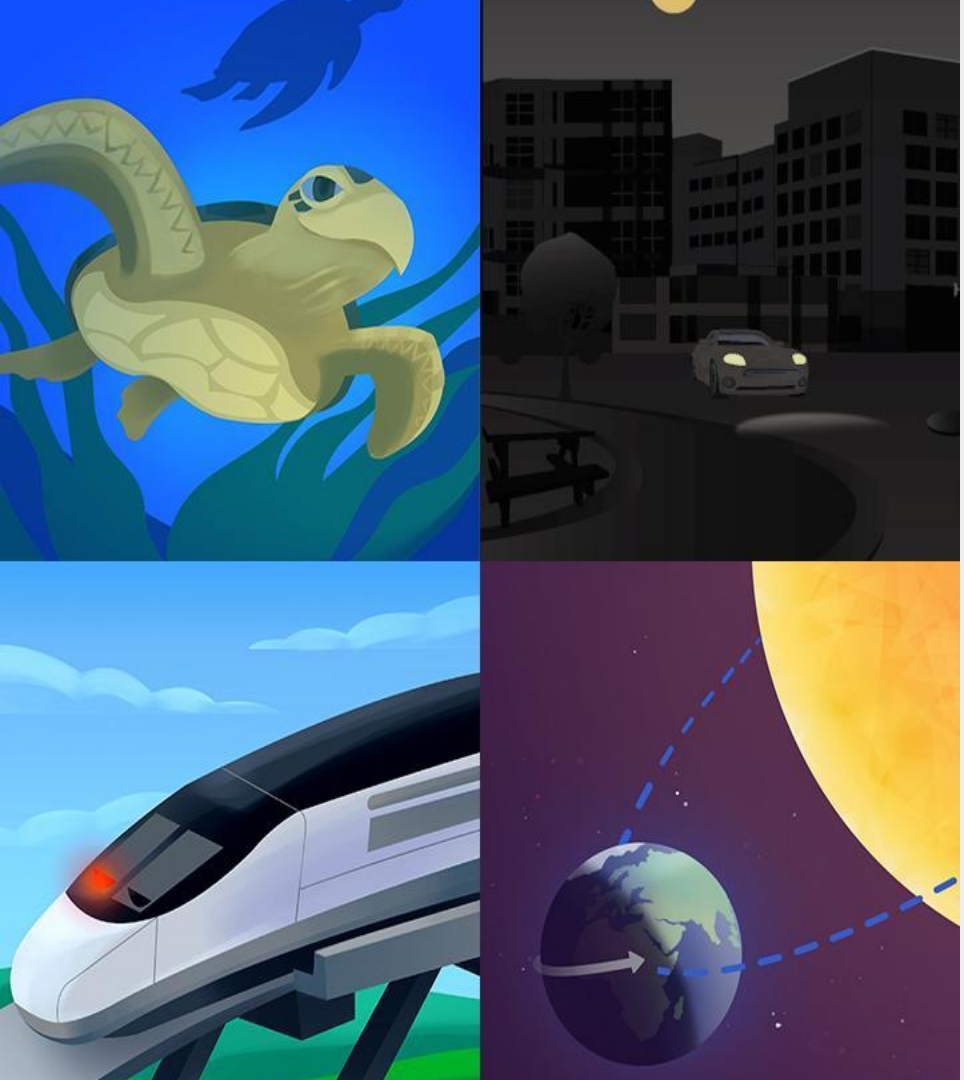
What is the phenomenon/real-world problem students are investigating in your unit?	Student Role:
Ergstown experiences frequent blackouts. Students will figure out how an electrical system can fail.	System Engineers
Unit Question:	**Relationship between the Unit Phenomenon and Unit Question:**
How does the electrical system work?	Students will better understand the parts of the electrical system and how vital it is to modern life. Students will understand where energy comes from, how it moves through a system, and what forms it takes

By the end of the unit, students figure out...

Electrical energy that comes through the electrical grid must have a source and a source converter. Each source has a converter that changes the energy form of the source to electrical energy.

How do students engage with three-dimensional learning to figure out the phenomenon/real-world problem in your unit?

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).



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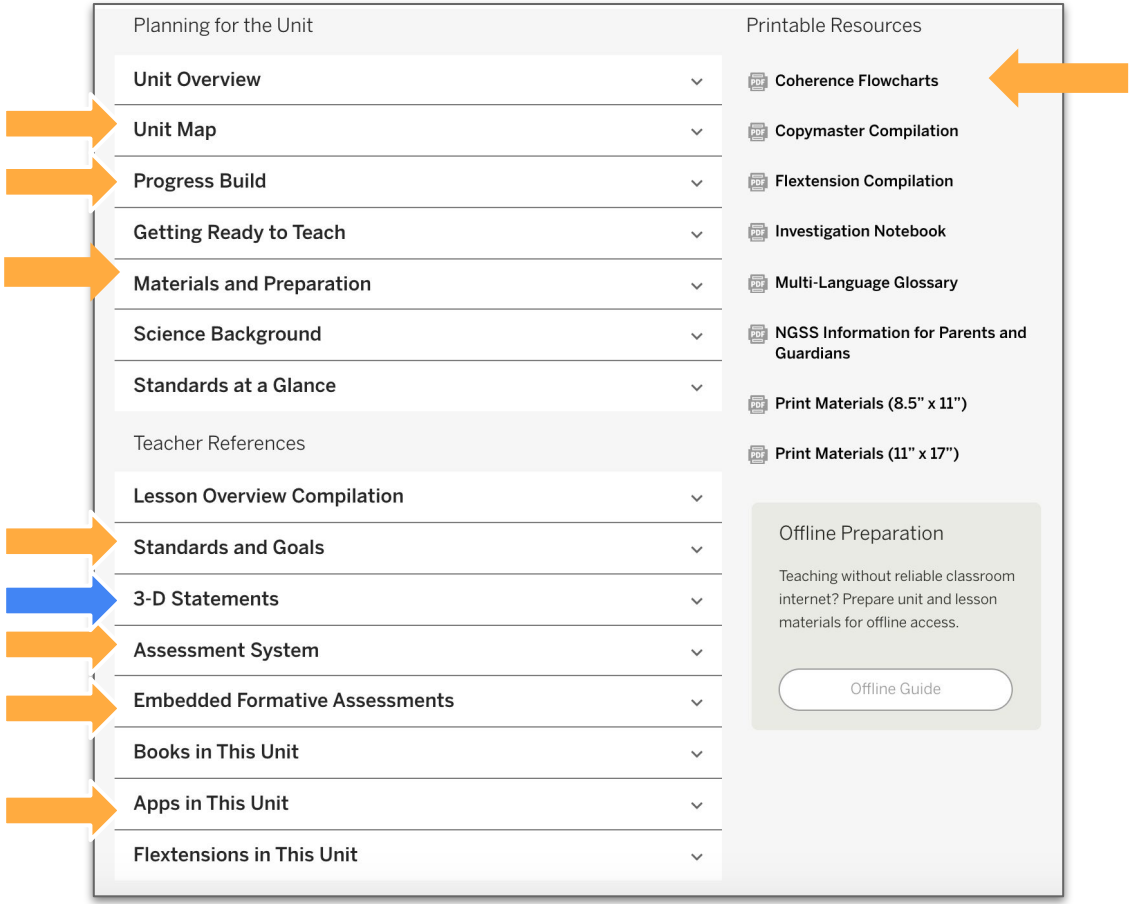
Key Documents for Planning Work Time



Unit 3D 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).

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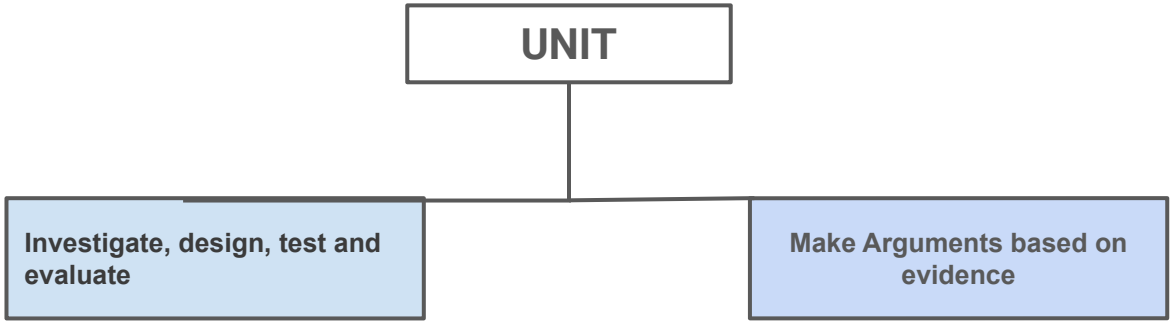
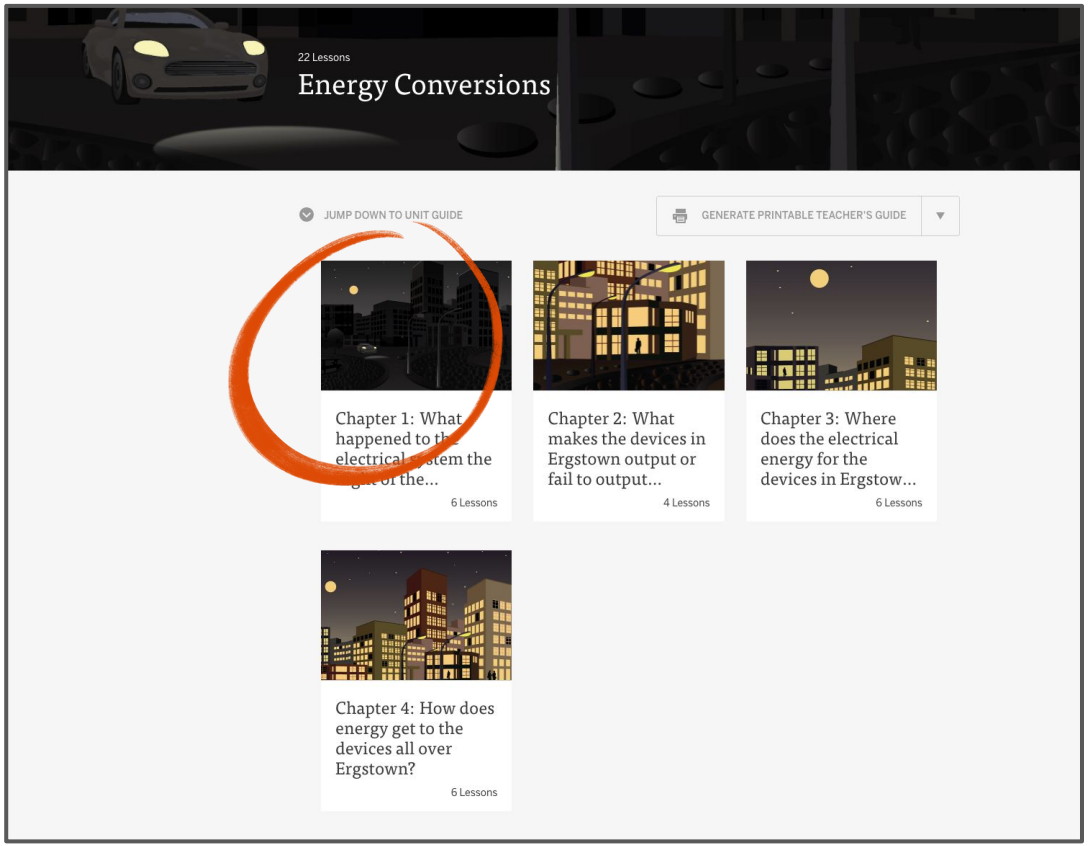
Energy Conversions

Science & Engineering Practices



These are the two main categories of Science and Engineering Practices that the students will be engaged with in this unit.

Waves, Energy and Information



Chapter 1 3D Statements

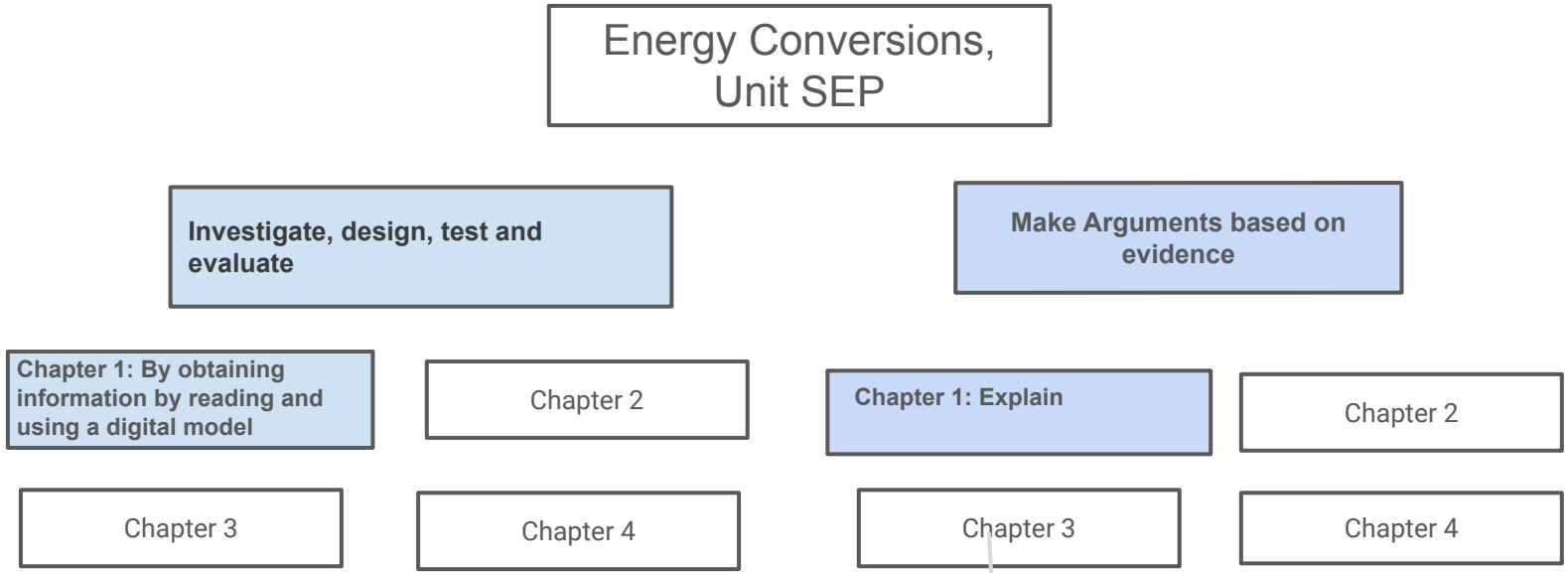
Key

Practices | Disciplinary Core Ideas | Crosscutting Concepts

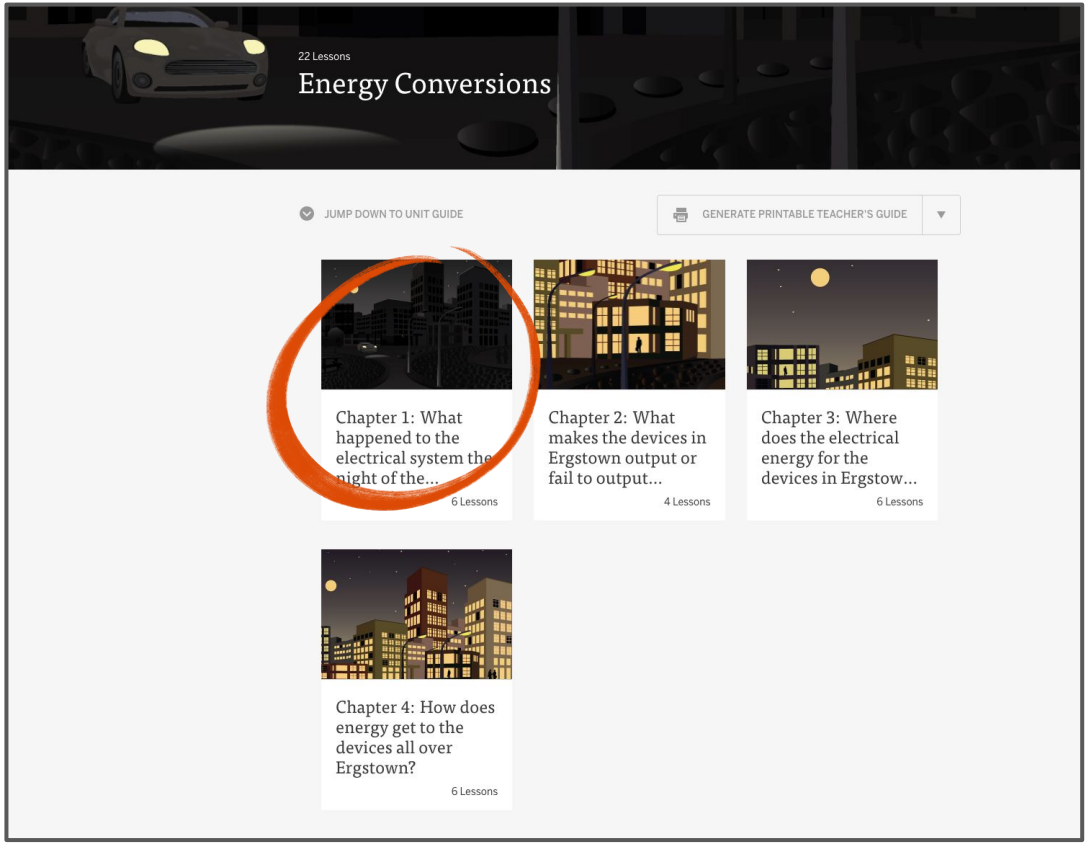
Chapter 1: What happened to the electrical system the night of the blackout?

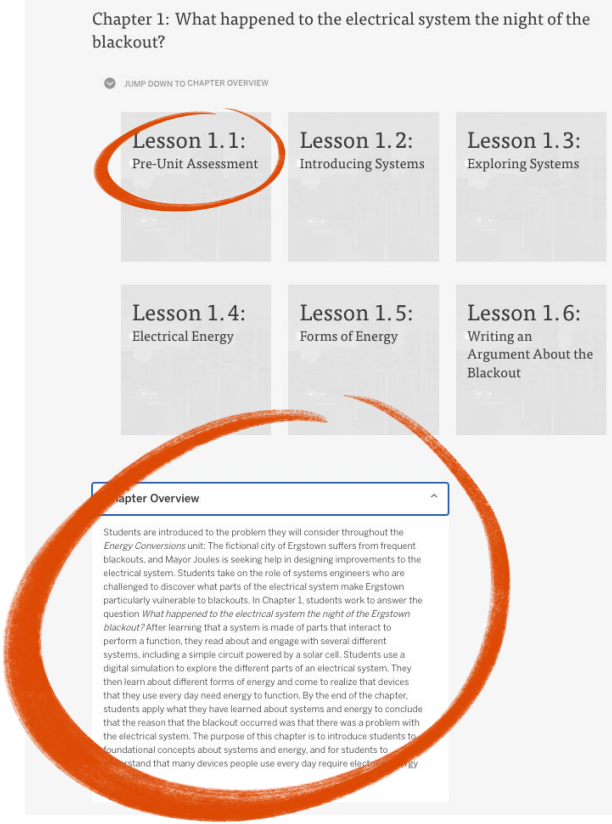
Students obtain information about electrical systems and the different forms of input and output energy (systems and system models; energy and matter) by reading and by using a digital model. They then apply what they have learned about systems and energy (systems and system models; energy and matter)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

Science & Engineering Practices



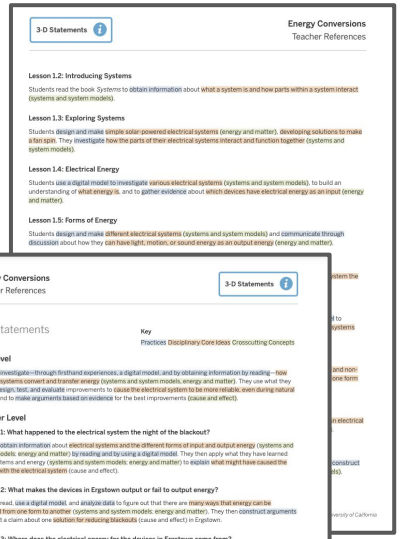
Chapter 1 Overview

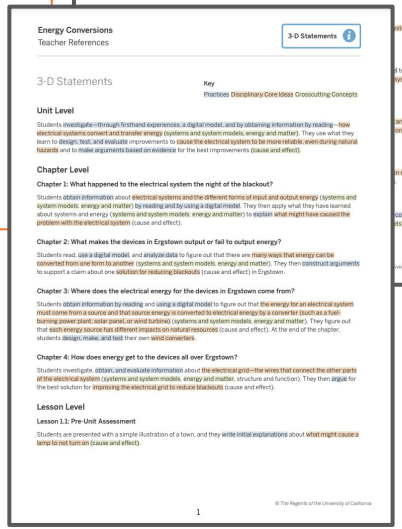


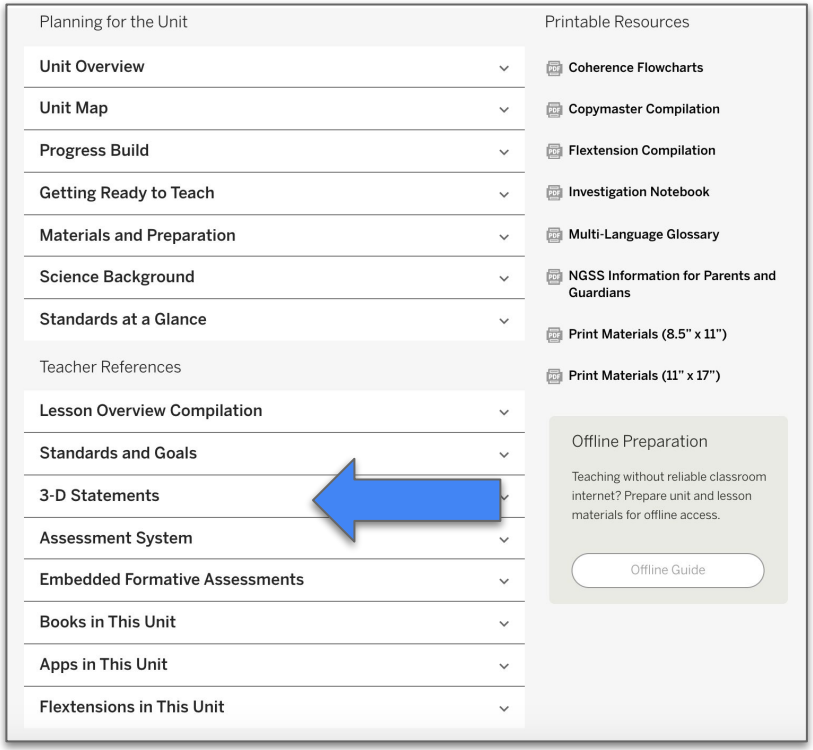


3D Statements Work time

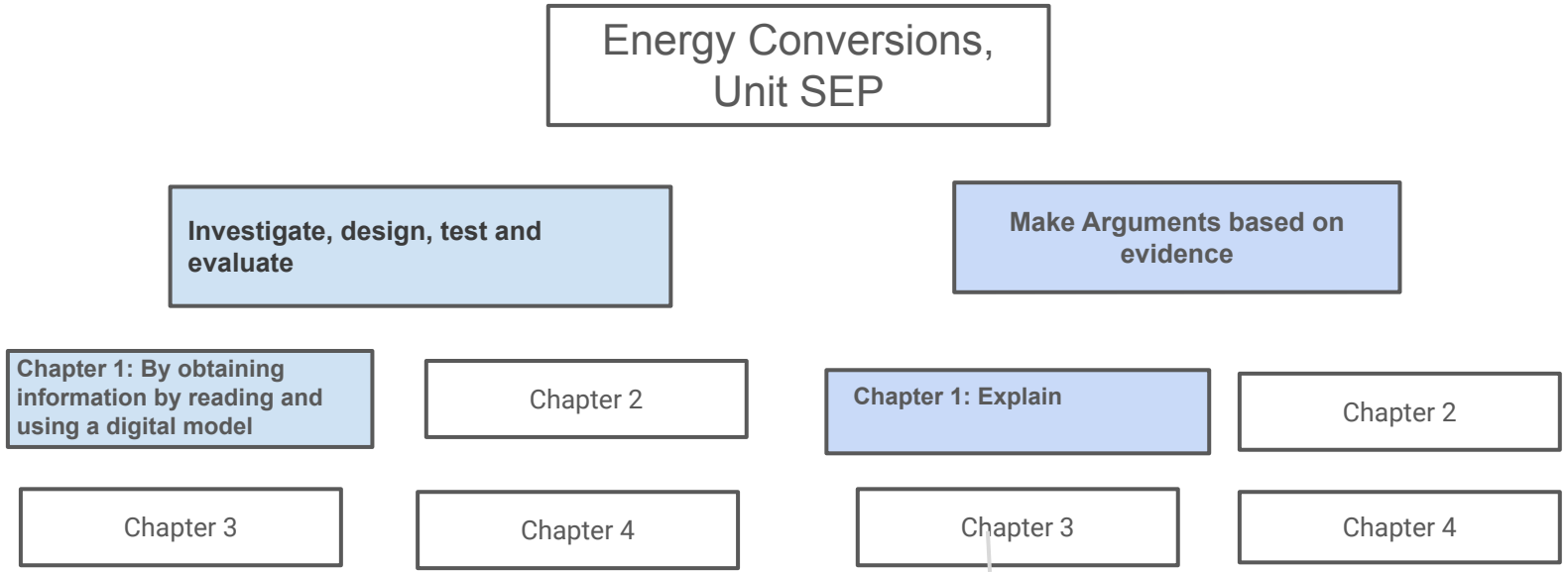
1. Go to the **3D Statement** on the **Unit Page.**
2. Look at the 3D Statement **for each chapter**
3. Identify the **Science and Engineering Practices** for each chapter.
4. **Categorize** them.



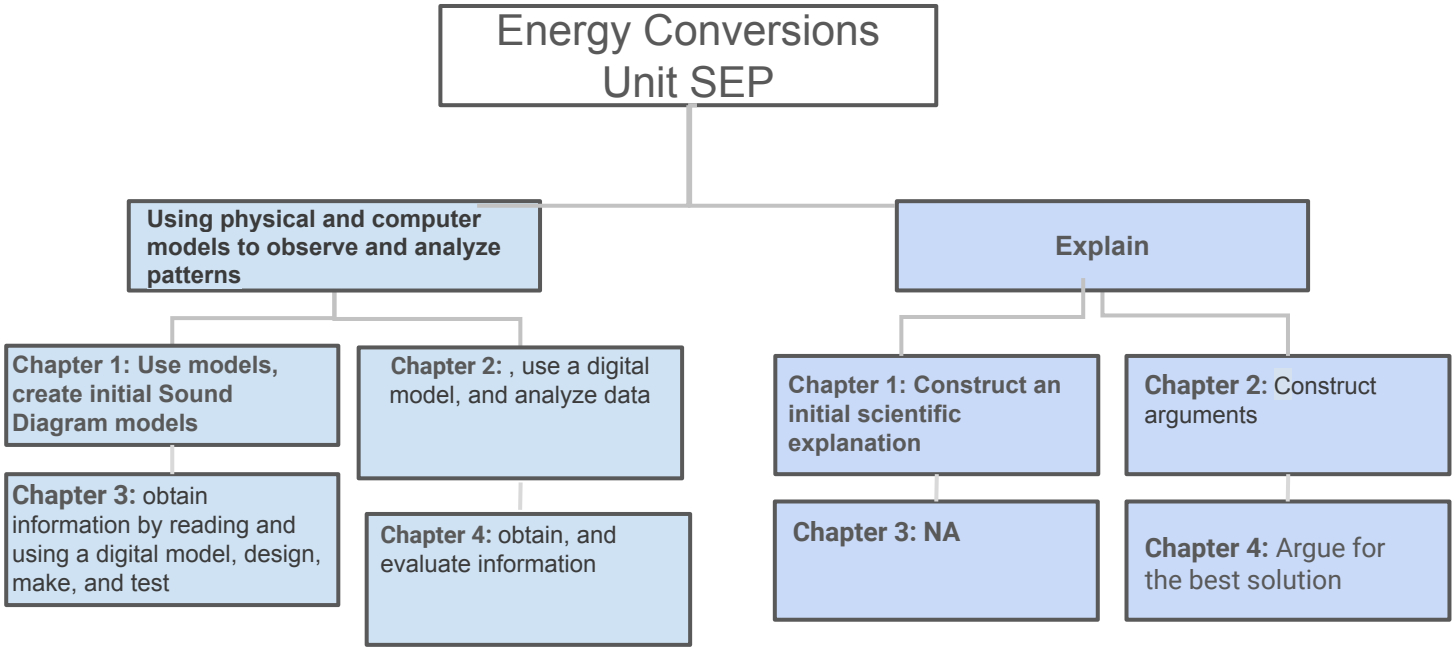




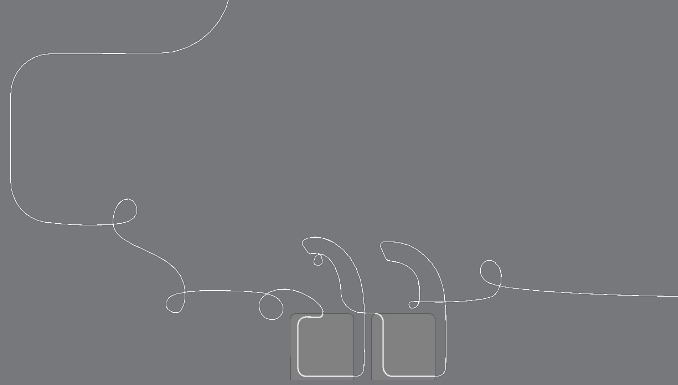
Let's Review


Energy Conversions, Unit SEP
Investigate, design, test and evaluate
Make Arguments based on evidence
Chapter 1: By obtaining information by reading and using a digital model
Chapter 2
Chapter 3
Chapter 4
Chapter 1: Explain
Chapter 2
Chapter 3
Chapter 4

Let's Review


Energy Conversions Unit SEP
Using physical and computer models to observe and analyze patterns
Explain
Chapter 1: Use models, create initial Sound Diagram models
Chapter 2: , use a digital model, and analyze data
Chapter 3: obtain information by reading and using a digital model, design, make, and test
Chapter 4: obtain, and evaluate information
Chapter 1: Construct an initial scientific explanation
Chapter 2: Construct arguments
Chapter 3: NA
Chapter 4: Argue for the best solution

Questions?



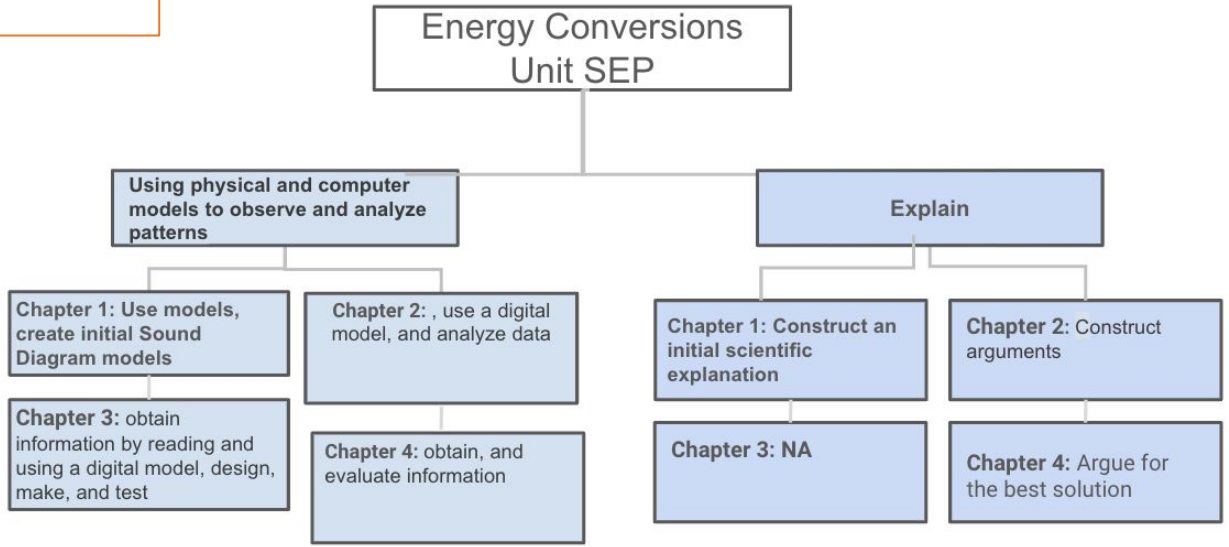
Share Out

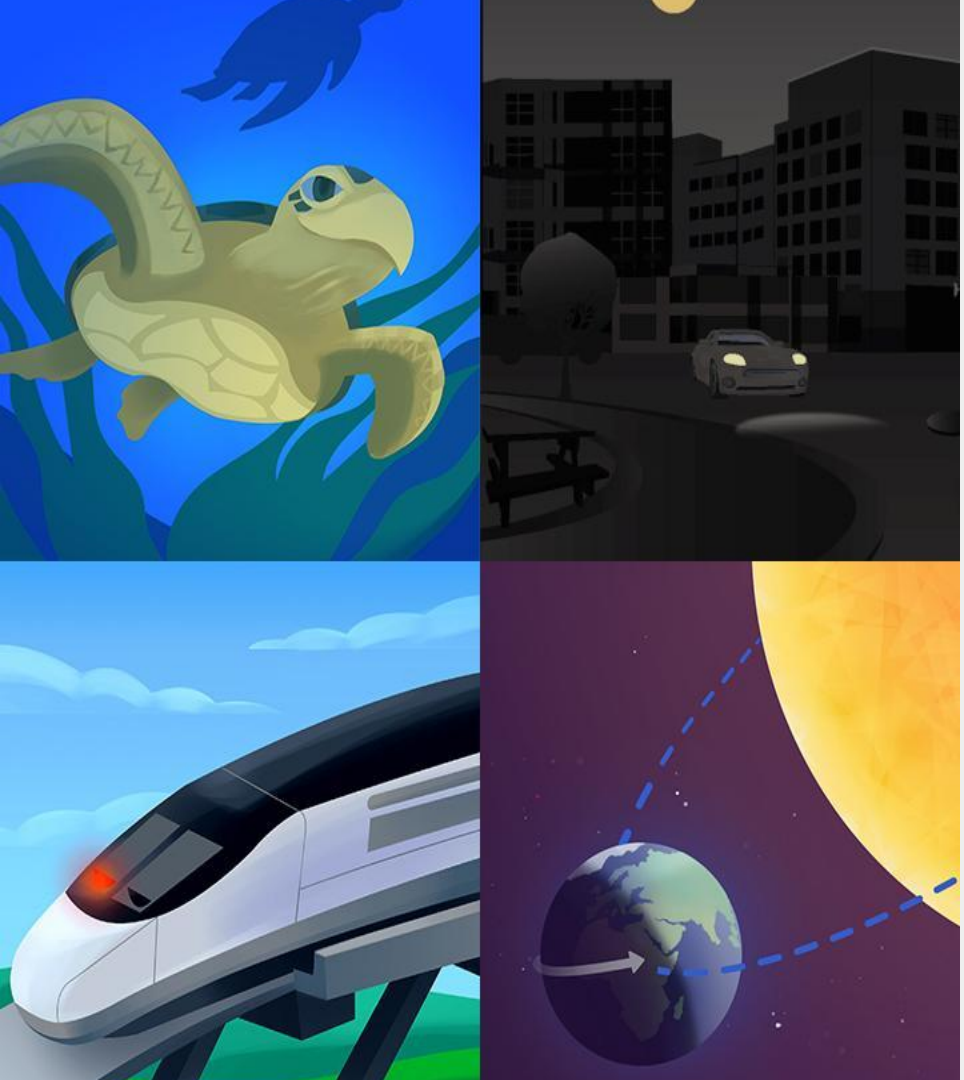
Jamboard

Reflect on how these practices are scaffolded through the unit and what that means for student learning.

Science & Engineering Practices:

Building the practices incrementally, chapter by chapter.





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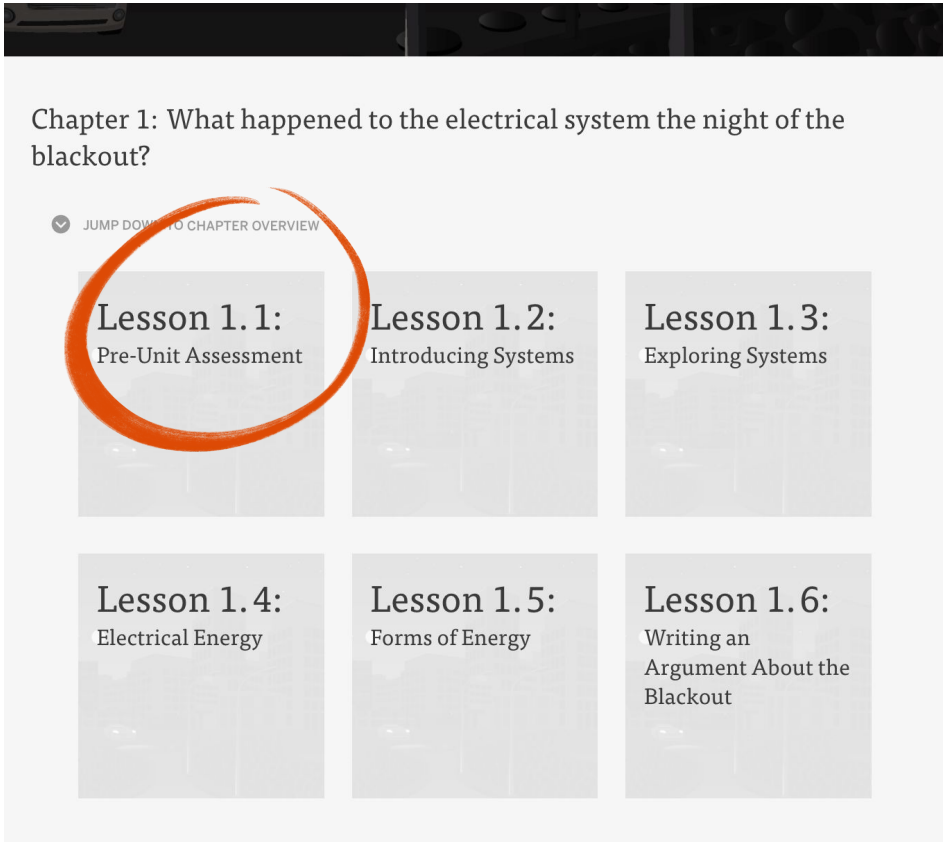
Energy Conversions

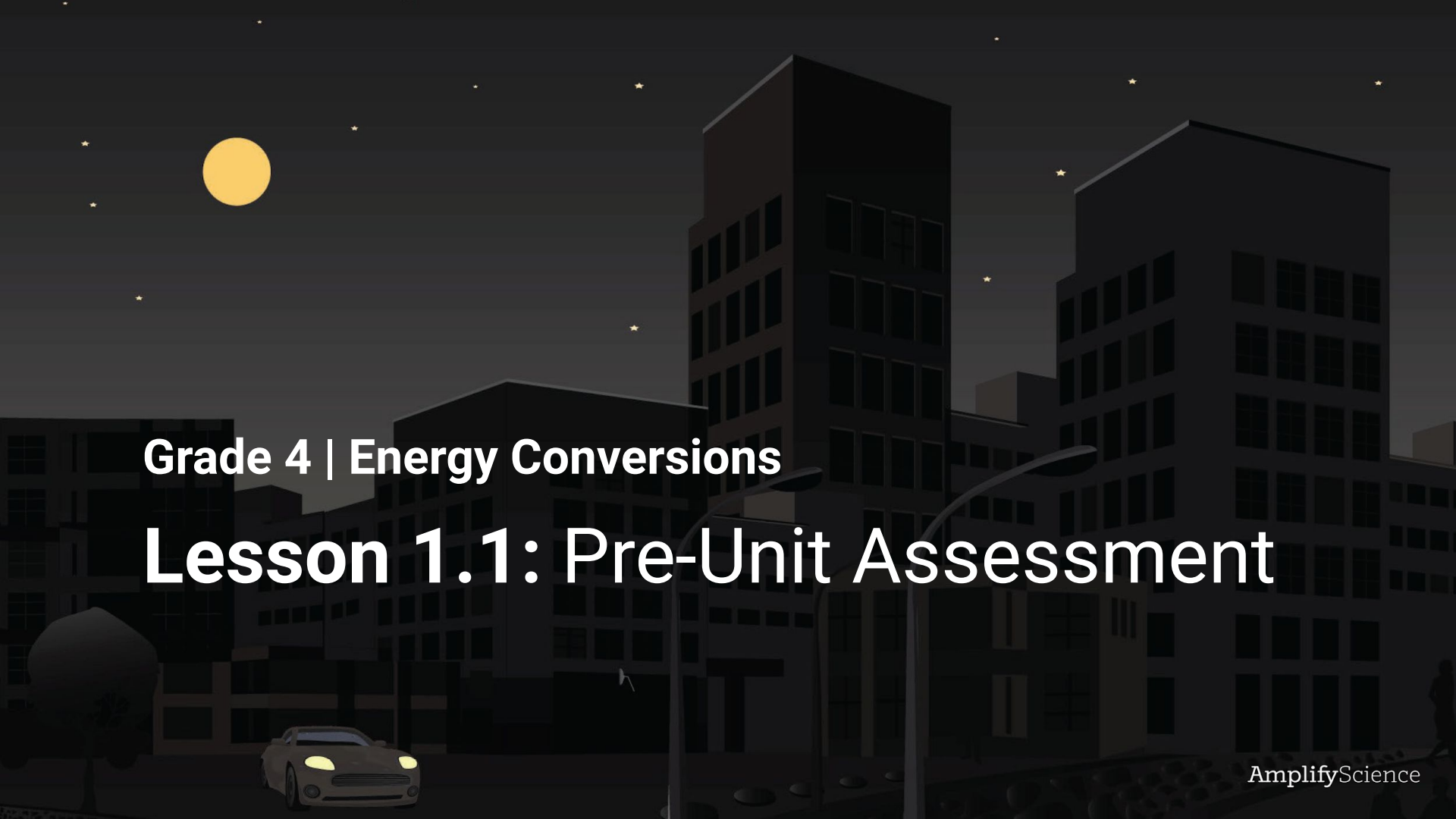


3D Statements, Lesson 1.1

Key

Practices | Disciplinary Core Ideas | Crosscutting Concepts

Students are presented with a simple illustration of a town, and they write initial explanations about what might cause a lamp to not turn on (cause and effect)



Grade 4 | Energy Conversions

Lesson 1.1: Pre-Unit Assessment

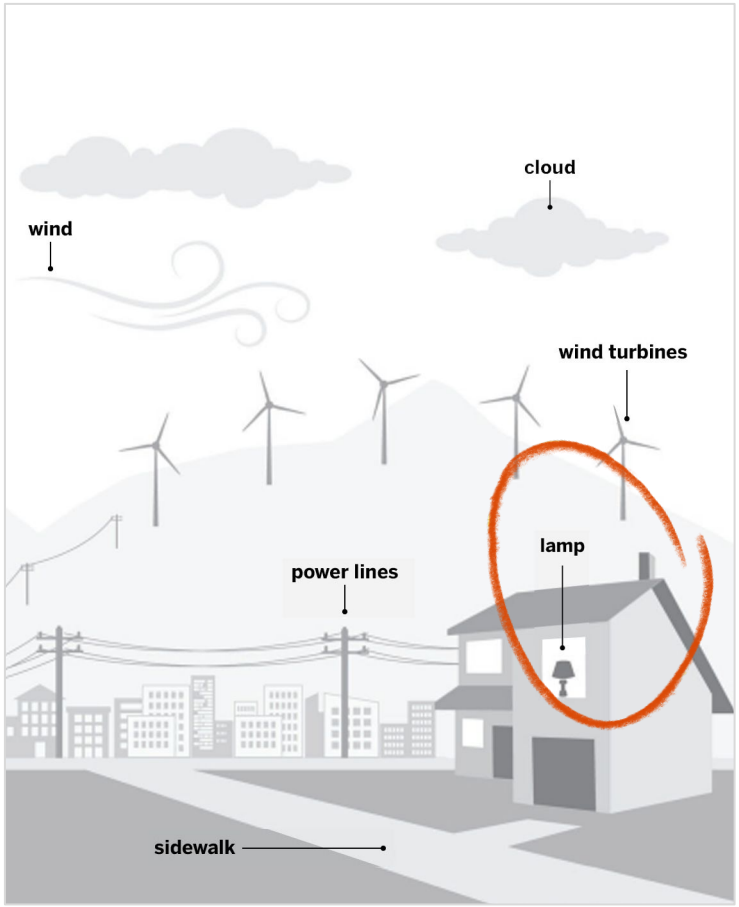
AmplifyScience

20 MIN

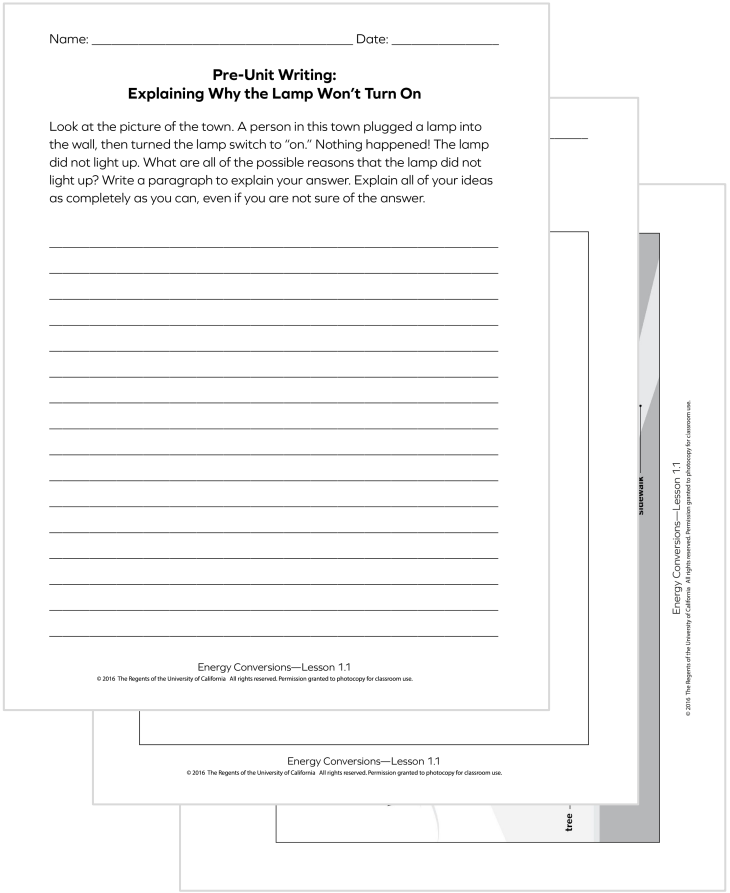
Activity 1

Students Write Initial Explanations

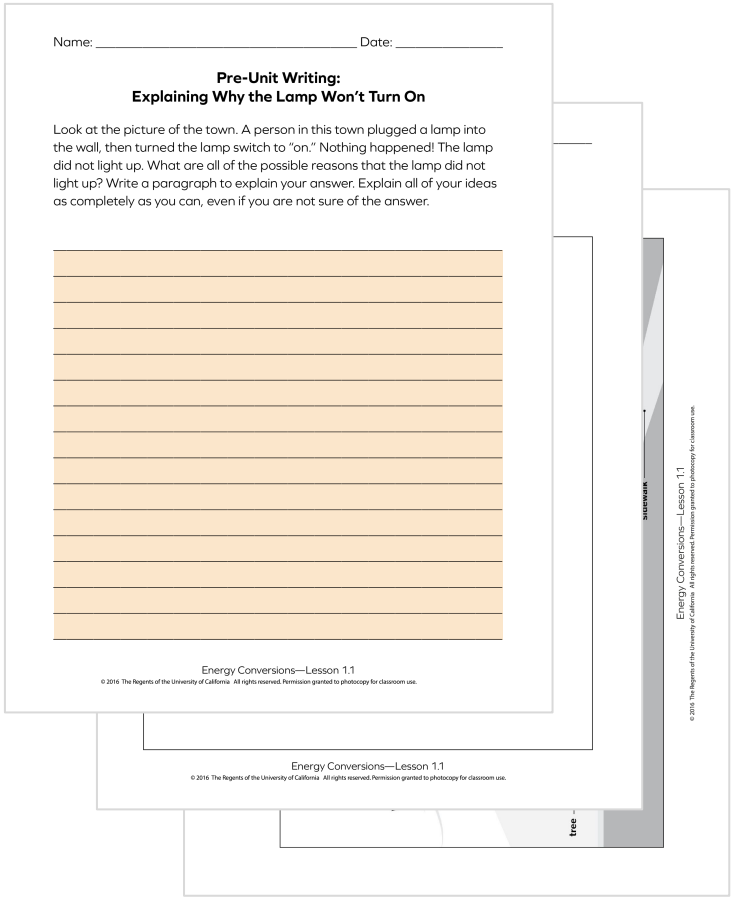
Students are presented with a simple illustration of a town, and they write initial explanations about what might cause a lamp to not turn on (cause and effect)



We are beginning a new unit about energy and the electrical system.



There is one page for the **question**, one page where you can make a **drawing**, and one page with the **picture** you saw.


Name: _____ Date: _____

Pre-Unit Writing:
Explaining Why the Lamp Won't Turn On

Look at the picture of the town. A person in this town plugged a lamp into the wall, then turned the lamp switch to "on." Nothing happened! The lamp did not light up. What are all of the possible reasons that the lamp did not light up? Write a paragraph to explain your answer. Explain all of your ideas as completely as you can, even if you are not sure of the answer.

Energy Conversions—Lesson 1.1

Energy Conversions—Lesson 1.1

tree

Energy Conversions—Lesson 1.1

Write and draw your ideas about why the lamp won't turn on.

15 MIN

Activity 2

Introducing the Problem

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?

Have you ever been in a blackout? What was it like?

Why might blackouts be a problem?

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!

Unit Question

How does the electrical system work?

Vocabulary

engineer

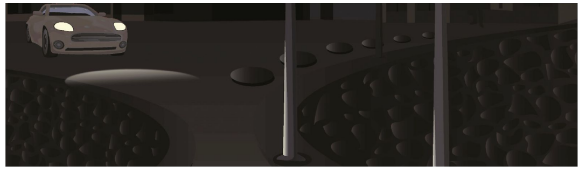
a person who uses science knowledge to design something in order to solve a problem

10 MIN

Activity 3

Introducing Investigation Notebooks

AmplifyScience



Energy Conversions:

Blackout in Ergstown

Investigation Notebook

We are going to be using an **Investigation Notebook** like scientists use.

End of Lesson

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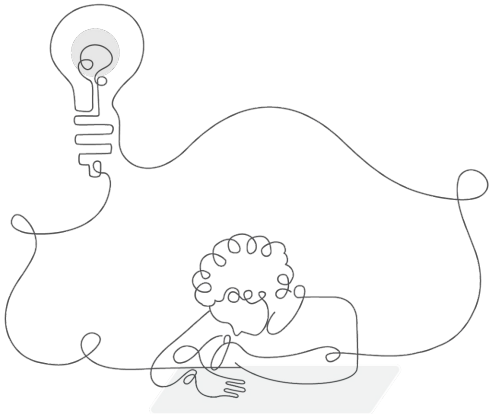
Science and Engineering Practices

Describe the science and engineering practices the students were engaged in during this lesson.



Science & Engineering Practices

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

Chapter 1: By obtaining information by reading and using a digital model

Lesson 1:
NA

Chapter 1: Explain

Lesson 1:
What - Write their initial explanations
How - Pre-Unit Assessment

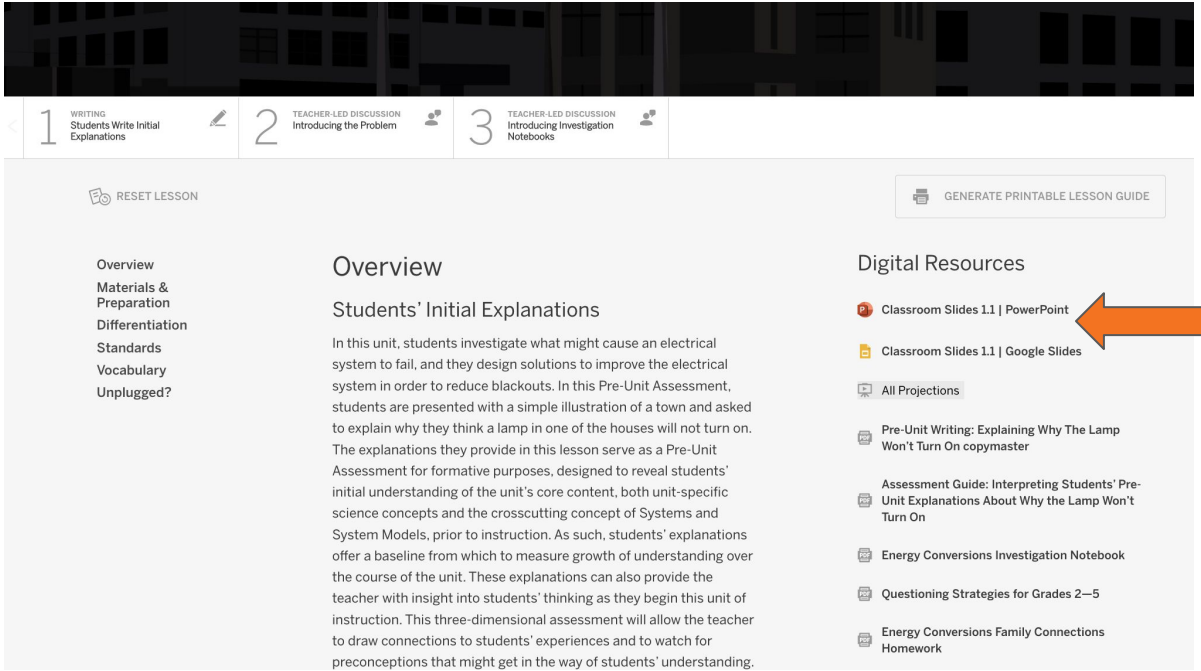
Lesson Brief

Lesson at a Glance

1: Students Write Initial Explanations (20 min.)
Students' initial explanations of why a lamp will not turn on reveal their initial understanding of the core content of the unit. Explanations can be assessed by using the Assessment Guide: Interpreting Students' Pre-Unit Explanations About Why the Lamp Won't Turn On (in Digital Resources). Asking students to take stock of their initial knowledge also helps prepare them to make connections to new knowledge.

2: Introducing the Problem (15 min.)
By viewing slides of a blackout in the fictional town of Ergstown and reading a message from the town's mayor, students are introduced to the problem that they will investigate and design solutions for throughout the unit—how to design improvements to an electrical system in order to prevent blackouts. They are also introduced to their role as systems engineers.

3: Introducing Investigation Notebooks (10 min.)
Students receive their *Energy Conversions* Investigation Notebooks and learn some of the ways that scientists use notebooks.

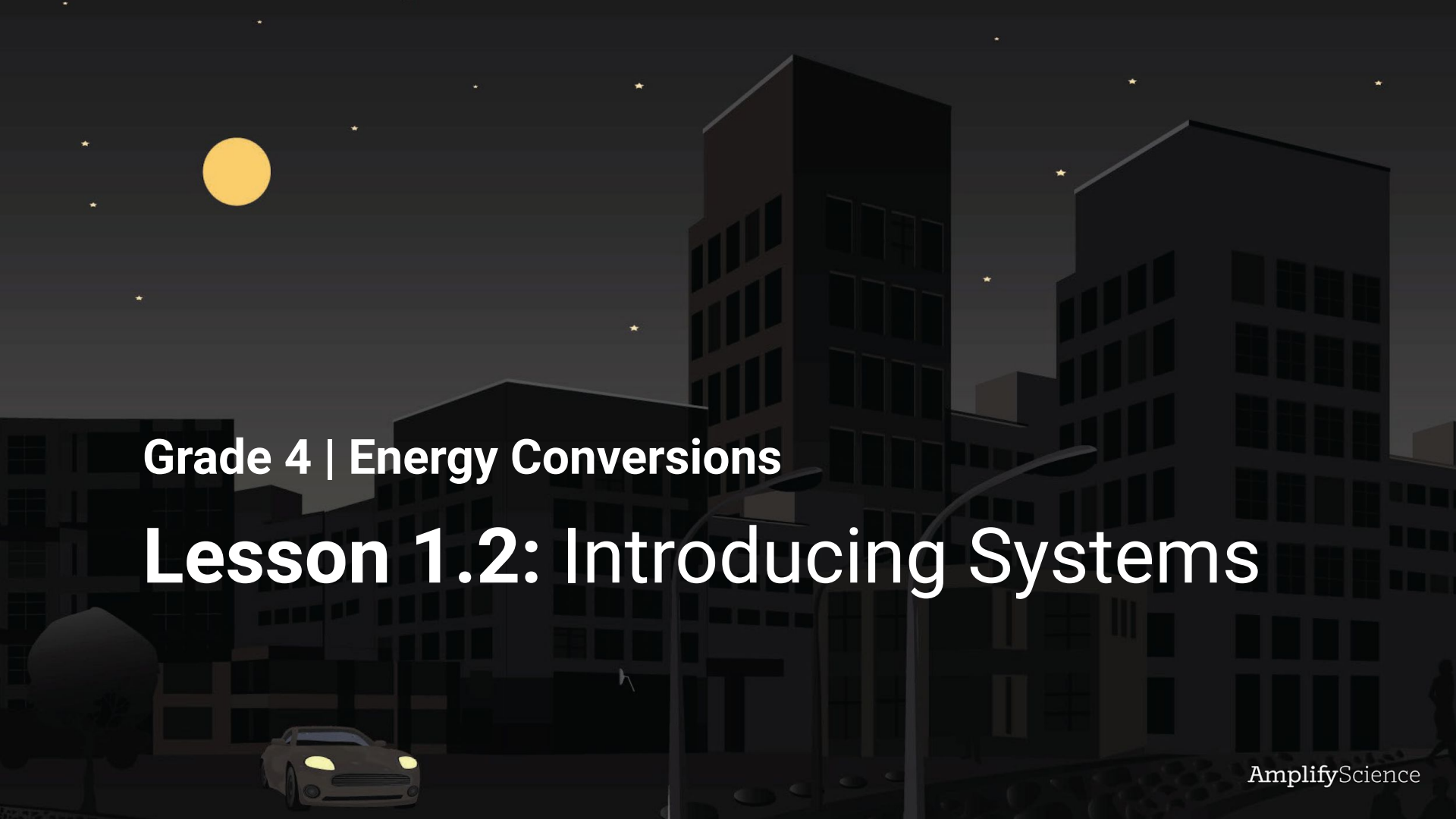


3D Statements, Lesson 1.2

Key

Practices | Disciplinary Core Ideas | Crosscutting Concepts

Students read the book *Systems* to obtain information about what a system is and how parts within a system interact (systems and system models).



Grade 4 | Energy Conversions

Lesson 1.2: Introducing Systems

AmplifyScience

5 MIN

Activity 1

Reflecting on the Unit Problem

Ergstown: Later That Night

Remember you are taking on the role of systems engineers to help Ergstown.

What are your ideas about **what your job will be** as systems engineers?

Chapter 1 Question

What happened to the electrical system the night of the Ergstown blackout?

What do you **recall** was happening in each of these scenes from Ergstown?

Ergstown

Ergstown: a Few Moments Later

Ergstown: Later That Night

Today, we are going to investigate this question:

What is a system?

15 MIN

Activity 2

Observing a Simple System

What are some **systems** you have heard of before?

We will use this **mystery system** as an example for you to begin understanding what a system is.

What do you observe about how the mystery system works?

What do you think the mystery system might be used for?

Observe the system carefully to see how it works.

_____ System

Part				
Function				

System function: _____

Cherry Pitter System

Part	handle	cherry cup	poker	spring
Function	to hold and squeeze	to hold the cherry in place	to push the pit out of the cherry	to open the handle after you squeeze it closed

System function: To take the pits out of the cherries.

Vocabulary

function

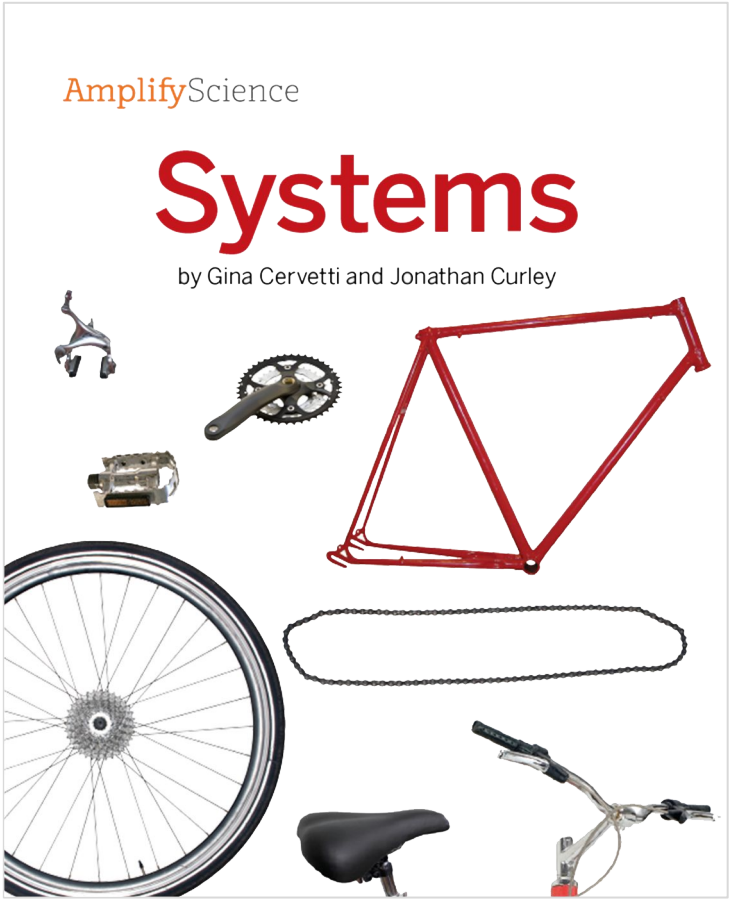
what something can do

15 MIN

Activity 3

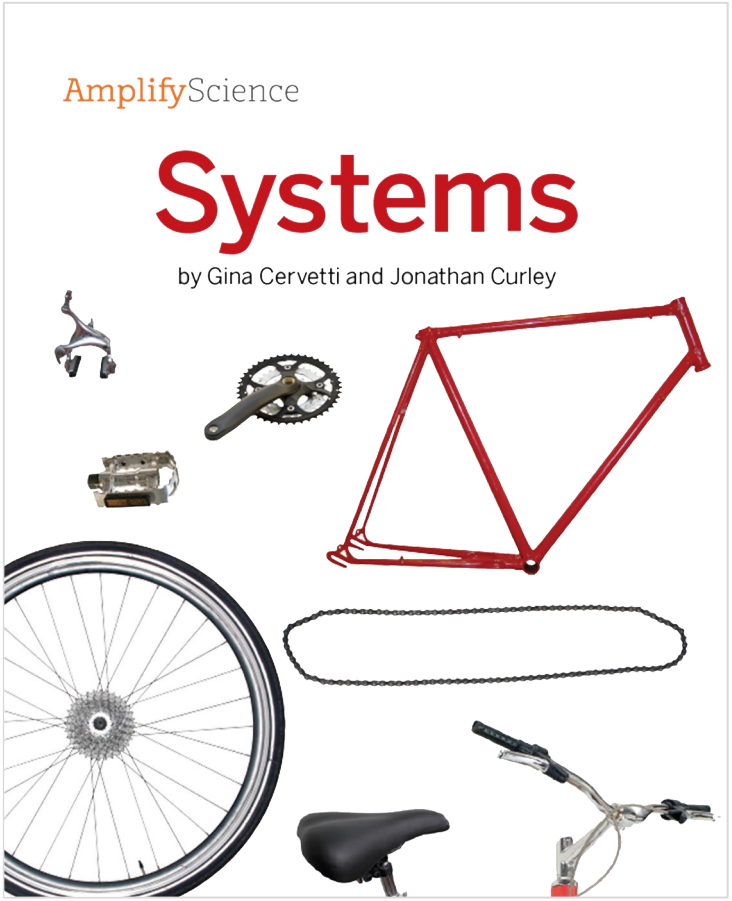
Introduction to Synthesizing

Students read the book *Systems* to obtain information about what a system is and how parts within a system interact (systems and system models).



Reading this book will help us answer the Investigation Question:

What is a system?



As we read, we will practice **making connections** between what we read and what we already know.

What Makes a Wheel a Wheel?

This is a wheel from a bicycle. You have probably seen a bicycle wheel before, but have you ever really thought about why a wheel is the way it is?

It's the **structure** of a wheel—the way the wheel is shaped and built—that makes it a wheel. This wheel is round and has long, thin spokes crossing in the middle. The spokes keep the wheel from bending out of shape.

Why is the structure of the wheel important? Its structure has to do with its **function**—what it does or what it is used for. The function of this wheel is to roll so that the bicycle can move forward.

Turn to page 5.

Who would like to read this page aloud?

Bicycle Parts

A wheel is just one part of a bicycle. A bicycle is made of lots of parts. One bike can have more than 100 different parts. Each part of a bicycle has a function and a structure that helps the part perform its function well.

pedals

frame

brakes

front wheel

back wheel

Turn to page 6.

Who would like to read this page aloud?

Bicycle Parts

A wheel is just one part of a bicycle. A bicycle is made of lots of parts. One bike can have more than 100 different parts. Each part of a bicycle has a function and a structure that helps the part perform its function well.

pedals

brakes

frame

front wheel

back wheel

chain

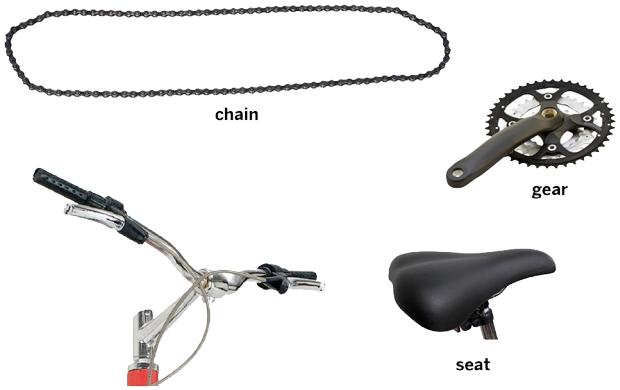
gear

handlebars

seat

This **table** lists some bicycle parts and the function of each part.

Part	Function
seat	holding up the person who is riding the bike
handlebars	steering the bike
frame	holding the other parts of the bike together
pedal	*What is the function of the pedal?*



This **table** lists some bicycle parts and the function of each part.

Part	Function
seat	holding up the person who is riding the bike
handlebars	steering the bike
frame	holding the other parts of the bike together
pedal	*What is the function of the pedal?*

7

This **table** provides more information about the bicycle.

It lists bicycle **parts** and the **function** of each part.

A Bicycle Is a System

Of course, bike parts don't do much good unless they are all put together to make a bicycle. You can't ride just a wheel! A bicycle with all its parts connected is a **system**.

A system is a group of parts that work together. When the pedals on a bicycle move, they turn the gear. When the gear turns, it moves the chain. The moving chain makes the back wheel turn—and that pushes the bicycle forward. The handlebars are connected to the frame. The handlebars, frame, and front wheel work together for steering. All the parts of a bicycle have to work together for the bicycle to work.

Turn to page 8.

Who would like to **read** the first paragraph?

A Bicycle Is a System

Of course, bike parts don't do much good unless they are all put together to make a bicycle. You can't ride just a wheel! A bicycle with all its parts connected is a **system**.

A system is a group of parts that work together. When the pedals on a bicycle move, they turn the gear. When the gear turns, it moves the chain. The moving chain makes the back wheel turn—and that pushes the bicycle forward. The handlebars are connected to the frame. The handlebars, frame, and front wheel work together for steering. All the parts of a bicycle have to work together for the bicycle to work.

A bicycle is a **system** and a cherry pitter is a **system**.

Vocabulary

synthesize

to put together multiple pieces of information in order to understand something

25 MIN

Activity 4

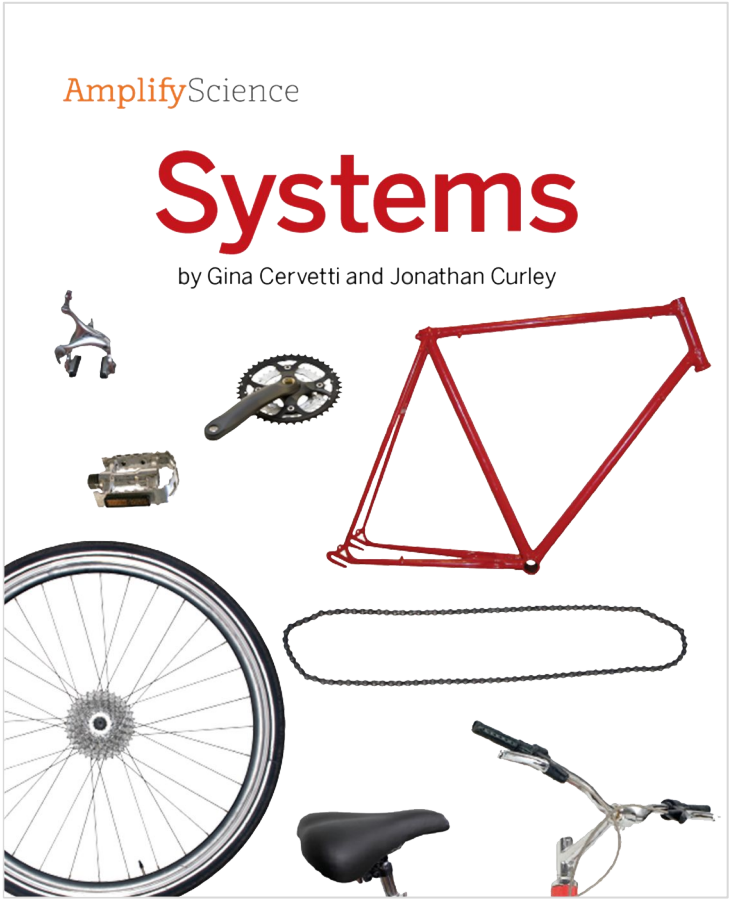
Reading: Systems

Students read the book *Systems* to obtain information about what a system is and how parts within a system interact (systems and system models).

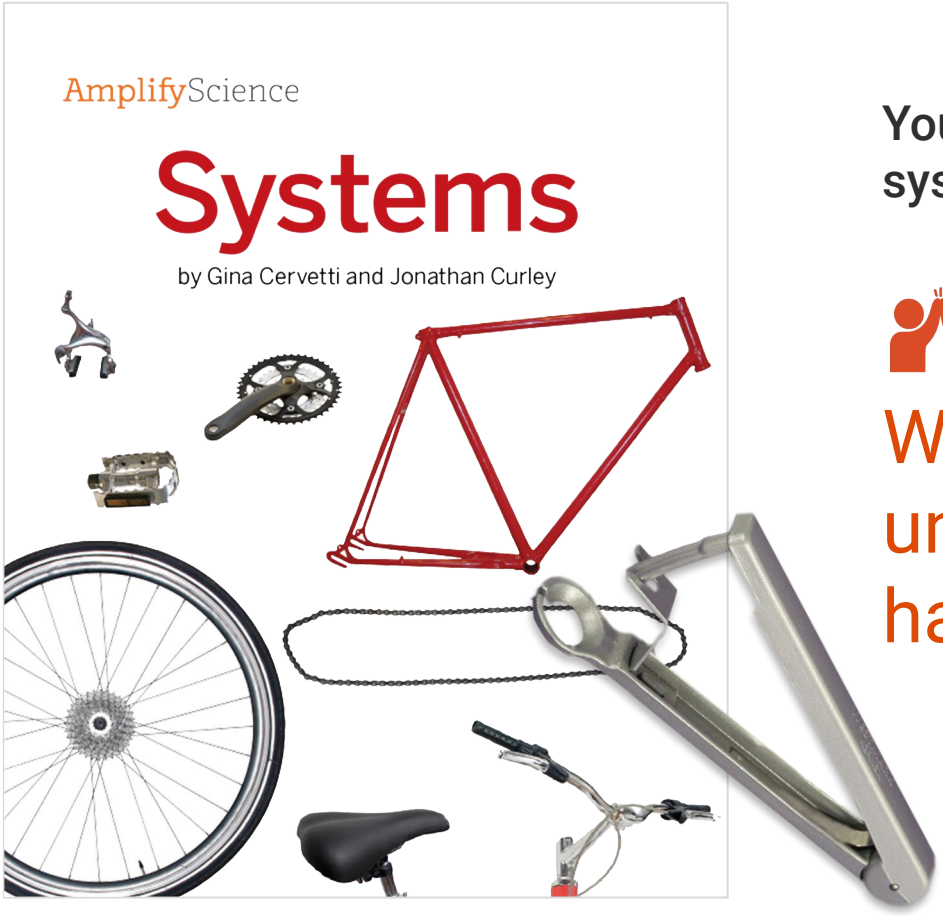
Additional SEP: Obtaining, evaluating, and communicating information

Partner Reading Guidelines

1. Sit next to your partner and place the book between you.
2. Take turns reading.
3. Read in a quiet voice.
4. Be respectful and polite to your partner.
5. Ask your partner for help if you need it. Work together to make sure you both understand what you read.



As you read, **make connections** and discuss your new ideas about systems with your partners.



You have just observed a cherry pitter system and read about systems.

What new understandings do you have about systems?

End of Lesson

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Science & Engineering Practices

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

Chapter 1: By obtaining information by reading and using a digital model

Lesson 1.1

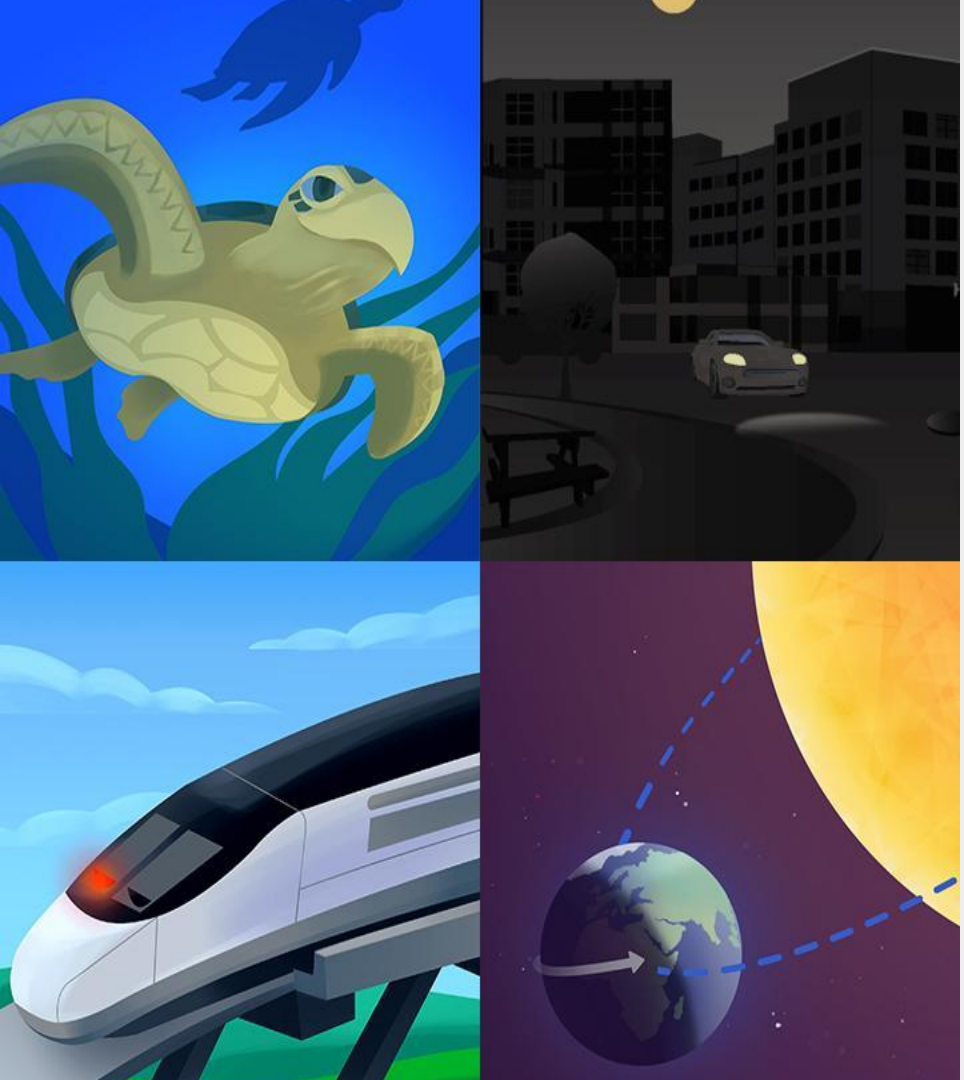
NA

Lesson 1.2
What - Obtain information
How - Observe a system (Cherry Pitter) and read *Systems*

Chapter 1: Explain

Lesson 1.1
What - Write their initial explanations
How - Pre-Unit Assessment

Lesson 1.2
What - Use sense making strategy of synthesizing & explain
How - Synthesize information from *Systems* and explain new understandings.



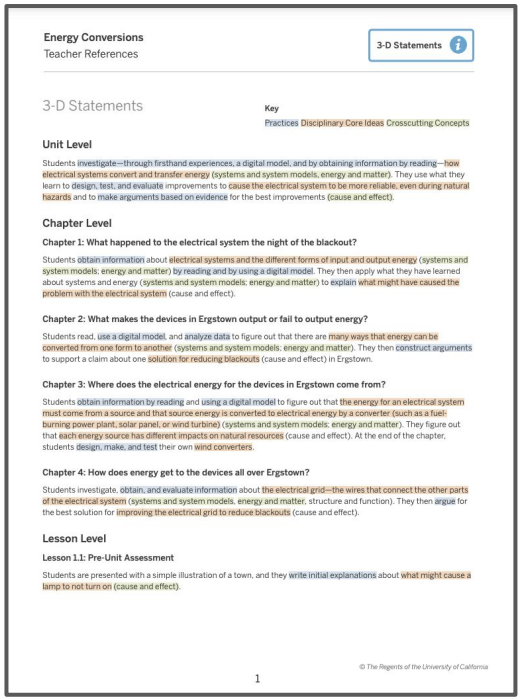
Plan for the day

- Framing and Review
- Introducing the Unit
- Unit Internalization
- Identifying the Science and Engineering Practices at the unit and chapter level
- Science and Engineering Practices within a lesson
- Lesson Planning
- Closing

3D Statements Lesson Work time

1. Identify what **Science and Engineering Practices** are addressed in each lesson in Chapter One.

2. Identify how the **Science and Engineering Practices** are addressed



Energy Conversions
Teacher References

3-D 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).

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

Students read, use a digital model, and analyze data to figure out that there are many ways that energy can be converted from one form to another (systems and system models: energy and matter). They then construct arguments to support a claim about one solution for reducing blackouts (cause and effect) in Ergstown.

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

Students obtain information by reading and using a digital model to figure out that the energy for an electrical system must come from a source and that source energy is converted to electrical energy by a converter (such as a fuel-burning power plant, solar panel, or wind turbine) (systems and system models: energy and matter). They figure out that each energy source has different impacts on natural resources (cause and effect). At the end of the chapter, students design, make, and test their own wind converters.

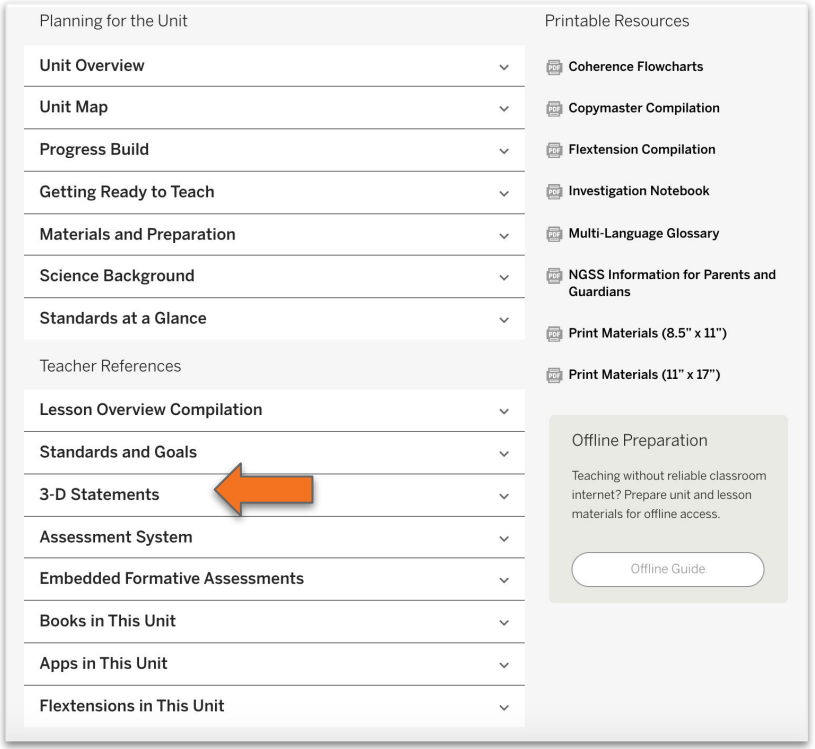
Chapter 4: How does energy get to the devices all over Ergstown?

Students investigate, obtain, and evaluate information about the electrical grid—the wires that connect the other parts of the electrical system (systems and system models: energy and matter, structure and function). They then argue for the best solution for improving the electrical grid to reduce blackouts (cause and effect).

Lesson Level

Lesson 1.1: Pre-Unit Assessment

Students are presented with a simple illustration of a town, and they write initial explanations about what might cause a lamp to not turn on (cause and effect).



Planning for the Unit

- Unit Overview
- 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
- Flextensions in This Unit

Printable Resources

- Coherence Flowcharts
- Copymaster Compilation
- Flextension Compilation
- Investigation Notebook
- Multi-Language Glossary
- NGSS Information for Parents and Guardians
- Print Materials (8.5" x 11")
- Print Materials (11" x 17")

Offline Preparation

Teaching without reliable classroom internet? Prepare unit and lesson materials for offline access.

Offline Guide

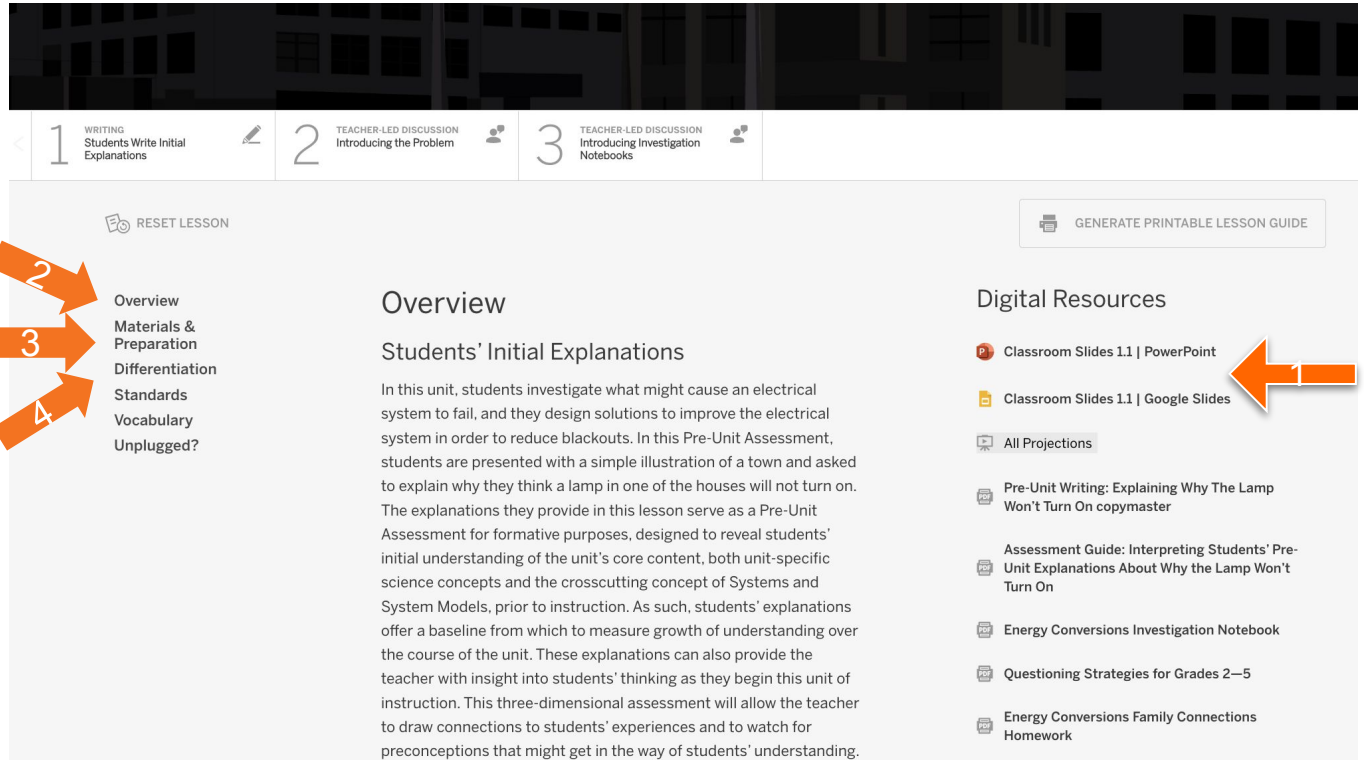
4 Easy Steps to Teaching an Amplify Lesson

Step 1: Download the Classroom Slides

Step 2: Read the Overview Section

Step 3: Read the Materials & Preparation Section

Step 4: Read the Differentiation Section



Welcome to Classroom Slides

Amplify Science Classroom Slides are designed to make it easier for teachers to prepare for and present lessons. The slides provide a convenient option for presenting student instructions, student prompts, and other text and visuals and are fully editable so that you can customize them for your own classroom.

Your classroom license allows you to use and modify the slides for your own personal use. The unauthorized copying, sharing, or distribution of copyrighted material is strictly prohibited.

For more information about how to use Classroom Slides go to amplify.com/slideshelp.

1

Grade 4 | Energy Conversions

Lesson 1.1: Pre-Unit Assessment

2

Activity 1

Students Write Initial Explanations

3

We are beginning a new unit about energy and the electrical system.

4

There is one page for the **question**, one page where you can make a **drawing**, and one page with the **picture** you saw.

5

Write and draw your ideas about why the lamp won't turn on.

6

Activity 2

Introducing the Problem

7

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**.

8

Ergstown

This picture shows a town we'll call Ergstown.

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

9

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?

10

Ergstown: Later That Night

What do you notice in this picture?

11

Have you ever been in a blackout? What was it like?

12

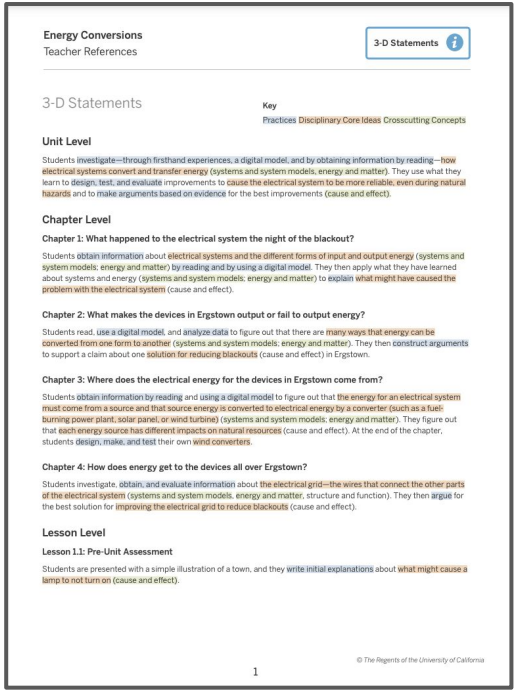
Materials Management

3.5	4	x		Prep Prior: • 1 tray with wind turbine designs and materials from Lesson 3.4
4.1	2	x		Prep Prior: For each group of 3-5 students: 1 self-sealing, plastic bag, 1 solar panel, 1 motor with fan blades attached • 2 cables with alligator clips
4.2	2			Teacher will do the system improvement demonstration: • 1 spool of two-conductor wire, 1 wire cutte, 1 motor with fan attachment, 1 solar panel, 4 wires with clip leads, 1 clamp lamp with lightbulb. • Set the motor with fan 3–7.5 meters (10–25 feet) from the light source (lamp or sunlight). • Clip two of the short wires to the fan. • Clip the other end of each short wire to one of the two wires at one end of the long two-conductor wire. • Stretch the long two-conductor wire to where the bright light is shining. • Use the two additional short wires to connect the other two ends of the long wire to the two connections on the solar cell. • Hold the solar panel in the bright light. The fan at the other end of the long 2-conductor wire should function. If you plan to use the clamp lamp, you may have to hold the solar panel within a few inches of the light source. Be careful if the lamp is hot. (IMPORTANT NOTE: The clips from different wires must not touch each other. If they do, the system will not function.)

4.2	2			within a few inches of the light source. Be careful if the lamp is hot. (IMPORTANT NOTE: The clips from different wires must not touch each other. If they do, the system will not function.)

3D Statements Share Out

Share the what and how of the **Science and Engineering Practices** addressed in each lesson.



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Students investigate, obtain, and evaluate information about the electrical grid—the wires that connect the other parts of the electrical system (systems and system models; energy and matter, structure and function). They then argue for the best solution for improving the electrical grid to reduce blackouts (cause and effect).

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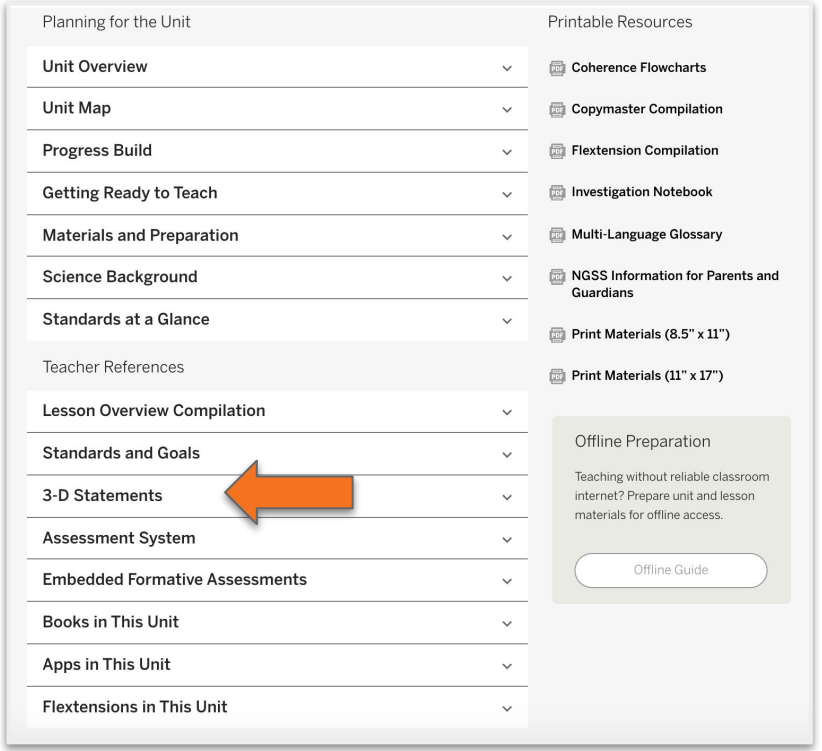

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Offline Guide

Science & Engineering Practices

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

Chapter 1: By obtaining information by reading and using a digital model

Lesson 1.1

NA

Lesson 1.2
What - Obtain information
How - Observe a system (Cherry Pitter) and read *Systems*

Lesson 1.3
What - design and make simple solar-powered electrical systems
How - Create a solar powered electrical system with a motor, fan blade and solar panel.

Chapter 1: Explain

Lesson 1.1
What - Write their initial explanations
How - Pre-Unit Assessment

Lesson 1.2
What - Use sense making strategy of synthesizing & explain
How - Synthesize information from *Systems* and explain new understandings.

Lesson 1.3
What - Explain
How - Students will reread *Systems and record and explain different systems*

Science & Engineering Practices

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

Chapter 1: By obtaining information by reading and using a digital model

Lesson 1.4
What - **use a digital model to investigate**
How - **Use the sim to build an energy system.**

Lesson 1.5
What - **Design and make energy systems**
How - Use the simulation to build an energy system

Lesson 1.6
NA

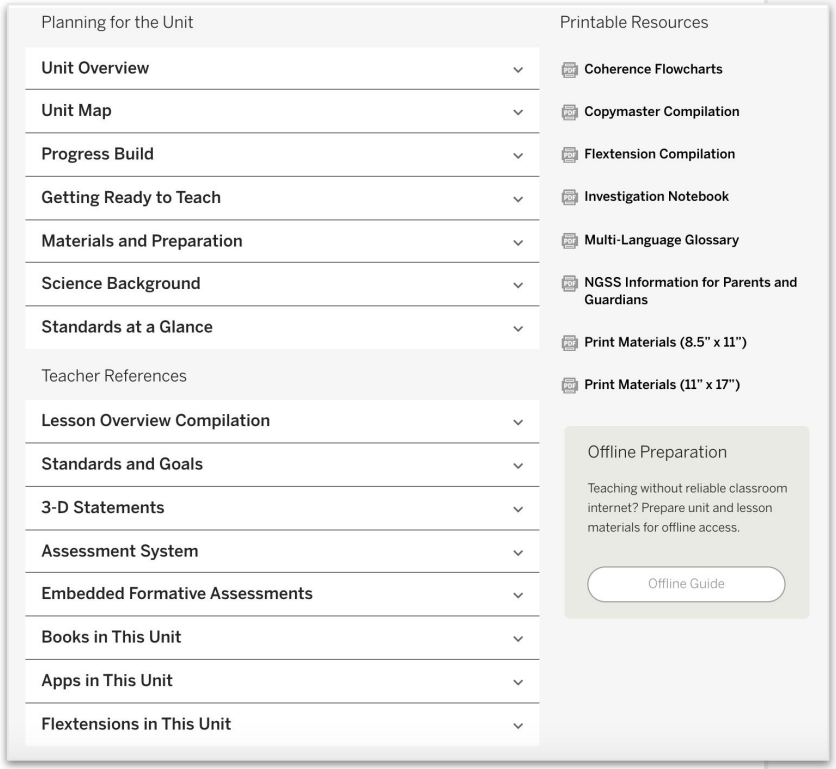
Chapter 1: Explain

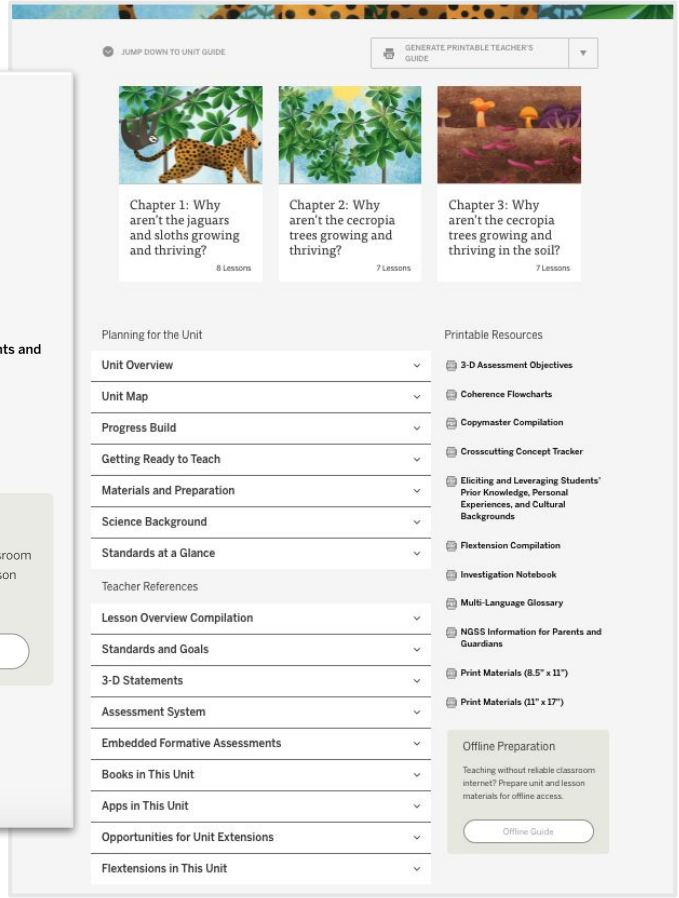
Lesson 1.4
What - Gather evidence
How - Gather and explain forms of energy with evidence

Lesson 1.5
What -Communicate through discussion
How - Synthesize information from *Systems* and explain new understandings.

Lesson 1.6
What - make arguments, orally and in writing, based on evidence
How -Use Shared Listening Routine and then write to different claims to use evidence

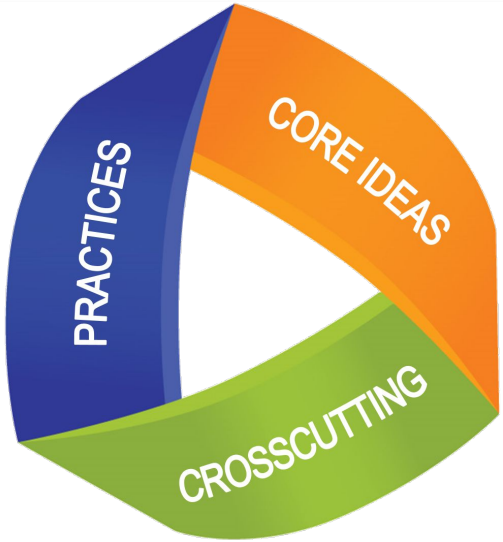
Standards at a Glance





Next Generation Science Standards

Science and Engineering Practices



1. Asking questions (for science) and defining problems (for engineering) Ch. 1, 3, 4
2. Developing and using models Ch. 1-4
3. Planning and carrying out investigations Ch. 1
4. Analyzing and interpreting data Ch. 1-4
5. Using mathematics and computational thinking Ch. 2-4
6. Constructing explanations (for science) and designing solutions (for engineering) Ch. 1-4
7. Engaging in argument from evidence Ch. 1-4
8. Obtaining, evaluating, and communicating information Ch. 1- 4

Science & Engineering Practices:

Building the practices incrementally, lesson by lesson, chapter by chapter.

Energy Conversions Unit SEP

Using physical and computer models to observe and analyze patterns

Chapter 1: Use models, create initial Sound Diagram models

Chapter 2: , use a digital model, and analyze data

Chapter 3: obtain information by reading and using a digital model, design, make, and test

Chapter 4: obtain, and evaluate information

Explain

Chapter 1: Construct an initial scientific explanation

Chapter 2: Construct arguments

Chapter 3: NA

Chapter 4: Argue for the best solution

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

Chapter 1: By obtaining information by reading and using a digital model

Lesson 1.1

NA

Lesson 1.2
What - **Obtain information**
How - Observe a system (Cherry Pitter) and read *Systems*

Lesson 1.3
What - design and make simple solar-powered electrical systems
How - Create a solar powered electrical system with a motor, fan blade and solar panel.

Chapter 1: Explain

Lesson 1.1
What - Write their initial explanations
How - Pre-Unit Assessment

Lesson 1.2
What - Use sense making strategy of synthesizing & explain
How - Synthesize information from *Systems* and explain new understandings.

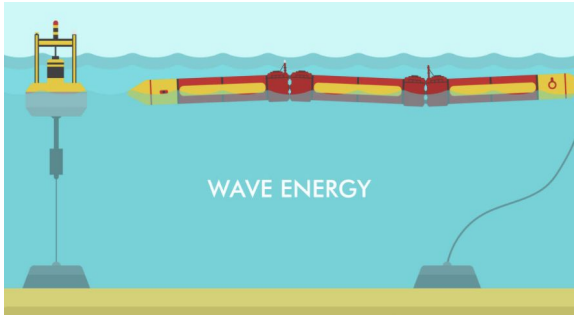
Lesson 1.3
What - Explain
How - Students will reread *Systems and record and explain different systems*

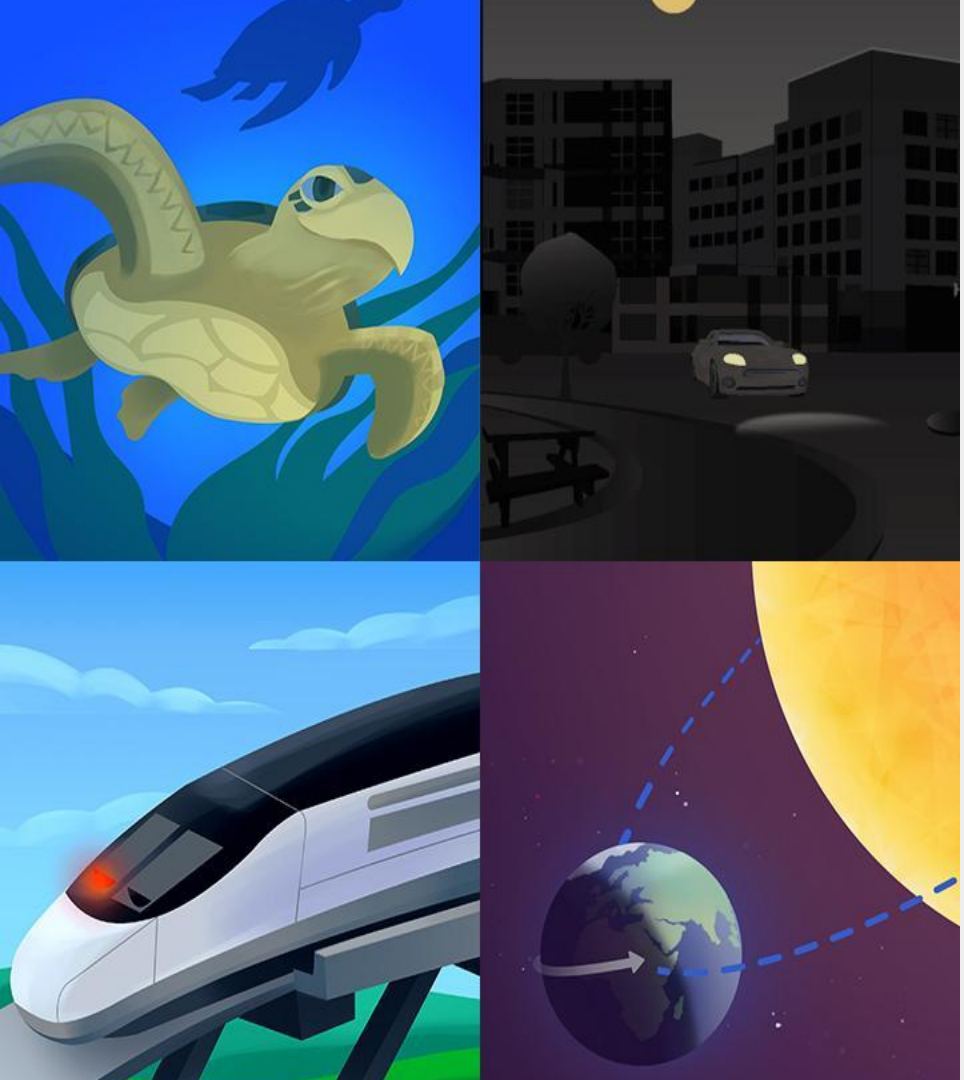
Questions?

Unit Extensions

Videos of

- Dams https://www.youtube.com/watch?v=W1pTtcE5NN8
- Wind Turbines https://www.energy.gov/eere/wind/how-do-wind-turbines-work
- Solar Panels https://www.youtube.com/watch?v=xKxrkht7CpY
- Virtual Field Trip Renewable Energy https://www.youtube.com/watch?v=CKZaBg1xkxs





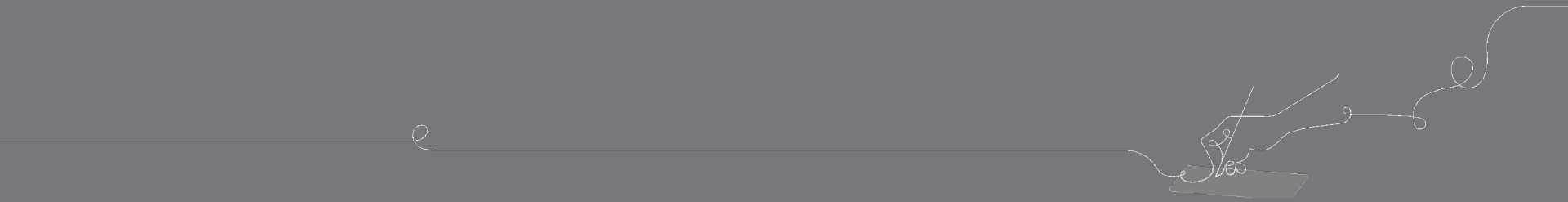
Plan for the day

- Framing
- Introducing the Unit
- Unit Internalization
- Identifying the Science and Engineering Practices at the unit and chapter level
- Science and Engineering Practices within a lesson
- Lesson Planning
- Closing

Overarching goals

By the end of this workshop, you will be able to:

- ❏ Identify the Science and Engineering Practices within a lesson and how they are taught.
- ❏ Apply this knowledge to prepare to teach.



Closing reflection

Based on our work today, 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!

ify.

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.

help@amplify.com

800-823-1969

Amplify Chat