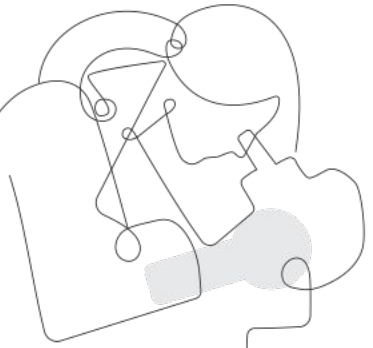
Do Now: *In the chat, share one new skill you and/or your students have learned this year during remote learning.*

Amplify Science

Unpacking Energy Conversions for Hybrid Learning

Unit 4, Grade 4



LAUSD

4/x/2021

Presented by Your Name

In a new tab, please log in to your Amplify Science account through Schoology.

Amplify.

Norms: Establishing a culture of learners

Please keep your camera on, if possible.

Take some time to orient yourself to the platform

- *"Where's the chat box? What are these squares at the top of my screen?, where's the mute button?"*

Mute your microphone to reduce background noise unless sharing with the group

The chat box is available for posting questions or responses to during the training

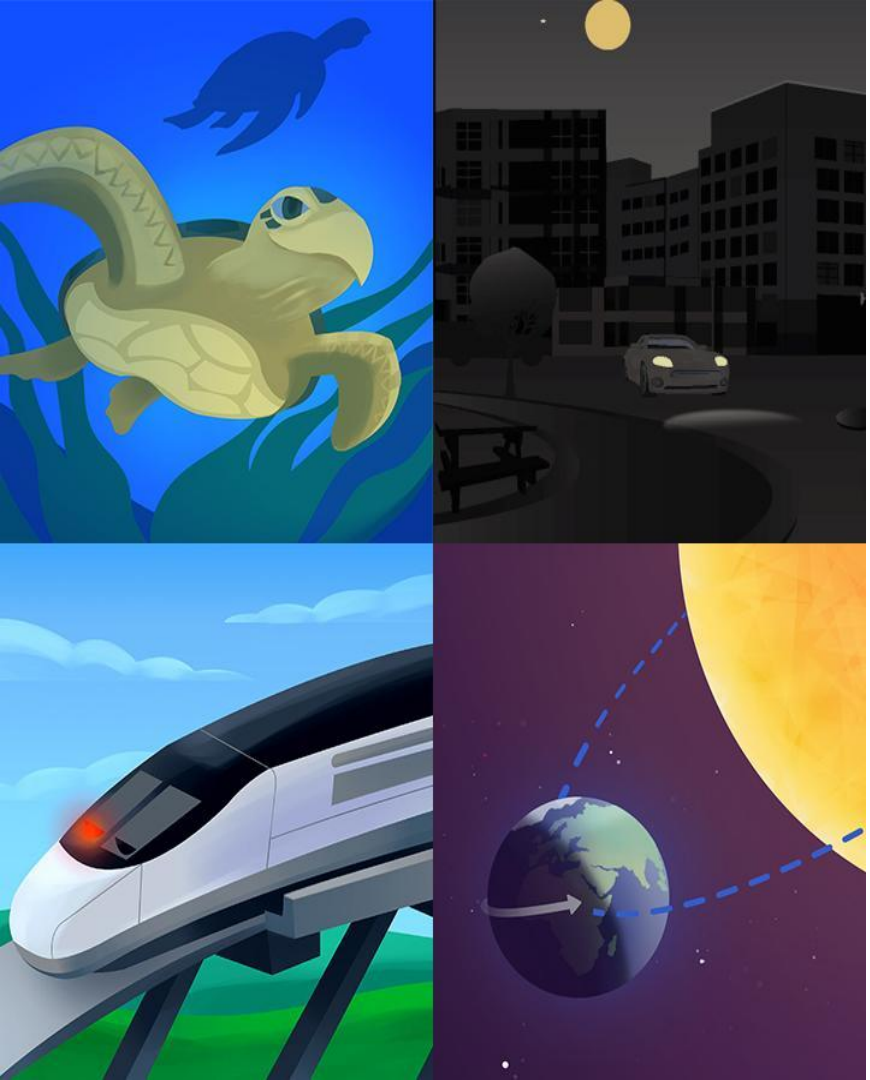
Make sure you have a note-catcher present

Engage at your comfort level - chat, ask questions, discuss, share!

Objectives

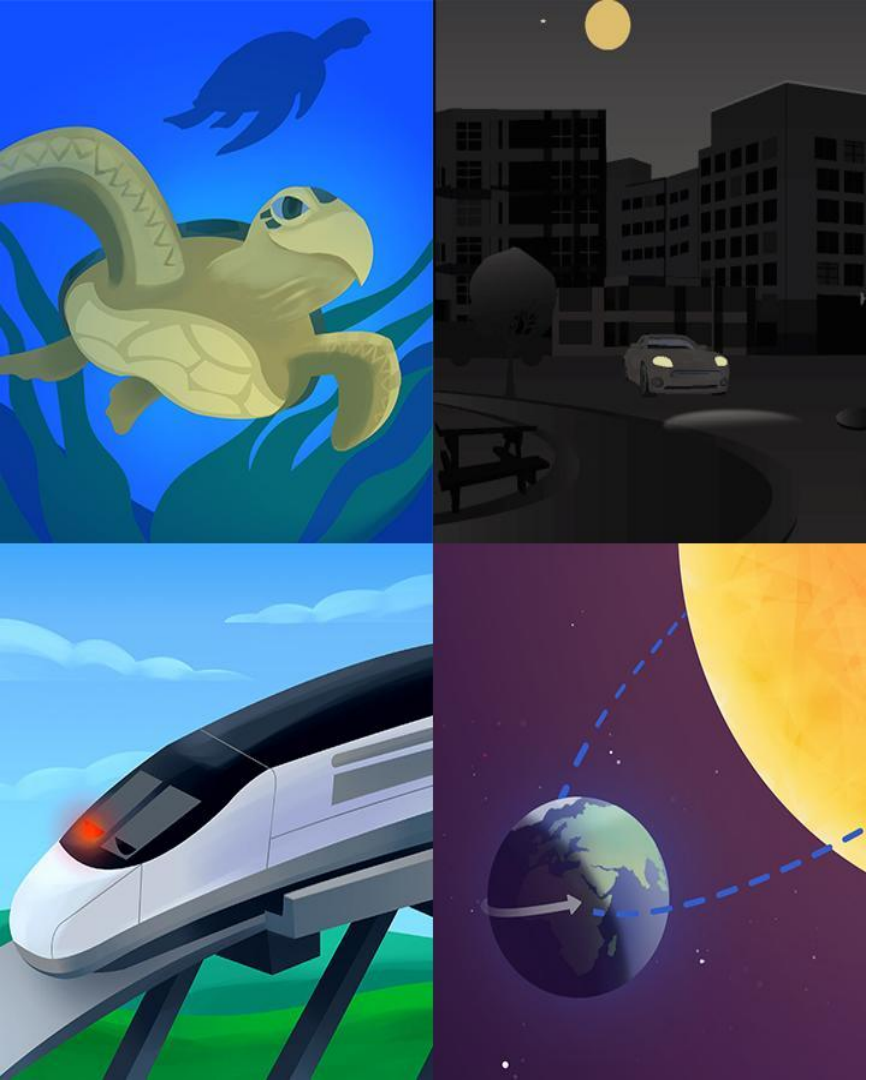
By the end of this workshop, you will be able to…

- Describe how students' conceptual understanding builds through the unit
- Explain how students figure out the phenomenon throughout the unit
- Make a plan for implementing Amplify Science within your class schedule and instructional format



Plan for the day

- **Framing the day**
  - Remote learning reflection
  - Revisiting the Amplify Approach
- **Phenomenon at the unit level**
  - Navigation refresher (standard curriculum)
  - Storyline and science concepts
  - Unit internalization work time
- **Planning to teach**
  - Navigation refresher (@Home resources)
  - Lesson walkthrough
  - Collaborative planning time
- **Closing**
  - Reflection & survey



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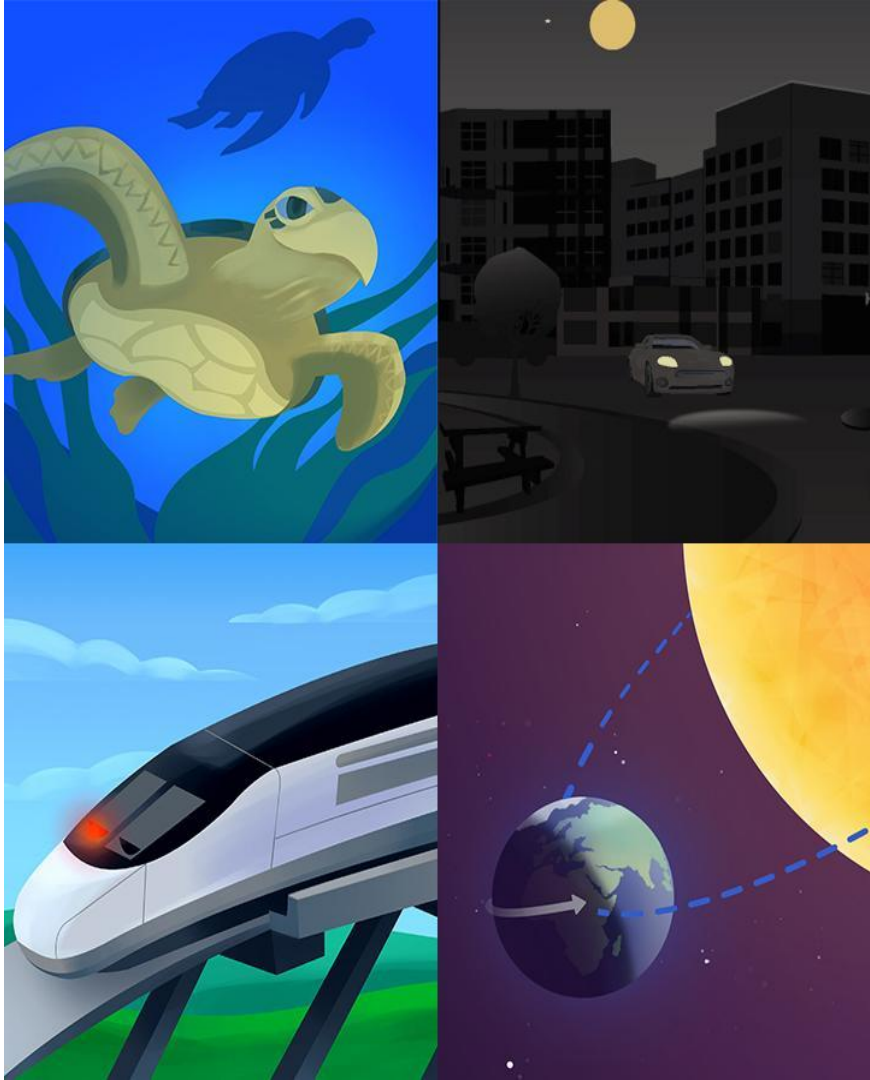
Opening reflection

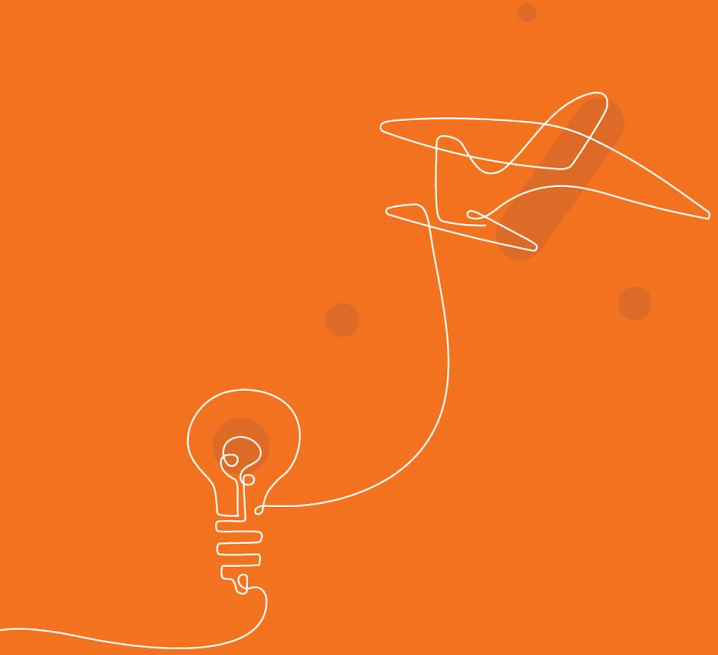
Jamboard

Having taught Amplify Science in a remote setting, what **skills and/or practices** have you developed with your students that you can **leverage as your shift to hybrid learning?**



Having taught Amplify Science in a remote setting, what skills and/or practices have you developed with your students that you can leverage as your shift to hybrid learning?

Students are able to use technology more independently.



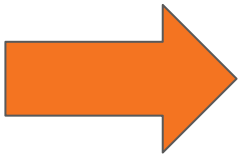
Key aspects of the Amplify Science instructional approach

Phenomenon-based instruction

A shift in science instruction

from learning about

(like a student)

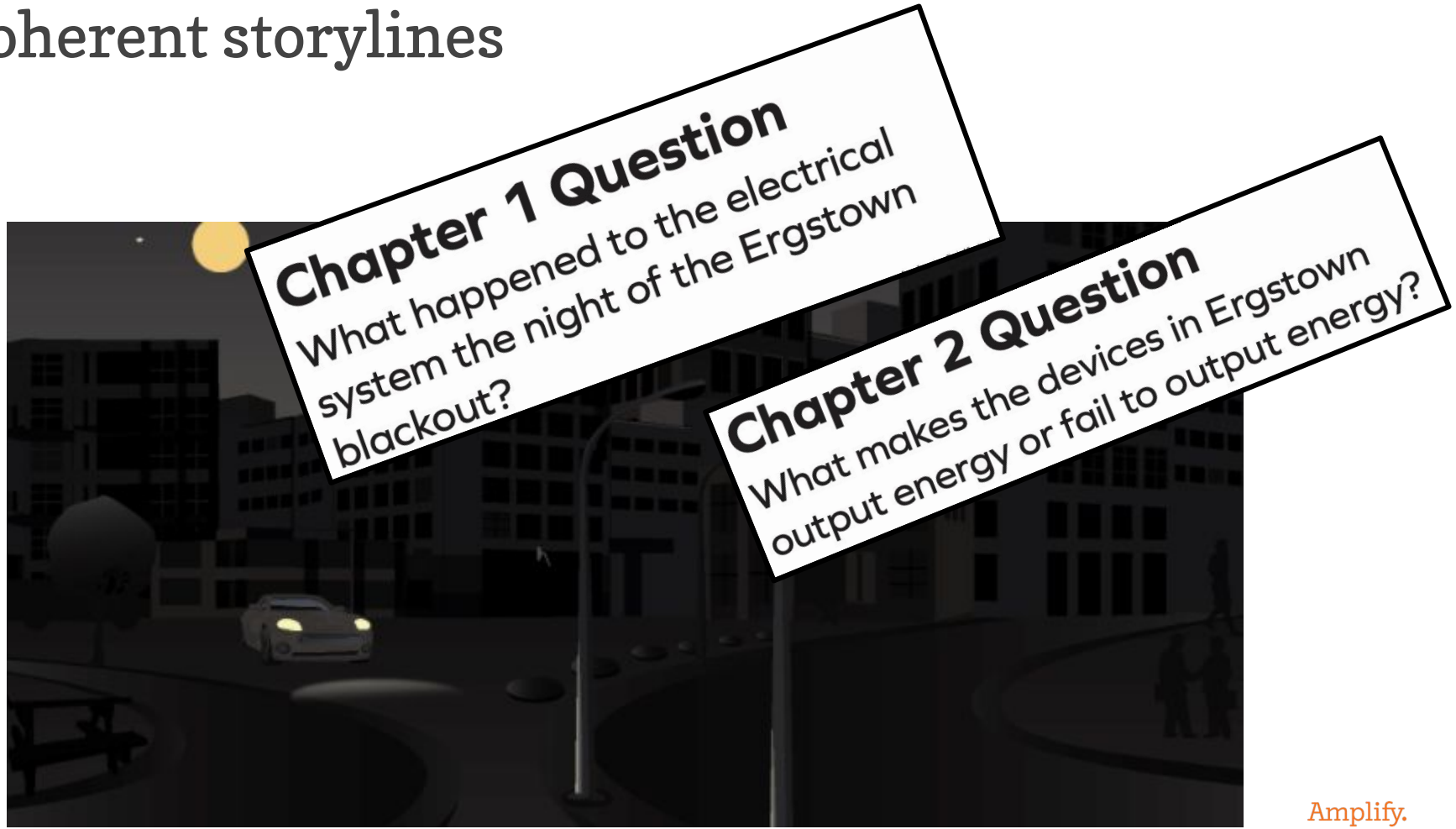


to figuring out

(like a scientist)

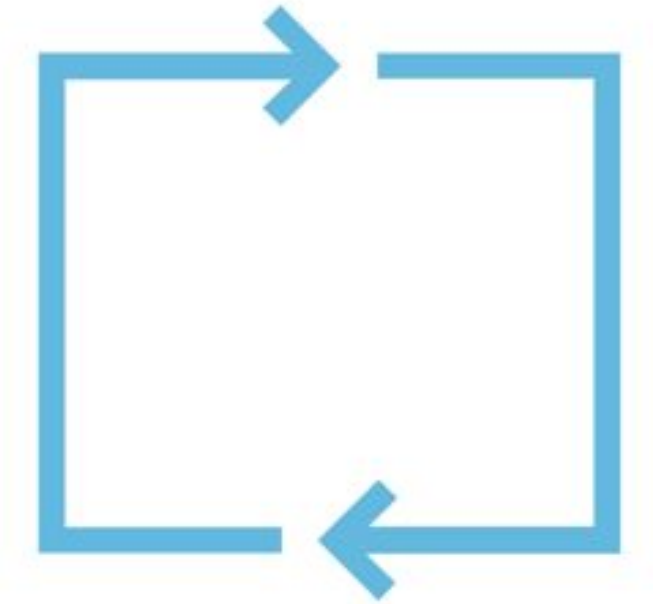
Scientific phenomenon: An observable event in the natural world you can use science ideas to explain or predict

Coherent storylines

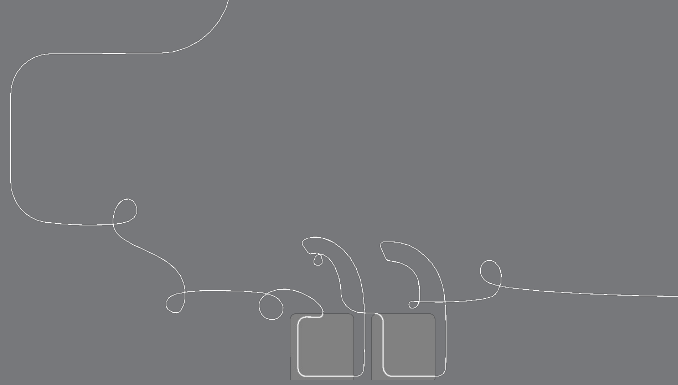


Multimodal learning

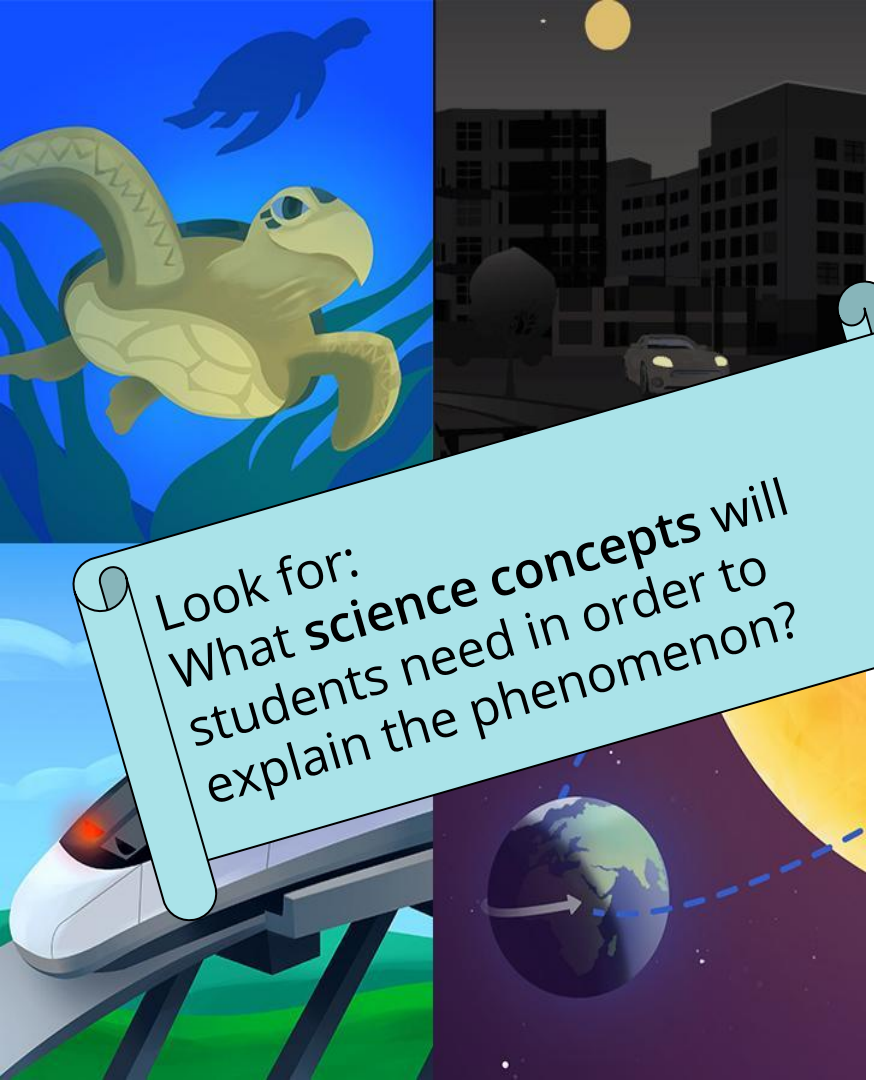
Gathering evidence over multiple lessons



Do,
Talk,
Read,
Write,
Visualize



Questions?



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Planning to teach

  - Navigation refresher (@Home resources)
  - Lesson walkthrough
  - Collaborative planning time

- **Closing**
  - Reflection & survey

Explaining the phenomenon: science concepts

Please respond in the chat

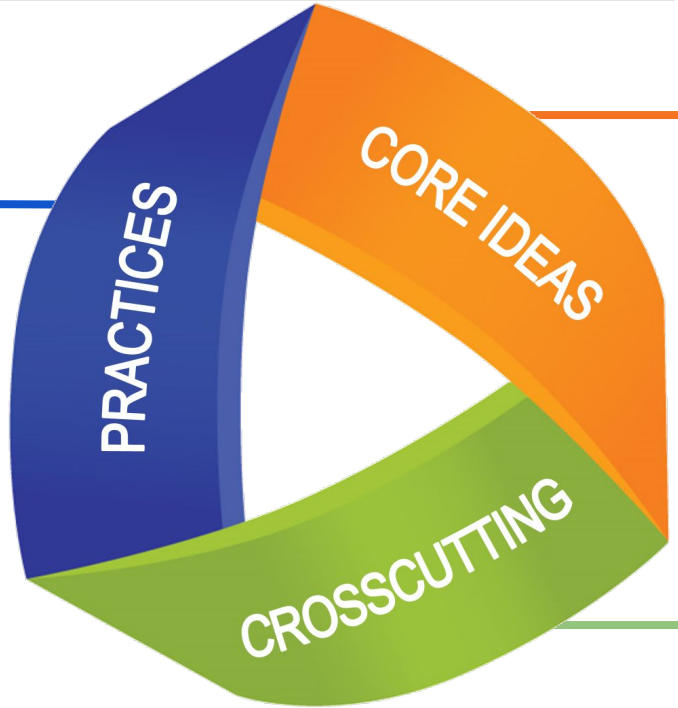
What **science concepts** do you think students need to understand in order to choose new electrical sources and energy converters for the town of Ergstown?

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

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).

Navigation Temperature Check

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

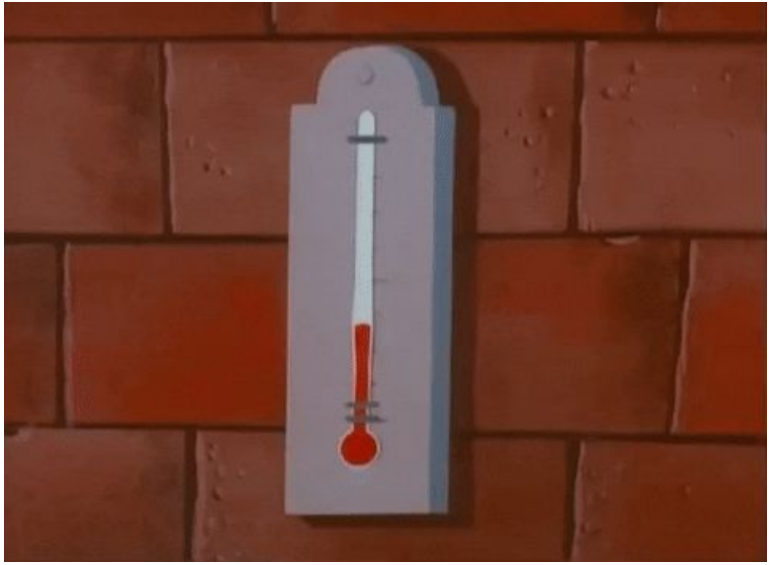
1 = Extremely Uncomfortable

2 = Uncomfortable

3 = Mild

4 = Comfortable

5 = Extremely Comfortable

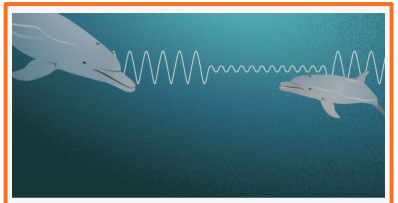


Unit

Chapters

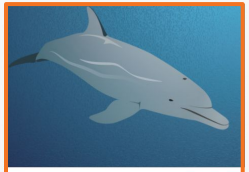
Lessons

Activities



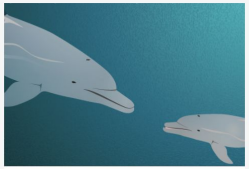
22 Lessons

Waves, Energy, and Information



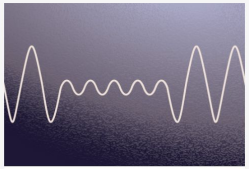
Chapter 1: How does a mother dolphin communicate with her calf across a...

5 Lessons



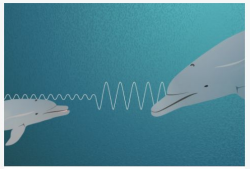
Chapter 2: How does sound energy travel through water from a mother dolphin t...

6 Lessons



Chapter 3: How does a dolphin calf know which call is his mother's call?

7 Lessons



Chapter 4: How can humans use patterns to communicate?

4 Lessons

Lesson 1.1:
Pre-Unit Assessment

Lesson 1.2:
Exploring Waves

Lesson 1.3:
Warning: Tsunami!

Lesson 1.4:
Exploring Sound Waves

Lesson 1.5:
Introducing Scientific Explanation

1 TEACHER-LED DISCUSSION
Introducing the Scientific Phenomenon

2 TEACHER-LED DISCUSSION
Thinking About Forms of Communication

3 TEACHER-LED DISCUSSION
Dolphin Communication

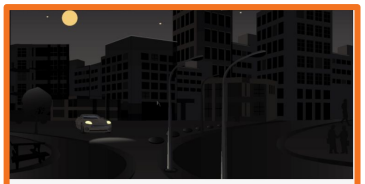
4 WRITING
Writing Initial Explanations

Unit

Chapters

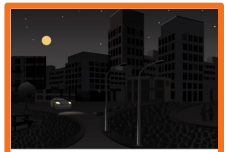
Lessons

Activities



22 Lessons

Energy Conversions

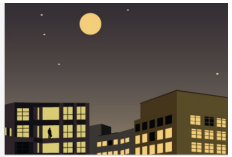


Chapter 1: What happened to the electrical system the night of the...

6 Lessons

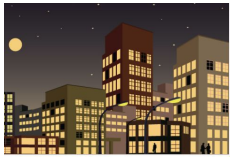
Chapter 2: What makes the devices in Ergstown output or fail to output...

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

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

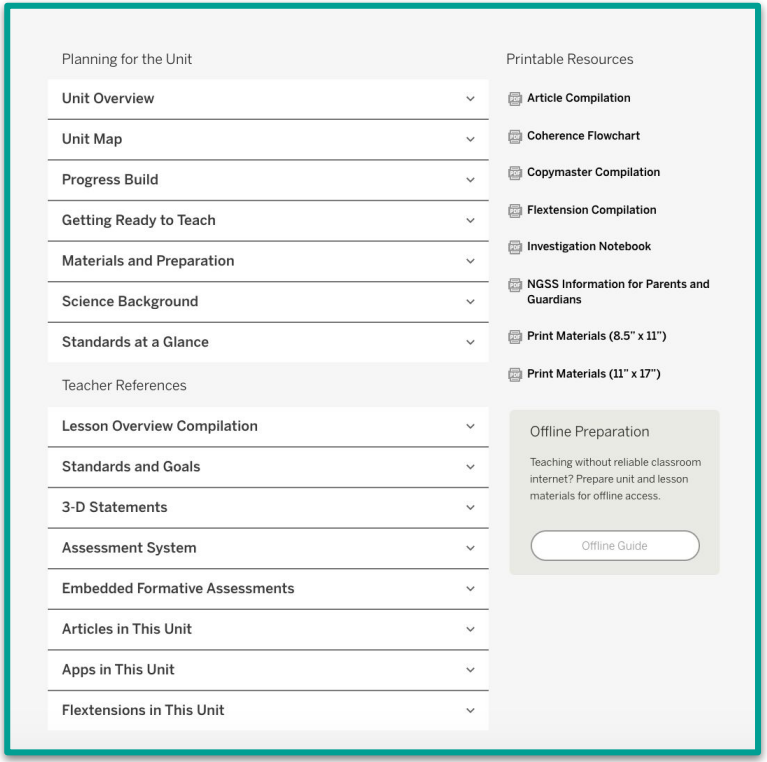
1 WRITING
Students Write Initial Explanations

2 TEACHER-LED DISCUSSION
Introducing the Problem

3 TEACHER-LED DISCUSSION
Introducing Investigation Notebooks

Amplify.

Unit Guide Resources



Unit Guide resources

Once a unit is selected, select **JUMP DOWN TO UNIT GUIDE** in order to access all unit-level resources in an Amplify Science unit.

Planning for the unit

Unit Overview	Describes what's in each unit, the rationale, and how students learn across chapters
Unit Map	Provides an overview of what students figure out in each chapter, and how they figure it out
Progress Build	Explains the learning progression of ideas students figure out in the unit
Getting Ready to Teach	Provides tips for effectively preparing to teach and teaching the unit in your classroom
Materials and Preparation	Lists materials included in the unit's kit, items to be provided by the teacher, and briefly outlines preparation requirements for each lesson
Science Background	Adult-level primer on the science content students figure out in the unit
Standards at a Glance	Lists Next Generation Science Standards (NGSS) (Performance Expectations, Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts), Common Core State Standards for English Language Arts, and Common Core State Standards for Mathematics

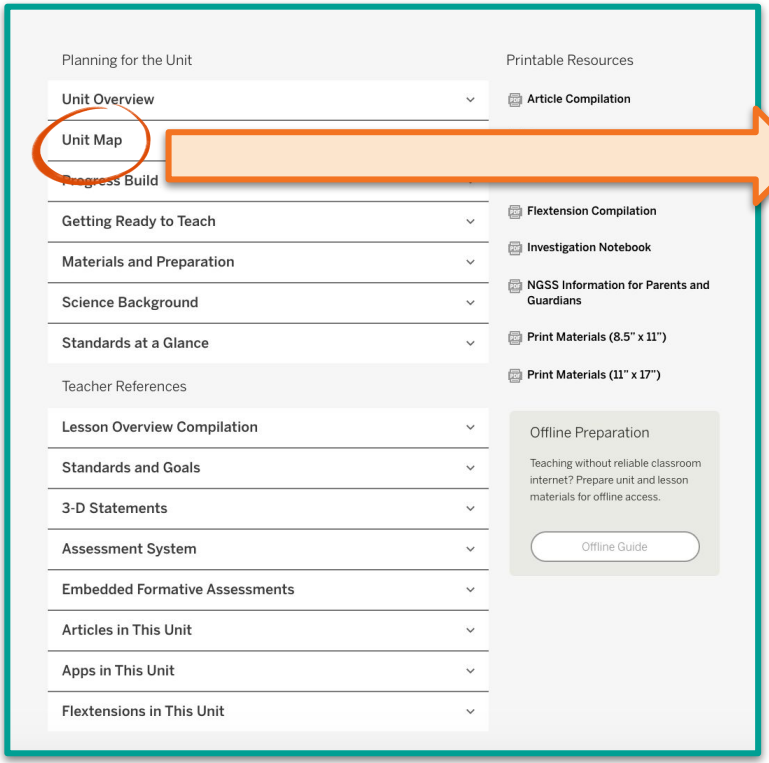
Teacher references

Lesson Overview Compilation	Lesson Overview of each lesson in the unit, including lesson summary, activity purposes, and timing
Standards and Goals	Lists NGSS (Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts) and CCSS (English Language Arts and Mathematics) in the unit, explains how the standards are reached
3-D Statements	Describes 3-D learning across the unit, chapters, and in individual lessons
Assessment System	Describes components of the Amplify Science Assessment System, identifies each 3-D assessment opportunity in the unit
Embedded Formative Assessments	Includes full text of formative assessments in the unit
Books in This Unit	Summarizes each unit text and explains how the text supports instruction
Apps in This Unit	Outlines functionality of digital tools and how students use them (in grades 2-5)

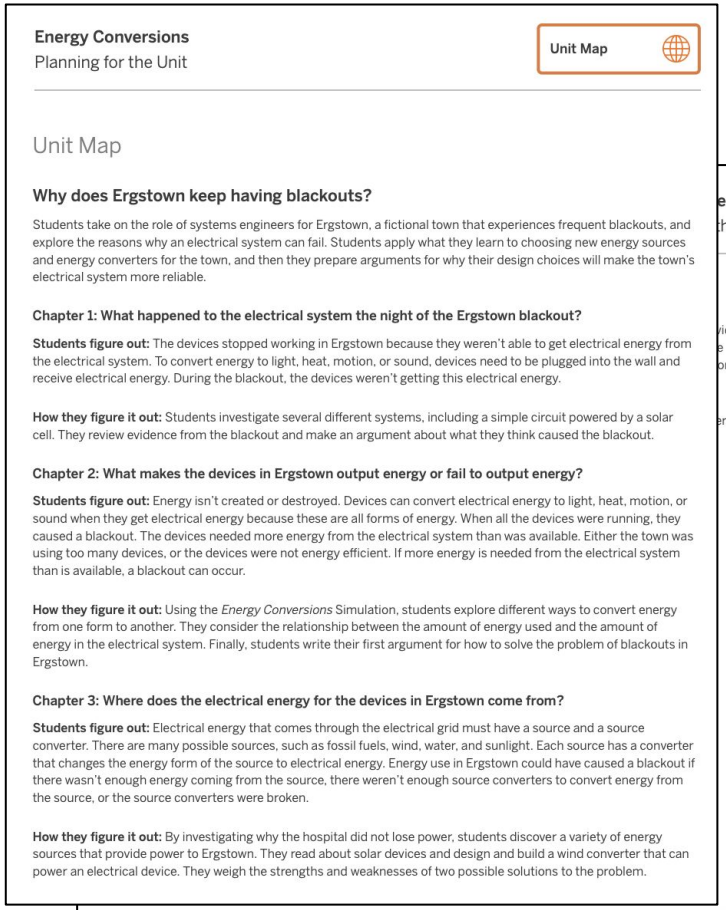
Printable resources

Copymaster Compilation	Compilation of all copymasters for the teacher to print and copy throughout the unit
Investigation Notebook	Digital version of the Investigation Notebook, for copying and projecting
Multi-Language Glossary	Glossary of unit vocabulary in multiple languages
Print Materials (8.5" x 11")	Digital compilation of printed cards (i.e. vocabulary cards, student card sets) provided in the kit
Print Materials (11" x 17")	Digital compilation of printed Unit Question, Chapter Questions, and Key Concepts provided in the kit

Unit Map



Pages 2-3



Energy Conversions
Planning for the Unit

Unit Map

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.

How they figure it out: By investigating why the hospital did not lose power, students discover a variety of energy sources that provide power to Ergstown. They read about solar devices and design and build a wind converter that can power an electrical device. They weigh the strengths and weaknesses of two possible solutions to the problem.

Applying conceptual understanding to explain the phenomenon

Use ideas from the Progress Build and Unit Map to make notes about the conceptual and explanatory builds in your unit.

	Science concepts	Explanation of the phenomenon
	Students figure out...	*So they can explain...*
Chapter 1	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 electrical energy.
Chapter 2		

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.

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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.

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Chapter 2	Energy isn't created or destroyed. Light, heat, motion or sound are all forms of energy.	When all the devices were running, they caused a blackout. Either the town was using too many devices or the devices were not energy efficient
Chapter 3		
Chapter 4		

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.

How they figure it out: By investigating why the hospital did not lose power, students discover a variety of energy sources that provide power to Ergstown. They read about solar devices and design and build a wind converter that can power an electrical device. They weigh the strengths and weaknesses of two possible solutions to the problem.

	forms of energy.	town was using too many devices or the devices were not energy efficient
Chapter 3	Electrical energy that comes through the electrical grid must have a source and a source converter. Fossil fuels, windm water and sunlight are sources of energy.	Energy use in Ergstown caused the blackout.
Chapter 4		

Applying conceptual understanding to explain the phenomenon

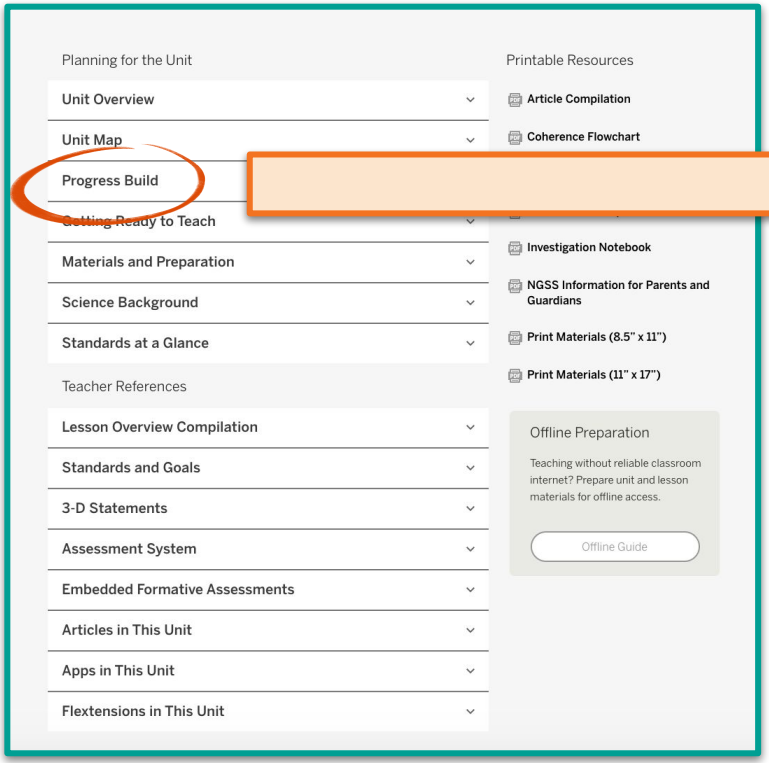
Chapter 4: How does energy get to the devices all over Ergstown?

Students figure out: The energy that comes from the source is transferred through the electrical grid. The devices won't function if the wires that connect the source converter and the devices are broken. This can happen if the connections between the grid and the converters aren't strong enough, if the wires aren't in a secure location, or if there aren't enough backup wires.

How they figure it out: Students review evidence from Ergstown and analyze the efficiency of various converters. They assess different improvements to the electrical system and design and present two possible "best" solutions.

	movement of particles results in a sound wave.	the calf hears the sound
Chapter 3	Electrical energy that comes through the electrical grid must have a source and a source converter. Fossil fuels, windm water and sunlight are sources of energy.	Energy use in Ergstown caused the blackout.
Chapter 4	The energy that comes from the source i transferred through the electrical grid.	Evidence from Ergstown shows that the various converters were not efficient.

Progress Build



Energy Conversions
Planning for the Unit

Progress Build

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.

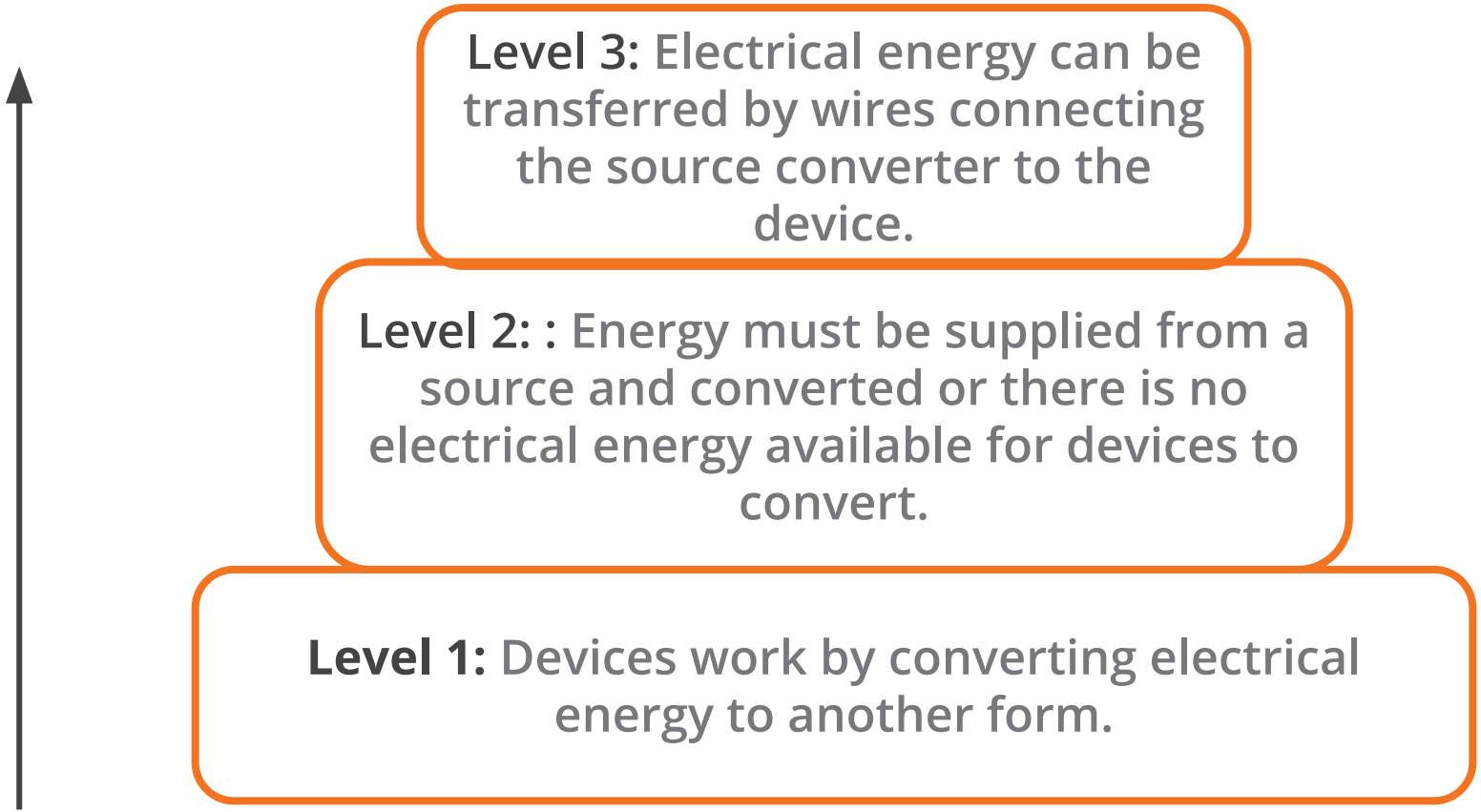
Progress Build Level 2: Energy must be supplied from a source and converted or there is no electrical energy available for devices to convert.

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 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). **Electrical energy can be transferred by wires connecting the source converter to the device. If that connection is broken, the wires cannot play their role and the system does not function.**

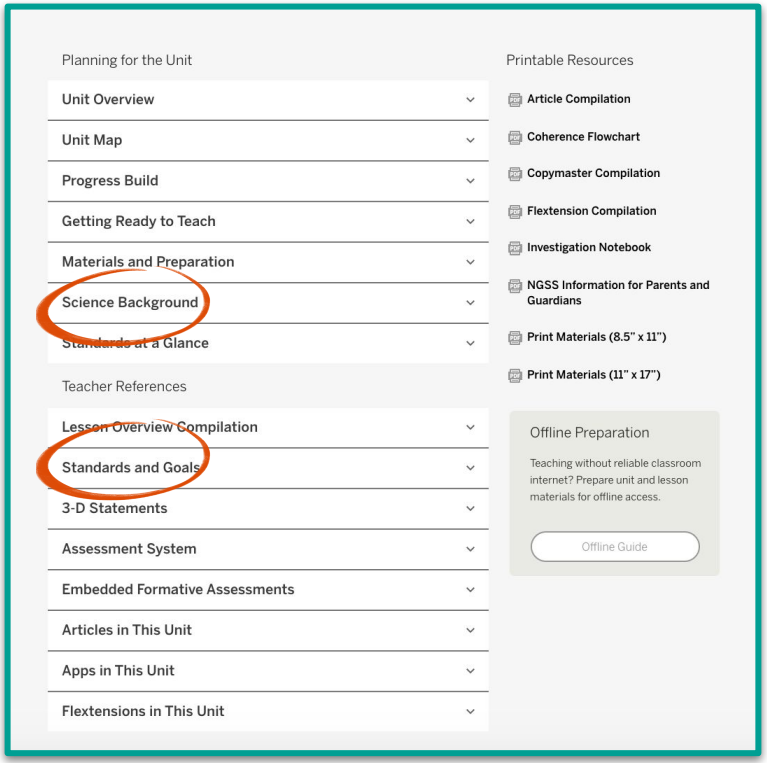
Progress Build



Additional science concept resources for teachers

Science Background:
Adult-level summary of unit science concepts

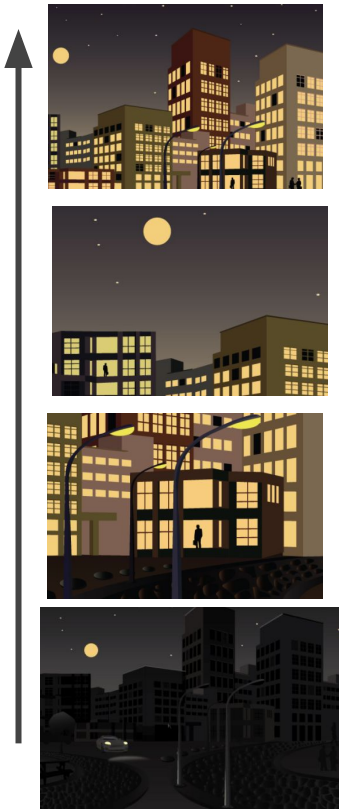
Standards and Goals:
Information about NGSS standards and how they're achieved in the unit



Key Takeaway

Conceptual build and explanatory build

Throughout the unit, students' conceptual understanding grows deeper, allowing their explanations of the phenomenon to become more complete and complex.



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

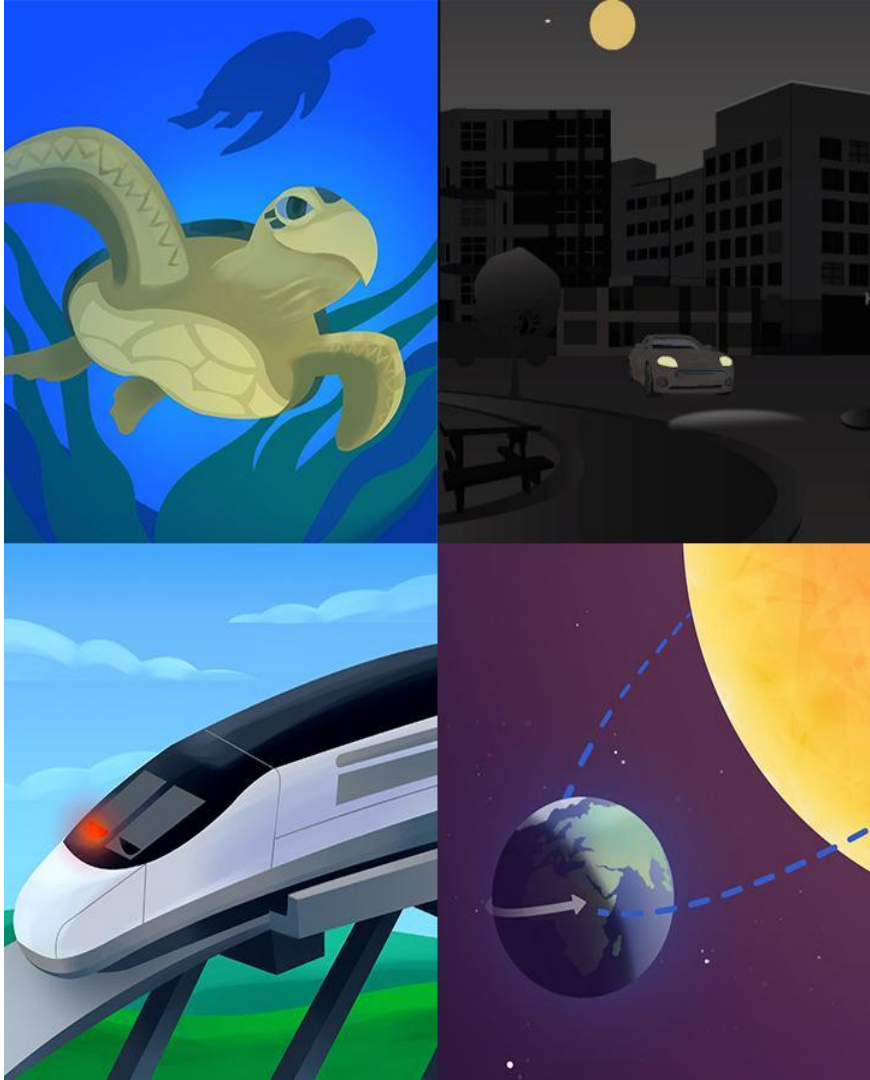
Level 2: : Energy must be supplied from a source and converted or there is no electrical energy available for devices to convert.

Level 1: Devices work by converting electrical energy to another form.

Reflection

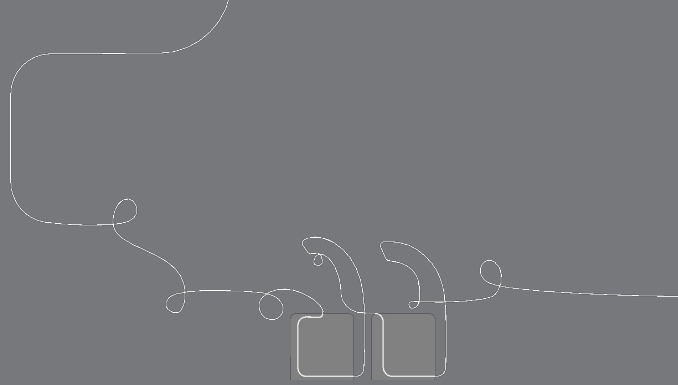
Jamboard

How will understanding the unit's **storyline** help you during **remote instruction**?

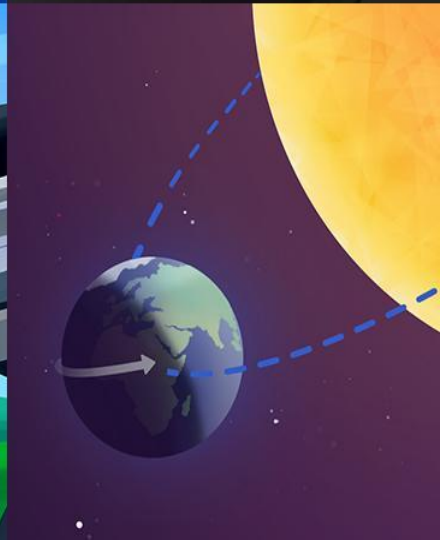


How will understanding the unit's storyline help you during hybrid instruction?

I'll ask my students what they're wondering at the end of each chapter.



Questions?

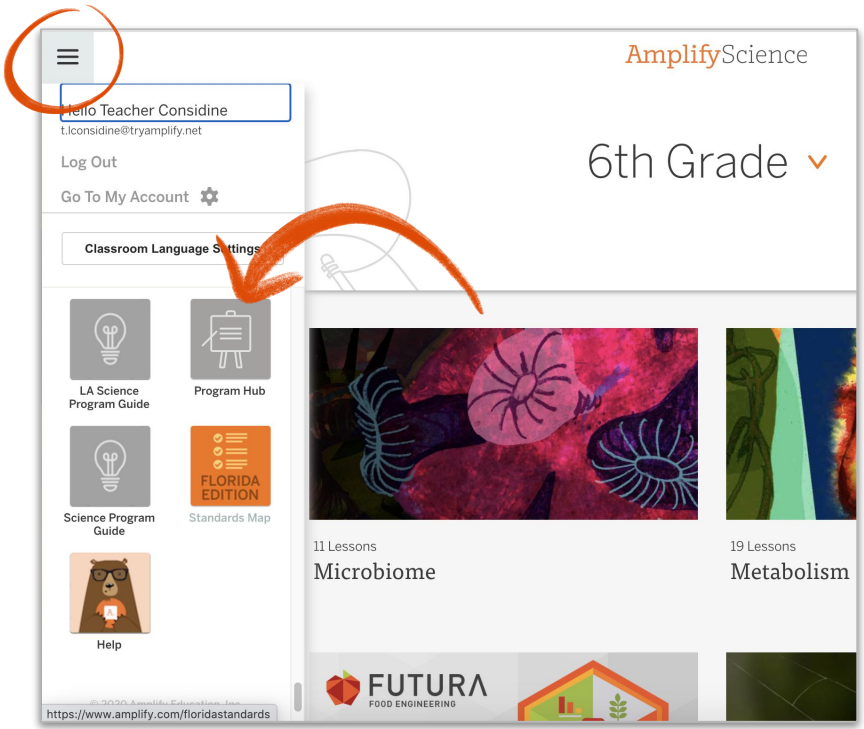



Plan for the day

- **Framing the day**
  - Remote learning reflection
  - Revisiting the Amplify Approach
- **Phenomenon at the unit level**
  - Navigation refresher (standard curriculum)
  - Storyline and science concepts
  - Unit internalization work time
- **Planning to teach**
  - Navigation refresher (@Home resources)
  - Lesson walkthrough
  - Collaborative planning time
- **Closing**
  - Reflection & survey

Accessing the Program Hub

Page 6



Amplify Science@Home resources reference

Use this guide to keep track of the different resources available for remote and hybrid learning.

Instructional materials: Click Remote and hybrid learning resources, then select your grade level from the dropdown menu. Select your unit.	
@Home Unit resources: These will appear when you select your unit.	
Teacher Overview	General information for teaching with @Home Units, planning information, chapter and lesson outlines
Lesson Index	Lists the original Amplify Science lessons associated with each @Home lesson, and the Investigation Notebook pages, copymasters, and print materials associated with the @Home Unit Student Sheets
Family Overview	Information to send home to families to help them support students with remote learning
Student lesson materials for @Home Units	Printable or digital lessons condensed to be about 30 minutes long. You can access compilations of all student materials for your unit, or select from individual lessons.
@Home Video resources: After selecting your grade level and unit, select the @Home Videos tab below your unit title.	
@Home Video links	Links to video lessons that include all activities from the original units. Lesson playlists are on YouTube, and they autoplay in a playlist form.
Additional remote and hybrid instructional materials: These can be accessed from the tabs below your unit title.	
Hands-on investigations support	Videos of every unit's hands-on activities (note, these videos also appear in the student lesson materials).
Read-aloud videos	Link to a YouTube playlist of read-aloud videos of all books in your unit.
Orientation and Tutorials: Click Remote and hybrid learning resources, then select your grade from the dropdown menu. Click Orientation and Tutorials. You'll not only find videos to help you use the resources, but also videos you can share with students and caregivers.	

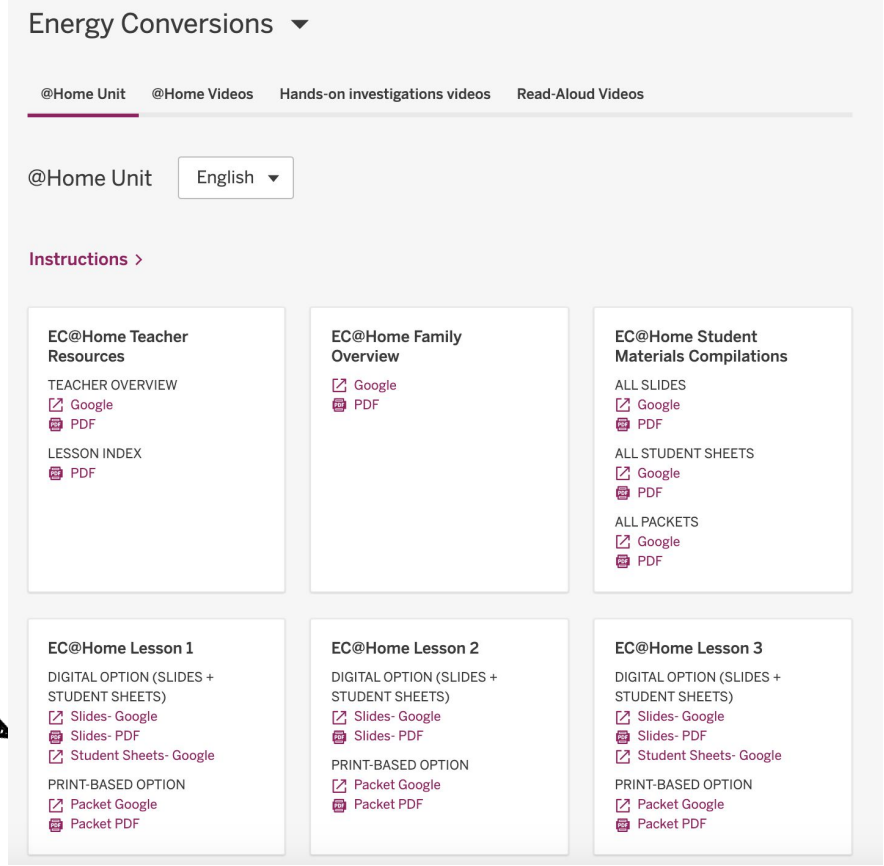
Program Hub work time

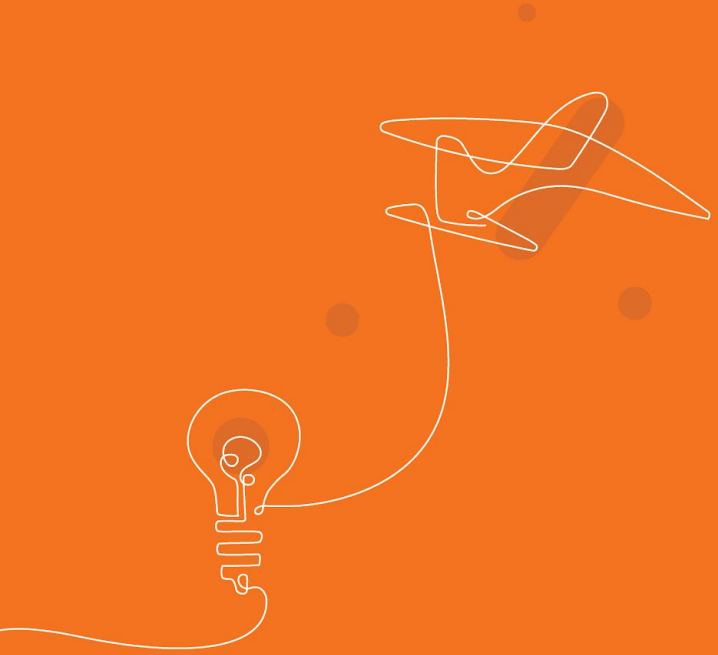
5 minutes

Navigate to the Program Hub. Open:

- Teacher Overview
- Lesson Index
- @Home Lesson 1
  - Slides- Google
  - Student Sheets- Google

If you have extra time, explore the other tabs.





Lesson Walkthrough

@Home Lesson 1

Adapted from: Amplify Science *Energy Conversions* Lesson 1.1

Key Activities

- **Write:** Students complete a pre-unit writing activity to provide insight to their ideas about the electrical system.
- **Introducing Ergstown:** Students are introduced to the unit problem and their role as systems engineers.

@Home Slides

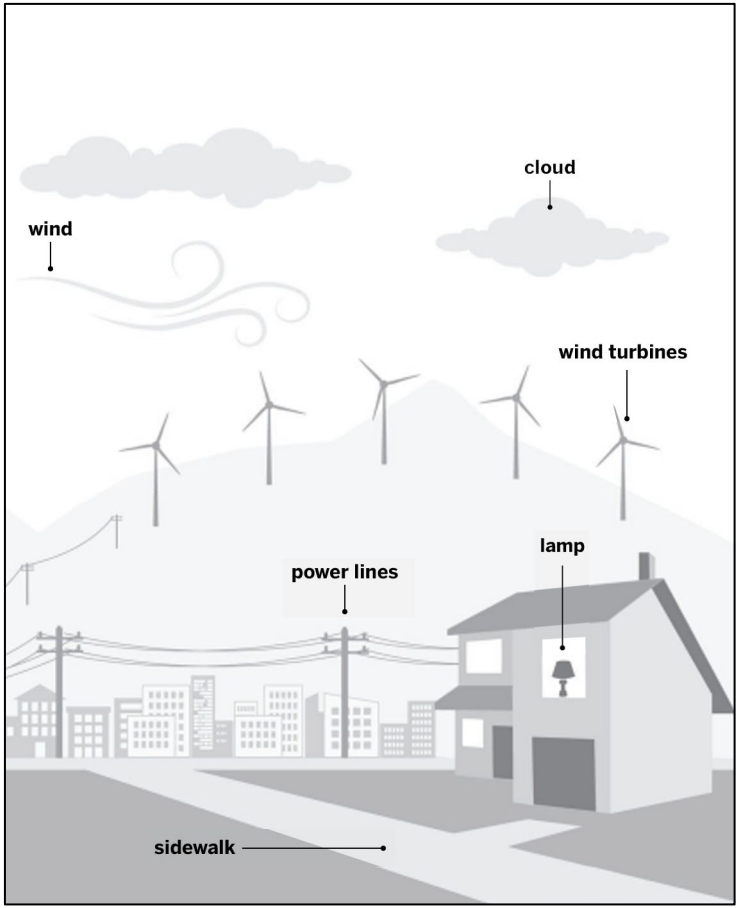
Energy Conversions

AmplifyScience

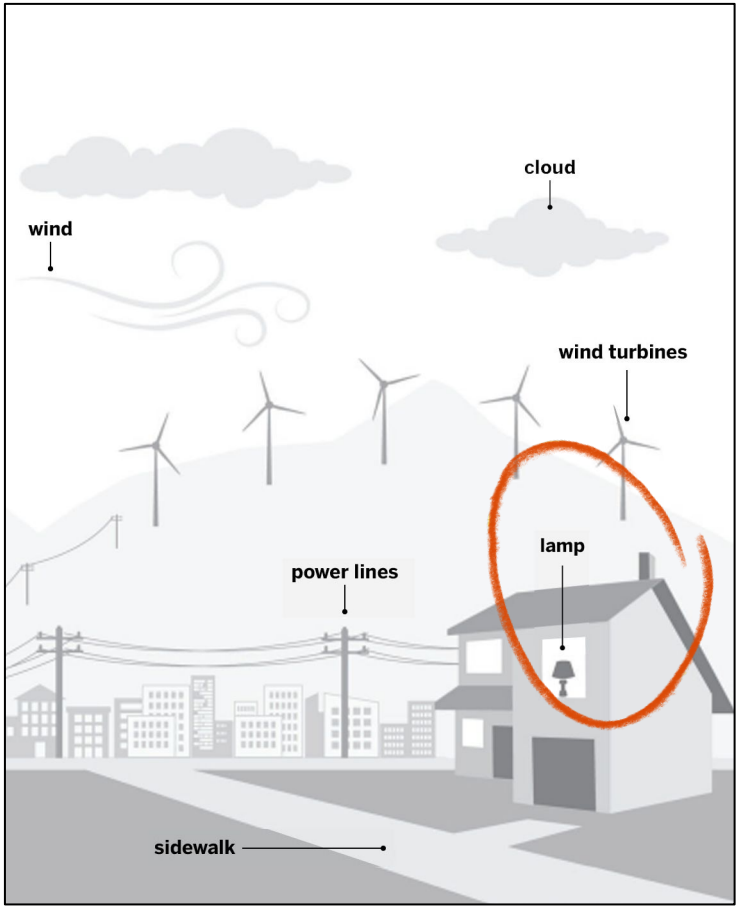
@Home Lesson 1

Energy Conversions

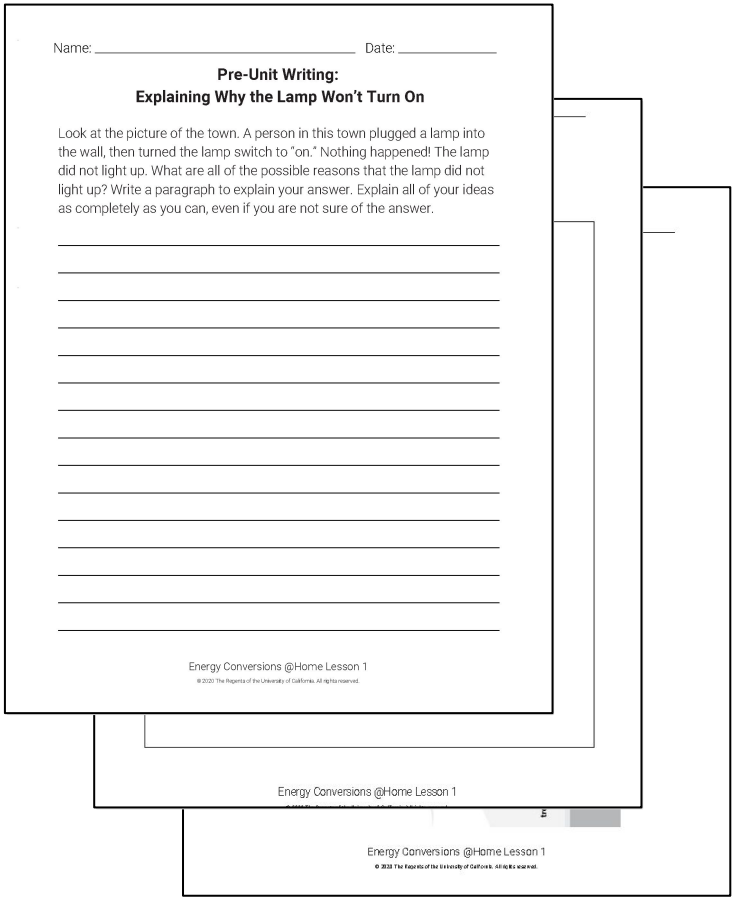
AmplifyScience



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



To start, we will write about why the lamp in this house will not turn on.



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

You are not expected to know everything about why the lamp won't turn on. Just **write and draw your first ideas**.

@Home Lesson 1

Adapted from: Amplify Science *Energy Conversions* Lesson 1.1

Key Activities

- **Write:** Students complete a pre-unit writing activity to provide insight to their ideas about the electrical system.
- **Introducing Ergstown:** Students are introduced to the unit problem and their role as systems engineers.

Ergstown

Now let's think about the problem that we'll investigate for the rest of this unit.

This picture shows a town called **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?

Ergstown has a problem with **blackouts**. During a blackout, all the power in a city goes out. Blackouts happen much more often in Ergstown than in other places.

Have you ever been in a blackout? What was it like?
Why might blackouts be a problem?

Go to the Jamboard link and jot your ideas about these questions.
(Teachers you can use Jamboard or a different discussion board to get students to participate in the discussion virtually.

Read the message from Ergstown’s mayor on the next slide.

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!

To figure out why Ergstown has frequent blackouts and how to prevent them, we will work to answer this question throughout this unit:

Unit Question

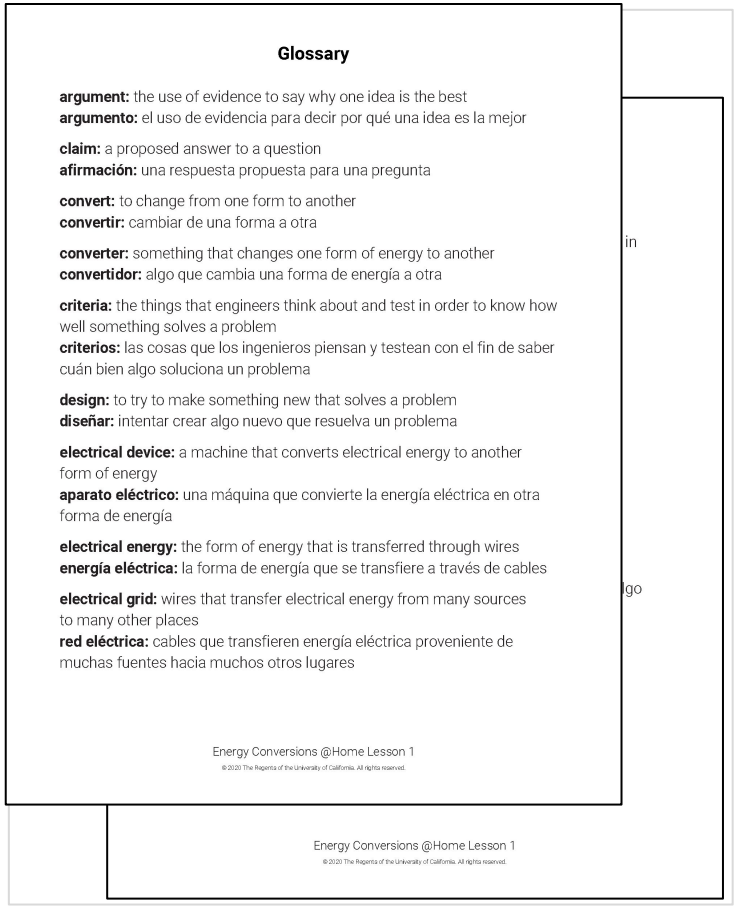
How does the electrical system work?

You will be a systems engineer for Ergstown.

As a **systems engineer**, you'll figure out more about blackouts to solve Ergstown's problem.

We will be learning new science words throughout this unit.
Here is a new word that describes your role.

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



Glossary

argument: the use of evidence to say why one idea is the best
argumento: el uso de evidencia para decir por qué una idea es la mejor

claim: a proposed answer to a question
afirmación: una respuesta propuesta para una pregunta

convert: to change from one form to another
convertir: cambiar de una forma a otra

converter: something that changes one form of energy to another
convertidor: algo que cambia una forma de energía a otra

criteria: the things that engineers think about and test in order to know how well something solves a problem
criterios: las cosas que los ingenieros piensan y testean con el fin de saber cuán bien algo soluciona un problema

design: to try to make something new that solves a problem
diseñar: intentar crear algo nuevo que resuelva un problema

electrical device: a machine that converts electrical energy to another form of energy
aparato eléctrico: una máquina que convierte la energía eléctrica en otra forma de energía

electrical energy: the form of energy that is transferred through wires
energía eléctrica: la forma de energía que se transfiere a través de cables

electrical grid: wires that transfer electrical energy from many sources to many other places
red eléctrica: cables que transfieren energía eléctrica proveniente de muchas fuentes hacia muchos otros lugares

Energy Conversions @Home Lesson 1

Energy Conversions @Home Lesson 1

You have a **Glossary** you can use if you need to find definitions for science words we are using throughout the unit.

In the next @Home Lesson, we'll work to understand more about **systems** in our role as systems engineers.

End of @Home Lesson

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Amplify.

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@Home Lesson 1

Adapted from: Amplify Science *Energy Conversions* Lesson 1.1

Key Activities

- **Write:** Students complete a pre-unit writing activity to provide insight to their ideas about the electrical system.
- **Introducing Ergstown:** Students are introduced to the unit problem and their role as systems engineers.

Ideas for synchronous or in-person instruction

While meeting, introduce the phenomenon. Have students discuss their initial ideas about what happened in Ergstown and share their experiences with blackouts.

Suggestions for Online Synchronous Time

Online synchronous time

Online discussions: It's worthwhile to establish norms and routines for online discussions in science to ensure equity of voice, turn-taking, etc.

Digital tool demonstrations: You can share your screen and demonstrate, or invite your students to share their screen and think-aloud as they use a Simulation or other digital tool.

Interactive read-alouds: Screen share a digital book or article, and pause to ask questions and invite discussion as you would in the classroom.

Shared Writing: This is a great opportunity for a collaborative document that all your students can contribute to.

Co-constructed class charts: You can create digital charts, or create physical charts in your home with student input.

page 7

Questioning Strategies

Pages 8-9

- Questions to assess students' knowledge and skills
- Questions to promote student-to-student discourse
- Questions to guide student learning

Questioning Strategies for Grades 2–5

Overview of the Role of Open-Ended Questioning

Repeated opportunities for students to listen to and speak with others are essential for promoting deep thinking and learning in science. Meaningful teacher-initiated questions create a rich context for promoting open-ended student dialogue and discussion. The *Science Framework for California Public Schools* explains that "Simply providing opportunities to talk is not enough. Effective questioning can scaffold student thinking" (*California Science Framework*, 2016, Chapter 11, p. 21). The Framework suggests that "Teacher-initiated questions are key to helping students expand their communication, reasoning, arguments, and representation of ideas in science" (*California Science Framework*, 2016, Chapter 11, p. 21). The types of questions that teachers pose are instrumental in supporting student understanding. The Framework calls for more open-ended teacher questioning that "prompts and facilitates students' discourse and thinking" and less teacher questioning that prompts "students to seek a confirmatory right answer" (*California Science Framework*, 2016, Chapter 11, p. 6).

The Amplify Science Teacher's Guide is infused with opportunities for students to discuss their developing ideas in response to open-ended prompts. Questions to promote student thinking and discussion are purposefully built into the Teacher's Guide instructional steps and Teacher Support notes that surround all our hands-on and reading activities. In addition, all units include discourse routines (e.g., Shared Listening, Think-Draw-Pair-Share, Write and Share, Word Relationships) that provide opportunities for students to use focal unit vocabulary as they think and talk with partners and the class about their understanding of key science content and practices. Many of the On-the-Fly Assessment suggestions provided throughout each unit offer open-ended follow-up questions that can be used to probe student thinking and formatively assess student understanding of the content. In addition, each unit includes multiple opportunities for students to respond to open-ended questions through additional modalities (e.g., in writing, with diagrams, through a kinesthetic model).

While the prompts embedded in each of the opportunities mentioned above provide fertile ground for student discussion, continued use of flexible, open-ended questions is invaluable for assessing students' knowledge and skills, promoting student-to-student discourse, and guiding student learning. A collection of grade-appropriate questions follows that can be used for these purposes. You will also find a list of activity types included within the Amplify Science curriculum that are particularly conducive to the use of these questions. You may choose to print out these questions and activity types for reference throughout your instruction.

- Discourse routines (e.g., Thought Swap, Think-Draw-Pair-Share)
- Science Practice Tool activities (modeling, sorting, graphing, diagramming, data)
- Simulation activities (grades 4–5)
- Evidence Card sorts
- Evidence Circles
- Roundtable Discussions

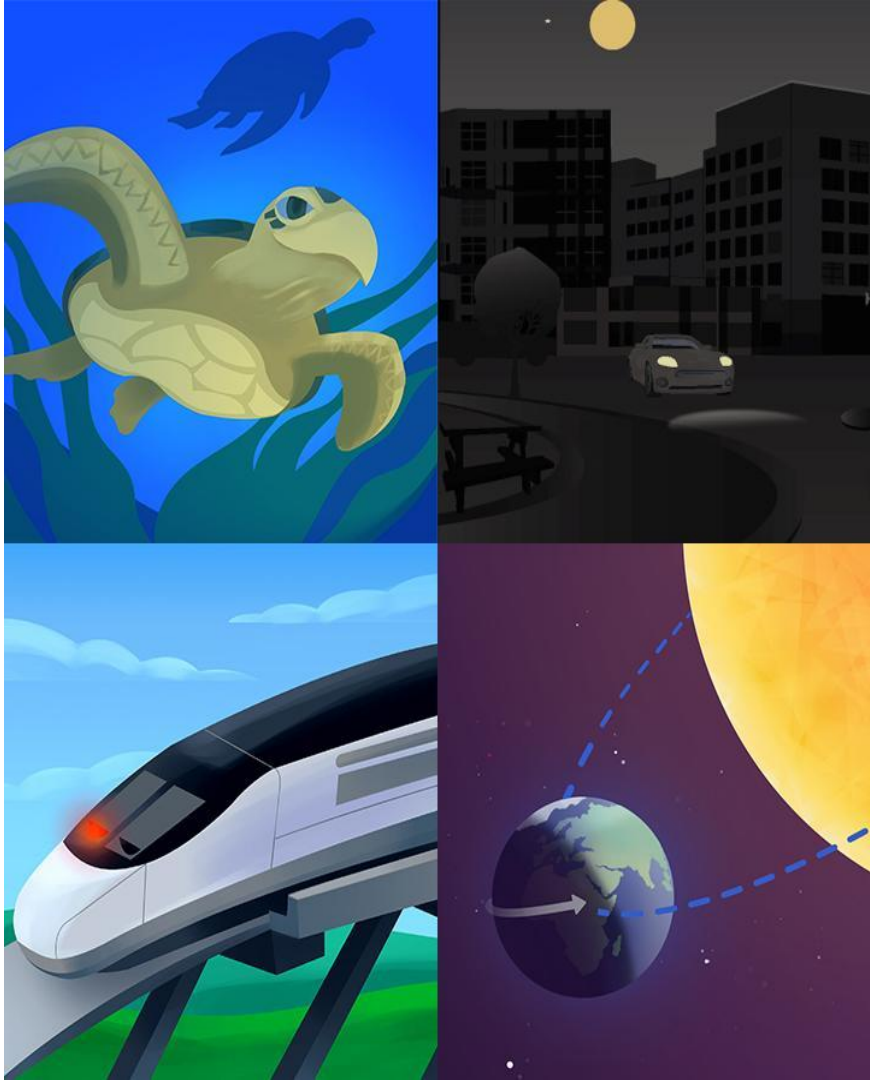
Hands-on Suggestions

Grade 4			Unit: Energy Conversions		Hands-On Investigation Video Playlist				
Lesson	**Activity**	**@Home Lesson**	**Activity Description**	**Suggested Modality**	**Reasoning**	**Teacher/Student Provided Materials**	**Consumable Materials**	**Consumable Mat**	**Replacement M**
1.3	1	3	Students build a simple electrical system (a simple circuit) powered by a solar panel.	watch video	Safety Note: In this activity, students build a simple electrical system. Ensure that students do not clip the alligator clips to their skin; while there is no danger of electrical shock, the clips themselves can damage skin and cause pain. Ensure that students keep the moving fan away from their faces. All electrical investigation materials should be kept away from electrical outlets and water. If you choose to use a lamp with an incandescent bulb to power your students' circuits, secure the lamp and caution students not to touch the bulb or the top of the lamp as they will both grow hot very quickly.				
1.5	1	5	Students build simple electrical systems and observe devices that produce motion, light, or sound as energy outputs	watch video					
2.2	1	8	Students use the Energy Conversions Sorting Tool to identify the input and output energy forms of various energy converters.	hands-on	Students will access the sorting tool in the student apps page of Amplify Science.		NA	NA	
2.3	2	9	Students receive a message from the City Planner explaining recent changes in Ergstown. They discuss the changes and sort them into categories	hands-on					
2.3	4	9	The teacher uses a model to demonstrate the concept of limited energy in the electrical system.	hands-on	Students will access the sorting tool in the student apps page of Amplify Science. Teacher will demonstrate or use the video to show what happens when multiple devices are plugged into one system.	Changes in Ergstown Cards			
3.2	2	12	Using the Energy Conversions Sorting Tool, partners sort energy converters based on their function in the electrical system.	hands-on	Studens will access the sorting tool in the student apps page of Amplify Science.				

Reflection

Jamboard

How would you teach this lesson?
How might you include suggestions for online synchronous time and/or questioning strategies?



I would prioritize the group discussion during synchronous or in-person learning time.

Planning for @Home Lesson 1

How would you teach this lesson?
How might you include suggestions for online synchronous time and/or questioning strategies?

Multi-day planning, including planning for differentiation and evidence of student work

Day @Home Lesson 1	
Minutes for science: 15 min.	**Minutes for science:** _____
Instructional format: ☒ Asynchronous ☐ Synchronous	**Instructional format:** ☐ Asynchronous ☒ Synchronous
Lesson or part of lesson: Look at the slides and complete the worksheets (slides 1-4) (Pre-assessment)	**Lesson or part of lesson:**
Mode of instruction: ☒ Preview ☐ Review ☐ Teach full lesson live ☐ Teach using synchronous suggestions ☒ Students work independently using: ☐ Printed @Home Slides ☒ Digital @Home Slides ☐ @Home Videos	**Mode of instruction:** ☐ Preview ☐ Review ☐ Teach full lesson live ☐ Teach using synchronous suggestions ☐ Students work independently using: ☐ Printed @Home Slides ☐ Digital @Home Slides ☐ @Home Videos

Students will...	Teacher will...	Students will...	Teacher will...
View slides and write their initial ideas about why the lamp won't turn on.	Assign slides 1-4 in Schoology and also assign google sheets for the pre assessment in schoology.		

Multi-day planning, including planning for differentiation and evidence of student work

Day @Home Lesson 1

Minutes for science: 15 min.

Instructional format:
- [x] Asynchronous
- [ ] Synchronous

Lesson or part of lesson:
Look at the slides and complete the worksheets (slides 1-4) (Pre-assessment)

Mode of instruction:
- [x] Preview
- [ ] Review
- [ ] Teach full lesson live
- [ ] Teach using synchronous suggestions
- [x] Students work independently using:
  - [ ] Printed @Home Slides
  - [x] Digital @Home Slides
  - [ ] @Home Videos

Students will...
View slides and write their initial ideas about why the lamp won't turn on.

Teacher will...
Assign slides 1-4 in Schoology and also assign google sheets for the pre assessment in schoology.

Minutes for science: 30 min

Instructional format:
- [ ] Asynchronous
- [x] Synchronous

Lesson or part of lesson:
Introduce Ergstown and unit question and student role slides 5-13

Mode of instruction:
- [ ] Preview
- [ ] Review
- [ ] Teach full lesson live
- [x] Teach using synchronous suggestions
- [ ] Students work independently using:
  - [ ] Printed @Home Slides
  - [ ] Digital @Home Slides
  - [ ] @Home Videos

Students will...
Students will discuss what they think is happening in Ergstown. (Blackouts and why they are happening.)

Teacher will...
Introduce the unit question Hold a discussion about the blackouts in Ergstown .(Note:: create some interactive discussion board such as Jamboard to share answers to questions on slide 9. Introduce the glossary and assign in schoology. Build a virtual classroom wall.

Look at the *Students will* columns. What are students working in the lesson(s) that you could collect, review, or provide feedback on?
See Some Types of Written Work in Amplify Science to the right for guidance.

If there isn't a work product listed above, do you want to add one? Make notes below.

Asynchronous: students jot down their initial ideas

.

Some Types of Written Work in Amplify Science

- Daily written reflections
- Homework tasks
- Investigation notebook pages
- Written explanations (typically at the end of Chapter)
- Diagrams
- Recording pages for Sim uses, investigations, etc

How will students submit this work product to you?
See the Completing and Submitting Written Work tables to the right for guidance on how students can complete and submit work.

Asynchronous: students jot initial ideas on google sheets and submit prior to class synchronous lesson through schoology.

Synchronous: Students will discuss ideas about blackouts and their causes in a discussion board.

Completing Written Work	Submitting Written Work
• Plain paper and pencil (videos include prompts for setup) • (6-8) Student platform • Investigation Notebook • Record video or audio file describing work/answering prompt • Teacher-created digital format (Google Classroom, etc)	• Take a picture with a smartphone and email or text to teacher • Through teacher-created digital format • During in-school time (hybrid model) or lunch/materials pick-up times • (6-8) Hand-in button on student platform

How will you differentiate this lesson for diverse learners? (Navigate to the lesson level on the standard Amplify Science platform and click on differentiation in the left menu.)

Look at the *Students will* columns. What are students working in the lesson(s) that you could collect, review, or provide feedback on?
See Some Types of Written Work in Amplify Science to the right for guidance.

If there isn't a work product listed above, do you want to add one? Make notes below.

Asynchronous: students jot down their initial ideas

Synchronous: record observations of dolphin sounds.

Some Types of Written Work in Amplify Science

- Daily written reflections
- Homework tasks
- Investigation notebook pages
- Written explanations (typically at the end of Chapter)
- Diagrams
- Recording pages for Sim uses, investigations, etc

How will students submit this work product to you?
See the Completing and Submitting Written Work tables to the right for guidance on how students can complete and submit work.

Asynchronous: students jot initial ideas on paper or digitally to bring with them to the asynchronous lesson

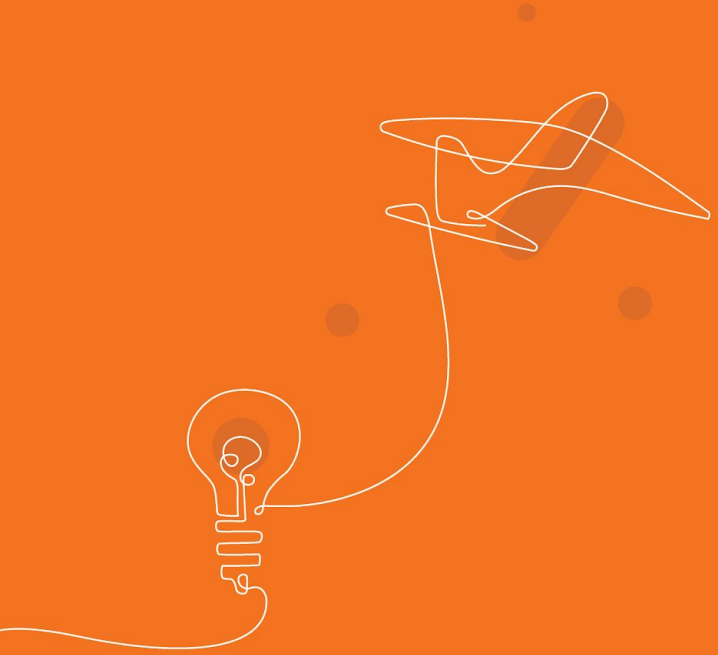
Synchronous: Students will use the student sheets to record their observations and complete the pre unit assessment and submit through Schoology.

Completing Written Work	Submitting Written Work
• Plain paper and pencil (videos include prompts for setup) • (6-8) Student platform • Investigation Notebook • Record video or audio file describing work/answering prompt • Teacher-created digital format (Google Classroom, etc)	• Take a picture with a smartphone and email or text to teacher • Through teacher-created digital format • During in-school time (hybrid model) or lunch/materials pick-up times • (6-8) Hand-in button on student platform

How will you differentiate this lesson for diverse learners? (Navigate to the lesson level on the standard Amplify Science platform and click on differentiation in the left menu.)

Supports:

- Encourage students to engage in student-to-student discussion
- Provide students with the Multi-Language Glossary where appropriate, add images
- Leverage primary language for discussions
- Strategic grouping



Collaborative Planning

Breakout groups

pages 12-15

Discussion prompts

Planning:

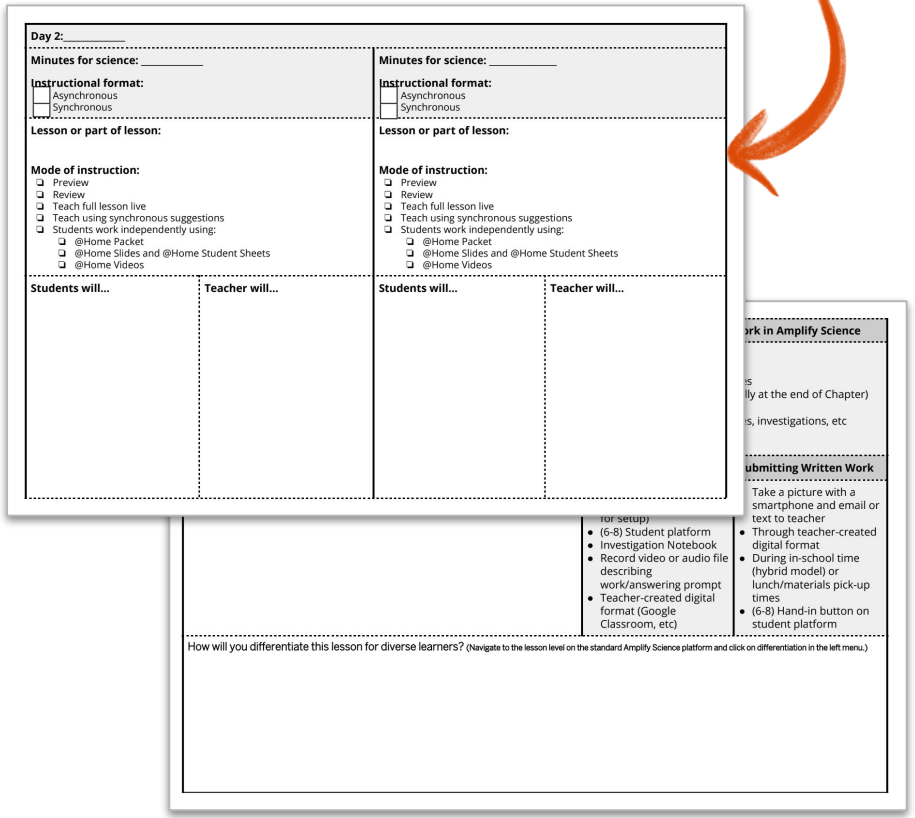
- Dig into the @Home Resources for lesson 2. Discuss what you will prioritize for synchronous vs. asynchronous time

Student work:

- Discuss how you can collect evidence of student work

Differentiation:

- Consider how you might differentiate the lesson for diverse learners



Breakout groups

Please choose a person from your group to share out!

Planning:

- What did you will prioritize for synchronous vs. asynchronous time?

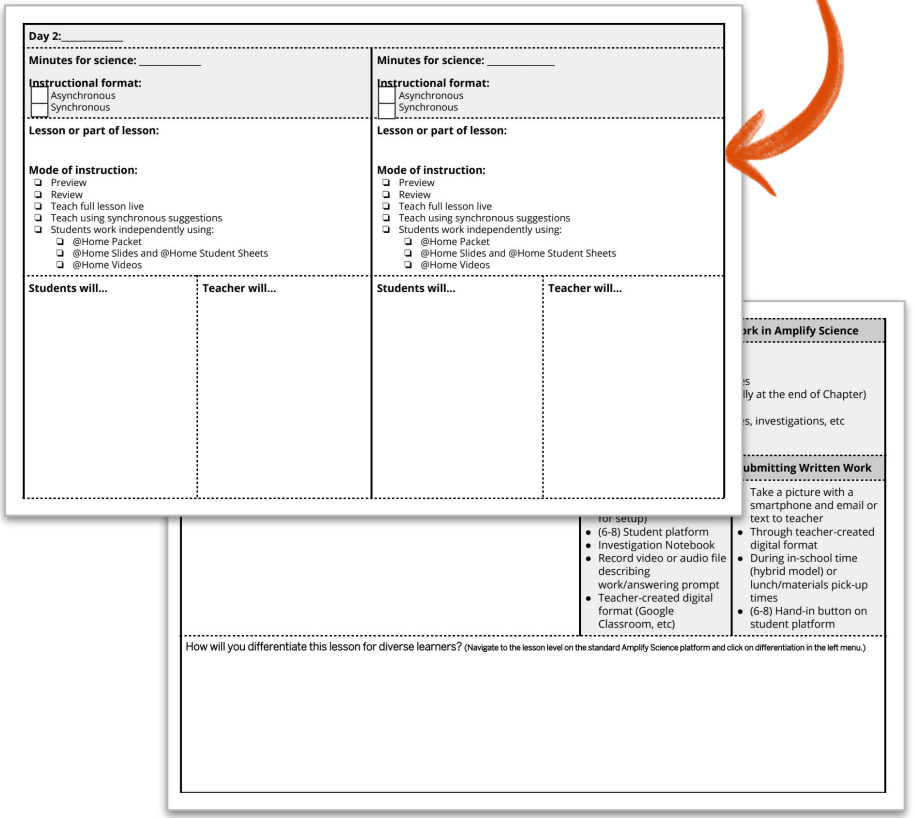
Student work:

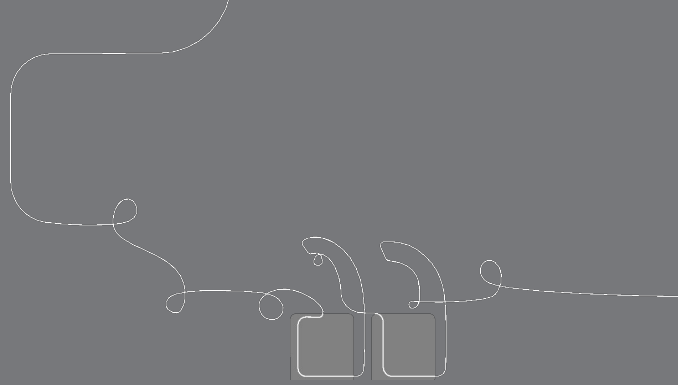
- How do you plan to collect evidence of student work?

Differentiation:

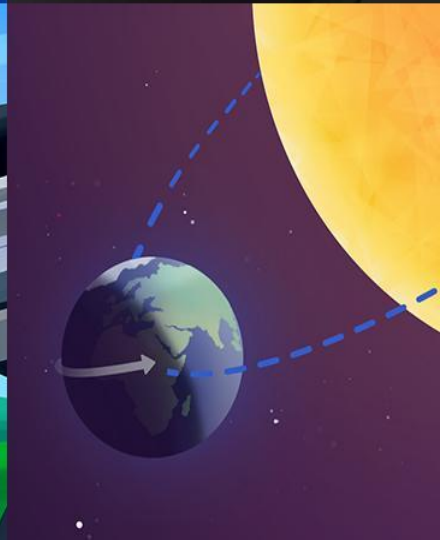
- How do you plan to differentiate the lesson for diverse learners?

pages 12-15





Questions?

Plan for the day

- **Framing the day**
  - Remote learning reflection
  - Revisiting the Amplify Approach
- **Phenomenon at the unit level**
  - Navigation refresher (standard curriculum)
  - Storyline and science concepts
  - Unit internalization work time
- **Planning to teach**
  - Navigation refresher (@Home resources)
  - Lesson walkthrough
  - Collaborative planning time
- **Closing**
  - Reflection & survey

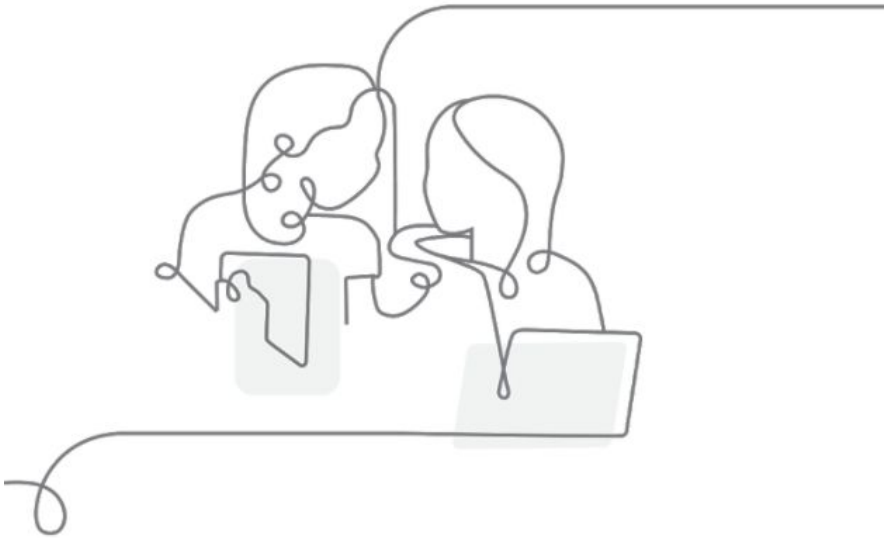
Head or hands reflection

Reflect independently, then volunteer to share

Based on our work today....

Head: What will you keep in mind while you plan?

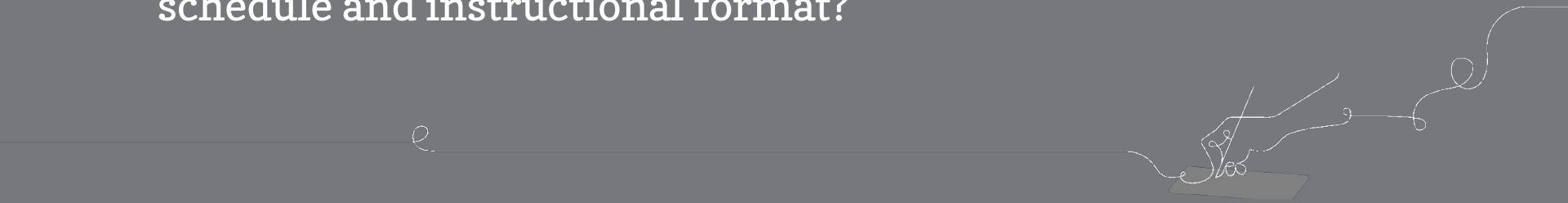
Hands: What will you do when you're teaching?

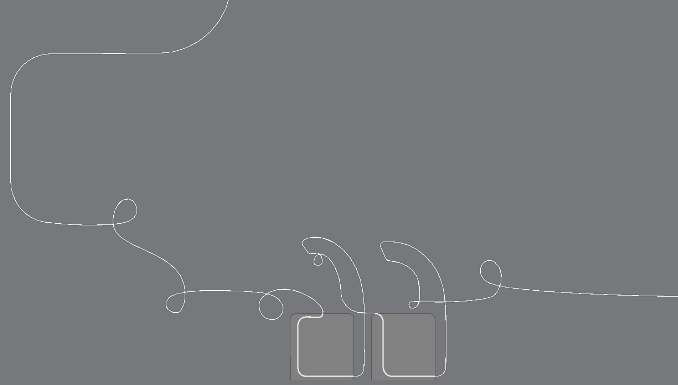


During this workshop did we meet our objectives?

Do you feel able to…

- Describe how students' conceptual understanding builds through the unit?
- Explain how students figure out the phenomenon throughout the unit?
- Make a plan for implementing Amplify Science within your class schedule and instructional format?



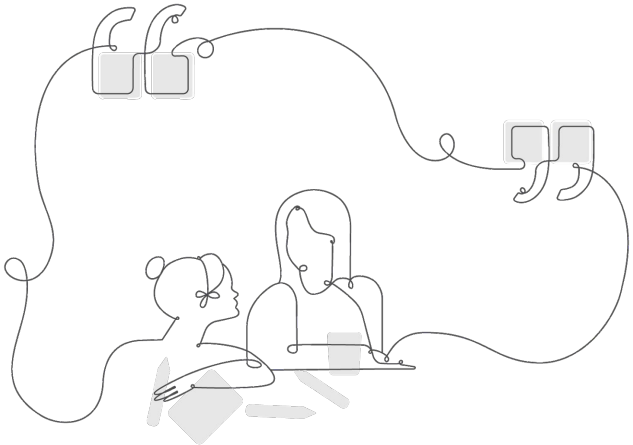


Final questions?

Upcoming LAUSD Office Hours

Twice Monthly on Thursdays, 4:30-5:30pm:

- April 8
- April 22
- May 13
- May 27

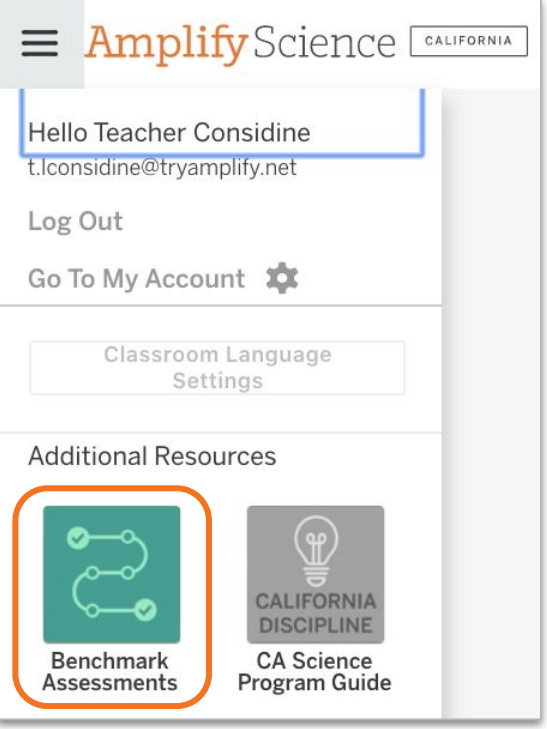


http://bit.ly/TK-6OfficeHours

We would love your input on PD for Back to School, 2021-22

2021-22 Amplify Science BACK TO SCHOOL PD Survey [LAUSD]

The questions below will help us plan for back to school PD sessions over the summer and in the fall.



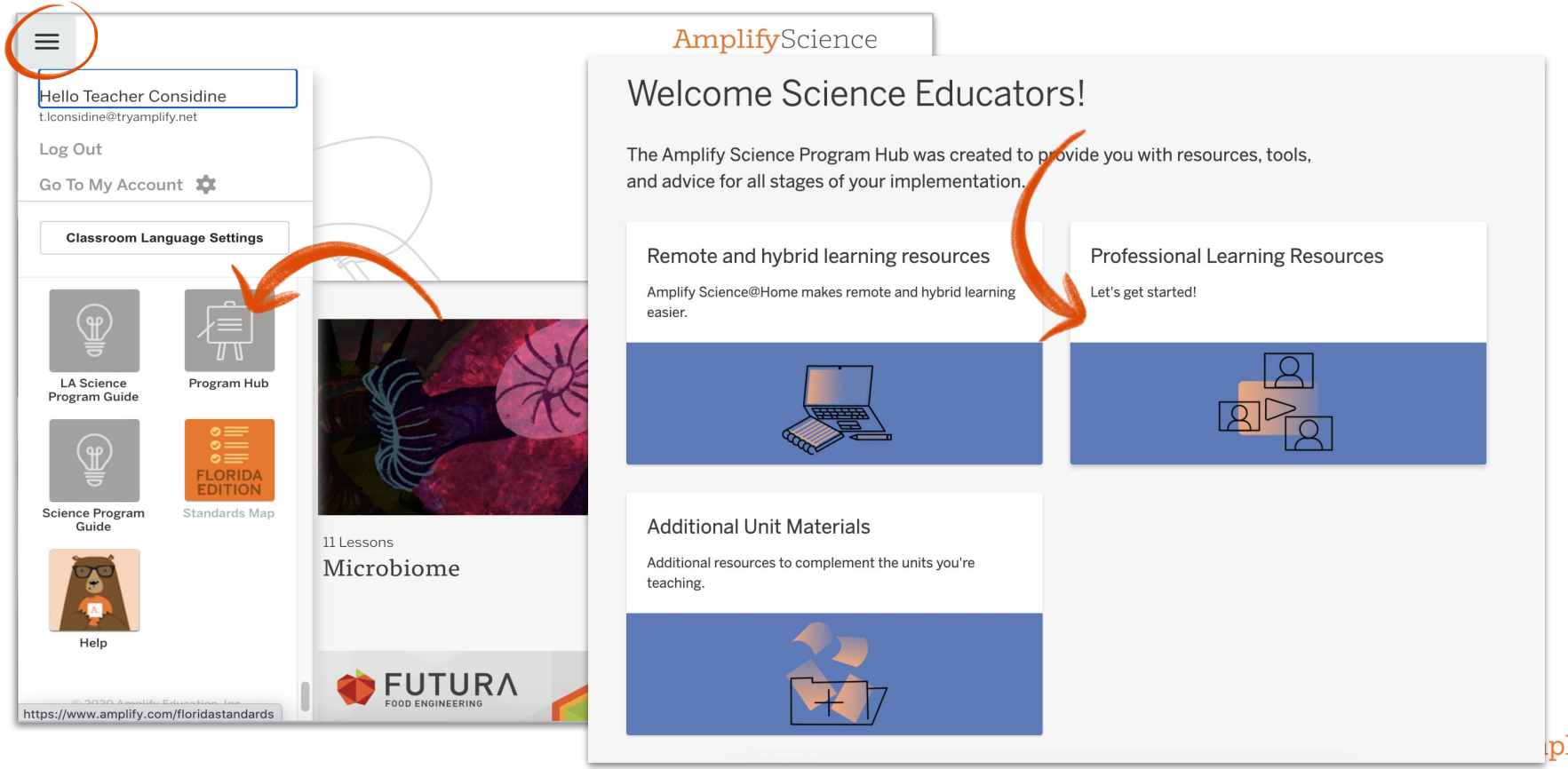
Benchmark Assessments

In conjunction with Amplify Science, teachers can administer benchmark assessments to evaluate students' progress toward meeting Next Generation Science Standards several times each school year.

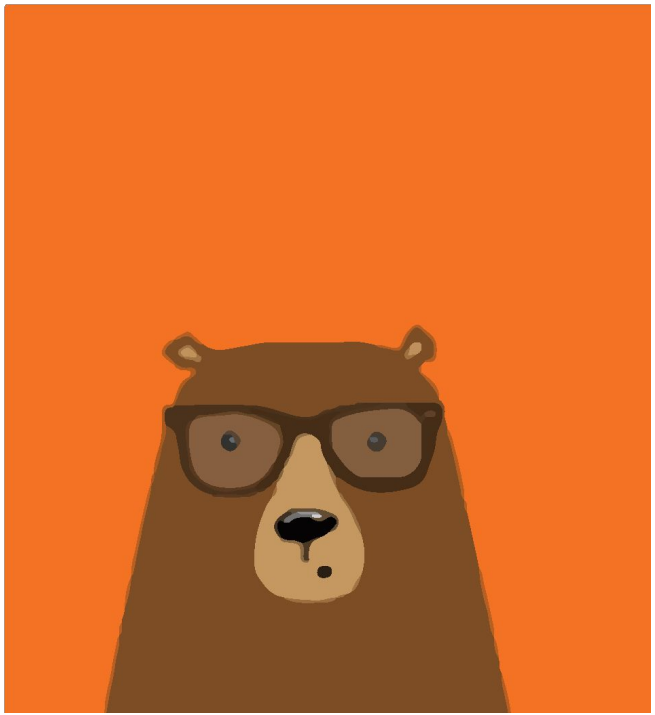
Designed to test all standards across grades 3-8. The assessment forms are paced to align with the Amplify Science curriculum sequence.

Benchmark Assessment Summary		
Grades 3-5	4 benchmarks per grade	14-15 items per form

Program Hub: Self Study Resources



Additional Amplify resources



Program Guide

Glean additional insight into the program's structure, intent, philosophies, supports, and flexibility.

https://cascience.wpengine.com/content/welcome-k-8/integrated-model/

Amplify Help

Find lots of advice and answers from the Amplify team.

my.amplify.com/help

Additional Amplify Support

Customer Care

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

scihelp@amplify.com

800-823-1969

Amplify Chat

When contacting the customer care team:

- Identify yourself as an Amplify Science user.
- Note the unit you are teaching.
- Note the type of device you are using (Chromebook, iPad, Windows, laptop).
- Note the web browser you are using (Chrome or Safari).
- Include a screenshot of the problem, if possible.
- Copy your district or site IT contact on emails.

Creating Assignments in Schoology

- Click Add Materials.
- Select Add Assignment.
- Fill out the Create Assignment form.
- Options. Use Options to turn on/off the following features: Use Individually Assign to only display the assignment to a specific member of the course or a grading group.
- Click Create to complete

LAUSD Shared Logins

AmplifyScience

Go to: my.amplify.com

A. Log In with Amplify

District Shared Logins		
Grade	**Username**	**Password**
Kindergarten	LAUSDscienceK	LAUSD1234
1	LAUSDscience1	LAUSD1234
2	LAUSDscience2	LAUSD1234
3	LAUSDscience3	LAUSD1234
4	LAUSDscience4	LAUSD1234
5	LAUSDscience5	LAUSD1234
6	LAUSDscience6	LAUSD1234
7	LAUSDscience7	LAUSD1234
8	LAUSDscience8	LAUSD1234