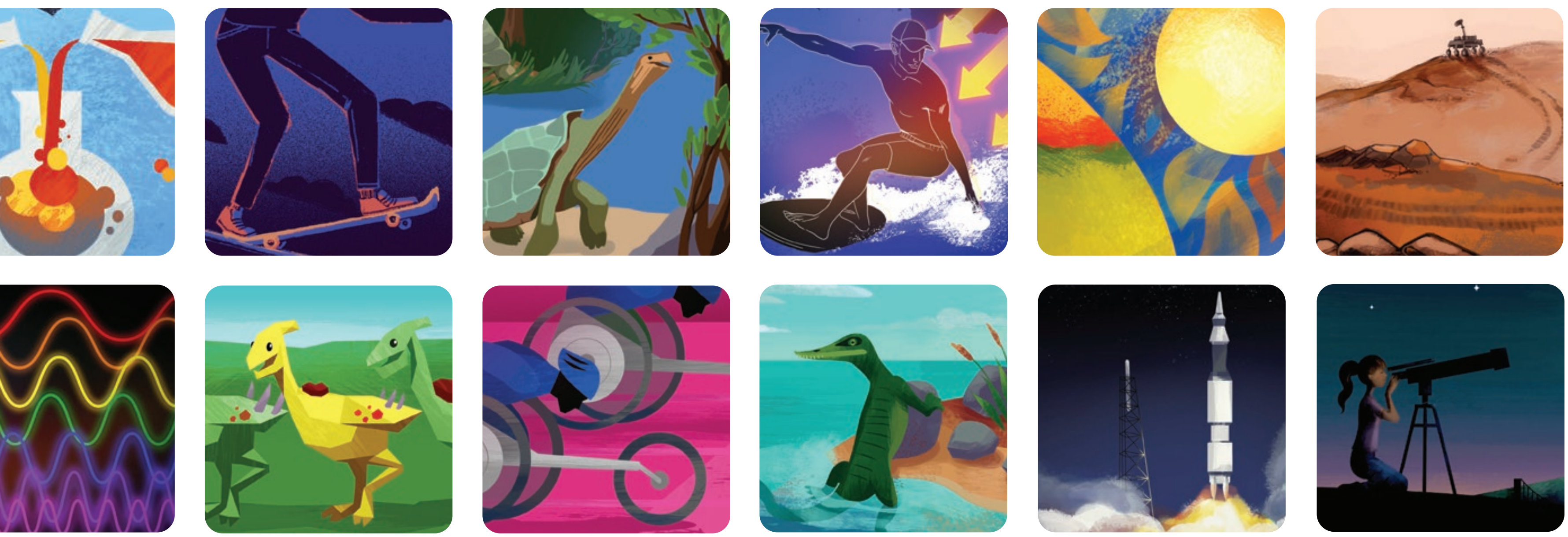
Amplify Science

Grades 6–8

DOMAIN MODEL

Planning guide



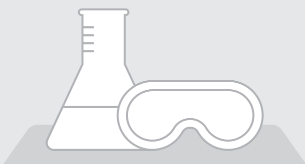
authored by THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY


product

Program components

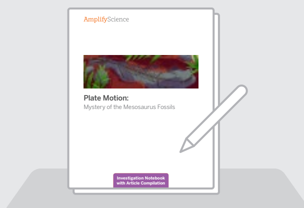
Student

Hands-on



Kit materials

Reading and writing



Student Investigation Notebooks with Article Compilations

Digital Simulations

One Sim per unit in grades 6–8

Supporting digital resources

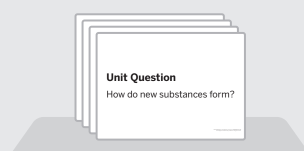
Including videos, assessments, article library, and Futura Workspace for Engineering Internship units

Teacher

Instruction

Print Teacher's Guide

Digital Teacher's Guide



Display and hands-on materials (vocabulary cards, unit questions, key concepts, sorting cards, and more)

Planning for a year: Earth and Space Science

Earth and Space Science recommended Scope and Sequence

(145 days of instruction)

Key: E.I. = Engineering Internship

Launch: Geology on Mars

11 45-minute lessons

Focal NGSS Performance expectations:

- MS-ESS1-3
- MS-ESS2-2

Focal Disciplinary Core Ideas:

- ESS1.B
- ESS2.A
- ESS2.C

Plate Motion

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-ESS1-4
- MS-ESS2-2
- MS-ESS2-3

Focal Disciplinary Core Ideas:

- ESS1.C
- ESS2.A
- ESS2.B

E.I.: Plate Motion

10 45-minute lessons

Focal NGSS Performance expectations:

- MS-ETS1-1
- MS-ETS1-2
- MS-ETS1-3
- MS-ETS1-4
- MS-ESS3-2

Focal Disciplinary Core Ideas:

- ETS1.A
- ETS1.B
- ETS1.C
- ESS3.B

Rock Transformations

16 45-minute lessons

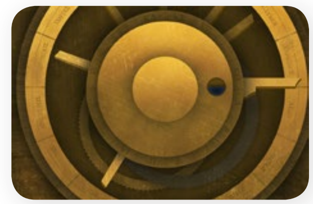
3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-ESS2-1
- MS-ESS2-2
- MS-ESS3-1

Focal Disciplinary Core Ideas:

- ESS2.A
- ESS2.C
- ESS3.A
- ESS3.C



Earth, Moon, and Sun

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-ESS1-1
- MS-ESS1-2
- MS-ESS1-3

Focal Disciplinary Core Ideas:

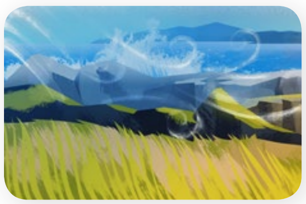
- ESS1.A
- ESS1.B

Unit types

Launch units introduce students to norms, routines, and practices that will be built on throughout the year.

Core units guide students in constructing understanding of science concepts by using key science and engineering practices.

In **Engineering Internship units**, students take on the role of interns to design solutions for real-world problems to help those in need.



Ocean, Atmosphere, and Climate

16 45-minute lessons

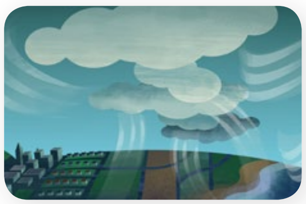
3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-ESS2-6

Focal Disciplinary Core Ideas:

- ESS2.D



Weather Patterns

16 45-minute lessons

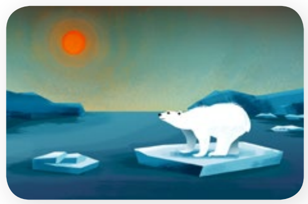
3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-ESS2-4
- MS-ESS2-5

Focal Disciplinary Core Ideas:

- ESS2.C
- ESS2.D



Earth's Changing Climate

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-ESS3-3
- MS-ESS3-4
- MS-ESS3-5

Focal Disciplinary Core Ideas:

- ESS3.C
- ESS3.D

E.I.: Earth's Changing Climate

10 45-minute lessons

Focal NGSS Performance expectations:

- MS-ETS1-1
- MS-ETS1-2
- MS-ETS1-3
- MS-ETS1-4
- MS-ESS3-3

Focal Disciplinary Core Ideas:

- ETS1.A
- ETS1.B
- ETS1.C
- ESS3.C

Planning for a year: Life Science

Life Science recommended Scope and Sequence

(145 days of instruction)

Key: E.I. = Engineering Internship

Launch: Microbiome

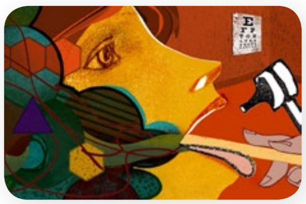
11 45-minute lessons

Focal NGSS Performance expectations:

- MS-LS1-1
- MS-LS1-2
- MS-LS1-3

Focal Disciplinary Core Ideas:

- LS1.A
- LS2.A



Metabolism

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-LS1-1
- MS-LS1-2
- MS-LS1-3
- MS-LS1-7
- MS-LS1-8

Focal Disciplinary Core Ideas:

- LS1.A
- LS1.C
- LS1.D
- PS3.D

E.I.: Metabolism

10 45-minute lessons

Focal NGSS Performance expectations:

- MS-ETS1-1
- MS-ETS1-2
- MS-ETS1-3
- MS-ETS1-4

Focal Disciplinary Core Ideas:

- ETS1.A
- ETS1.B
- ETS1.C

Traits and Reproduction

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-LS1-2
- MS-LS1-4
- MS-LS1-5
- MS-LS3-1
- MS-LS3-2
- MS-LS4-5

Focal Disciplinary Core Ideas:

- LS1.A
- LS1.B
- LS3.A
- LS3.B
- LS4.B

Populations and Resources

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-LS2-1
- MS-LS2-2
- MS-LS2-3
- MS- LS2-4
- MS-LS2-5

Focal Disciplinary Core Ideas:

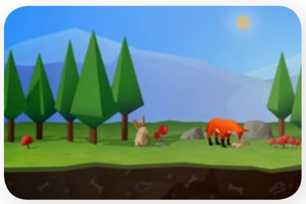
- LS2.A
- LS2.B
- LS2.C
- LS4.D

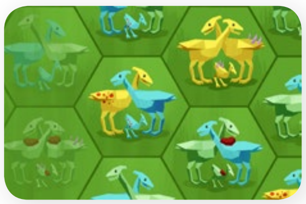
Unit types

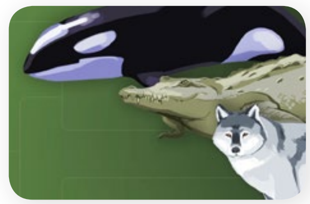
Launch units introduce students to norms, routines, and practices that will be built on throughout the year.

Core units guide students in constructing understanding of science concepts by using key science and engineering practices.

In **Engineering Internship units**, students take on the role of interns to design solutions for real-world problems to help those in need.







Matter and Energy in Ecosystems

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- LS1-6
- LS1-7
- LS2-2
- LS2-3
- LS2-4

Focal Disciplinary Core Ideas:

- LS1.C
- LS2.A
- LS2.B
- LS2.C
- PS3.D

Natural Selection

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-LS3-1
- MS-LS4-4
- MS-LS4-6

Focal Disciplinary Core Ideas:

- LS3.A
- LS3.B
- LS4.B
- LS4.C

E.I.: Natural Selection

10 45-minute lessons

Focal NGSS Performance expectations:

- MS-ETS1-1
- MS-ETS1-2
- MS-ETS1-3
- MS-ETS1-4

Focal Disciplinary Core Ideas:

- ETS1.A
- ETS1.B
- ETS1.C

Evolutionary History

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-LS4-1
- MS-LS4-2
- MS-LS4-3

Focal Disciplinary Core Ideas:

- LS4.A
- LS4.C

Planning for a year: Physical Science

Physical Science recommended Scope and Sequence

(145 days of instruction)

Key: E.I. = Engineering Internship

Launch: Harnessing Human Energy

11 45-minute lessons

Focal NGSS Performance expectations:

- MS-PS3-1
- MS-PS3-2

Focal Disciplinary Core Ideas:

- PS3.A
- PS3.B

Force and Motion

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-PS2-1
- MS-PS2-2
- MS-PS3-1

Focal Disciplinary Core Ideas:

- PS2.A
- PS3.A

E.I.: Force and Motion

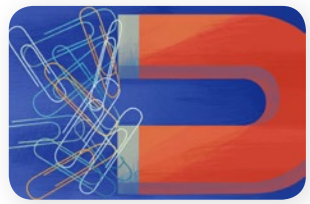
10 45-minute lessons

Focal NGSS Performance expectations:

- MS-ETS1-1
- MS-ETS1-2
- MS-ETS1-3
- MS-ETS1-4

Focal Disciplinary Core Ideas:

- ETS1.A
- ETS1.B
- ETS1.C



Magnetic Fields

16 45-minute lessons

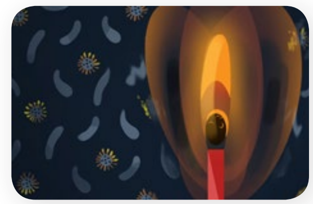
3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-PS2-3
- MS-PS2-4
- MS-PS2-5
- MS-PS3-2

Focal Disciplinary Core Ideas:

- PS2.B
- PS3.A
- PS3.C



Thermal Energy

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-PS3-3
- MS-PS3-4
- MS-PS3-5

Focal Disciplinary Core Ideas:

- PS3.A
- PS3.B

Unit types

Launch units introduce students to norms, routines, and practices that will be built on throughout the year.

Core units guide students in constructing understanding of science concepts by using key science and engineering practices.

In **Engineering Internship units**, students take on the role of interns to design solutions for real-world problems to help those in need.

Phase Change

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-PS1-1
- MS-PS1-4

Focal Disciplinary Core Ideas:

- PS1.A

E.I.: Phase Change

10 45-minute lessons

Focal NGSS Performance expectations:

- MS-ETS1-1
- MS-ETS1-2
- MS-ETS1-3
- MS-ETS1-4

Focal Disciplinary Core Ideas:

- PS1.A
- PS1.B

Chemical Reactions

16 45-minute lessons

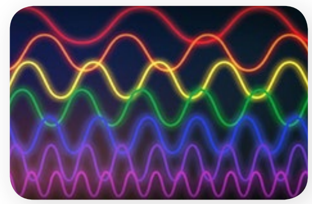
3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-PS1-1
- MS-PS1-2
- MS-PS1-3
- MS-PS1-5
- MS-PS1-6

Focal Disciplinary Core Ideas:

- ESS2.D



Light Waves

16 45-minute lessons

3 dedicated assessment days

Focal NGSS Performance expectations:

- MS-PS4-1
- MS-PS4-2
- MS-PS4-3

Focal Disciplinary Core Ideas:

- PS4.A
- PS4.B
- PS4.C

Planning for a year

Scheduling options

No matter what your scheduling preference is, Amplify Science will work in your classroom.

"I see my students two or three times a week."

While Amplify Science for grades 6–8 is designed for daily science instruction, more limited schedules can still work. Teachers who see their students for science less frequently may have to make tough choices about which units to fit into instruction. You might skip one of the Engineering Internships, as the standards covered in the Internships are also covered in the core units. You might have a STEM colleague in your building who can pick up some of the content you need to skip in order to still hit all standards. Amplify will work with you to create a unit sequence that works with your schedule and maintains a logical sequence and balance for your students.

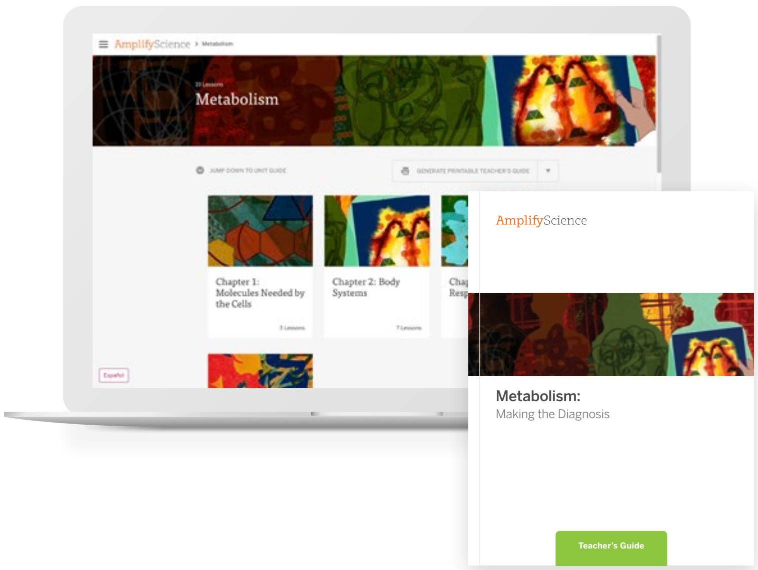
"I see my students every day."

It will take you approximately three weeks (16 school days) to complete each unit. If you plan for sessions shorter than 45 minutes, the units will take slightly longer to complete.

Amplify will work with you to create a unit sequence that works with your schedule and maintains a logical sequence and balance for your students.

Planning for a unit

Each unit's Teacher's Guide has all the information you need to learn about that unit's content and structure, materials, storyline, and student learning objectives.



Planning Options

1 hour per unit

If you want to thoroughly prepare for a unit, the most important resources are:

Foundational:

- **Unit Overview:** A few paragraphs outlining the unit, including what the unit is about, why it was written this particular way, and how students experience the unit.
- **Unit Map:** A 1-page summary showing how the chapters build upon each other, what questions students will investigate, and what evidence sources they will use to figure those questions out.
- **Lesson Overview Compilation:** 1–2 pages on each lesson that provide insight into each lesson's sequence of activities, intent, materials used, and how the lessons connect with and build upon each other.

Supporting:

- **Progress Build:** A thorough explanation of the unit's learning progression. Understanding and internalizing the Progress Build is key to understanding the embedded unit assessments.
- **Science Background:** A teacher-facing document that gives valuable science content information and calls out common student misconceptions and preconceptions. The Science Background resource provides all the context and subject matter knowledge needed to teach the unit.

NOTE

There's much more information available in the Teacher's Guide, including overviews of the unit's assessments, readings, student-facing technology, and standards.

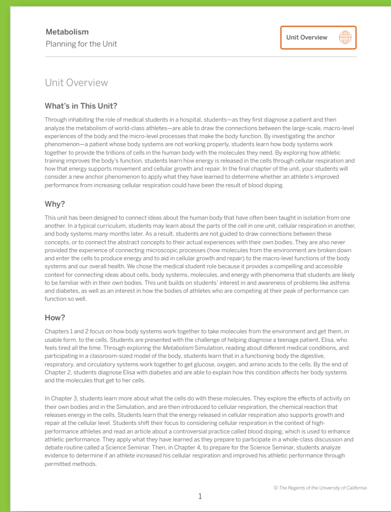
30 minutes per unit

If you're a bit pressed for time but still want to get the essentials, try to focus on:

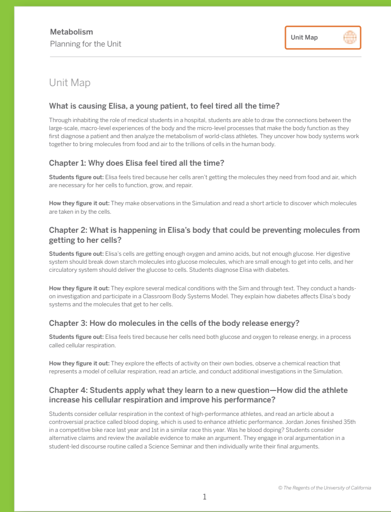
- **Unit Overview**, 1 page
- **Unit Map**, 1 page
- **Lesson Overview Compilation**

5 minutes per unit

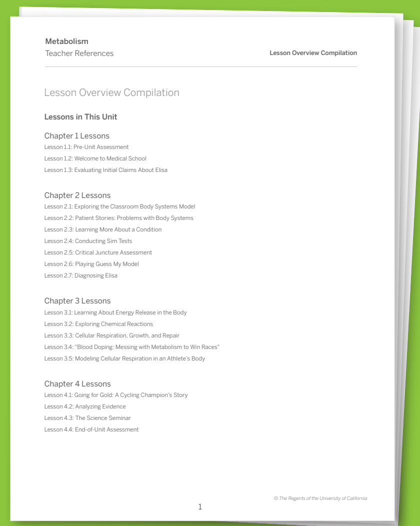
If you have only 5 minutes to familiarize yourself with the most essential aspects of the unit, skip right to the **Unit Overview** and **Unit Map**. At the very least, you'll understand the unit narrative and structure, and get a sense of the materials used.



Unit Overview
1 page

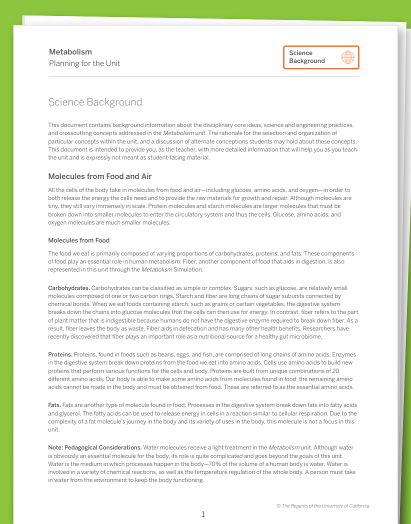


Unit Map
1 page



Lesson Overview Compilation
Read through the lesson overviews in Chapter 1 - ***1 page each***

Progress Build
1 page



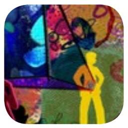
Science Background
Between 3 and 9 pages

Planning for a unit: Earth and Space Science

Unit	Investigation focus	Student role and phenomena	Insights
 Launch: **Geology on Mars**	In the *Geology on Mars* unit, students will observe satellite images and Mars rover data as they consider what may have formed a long channel on the surface of Mars.	In their role as student planetary geologists working to investigate the planet Mars, students investigate whether a particular channel on Mars was caused by flowing water or flowing lava.	Throughout the unit, students consider two possible claims for what may have formed the channel—flowing lava or flowing water. By comparing the channel on Mars to analogous structures on Earth's surface and in physical models, students are able to gather evidence and evaluate whether it supports the claim that flowing liquid water formed the channel.
 **Plate Motion**	In the *Plate Motion: Mystery of the Mesosaurus Fossils* unit, students investigate plates, what happens at plate boundaries, and at what rate changes happen on a geologic scale.	In the role of geologists working for the fictional Museum of West Namibia, your students will investigate a fossil mystery: Why are fossils of Mesosaurus, a population of extinct reptile that once lived all together, now found separated by thousands of kilometers of ocean?	After determining that there is a plate boundary between these groups of fossils, students determine whether the fossils were separated suddenly as a result of one geologic event, or slowly over millions of years. Students explore plates and plate boundaries through a series of hands-on investigations and engaging articles and videos featuring real-life scientists. Using a simulation, students create continents, set plates in motion, and watch what happens.
 Engineering Internship: **Plate Motion**	In the *Plate Motion Engineering Internship: Tsunami Warning Systems* unit, students will consider the design problem of how to protect people from natural hazards.	Students work as geohazard engineering interns at Futura Engineering to design a tsunami warning system along the plate boundaries in the Indian Ocean region.	Students use a digital model to simulate placing earthquake, deep water, and shallow water sensors at various places in the Indian Ocean region in order to maximize the response time people receive to get to safety, minimize the number of false alarms so people don't become complacent and resources are not wasted from evacuating unnecessarily, and minimize the cost so local governments can afford to install the warning system and maintain it for many years to come.
 **Rock Transformations**	In the *Rock Transformations: Geologic Puzzle of the Rockies and Great Plains* unit, students develop an understanding of rock transformation processes to explain how rock material from the Rocky Mountains eventually became part of the Great Plains.	In this unit, students play the role of student geologists as they investigate different ways rocks form and change in The Rocky Mountains and Great Plains, two iconic locations in the United States that have a shared geologic history.	Using physical models, a digital simulation, and hands-on activities as well as information gathered from data and science texts, students investigate the cycling of matter (rock material) on Earth and how energy from the sun and from Earth's interior drive different rock transformation processes.

Unit	Investigation focus	Student role and phenomena	Insights
 **Earth, Moon, and Sun**	In the *Earth, Moon, and Sun: An Astrophotographer's Challenge* unit, students gain a deeper understanding of everyday observations of the Moon, transforming the experience of Moon gazing into an act of profound and expansive perception.	Students take on the role of student astronomers, tasked with advising an astrophotographer who needs to take photographs of the Moon for a fictional magazine called *About Space*. The astrophotographer can take pictures of specific features on the Moon only at certain times.	Through developing hypotheses and engaging in argumentation, students will come to an understanding about the phases of the Moon and its orbital positions, which they will then apply to their advice to the astrophotographer. By the end of the unit, students will be able to explain the mechanisms behind patterns of light and dark on the Moon, moon phases, and lunar eclipses.
 **Ocean, Atmosphere, and Climate**	In the *Ocean, Atmosphere, and Climate: Cold Years in New Zealand* unit, students investigate how ocean currents behave and what effect they have on the climate of different locations around the world, specifically the air temperature of various locations.	In the role of climatologists, students investigate changes in air temperature in Christchurch, New Zealand during El Niño years. Students are called upon to explain what causes the change in air temperature.	By analyzing temperature fluctuations caused by changes in wind and surface ocean currents that occur during El Niño years, students learn about the relationship between atmosphere and ocean and its effects on regional climate/temperature patterns.
 **Weather Patterns**	In the *Weather Patterns: Severe Storms in Galetown* unit, students will learn about how differences in the amount of water vapor, temperature, and air pressure can affect the amount of rain.	In the role of student forensic meteorologists, students will investigate severe rainstorms in a fictional town called Galetown. They investigate how water vapor, temperature, energy transfer, and wind influence local weather patterns and how these factors can lead to severe rainstorms.	Using physical models, a digital simulation, and hands-on activities as well as information gathered from data and science texts, students will investigate the mechanisms by which a warm weather rainstorm can be generated, through the lens of energy transfer.
 **Earth's Changing Climate**	In the *Earth's Changing Climate: Vanishing Ice* unit, students figure out that whenever more energy enters the atmosphere than exits, the amount of energy absorbed by the surface increases and that increased carbon dioxide or methane in the atmosphere redirects outgoing energy back to Earth's surface.	Students adopt the role of climatologists who help the fictional World Climate Institute research causes of ice loss and climate change with the goal of educating the public about their findings.	In order to delve into the mechanism of climate change, students investigate with a computer simulation, data, physical models, and science texts. They investigate how the sun's energy interacts with Earth, how energy absorbed controls average global temperature, and how increasing temperatures correlate with increased carbon dioxide and methane in the atmosphere.
 Engineering Internship: **Earth's Changing Climate**	In the *Earth's Changing Climate Engineering Internship: Rooftops for Sustainable Cities* unit, students use engineering practices and compose a written proposal that supports their design for making a city more environmentally responsible.	As civil engineering interns at Futura Engineering, students learn about The Design Cycle and apply their understanding of energy and climate science to create roof modification designs for a city in the desert.	Students consider two roof types, white and solar, and design a proposal of roof modifications the city could implement to reduce the city's climate impact. The project asks students to consider three criteria: reducing climate impact, preserving the city's historical character, and keeping costs low.

Planning for a unit: Life Science

Unit	Investigation focus	Student role and phenomena	Insights
 Launch: **Microbiome**	In the *Microbiome* unit, students learn about the human microbiome and dive into a current topic in science, providing a compelling on-ramp to learning about the invisible.	In this unit, students take on the role of student researchers as they work out and explain the anchor phenomenon for the unit—a fecal transplant cured a patient suffering from a potentially deadly *C. difficile* infection.	By engaging in sense-making about the same types of data that professional scientists use, students work to understand how having 100 trillion microorganisms on and in the human body can keep a person healthy. In the process, they learn to examine living things at multiple scales, from molecules to single-celled organisms to the overall human body.
 **Metabolism**	In the *Metabolism: Making the Diagnosis* unit, students learn how body systems work together to provide cells in the human body with the molecules they need, how energy is released in the cells through cellular respiration, and how that energy supports movement and cellular growth and repair.	Through inhabiting the role of medical students in a hospital, students—as they first diagnose a patient and then analyze the metabolism of world-class athletes—are able to draw the connections between the large-scale, macro-level experiences of the body and the micro-level processes that make the body function.	This unit provides a compelling and accessible context for connecting ideas about cells, body systems, molecules, and energy with phenomena that students are likely to be familiar with in their own bodies. This unit builds on students' interest in and awareness of problems like asthma and diabetes, as well as an interest in how the bodies of athletes who are competing at their peak of performance can function so well.
 Engineering Internship: **Metabolism**	In the *Metabolism Engineering Internship: Health Bars for Disaster Relief* unit, Futura Engineering has been hired to design a series of health bars that will feed people in regions affected by natural disasters, with a particular emphasis on two populations who have health needs beyond what can be provided by emergency meals: patients and rescue workers.	Students work as food engineer interns at Futura Engineering and apply their understanding of metabolism in designing recipes for bars that balance three criteria: the metabolic needs of a target population, taste, and cost. In order to address metabolic needs, interns look at protein, carbohydrates, and the glycemic index of different ingredients.	Students complete several tests and tasks using Futura RecipeTest, a digital design tool, to collect data. They analyze this data and run iterative tests of their recipes, preparing a final proposal that justifies the choices they made relative to the criteria.
 **Traits and Reproduction**	In the *Traits and Reproduction: The Genetics of Spider Silk* unit, students create physical models, read articles, and observe genetics in action, using the Traits and Reproduction Simulation, which allows students to observe and breed spiders, making connections between what happens inside cells and how this affects the traits of an organism.	In this unit, students take on the role of student genetic researchers, working with the fictional bioengineering firm Bay Medical Company, which is attempting to breed spiders with silk that can be used for medical applications. The student genetic researchers are faced with the challenge of explaining how the silk flexibility traits of closely related spiders can vary.	Through their research, students learn about the roles proteins, genes, and sexual reproduction play in trait variation. They are able to apply what they have learned about spiders to a human context.

Unit	Investigation focus	Student role and phenomena	Insights
 **Populations and Resources**	In the *Populations and Resources: Too Many Moon Jellies* unit, students learn how different populations are connected to one another as part of a food web, a key to understanding how changes in one population may affect change in another.	In the role of student ecologists at a research center near the fictional Glacier Sea, students investigate what may have caused a puzzling increase in the size of the moon jelly population there.	Using a fictional scenario based on real moon jelly increases all over the world, students are motivated to find out more about how the ecosystem is connected and use their newfound knowledge and data from Glacier Sea to determine the most likely cause of the moon jelly population increase as well as engage in scientific argumentation as they model and explain their claim.
 **Matter and Energy in Ecosystems**	In the *Matter and Energy in Ecosystems: Biodome Collapse* unit, students expand their understanding of ecosystems by considering both living and nonliving components—how their producers, consumers, and decomposers meet their energy needs.	In the role of student ecologists, students investigate a fictional failed biodome, where plants and animals were not getting the resources they needed to release energy, and the ecosystem appeared to be failing.	Students' understanding of biodomes develops through learning about the processes of photosynthesis and cellular respiration; how carbon, a key component of those processes, moves between nonliving and living matter; and how sunlight and the atmosphere function within the overall system.
 **Natural Selection**	In the *Natural Selection: Poisonous Newts* unit, students connect ideas about how the environment determines which traits are adaptive and non-adaptive, and how this affects the likelihood of survival and reproduction, to form an understanding of natural selection.	In the role of student biologists, students investigate what caused a newt population in Oregon to become more poisonous over time.	Using the Natural Selection Simulation, students investigate how the population of newts changed over time. Over the course of the unit, they gather evidence from the Simulation, hands-on activities, and texts to construct their own explanations of how the newts came to be so poisonous.
 Engineering Internship: **Natural Selection**	In the *Natural Selection Engineering Internship: Fighting Drug-Resistant Malaria* unit, students apply what they learned in the Natural Selection unit as they explore ways to prevent certain traits in a parasite population from increasing—in this case, the trait for high resistance to an antimalarial drug.	In the role of biomedical engineering interns, students design a treatment that does not cause an increase in the malaria parasite population while considering three criteria: minimizing drug resistance in the malaria parasite population; minimizing patient side effects; and keeping costs low.	Students use the MalariaMed Design Tool to collect and analyze data, complete iterative tests, and learn about optimizing designs. By the end of this unit, students can describe engineering practices and compose a written proposal that supports their optimal design for making a safe and effective malaria treatment, one that also manages trade-offs between the project criteria.
 **Evolutionary History**	In the *Evolutionary History: Advising a Paleontology Museum* unit, students learn that species share similar structures because they descended from a common ancestor and that differences in structure arise due to natural selection and speciation over vast amounts of time.	In the role of student paleontologists investigating a Mystery Fossil, students determine the Mystery Fossil's evolutionary history so that they can accurately place the specimen in a museum exhibit.	By the end of the unit, students can use their analysis of skeletal structures to determine where they should place the Mystery Fossil in the museum, according to what type of organism the evidence shows it to be most closely related to—whales or wolves.

Planning for a unit: Physical Science

Unit	Investigation focus	Student role and phenomena	Insights
 Launch: **Harnessing Human Energy**	In the *Harnessing Human Energy* unit, students apply their knowledge about energy to design an energy system that can use human kinetic energy to power an electrical device.	In their role as student energy scientists, students work to find a way to get energy to the batteries in the rescue workers' electrical devices, even during power outages.	Students are motivated to explore relationships among different types of energy—with an emphasis on kinetic energy and potential energy—and the ways energy is transferred and converted. To solve the rescue team's energy problem, students research various ways to capture and store energy.
 **Force and Motion**	In the *Force and Motion: Docking Failure in Space* unit, students learn about the relationships between force, velocity change, mass, and the equal and opposite forces exerted during collisions.	In this unit, students take on the role of student physicists working for the fictional Universal Space Agency (USA). They are called upon to assist in the investigation of a space pod that failed to dock at the space station as planned.	As they investigate, students will learn about the relationships between force, velocity change, mass, and the equal and opposite forces exerted during collisions. Students gather data about how forces affect the motion of objects, which they use as evidence to explain what happened to the pod.
 Engineering Internship: **Force and Motion**	In the *Force and Motion Engineering Internship: Pods for Emergency Supplies* unit, students apply knowledge that they've learned about forces and collisions to an authentic problem—designing an emergency supply drop pod.	Students work as mechanical engineering interns at Futura Engineering to design a supply pod that will deliver humanitarian aid packages to people in disaster-stricken locations.	Using the SupplyDrop Design Tool to run iterative tests and collect data, students strive to meet the design criteria: minimizing cargo damage, maximizing shell condition, and keeping costs low. By the end of the unit, students are able to explain the features, trade-offs and science behind their optimal design in a written proposal.
 **Magnetic Fields**	In the *Magnetic Fields: Launching a Spacecraft* unit, students gain an understanding of how magnetic force causes motion and the relationship of magnetic force to kinetic and potential energy.	In the role of physicists working for the Universal Space Agency, a fictional agency that resembles NASA, students investigate the unexpected results from one test launch of a magnetic spacecraft that traveled much faster than expected.	Students use their newfound understanding, as well as evidence about the spacecraft test launches, to explain what they think happened in the test launch. They then apply their knowledge to analyzing three designs for a magnetic roller coaster launcher.

Unit	Investigation focus	Student role and phenomena	Insights
 **Thermal Energy**	In the *Thermal Energy: Using Water to Heat a School* unit, students go beyond intuition to discover that observed temperature changes can be explained by the movement of molecules, which facilitates the transfer of kinetic energy from one place to another.	In their role as student thermal scientists, students work with the principal of Riverdale School, a fictional school, in order to help choose a new heater system. The principal is considering two proposed systems, both of which would use water to heat the school. How these two systems work serves as the anchor phenomenon for this unit and the explanations students make allow them to make a recommendation to the principal.	Throughout the unit, students are called upon to analyze the differences between two heating systems at the molecular scale and to explain how and why they will heat the school. At the end of Chapter 3, students make a recommendation to the principal in favor of the system that will heat the school more during the winter.
 **Phase Change**	In the *Phase Change: Titan's Disappearing Lakes* unit, students develop an understanding of molecules, kinetic energy, and attraction, as well as evidence about the conditions on Titan, to explain what they think happened to Titan's mysterious lake.	Taking on the role of student chemists working for the fictional Universal Space Agency, students investigate the mystery of the methane lake on Titan. One team of scientists at the Universal Space Agency claims that the lake evaporated while the other team of scientists claims that the lake froze.	Students gather evidence from the Phase Change Simulation, from several articles, and from physical investigations of phase change. They learn that the molecules of a substance move differently when that substance is in different phases. They also learn how the kinetic energy of molecules and the attraction between the molecules affects the way in which the molecules move.
 Engineering Internship: **Phase Change**	In the *Phase Change Engineering Internship: Portable Baby Incubators* unit, students apply what they learned in the Phase Change unit to design a device that could potentially save thousands of newborns each year.	Students play the role of chemical engineering interns at Futura Engineering. They will consider the design problem of how to create an incubator that considers three criteria: keep the baby's average temperature close to 37°C, minimize the time outside the healthy temperature range, and keep costs low.	By the end of this unit, students will compose a written proposal that supports their optimal designs for making an effective portable incubator, while managing the trade-offs among the project criteria.
 **Chemical Reactions**	In the *Chemical Reactions: Mysterious Substance in Westfield's Weather* unit, students will learn about what makes substances different, chemical reactions, and the conservation of matter to solve mysteries.	Students take on the role of student chemists to solve a mystery that can only be solved with an understanding of fundamental chemical principles: Why is there a reddish-brown substance coming out of the water pipes in a neighborhood that gets its water from a well?	In the last chapter of this unit, students continue in their role as student chemists, working to assist in a police investigation of a robbery that involved the use of an unknown substance to steal a rare and expensive diamond.
 **Light Waves**	In the *Light Waves: Skin Cancer in Australia* unit, students gain a deeper understanding of how light interacts with materials and how these interactions affect our world, from the colors we see to changes caused by light from the sun, such as warmth, growth, and damage.	Taking on the role of student spectroscopists working for the fictional Australian Health Alliance, students investigate why Australia's cancer rate is so high, analyzing real data that scientists might consider.	Students apply new ideas to construct an argument explaining the high skin cancer rate in Australia, citing both low ozone levels in the atmosphere and low levels of melanin in the population.

Planning for a lesson

Amplify Science makes lesson prep as easy as 1, 2, 3. You can use either the printed or digital Teacher's Guide.

1

Read the one-page **Lesson Overview**, which contains:

- A **one-paragraph summary of the lesson**, including insights into the lesson's activities and any materials used.
- Clearly labeled **phenomena**.
- **Student learning objectives**.
- **Lesson at a Glance**, which provides an outline of the lesson along with pacing suggestions.

Have some extra time? Read through the full step-by-step instructions for the lesson to see exactly where different materials are used, where projections are shown, and where to insert recommended teacher talk moments.

2

Every lesson includes a **Materials and Preparation** section, which clearly identifies all of the hands-on manipulatives, printed classroom wall materials, articles, and digital tools needed for each lesson.

If your students work exclusively online, you'll want to take some time to test your technology and make sure your students are set up with logins for their student accounts.

Visit **my.amplify.com/help** and click "Getting Started" for helpful articles on setting up and testing technology.

If your students either work offline or in a combination of digital and print, the Materials and Preparation section will also tell you which pages of the Student Investigation Notebook students will access in each lesson.

Remember: Every lesson is different! Some lessons might call for articles; other lessons might call for setting up stations for hands-on investigations. Be sure to glance at the Materials and Preparation section to see what you need for your specific lesson.

3

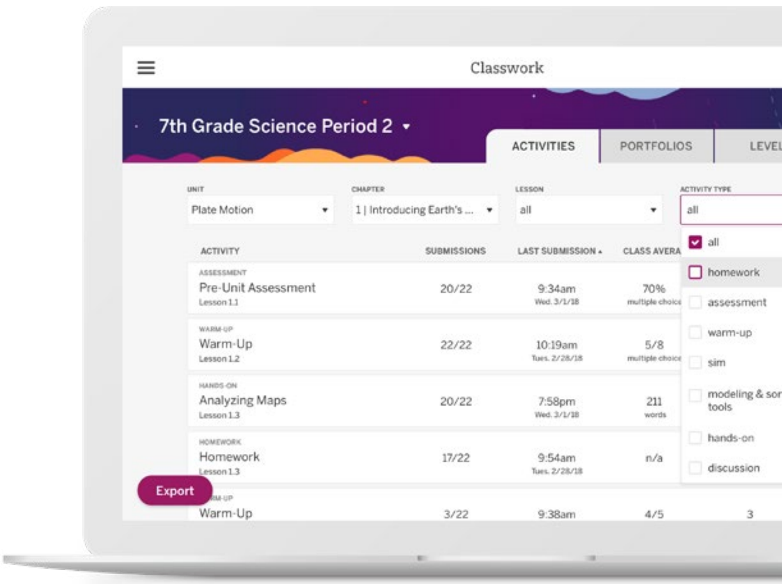
Download any **Digital Resources** needed for the lesson. For example, most lessons have projections that you can show to your students at specific parts in the lesson. Be sure to download the PDF of projections before class. You can also download videos to be shown in a lesson before class begins.

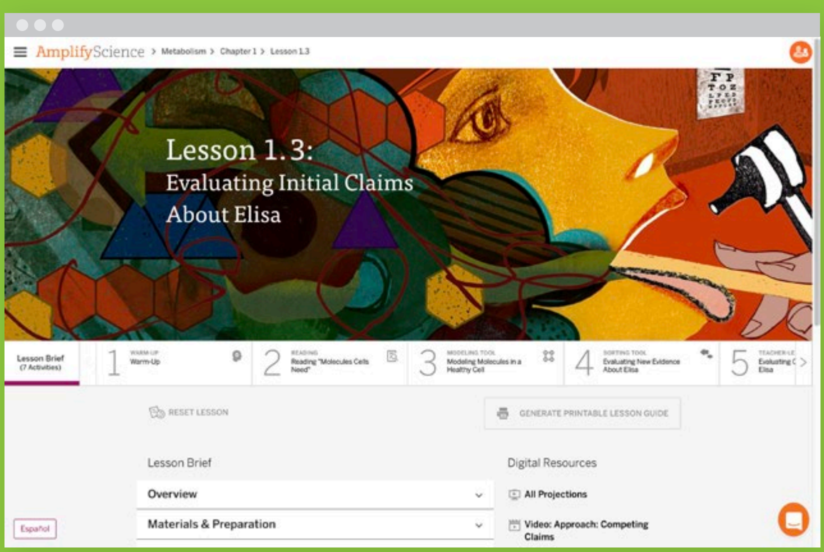
The assessment on the first day of each unit should be taken online.

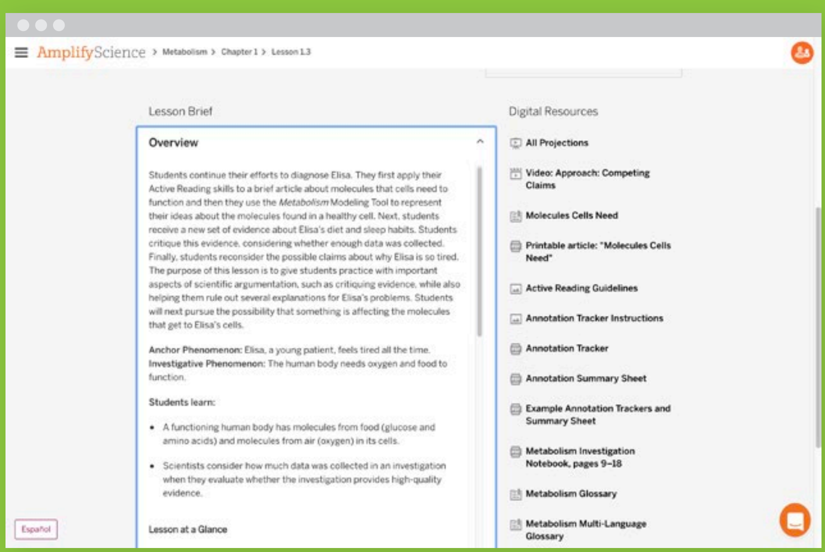
Reviewing and grading student work: Classwork

With Classwork you have quick and easy access to unreviewed work, student portfolios of work, and automatically generated differentiation groups based on student performance. Classwork is clean and organized, allowing you to spend less time looking for student work and more time focusing on reviewing your students' work.

You can review all student work on one page, provide feedback and a score, and then advance to the next student on the same assignment. Rubrics and student work sit side-by-side for easy grading. Commenting is easy and you can even include emojis. You can see the total number of students who answered an automatically graded question correctly to quickly and easily compare student performance to class performance.








VILLI

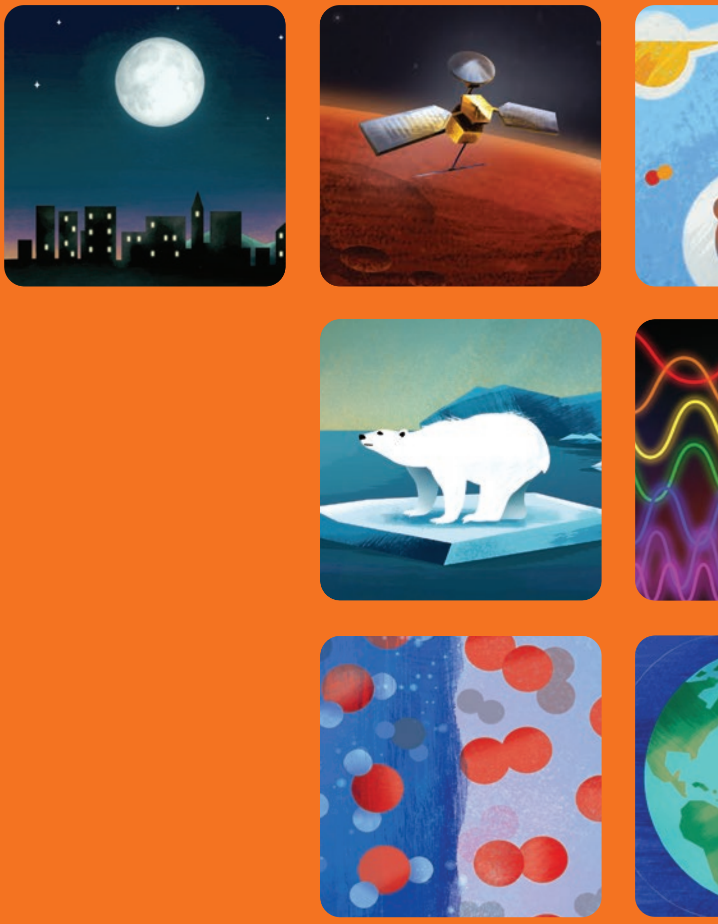
Join our community!

Amplify Science users are able to join our online community of teachers from across the country to share ideas and best practices.

To join, visit:
facebook.com/groups/AmplifyScienceCommunity

Amplify Science

For more information on Amplify Science, visit **amplify.com/science**.



Amplify.

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

AMP-SCI-NA-PLAN-68DOM-0819