

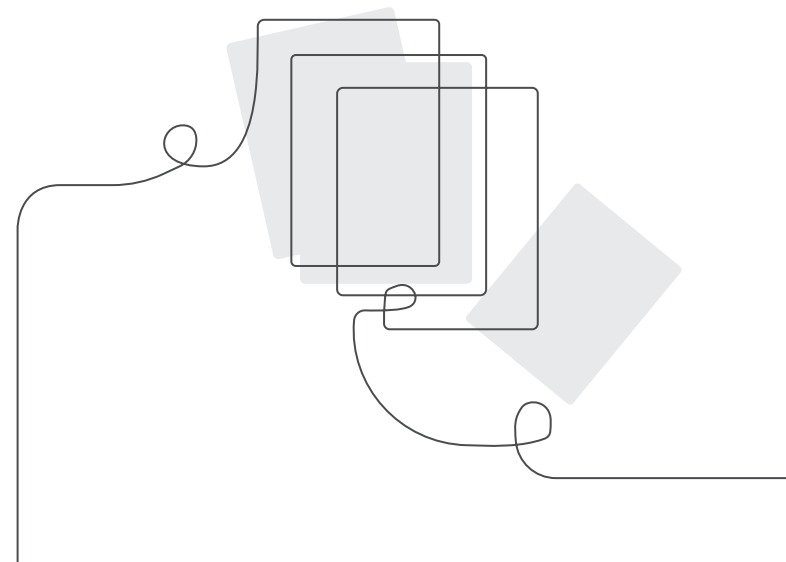
# EQuIP Rubric for Lessons & Units: Science

VERSION 3.0

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## Category I: NGSS 3D Design (lessons and units):

The lesson/unit is designed so students make sense of phenomena and/or design solutions to problems by engaging in student performances that integrate the three dimensions of the NGSS.

### Lesson and unit criteria

Lessons and units designed for the NGSS include clear and compelling evidence of the following:

### Where to find evidence in Amplify Science

(Note: When appropriate, a brief explanation of the location of information/documents in the Amplify Science online Teacher's Guide is provided.)

#### A Explaining phenomena/ designing solutions

Making sense of phenomena and/or designing solutions to a problem drive student learning.

- i Student questions and prior experiences related to the phenomenon or problem motivate sense making and/or problem solving.
- ii The focus of the lesson is to support students in making sense of phenomena and/or designing solutions to problems.
- iii When engineering is a learning focus, it is integrated within the development of disciplinary core ideas from physical, life, and/or earth and space sciences.

#### Explanation

In each Amplify Science unit, students are asked to inhabit the role of a scientist or engineer in order to figure out scientific phenomena through a 21st-century, real-world problem context. Over the course of the unit, students collect and make sense of evidence from multiple sources and through a variety of modalities, ensuring that they have multiple vehicles through which to develop and articulate their understanding of each phenomenon. As the class progresses through their lessons, students move back and forth from firsthand investigation and inquiry to secondhand analysis and synthesis, formulating an increasingly complex explanation to help them solve the problem at hand. Finally, at the end of the unit, students are presented with a brand-new problem context to consider, giving them an opportunity to take what they've learned over the course of the unit thus far and apply it to this new context, thereby demonstrating a deep understanding of the phenomenon.

#### Evidence

- **Metabolism** unit: Students figure out the phenomenon of a young hospital patient who is feeling tired all of the time. They do this by inhabiting the role of medical students whose task is to diagnose the young patient. Students start the unit by watching a video about the young girl to learn about her symptoms and history, and make connections to their own prior experiences, brainstorming possible reasons for her current condition. Over the course of the unit, students draw connections—through the use of physical and digital models, articles, videos, and hands-on investigations—between macroscale and microscale processes in order to investigate how the body systems work together to provide the body's cells with the molecules they need for cellular respiration (energy), growth, and repair. After providing their diagnosis, students are then given a new problem context, and must apply their understanding of metabolism to now analyze the metabolism of a world-class athlete.
- **Magnetic Fields** unit: Acting as physicists consulting for the fictional Universal Space Agency, students work to understand the function of a magnetic spacecraft launcher (a simplified version of real technology currently under development). In particular, they seek to explain why a particular test launched the spacecraft much faster than expected. To do this, they begin by exploring attracting and repelling forces with magnets and the digital simulation. As the unit progresses, students continue to conduct investigations and use physical and digital models, articles, and videos to collect and analyze evidence as they connect increasingly complex ideas about magnetic fields, magnetic forces, potential energy, and kinetic energy. After developing a detailed explanation of the Universal Space Agency's unexpected test launch result, students apply what they've learned about magnetic force to a new problem context: evaluating roller coaster designs.
- **Ocean, Atmosphere, and Climate** unit: Students act as student climatologists helping a group of farmers near Christchurch, New Zealand, figure out the cause of significantly colder air temperatures in New Zealand during the El Niño climate event. To solve the puzzle, students investigate what causes regional climates. They learn about energy from the sun and energy transfer between Earth's surface and atmosphere, ocean currents, and prevailing winds. At the end of the unit, students apply their newly acquired content knowledge to a new context as they are asked to analyze evidence to figure out if the air temperature in South China during the late Carboniferous period was warmer or cooler than the air temperature in South China today.

In addition to figuring out and explaining phenomena, students take part in two engineering internship units per year in which they apply content from a previous unit in order to design inventive solutions for real-world challenges. Each engineering internship requires students to develop, test, and optimize a solution to an engineering problem. Each unit has a custom design tool that allows students to Plan, Build, Test and Analyze their designs. Students learn about the value of iterative tests, how to balance trade-offs, and how to make sense of the results in order to inform their next decisions.

### Evidence

- **Natural Selection Engineering Internship** unit: Students act as biomedical engineering interns to design a malaria treatment plan. These treatment plans must reduce the population of malaria plasmodia while meeting three design criteria: 1) limiting the amount of the drug-resistance trait that develops in the population; 2) minimizing the side-effects caused by the treatment; and 3) minimizing the treatment costs as much as possible, so as many patients can be treated as possible. 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.
- **Force and Motion Engineering Internship**: Students use the classic “egg drop model” iterative testing in a digital simulation, and quantitative data analysis to plan, design, and refine a supply pod that will be dropped from a helicopter into disaster areas. Their designs are based on their knowledge of forces, mass, and velocity, as well as the consideration of the structure and function of different features. Students then make arguments about how they have optimized their design solutions. To conclude the unit, students brainstorm problems that relate to understanding impact forces, and then define the criteria for a solution.
- **Earth’s Changing Climate Engineering Internship** unit: Students act as civil engineering interns to design a plan to modify a city’s roofs in order to reduce the city’s impact on climate change. These plans must meet three design criteria: 1) reducing impact on the climate; 2) preserving the city’s historic character; and 3) minimizing costs. Students focus on the practice of isolating variables in planning and conducting tests to deepen their understanding of climate changes. Students also learn about the cause-and-effect mechanisms involved as changes to albedo and changes to combustion of fossil fuels affect climate.

### Finding additional evidence

#### Unit level, refer to:

- 1 **Unit Map.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Unit Map.”
- 2 **Unit Overview.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Unit Overview.” Notice the What? How? Why? paragraphs.
- 3 **Embedded Formative Assessments.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Embedded Formative Assessments.” Note the focus on making sense of and supporting students for the list of Lessons/Activities within a lesson, and the specific phenomena.

#### Lesson level, refer to:

- 1 **Early in the Unit (usually lesson 1.2, after the Pre-Unit Assessment)**, students are introduced to the scientific roles they will inhabit and the phenomena that they will figure out. Refer to the Instructional Guide in each lessons for detailed teacher-facing instructions.
- 2 Explore the **Activities** in any lesson, and the associated Instructional Guides. See the multiple modes of investigation/ firsthand inquiry, collaboration/student-to-student discourse, modeling, reading, and visualizations.

## B Three dimensions

Builds understanding of multiple grade-appropriate elements of the science and engineering practices (SEPs), disciplinary core ideas (DCIs), and crosscutting concepts (CCCs) that are deliberately selected to aid students in *making sense of phenomena and/or designing solutions*.

### Amplify Science 3D Statements

- Science and engineering practices
- Disciplinary core ideas
- Crosscutting concepts

## Explanation

Amplify Science's real-world problems provide relevant, 21st-century contexts through which students will investigate different scientific phenomena and develop a deeper understanding of Disciplinary core ideas (DCIs), acquire more experience with Science and engineering practices (SEPs), and observe the interconnectedness of various science disciplines through the Crosscutting concepts (CCCs).

The Amplify Science curriculum developers at University of California, Berkeley's Lawrence Hall of Science crafted each unit, chapter, and lesson with the following questions in mind: What do we want students to figure out (what DCI or part of a DCI)? How do we want them to figure it out (what SEP will they engage in to figure it out)? What CCC can scaffold students' understanding and connect it to other ideas about the natural world that they have learned? This resulted in a curriculum that incorporates a strategic, well-balanced integration of the three dimensions. In order to help teachers recognize the three-dimensional structure of every unit, chapter, and lesson, each unit contains a "3-D Statement" document that makes the integration clear. The "3-D Statement" document is made all the more effective by color-coding the three dimensions for easy recognition. This color-coded information is also made available to teachers at the individual lesson level, within the "Standards" section of the Lesson Brief.

## Evidence

3-D statements from the **Evolutionary History** unit include:

- **Unit level:** Students obtain information from science texts and analyze and interpret data from digital and physical models as they investigate the body structures of both extinct and living species (structure and function). Students identify similarities and differences, figure out how common body structures are evidence of common ancestry, and how natural selection can lead to changes in body structures and the evolution of new species over time (stability and change).
- **Chapter level:** Chapter 2, "Investigating Body Structure Differences": Students gather evidence from science texts and a digital model to investigate how different body structures with different functions can be adaptive in different environments (structure and function) and how small changes can accumulate over evolutionary time, resulting in speciation and large differences in body structures between species (stability and change).
- **Lesson level:** Lesson 1.2, "Welcome to the Natural History Museum": Students are introduced to a mystery fossil and are charged with constructing explanations about its origins. Students complete a card sort in which they analyze and interpret images in order to group different species, both living and extinct, according to similar patterns in body structure (patterns).

3-D statements from the **Light Waves** unit include:

- **Unit level:** Students use a digital model, obtain information from articles, and conduct hands-on investigations to discover how different types of light interact with different types of matter (energy and matter). They use these ideas and analyze data to construct explanations about the cause of Australia's high rate of skin cancer (cause and effect).
- **Chapter level:** Chapter 3, "More Light Interactions": Students use a digital model and hands-on materials to investigate how energy from light can be absorbed, transmitted, or reflected by different materials (energy and matter). They use this knowledge to analyze and interpret evidence and construct explanations about the cause of Australia's high rate of skin cancer.
- **Lesson level:** Lesson 2.2, "Harvesting Sunlight": Students ask questions and obtain and evaluate information as they actively read "Harvesting Sunlight," an article about the different types of light from the sun that plants use for photosynthesis (energy and matter).

- **Unit level:** Students **analyze data** about **plates, plate boundaries, and the patterns of geologic activity characteristic of plate boundaries (patterns)**—through the use of **physical and digital models** and articles and videos featuring real-life scientists—in order to **construct explanations** of how the **fossils** of *Mesosaurus* (a population of extinct reptile that once lived all together) were separated by thousands of kilometers of ocean as a result of **slow plate movement over millions of years** (scale, proportion, and quantity).
- **Chapter level:** Chapter 1, “Introducing Earth’s Outer Layer”: Students **use a digital model** of **plate motion** and **analyze evidence**, including patterns of geologic activity and images of core samples, in order to learn that **Earth’s outer layer is made of hard, solid rock divided into moving plates (Patterns)**.
- **Lesson level:** Lesson 2.1, “Considering What’s Underneath Earth’s Plates”: Students use **physical and digital models to gather information** about the **properties of Earth’s mantle (patterns)** and the **interactions between the hard, solid plates and the soft, solid mantle (cause and effect)**.

### Finding additional evidence

**Unit level, refer to:**

- 1 **3-D Statements.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “3-D Statements.”

**Lesson level, refer to:**

- 1 **Standards** (Lesson Brief). Open any lesson in any chapter of any unit. Scroll down to “Standards” line and click the black carrot to expand the section. See the 3-D Statement at the top.

- 
- i Provides opportunities to *develop and use* specific elements of the SEP(s).

**Unit level, refer to:**

- 1 **Standards and Goals.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Standards and Goals.”
- 1 **3-D Statements.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “3-D Statements.”

**Lesson level, refer to:**

- 1 **Standards** (Lesson Brief). Open any lesson in any chapter of any unit. Scroll down to “Standards” line and click the black carrot to expand the section.

- 
- ii Provides opportunities to *develop and use* specific elements of the DCI(s)

**Unit level, refer to:**

- 1 **Standards and Goals.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Standards and Goals.”
- 1 **3-D Statements.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “3-D Statements.”

**Lesson level, refer to:**

- 1 **Standards** (Lesson Brief). Open any lesson in any chapter of any unit. Scroll down to “Standards” line and click the black carrot to expand the section.

- iii Provides opportunities to *develop and use* specific elements of the CCC(s).

**Evidence needs to be at the element level of the dimensions. (See rubric introduction for a description of what is meant by “element.”)**

## C Integrating the three dimensions

Students making sense of phenomena and/or designing solutions requires student performances that integrate elements of the SEPs, CCCs, and DCIs.

**Unit level, refer to:**

- 1 **Standards and Goals.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Standards and Goals”
- 2 **3-D Statements.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “3-D Statements”

**Lesson level, refer to:**

- 1 **Standards** (Lesson Brief). Open any lesson in any chapter of any unit. Scroll down to “Standards” line and click the black carrot to expand the section.

## Explanation

Amplify Science is rooted in the research-based Do, Talk, Read, Write, Visualize, which has students engaging with SEPs, figuring out DCIs, and noticing and reflecting upon CCCs in thoughtful, structured activities in each lesson.

- **DO:** “Do” means collecting firsthand evidence. This can include conducting hands-on investigations, making observations of a video clip, or collecting data using a digital simulation, all of which can then be used as evidence in formulating a convincing scientific argument.
- **TALK:** Student-to-student discourse is a key indicator of a productive learning environment, and talking is a key modality for instruction in an Amplify Science class. This is more than just partner activities or group work (though there’s plenty of that, too). For example, reading activities are followed by a student-to-student discussion where students share their insights and questions with each other and with the whole class. Through talking and developing a collaborative environment, students feel comfortable asking questions of each other, challenging assumptions, and learning from each other.
- **READ:** Student books, written by the Lawrence Hall of Science, serve multiple purposes: They help students make connections between science concepts and real-world contexts; provide students with secondhand data to analyze; and model science practices, showing real scientists in action. Students also learn to read actively, with explicit instruction on how to record their questions, seek evidence from text, and monitor their understanding as they read.
- **WRITE:** Students in Amplify Science have frequent opportunities to write in order to help them reflect and make sense of what they are learning. Across the program students learn how to express their scientific thinking by leveraging evidence and using relevant vocabulary as they apply their thinking to writing. Frequent reflective writing helps students to gain a deep understanding of scientific arguments and explanations, both of which form the foundation of scientific understanding and expression.
- **VISUALIZE:** Through a combination of simulations (sims), media, hands-on activities, readings, and digital and physical models, students are empowered to visualize scientific phenomena in ways never possible before.

In the classroom, these modalities manifest themselves through carefully designed activities with students planning and conducting investigations, engaging in computational thinking, evaluating information, asking questions and defining problems, analyzing and interpreting data, crafting visual models, and formulating scientific arguments based on evidence they have collected — all through the lens of their investigations of real-world problems.



## Evidence

In the **Chemical Reactions** unit, students conclude Chapter 1 by using their newly acquired knowledge of substances, properties, and atoms to **write** a scientific argument that explains (SEP 6) the identity of a mysterious brown substance (rust) to the fictitious people of Westfield, who are worried about their water supply. To begin chapter 2, students investigate (SEP 3) whether or not substances can change into different substances by **doing** a hands on activity in which they observe chemical reactions at the macroscale, before using the digital simulation to **visualize** the same reactions on the microscale. Afterwards, students **talk** to each other in order to evaluate and communicate the information they observed (SEP 8) in their investigations, thereby demonstrating their ability to use properties and atomic-scale models (SEP 2) to distinguish substances. Before beginning the next lesson, students **read** and annotate an article about how scientists use knowledge about atoms to make synthetic materials.

## Finding additional evidence

### Unit level, refer to:

- 1 **Standards and Goals.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Standards and Goals." See descriptions of how SEPs and CCCs are integrated with the DCIs.
- 2 **Embedded Formative Assessments.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Embedded Formative Assessments." Note opportunities for formative assessments that integrate SEPs, CCCs and DCIs.
- 3 **3-D Statements.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "3-D Statements."

### Lesson level, refer to:

- 1 **Standards** (Lesson Brief). Open any lesson in any chapter of any unit. Scroll down to "Standards" line and click the black carrot to expand the section.

## Category I: NGSS 3D Design (additional criteria for units only):

If you are evaluating a lesson, it is not necessary to evaluate criteria D–F. Please enter your rating for a single lesson above (after C).

### Unit criteria

A unit or longer lesson designed for the NGSS will also include clear and compelling evidence of the following:

### Where to find evidence in Amplify Science

(Note: When appropriate, a brief explanation of the location of information/documents in the Amplify Science online Teacher's Guide is provided.)

#### D Unit coherence

Lessons fit together to target a set of performance expectations.

- i Each lesson builds on prior lessons by addressing questions raised in those lessons; cultivating new questions that build on what students figured out; or cultivating new questions from related phenomena, problems, and prior student experiences.
- ii The lessons help students develop toward proficiency in a targeted set of performance expectations.

#### Explanation

In conjunction with the iterative process of Do, Talk, Read, Write, Visualize, each successive lesson in a unit furthers student understanding of the phenomena they are investigating, as well as the targeted performance expectations, in a structured and considered way through the use of something we call Progress Builds. Progress Builds, or PBs, define levels in the increasingly complex explanation of a unit's anchoring phenomenon that students should be constructing over the course of the unit. Each PB level integrates and builds upon the knowledge and skills from lower levels. In this way, the unit's PB provides teachers and students with a clear roadmap for how understanding of the unit's anchor phenomenon is expected to deepen and develop over the course of the unit's learning experiences.

The Amplify Science curriculum was constructed to inspire a deep knowledge of the NGSS—not merely touching upon each standard, but truly allowing for a depth of coverage in a variety of modalities for each. PBs are an innovative way to ensure all students develop this deep understanding by aligning instruction and assessment around focused, meaningful, standards-based learning goals. Because PBs carefully consider not only the knowledge students are likely to have at the beginning of a sequence of instruction, but also how those learning experiences will position students for success with future learning opportunities, PBs support a consistent and coherent approach to a single unit of instruction. Structured by the PB, students' explanations of phenomena in each Amplify Science unit build over time through the accumulation of evidence from their investigations within a unit. As students engage in this evidence-gathering, they work toward increasingly sophisticated explanations that evolve with new evidence.

#### Evidence

See below for examples of Progress Build levels, given for two units. Note how each description of a given PB expands on the one that came before it to include deeper, more sophisticated concepts:

##### Rock Transformations unit:

- Progress Build Level 1: Rocks that form in different ways are different types of rock.
  - Description: Rock formations can be made in different ways, which cause them to become different rock types. One type is made from small pieces of rock material called sediment. When the sediment gets buried and pressed together, over time it hardens into one type of rock formation called sedimentary rock. Another type of rock formation is made from liquid rock material called magma; when it cools, it hardens into a rock type called igneous rock.

- Progress Build Level 2: Material for rock formations can come from rock formations that are weathered or melted.
  - Description: Rock formations can be made in different ways, which cause them to become different rock types. One type is made from small pieces of rock material called sediment. When the sediment gets buried and pressed together, over time it hardens into one type of rock formation called sedimentary rock. Another type of rock formation is made from liquid rock material called magma; when it cools, it hardens into a rock type called igneous rock. **The material that forms new rock comes from existing rock formations. Sediment is small pieces of rock that have been broken down from a rock formation at the surface of Earth. The small pieces are created by the movement of wind and water. The energy for this comes from the sun, and therefore these processes can only happen at the surface, where there is sun energy, air, and water. The melted rock (magma) that hardens to form new rock comes from existing rock deep below the surface of Earth. Energy from inside Earth melts the existing rock into magma.**
- Progress Build Level 3: Rock formations can move between Earth’s surface and its interior, which can lead to their transformation.
  - Description: Rock formations can be made in different ways, which cause them to become different rock types. One type is made from small pieces of rock material called sediment. When the sediment gets buried and pressed together, over time it hardens into one type of rock formation called sedimentary rock. Another type of rock formation is made from liquid rock material called magma; when it cools, it hardens into a rock type called igneous rock. The material that forms new rock comes from existing rock formations. Sediment is small pieces of rock that have been broken down from a rock formation at the surface of Earth. The small pieces are created by the movement of wind and water. The energy for this comes from the sun, and therefore these processes can only happen at the surface, where there is sun energy, air, and water. The melted rock (magma) that hardens to form new rock comes from existing rock deep below the surface of Earth. Energy from inside Earth melts the existing rock into magma. **Any type of rock can be transformed into any type of rock because of plate motion. A rock can be transformed when it is moved to a place where a different energy source can affect it, and therefore it can go through a different process. Plate motion can cause both subduction and uplift of rock. In subduction, rock (and rock material) is carried from the top of the outer layer to beneath it, where it is exposed to energy from Earth’s interior. Uplift brings rock material toward the top of the outer layer, where it can be exposed to sun energy and weathering.**

### Finding additional evidence

Unit level, refer to

- 1 **Progress Build.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Progress Build.”
- 2 **Unit Map.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Unit Map.”
- 3 **Standards and Goals.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Standards and Goals.” See descriptions of targeted Performance Expectations.

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## E Multiple science domains

When appropriate, links are made across the science domains of life science, physical science, and Earth and space science.

- i Disciplinary core ideas from different disciplines are used together to explain phenomena.
- ii The usefulness of crosscutting concepts to make sense of phenomena or design solutions to problems *across science domains* is highlighted.

Amplify Science organizes student learning around the exploration and explanation of real-world phenomena. Many real-world phenomena, by their very nature, cross the domain boundaries of life, physical, or earth and space science. When appropriate, strong links are made across the science domains in Amplify Science units.

### Evidence

- **Metabolism** unit: Students are presented with a patient who has an undiagnosed medical condition. In order to explain what is going wrong in their patient's body, students must investigate how body systems work together to carry molecules to the cells. Students are thus introduced to the physical science concepts of energy and chemical reactions in everyday life (cellular respiration), which they will be able to explore more deeply later in the Chemical Reactions unit, using the crosscutting concepts of Energy and Matter and Scale, Proportion, and Quantity as bridges.
- **Light Waves** unit: This unit focuses on wave properties and electromagnetic radiation, in the context of explaining the high rate of skin cancer in Australia. The crosscutting concept of Energy and Matter serves as a powerful lens through which students will investigate the unit's central phenomenon. Students will need to learn about the wave properties of light and also how light energy interacts with matter, both in the atmosphere where UV light destroys ozone and how UV light damages DNA in cells. Thus, this unit directly helps students connect the physical science of light with important phenomena in Earth and space science (the ozone hole) and life science (mutations that cause disease).
- **Plate Motion** unit: This unit helps students work towards mastery of disciplinary core ideas from Earth science (plate tectonics; the history of planet earth), but uses a real-world problem context from life science (i.e., fossils) to do so. The unit thus serves as a clear example of how real scientists must make linkages across domains in order to solve problems and explain phenomena.

### Finding additional evidence

- 1 **Phase Change unit, Standards and Goals** unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Standards and Goals." Note the physical science and Earth and space science performance expectations addressed by this unit, as well as the crosscutting concepts used to help make sense of the phenomenon.
- 2 **Weather Patterns unit, Standards and Goals** unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Standards and Goals." Note the physical science and Earth and space science performance expectations addressed by this unit, as well as the crosscutting concepts used to help make sense of the phenomenon.

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## F Math and ELA

Provides grade-appropriate connection(s) to the Common Core State Standards in Mathematics and/or English Language Arts & Literacy in history/social studies, science, and technical subjects.

Amplify Science provides instructional support for literacy, and provides instructions on how to read scientific texts, write scientific explanations and arguments from evidence, and engage in scientific discourse.

### Reading

In Amplify Science, students don't simply read the text and answer the questions that follow. Rather, students are always approaching their readings with a purpose in mind, from looking for pieces of evidence to support their scientific argument, to asking and recording questions as they read through the text.

### Evidence:

- **Geology on Mars** unit: In Lesson 2.1, Students are introduced to the strategy of Active Reading, a method of careful, attentive reading and discussion. After reviewing sample annotations of a different text, students create their own annotations, including questions they have and connections they observe, as they actively read an article about how scientists use computer models to explore landforms on Venus.

- **Metabolism:** Lesson 2.2 includes a jigsaw routine in which students develop their Active Reading skills, with one student in each group becoming an expert on one of four medical conditions presented in the article set.
- **Magnetic Fields:** In Lesson 2.1, students read the article “The Potential for Speed” in order to obtain and evaluate information that will help them answer the Investigation Question, *How can magnets cause objects to have kinetic energy?* As they carefully read the article, students create annotations, paying particular attention to identifying challenging words or phrases. Afterwards, students discuss their questions and ideas from the article set and reflect on words they annotated.

## Writing

In addition to vocabulary development, students will engage in a variety of writing activities, from quick reflection activities that start the class, to end-of-chapter scientific explanations, and finally, end-of-unit scientific arguments.

### Evidence:

- **Matter and Energy in Ecosystems** unit: The pre-unit assessment in Lesson 1.1 includes two writing prompts. The next lesson then begins with a warm up in which students respond in writing to a video about a biosphere that is similar to the closed and self-sustaining ecosystem featured in this unit. Later in the lesson, students read an article then write down some initial ideas about the Chapter 1 question: *Why didn't the plants and animals in the biodome have enough energy storage molecules?*
- **Phase Change** unit: Chapter 2 concludes with a written scientific explanation in which students apply ideas about phase change and energy to construct an argument about what happened to the “disappearing” lake on Titan. Afterwards, they get the chance to reflect on their learning in the unit so far by responding to writing prompts in an optional Self-Assessment activity.
- **Earth, Moon, Sun** unit: In Lesson 4.3, having discussed pertinent claims and evidence in the previous lesson, students conclude the Science Seminar (and the unit) by writing a scientific argument about whether or not there will be a lunar eclipse of the moon of Kepler-47c. As a homework activity, students engage in an important part of the writing process by reviewing and revising their written arguments. They also have an opportunity for metacognition in an optional self-assessment activity, when they reflect on their learning by responding to two brief written questions.

## Vocabulary

Developing a robust scientific vocabulary is an important aspect of our approach to literacy development. For each unit, a carefully selected set of conceptually important words has been identified, and students get repeated exposure to these words through multiple modalities: reading, writing, listening, and student-to-student talk.

### Evidence:

- **Traits and Reproduction** unit: In Lesson 2.2, the word *mutation* is introduced and codified for students with a video, a brief discussion that activates prior knowledge, and a modeling activity.
- **Thermal Energy** unit: In Lesson 1.3, the word *molecule* is introduced and codified for students with a free exploration of the digital simulation that is followed up with a class discussion about what they observed. After the discussion, students return to the simulation to investigate the relationship between temperature and the movement of molecules, thereby reinforcing the conceptual meaning of the word *molecule*. The lesson ends with a reading of a science article (“Absolute Zero”), which gives students more exposure to the word in the context of scientific texts.
- **Earth's Changing Climate** unit: In Lesson 2.1, the words *stability* and *change* are formally introduced to students directly after they engage in a physical model of energy entering and exiting the Earth system. The conceptual meaning of the words are then further reinforced with a short video that demonstrates how both the flow into and out of a system can affect what is held in the system, as well as with an investigation using the digital simulation.

## Discourse

Students in Amplify Science have numerous opportunities for structured student-to-student discourse, with low-stakes and high-stakes opportunities to share ideas, use newly acquired vocabulary, and craft oral scientific arguments.

### Evidence:

- **Evolutionary History** unit: In Lesson 2.5, students engage in a Word Relationships discourse routine. This routine supports students in incorporating scientific language with their discussions. Students discuss possible answers to explain how wolves, whales, and the Mystery Fossil became so different even though they evolved from a common ancestor population. Working with a small group, students use the given vocabulary words in their discussions. Providing students with the vocabulary words, time to discuss with a small group, and exposure to responses from their peers all support students in their acquisition and utilization of scientific language.
- **Light Waves** unit: In Chapter 4, students apply their understanding of how light interacts with materials to a new context in the Science Seminar sequence. They are asked to investigate whether a species of crabs can see the plankton they eat near the ocean floor. Students analyze evidence about visible light, then sort the evidence based on which claim it supports. In the Science Seminar (Lesson 4.2), students debate whether the evidence indicates that the crabs can see the plankton and, if so, what color the plankton appear. This provides a unique, student-driven experience that gives students practice with oral argumentation.
- **Rock Transformations** unit: In Lesson 3.4, students use a Write and Share discourse routine to apply their understanding of how uplift and subduction move rock formations. In the activity, students are assigned to a group in which each group member will respond to a different prompt, using the same vocabulary words. By having different prompts, students will not rely on their partners for an answer. Each student is responsible for her own prompt and response. However, as students are all using the same vocabulary, they will have the opportunity to write, speak, and listen to the same words repeatedly.

Teachers also have multiple opportunities for math extensions throughout the program.

### Evidence:

- **Populations and Resources** unit: In Lesson 1.3, the Teacher Support tab of the Instructional Guide includes a suggestion that after students complete the activity “Birth and Death Token Model,” teachers could *“challenge students to create a rule using inequalities for how populations change based on the number of deaths and births. Prompt students to use variables to represent the number of births and the number of deaths and write an inequality using the two variables for a population increase, a population decrease, and a stable population. [...]”*
- **Chemical Reactions** unit: In Lesson 1.4, students rewatch the “Everything Is Made of Atoms” video and use the Scale Tool to answer a question about the size of atoms. As a math extension, the Teacher Support tab of the Instructional Guide includes the suggestion, *“to support students in understanding the scale of atoms and molecules mathematically, consider the following activity before they open the Scale Tool for homework. Have students write out the length of a carbon atom (150 pm) and the length of a water molecule (280 pm) in decimal form and scientific notation. Then, have students calculate how much larger the average human (1.7 m) is compared to a carbon atom and water molecule. [...]”*
- **Weather Patterns** unit: In Lesson 1.3, students use a digital simulation to examine the factors affecting condensation and the amount of energy transfer. As a math extension, the Teacher Support tab of the Instructional Guide includes the suggestion, *“to further students’ understanding of the relationships between different variables such as temperature change, energy released, amount of cloud formed, and amount of rain formed, have students use the Data Tool to graph their data. This will allow them to model mathematically the relationship between the variables and see how one variable can affect another. [...]”*

## Finding additional evidence:

### Unit level, refer to:

- 1 **Standards and Goals.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Standards and Goals.” Scroll to bottom for Math and ELA standards addressed.
- 2 **Standards at a Glance.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Standards at a Glance.”

## Category II: NGSS Instructional Supports (lessons and units):

The lesson/unit supports three-dimensional teaching and learning for ALL students by placing the lesson in a sequence of learning for all three dimensions and providing support for teachers to engage all students.

### Lesson and unit criteria

Lessons and units designed for the NGSS include clear and compelling evidence of the following:

### Where to find evidence in Amplify Science

#### A Relevance and authenticity

Engages students in authentic and meaningful scenarios that reflect the practice of science and engineering as experienced in the real world.

- i Students experience phenomena or design problems as directly as possible (firsthand or through media representations).
- ii Includes suggestions for how to connect instruction to the students' homes, neighborhoods, communities, and/or culture as appropriate.
- iii Provides opportunities for students to connect their explanation of a phenomenon and/or their design solution to a problem to questions from their own experience.

In every unit of Amplify Science, students are asked to inhabit the role of a scientist or engineer in order to investigate a real-world problem. These real-world problems provide relevant, 21st-century contexts through which students will investigate different scientific phenomena. Students work to define the problem and collect and make sense of evidence from multiple sources and through a variety of modalities. At the end of the unit, students are presented with a brand-new problem, giving them an opportunity to apply what they've learned over the course of the unit to a new context.

#### Evidence:

- **Traits and Reproduction** unit: Students act as student geneticists to explore what causes variation in spider silk traits through their investigation into possible ways spider silk can be used for medical purposes, such as for artificial tendons. They uncover the roles of proteins and genes and the way that genes are inherited. At the end of the unit, students are able to apply what they have learned about spiders to a human context—whether or not a particular distance runner's trait could be due to gene inheritance, her environment, or a mutation in the runner's genes.
- **Phase Change**: Taking on the role of student chemists working for the fictional Universal Space Agency, students investigate the mystery of a disappearing 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. The students' assignment is to determine what happened to the lake. As they do so, students discover what causes phase changes, including the role of energy transfer and attraction between molecules.
- **Earth's Changing Climate**: In the role of student climatologists, students investigate what is causing ice on Earth's surface to melt in order to help the fictional World Climate Institute educate the public about the processes involved. Students consider claims about changes in energy from the sun, gases in the Earth's atmosphere, absorption of energy at Earth's surface, and human activities as contributing to climate change.

In addition each Engineering Internship unit invites students to design solutions for a real-world problem by figuring out how to help those in need through the application of engineering and design practices. The units emphasize compassion, sympathy, and the consideration of the needs of diverse peoples, from tsunami victims in Sri Lanka (**Plate Motion Engineering Internship**) to the special needs of premature babies (**Phase Change Engineering Internship**).

#### Finding additional evidence:

##### Unit level, refer to:

- 1 **Unit Overview**. Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Unit Overview." Notice the What? How? Why? paragraphs.
- 2 **Unit Map**. Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Unit Map."

## D Student ideas

Provides opportunities for students to express, clarify, justify, interpret, and represent their ideas and respond to peer and teacher feedback orally and/or in written form as appropriate.

As previously mentioned, Amplify Science is rooted in the research-based Do, Talk, Read, Write, Visualize approach. This learning approach presents students with multiple modalities to both figure out the unit's scientific phenomena and articulate their understanding.

For example:

- Student-to-student discourse is a key indicator of a productive learning environment, and talking is a key modality for instruction in an Amplify Science class. This is more than just partner activities or group work. For example, reading activities are followed by a student-to-student discussion where students share their insights and questions with each other and with the whole class. Through talking and developing a collaborative environment, students feel comfortable asking questions of each other, challenging assumptions, and learning from each other.
- **Evidence:** Each core middle school unit of Amplify Science culminates with a Science Seminar and final writing activity. Students explore a new real-world problem, collect and analyze evidence, and then debate which claims are best supported by evidence, all while making clear their reasoning that connects the evidence to the claims. This provides a unique, student-driven experience that gives students an opportunity to express their ideas and practice with oral argumentation. Finally, each individual student crafts a final written argument. For example:
  - **Populations and Resources** unit: In Chapter 4, students apply what they have learned about populations and resources to a new context: explaining a decrease in the size of an orange-bellied parrot population on an island off of the coast of Australia. Students create a food web to model the eating relationships on the island and then evaluate evidence, using the unit's Evidence Criterion, to determine which evidence is the highest quality. After students organize their thoughts, partners discuss and strengthen their arguments in preparation for the Science Seminar. Finally, students debate the main cause of the decrease in population: a decrease in births or an increase in deaths.
  - **Phase Change** unit: Students apply their understanding of phase change to a new context in the Science Seminar sequence. They are asked to investigate what is wrong with a liquid oxygen machine needed to launch a rocket to Titan. Students analyze evidence about the temperature of the tank and the amount of gas and liquid water present, then work in pairs to discuss and sort the evidence based on which claim it supports. Finally, in the Seminar, students debate why the liquid oxygen tank is malfunctioning, making clear their reasoning while they do so.
  - **Earth, Moon, Sun** unit: Students apply what they have learned about Earth, the Moon, and the sun to a new problem: deciding whether the moon of Kepler-47c, a newly-discovered planet outside our solar system, is likely to have a lunar eclipse during a given year. Students first research the new problem by collecting and analyzing evidence. In Lesson 4.2, students share their ideas about the claims and evidence with a partner so that they can practice their arguments in a low-stakes environment, before then participating in the productive, whole-class Science Seminar discussion. In the Science Seminar, students engage with their peers and demonstrate their developing facility with oral scientific argumentation by discussing the evidence and how it does or does not support two claims about the likelihood of a lunar eclipse.
- Students in Amplify Science have frequent opportunities for both low- and high-stakes writing in order to help them reflect on and make sense of what they are learning. From quick Warm Ups that start each class, to numerous formative assessment opportunities, to end-of-unit summative assessment writing assignments, students are learning how to express their scientific arguments in writing using evidence, vocabulary, and proper structure.
- Evidence:
  - **Natural Selection** unit: In Lesson 1.6, students participate in a Write and Share routine to practice using essential vocabulary and to apply their understanding about what makes the distribution of traits in a population change. In the activity that follows it, students examine histograms of the newt population and use what they have learned to construct a written explanation about why the newts in the population became more poisonous over time.



- **Force and Motion** unit: In Lesson 1.6, students revisit claims from Lesson 1.2 and write an explanation of how stronger or weaker forces exerted by the fictitious space pod's thrusters could have resulted in the pod changing directions in the seconds when the space agency lost communication. At the end of the lesson, students get the opportunity to express their ideas about their learning in the unit thus far by responding to written questions in an optional Self-Assessment.
- **Rock Transformations** unit: The pre-unit assessment in Lesson 1.1 has two writing activities, Lesson 1.2 starts with a writing activity for a warm up, Chapter 2 includes a written scientific explanation in lesson 2.4, and students develop an evidence-based final scientific argument in Lesson 4.3.
- Digital and paper modeling tools empower students to create, and later revise, visualizations of their understandings of key scientific phenomena at critical points in the curriculum.
  - Evidence:
    - **Traits and Reproduction** unit: In Lesson 2.4, students apply what they have learned about proteins and genes throughout Chapter 2 to create a more complete explanation of spider silk variation in the Darwin's bark spider family. To do so, they return to a paper Modeling Tool, introduced in the first chapter, to illustrate their ideas about the relationship between different gene versions and different proteins.
    - **Magnetic Fields** unit: In Lesson 1.5, students learn that the pattern of magnetic fields lines is different for attraction and repulsion, and revise the models they had created in the Modeling Tool in the previous lesson to reflect this.
    - **Oceans, Atmosphere, and Climate** unit: In Lesson 1.4, students use the unit's digital Modeling Tool to show why two generic locations have different air temperatures, thereby demonstrating their understanding of how incoming energy from the sun affects the air temperature of different places on Earth. The digital Modeling Tool continues to be used throughout the unit for creating visual representations of key ideas..

### Finding additional evidence:

#### Unit level, refer to:

- 1 **Program Guide.** Click the Global Navigation button on the left-hand side of the digital curriculum. Open the Program Guide and click "Designed for the NGSS," then "Our Approach." This section will detail Amplify Science's Do, Talk, Read, Write, Visualize pedagogical approach.
- 2 **Lesson Overview Compilation.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Lesson Overview Compilation." Scroll to the last few lessons listed; every unit ends in an individual writing activity, where students draft their scientific arguments based on evidence they have collected, making clear their reasoning that connects evidence to one of a number of claims.

#### Lesson level, refer to:

- 1 **Activities.** Open several lessons and review activities within the lesson for multiple examples of writing, peer discussion, responding to teacher or peer feedback in writing revisions, modeling, etc. Note how students are provided with frequent opportunities to express their prior knowledge.

## E Building progressions

Identifies and builds on students' prior learning in all three dimensions, including providing the following support to teachers:

- i Explicitly identifying prior student learning expected for all three dimensions.
- ii Clearly explaining how the prior learning will be built upon.

As previously mentioned, through the iterative process of Do, Talk, Read, Write, Visualize, each successive lesson in a unit furthers student understanding of the phenomena they are investigating (and the targeted performance expectations) in a structured and considered way through the use of something we call Progress Builds (PBs). PBs are explicitly designed cognitive models for a given unit that express how students will develop their knowledge and competence in the domain.

Amplify Science measures how well students can explain how and why things happen as they do, rather than merely measuring students' ability to describe science phenomena or recall isolated facts. This explanatory understanding of the world forms the basis for the levels of a PB. Each PB level characterizes an increasingly complex causal explanation of the unit's phenomenon. Each level also builds upon the knowledge and skills from lower levels toward a more complete, mechanistic understanding of that phenomenon.

### Evidence:

- **Matter and Energy in Ecosystems** unit Progress Build levels are as follows (note how each description of a given PB expands on the previous PB's description):
  - Progress Build Level 1: Producers make energy storage molecules, using the carbon from carbon dioxide.
    - Description: Energy storage molecules are made by producers through photosynthesis. In photosynthesis energy from the sun is used to make energy storage molecules using the carbon from carbon dioxide. This process moves carbon from abiotic matter to biotic matter. The amount of energy storage molecules available to supply the energy needs for an ecosystem depends on the amount of sunlight and carbon dioxide available to producers.
  - Progress Build Level 2: All organisms give off carbon dioxide when they release energy from energy storage molecules.
    - Description: Energy storage molecules are made by producers through photosynthesis. In photosynthesis energy from the sun is used to make energy storage molecules using the carbon from carbon dioxide. This process moves carbon from abiotic matter to biotic matter. The amount of energy storage molecules available to supply the energy needs for an ecosystem depends on the amount of sunlight and carbon dioxide available to producers. **Through the process of cellular respiration, producers, consumers, and decomposers release energy from energy storage molecules and make carbon dioxide using the carbon in energy storage molecules. When organisms give off carbon dioxide, this moves carbon from biotic matter to abiotic matter. This makes carbon available (in the form of carbon dioxide) to producers for photosynthesis.**
  - Progress Build Level 3: Carbon cannot be produced or used up, so in a closed ecosystem there is a fixed amount.
    - Description: Energy storage molecules are made by producers through photosynthesis. In photosynthesis energy from the sun is used to make energy storage molecules using the carbon from carbon dioxide. This process moves carbon from abiotic matter to biotic matter. The amount of energy storage molecules available to supply the energy needs for an ecosystem depends on the amount of sunlight and carbon dioxide available to producers. Through the process of cellular respiration, producers, consumers, and decomposers release energy from energy storage molecules and make carbon dioxide using the carbon in energy storage molecules. When organisms give off carbon dioxide, this moves carbon from biotic matter to abiotic matter. This makes carbon available (in the form of carbon dioxide) to producers for photosynthesis. **Carbon cannot be produced or used up. Therefore, the total amount of carbon in a closed ecosystem is always the same. This means a change in the amount of carbon in abiotic matter also means the amount of carbon in biotic matter has changed, and vice versa. A change in the distribution of carbon in the ecosystem indicates that the movement of carbon (via photosynthesis or cellular respiration) has changed in the ecosystem.**

### Finding additional evidence:

#### Unit level, refer to:

- 1 Standards and Goals.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Standards and Goals.” See section titled, *How This Unit Fits Into the Amplify Science Program*, which describes the unit’s place in the trajectory of core ideas and the prerequisite knowledge.
- 2 Progress Build.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Progress Build.” See section that describes “Prior knowledge (preconceptions).”

#### Lesson level, refer to:

- 1 Review the first several Activities in each chapter** for use of prior knowledge. Prior knowledge is often addressed in the Daily Written Reflection. Access the Instructional Guide within an Activity for detailed information.

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## F Scientific accuracy

Uses scientifically accurate and grade-appropriate scientific information, phenomena, and representations to support students’ three-dimensional learning.

Authored by the scientists and science education experts at University of California, Berkeley’s Lawrence Hall of Science, Amplify Science presents students with the most up-to-date scientific content, delivered in an intuitive and organized way. Given the digital delivery method of the curriculum, the Amplify Science team is committed to continuing to update the program to stay abreast of the latest scientific developments.

Content within Amplify Science has undergone extensive field tests in schools across the United States, with more than 400 teachers and 34,000 students participating. Furthermore, the Lawrence Hall of Science has incomparable access to scientists working in the fields of study included in the curriculum. Each unit has been reviewed and approved by this outside network of scientists.

Every unit in Amplify Science has students taking on the role of a scientist or engineer in order to investigate a real-world, phenomena-based problem. Students make the leap from “learning about” to “figuring out” scientific concepts by exploring them in depth. Through a variety of immersive experiences, both physical and digital, students conduct investigations, create and critique models, and gather evidence to support claims.

#### Unit level, refer to:

- 1 Science Background.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Science Background.”
- 2 Articles in this Unit.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Articles in this Unit.”

#### Lesson level, refer to:

- 1 Activities.** Review Activities, and associated Instructional Guide content, within a variety of lessons for various information, phenomena, and experiences of 3D learning. The Teacher Support tab within the Instructional Guide will often provide additional detailed scientific information.

**A note on curriculum development:** Every unit in Amplify Science had one or more expert science reviewers who provided input to the initial approach to the development of the unit and reviewed unit content for accuracy.

## G Differentiated instruction

Provides guidance for teachers to support differentiated instruction by including:

- i Appropriate reading, writing, listening, and/or speaking alternatives (e.g., translations, picture support, graphic organizers, etc.) for students who are English learners, have special needs, or read well below the grade level.
- ii Extra support (e.g., phenomena, representations, tasks) for students who are struggling to meet the targeted expectations.
- iii Extensions for students with high interest or who have already met the performance expectations to develop deeper understanding of the practices, disciplinary core ideas, and crosscutting concepts.

Amplify Science units provide many varied learning opportunities as well as timely supports to ensure that diverse learners can be successful with the language and content demands of science, ultimately becoming more independent learners and thinkers.

To support teachers in providing the best possible instruction, every lesson includes a Differentiation section in the Lesson Brief. The **Differentiation Brief** describes what is built into the lesson to support diverse learning needs; highlights potential challenges teachers should be aware of; and provides specific strategies for differentiating instruction. The Differentiation Brief contains the following sections:

- **Embedded Supports for Diverse Learners:** Every unit is designed with diverse learners in mind, with the goal of providing rigorous yet accessible science instruction. Each lesson is intentionally planned to provide multiple entry points for students, and to enable all students to be successful with all of the activities. This section of the Differentiation Brief highlights the scaffolds already embedded within the lesson so that teachers can take advantage of the power of these carefully designed activities.
- **Potential Challenges in This Lesson:** This section of the Differentiation Brief highlights aspects of the lesson that may present particular cognitive, linguistic, or social challenges for students.
- **Specific differentiation strategies for English learners:** This section of the Differentiation Brief points out activities that could pose linguistic challenges for English learners or reduce their access to science content, and suggests supports and modifications accordingly. Suggestions include linguistic supports to bolster students' understanding of science content, supports for engaging with science texts, ideas for helping students participate in discussions, multiple ways students can express their ideas in writing, and more.
- **Specific differentiation strategies for students who need more support:** Every lesson includes ways for teachers to support those students who are struggling or who have special needs. These additional scaffolds are to be used entirely at the discretion of the teacher, and provide targeted suggestions tailored for the activities in that particular lesson.
- **Specific differentiation strategies for students who need more challenge:** Every lesson has ways for a teacher to expand upon the lesson, or go beyond the scope of what is expected in that lesson. This section of the Differentiation Brief provides suggestions that allow students to engage with content more deeply, explore the material with a new purpose, pursue more independent research on a topic, and more.

The aim of the Amplify Science program is for all students to develop a deep understanding of science concepts as well as an aptitude with the science and engineering practices that are essential to the work of scientists and engineers. It is important to recognize that every classroom is composed of students with diverse learning needs, however, and that these can vary widely within and across classrooms. Amplify Science units therefore provide many varied learning opportunities as well as timely supports (detailed above) to ensure that diverse learners can be successful with the language and content demands of science. The goals of all instructional supports provided in the program, whether embedded or optional, are to:

- Access and build students' background knowledge.
- Provide explicit instruction in the language of science and engineering.
- Foster language development without diluting science content.
- Provide multiple means of accessing science content.
- Give students a sense of ownership in their learning.

### Finding additional evidence:

#### Lesson level, refer to:

- 1 **Differentiation Brief** (Lesson Brief). Open any lesson in any chapter of any unit. Scroll down to “Differentiation” line and click the black carrot to expand the section.
- 2 **Bilingual Glossary** (Lesson Brief). Open any lesson in any chapter of any unit. Go to “Digital Resources” area on right-hand side. Click the Bilingual Glossary within the list of resources.

## Category II: NGSS Instructional Supports (additional criteria for units only)

If you are evaluating a lesson, it is not necessary to evaluate criteria F–G. Please enter your rating for a lesson above (after E).

### Unit criteria

A unit or longer lesson designed for the NGSS will also include clear and compelling evidence of the following:

### Where to find evidence in Amplify Science

#### H Teacher support for unit coherence

Supports teachers in facilitating coherent student learning experiences over time by:

- i Providing strategies for linking student engagement across lessons (e.g., cultivating new student questions at the end of a lesson in a way that leads to future lessons, helping students connect related problems and phenomena across lessons, etc.).
- ii Providing strategies for ensuring student sense-making and/or problem-solving is linked to learning in all three dimensions.

Grounded in each unit's Progress Build (described above), ample teacher support is provided at all levels of Amplify Science to further connect all lessons to each other in a meaningful and thoughtful way. The teacher edition includes a wealth of resources through which Amplify Science teachers can develop and extend their knowledge, including the following:

- **Unit-level resources**
  - Unit Overviews
  - Lesson Summaries
  - Standards and Goals Overviews
  - Science Background information
  - Getting Ready to Teach information
  - Assessment System Overview
- **Embedded teacher supports in the lessons**
  - Differentiation strategies for each lesson
  - Teacher Support notes for activities within the lessons, including background knowledge on the scientific information being taught, pedagogical rationale, and suggestions on technology usage
  - Clear step-by-step instructions for each activity
- **Help Desk**
  - Available by phone, email, or online chat
  - Able to answer technology questions, adjust student rosters as needed, or contact Lawrence Hall of Science with content-related questions
- **Program Guide**
  - Free website containing information on the program pedagogy (Do, Talk, Read, Write, Visualize), the structure of the courses, how English learners were considered in the curriculum's development, tutorial videos, FAQs, and more

## I Scaffolded differentiation over time

Provides supports to help students engage in the practices as needed and gradually adjusts supports over time so that students are increasingly responsible for making sense of phenomena and/or designing solutions to problems.

Amplify Science units are designed with the idea of Gradual Release of Responsibility model—there is an emphasis on teacher modeling and direction at the beginning of the unit, but many of the scaffolds that existed earlier in the unit are thoughtfully and meaningfully removed as the unit progresses.

### Evidence:

- **Metabolism** unit: When students use the Modeling Tool in Lesson 1.3, they receive explicit instruction about the purpose of the modeling tool and how to use it, and complete a very simple model (placing molecules in the cell). By Lesson 2.2, students independently complete a somewhat more complex model showing a path that one molecule travels. By Lesson 2.6, students independently complete often complex models during Differentiation Day and discuss them with partners as a means of reviewing key content or exploring advanced content. By the end of the unit, they are writing sophisticated, evidence-based scientific arguments.
- **Harnessing Human Energy** unit: In Lesson 1.4, students are introduced to the strategy of Active Reading, a method of careful, attentive reading and discussion. After reviewing sample annotations, students create their own annotations, including questions they have and connections they observe, as they actively read an article about about how real-world scientists and inventors solve energy problems. By the last chapter of the unit, in Lesson 3.1, students independently read and annotate one article in a set of four, then share what they learned with their group members, who each read and annotated a different article.
- **Weather Patterns** unit: In Lesson 1.6, students engage in a Word Relationships discourse routine in which they use a set of cards to support them as they construct sentences together in small groups. To get them started, the teacher first models a sentence. Providing students with the vocabulary words, time to discuss with a small group, and exposure to responses from their peers supports students in their acquisition and utilization of academic language. Using this scaffolding, students then write a scientific explanation that demonstrates their understanding of Chapter 1 content to conclude the lesson. As the unit progresses, students will write with increased independence, ultimately developing a final written argument in Lesson 4.3.

## Category III: Monitoring NGSS Student Progress (lessons and units)

The lesson/unit supports monitoring student progress in all three dimensions of the NGSS as students make sense of phenomena and/or design solutions to problems.

### Lesson and unit criteria

Lessons and units designed for the NGSS include clear and compelling evidence of the following:

### Where to find evidence in Amplify Science

#### A Monitoring 3D student performances

Elicits direct, observable evidence of three-dimensional learning; students are using practices with core ideas and crosscutting concepts to make sense of phenomena and/or to design solutions.

The Amplify Science assessment system is grounded in the principle that students benefit from regular and varied opportunities to demonstrate understanding through performance. In practice, this means that for the overwhelming majority of assessment opportunities in each unit, student conceptual understanding is revealed through engagement in the science and engineering practices. For example, each grade level includes an Investigation Assessment, and each core unit includes a Science Seminar sequence that serves as a culminating 3D performance task.

This commitment to multidimensional, NGSS-aligned performance is clear in the embedded assessment opportunities that occur in nearly every lesson: Students investigate phenomena, construct scientific explanations, develop and use models, and engage in argument as a core part of the problem-based deep dives in each unit. While it is not feasible for every assessment opportunity to provide information about student progress along each dimension, careful consideration is given to ensure that each unit includes multiple opportunities to provide evidence of understanding of the focal concepts and practices in a given unit, as well as instructional suggestions for taking action based on that evidence

#### Evidence:

- **Metabolism** unit: In lesson 4.3, students engage in oral argumentation as they grapple with ideas about how energy is released in the body, in the context of a controversial claim that an athlete might be blood doping. The Science Seminar, a group discussion in which students make sense of evidence and debate which claims are best supported, provides a unique, student-centered argumentation experience and gives teachers a chance to formatively assess their students' facility with the SEP of scientific argumentation. Afterwards, students build on their oral argumentation experience to produce a final written scientific argument, requiring them to employ scientific practices to explain disciplinary core ideas and crosscutting concepts. The lesson includes a downloadable document for teachers to use in assessing this written argument. The PDF includes two rubrics. The first rubric may be used summatively to assess students' understanding of DCIs and CCCs from the unit. The second rubric is designed to formatively assess the SEP of constructing arguments. Relevant to both rubrics, possible student responses are provided that illustrate how a student's written work may demonstrate different levels of understanding.
- **Force and Motion** unit: In Lesson 2.1, to investigate whether a specific pod's failure to dock was a result of the pod collecting a different number of asteroid samples than pods on other missions, students work with physical materials to plan and conduct an investigation about how exerting the same force affects objects of different mass. This investigation also serves as an assessment that is designed to reveal students' facility with the practices of Planning and Conducting Investigations and Analyzing and Interpreting Data, and with their understanding of unit-specific science concepts and the crosscutting concept of Cause and Effect.



- **Rock Transformations** unit: In Lesson 2.5, students complete a Critical Juncture Assessment consisting of 12 multiple-choice questions and two written-response questions. This Critical Juncture Assessment, like the other formal assessments in Amplify Science, is quite different from traditional multiple-choice tests. Rather than testing recall of isolated facts, the questions are designed to assess the deep, explanatory understanding called for in the NGSS. Therefore, the questions require students to figure out and explain or make predictions about the scientific phenomena investigated in the unit—in effect, each question functions as a mini performance task. Reviewing students' responses to the two written response questions using the provided rubrics offers additional evidence of student understanding. When used in conjunction with the Pre- and End-of Unit Assessments, the CJ provides teachers with actionable, diagnostic information about student progress toward the three dimensional learning goals for the unit.

#### Finding additional evidence:

##### Unit level, refer to:

- 1 **Assessment System.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Assessment System."
- 2 **Embedded Formative Assessments.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Embedded Formative Assessments."

##### Lesson level refer to:

- 1 **"Rubrics for Final Written Argument" PDF.** In one of the final two lessons of each unit, students construct a final written argument. Open one of the final lessons, see the Digital Resources area and open "Rubric for Students' Final Written Argument." Note the guidelines there for how to interpret students' responses for use of practices, core ideas, and crosscutting concepts.

## B Formative

Embeds formative assessment processes throughout that evaluate student learning to inform instruction.

The variety of formative assessment options for Amplify Science include:

- **Pre-Unit Assessment** (formative): Written responses.
- **On-the-Fly Assessments (OtFA)** (formative): 3–4 per chapter; each OtFA includes guidance on what to look for in student activity or work products, and offers suggestions on how to adjust instruction accordingly.
- **End-of-chapter scientific explanations** (formative): Three-dimensional performance tasks to support students' understanding of ideas encountered in each chapter.
- **Self-assessments** (formative): One per chapter; brief opportunities for students to reflect on their own learning, ask questions, and reveal ongoing thoughts about unit content.
- **Critical Juncture Assessment (CJ)** (formative): Occurring at the end of each chapter, similar in format to the Pre-Unit and End-of-Unit assessments, a CJ signifies a point in the unit at which it is especially important that all students understand the content before continuing.

#### Evidence:

- **Microbiome** unit: In Lesson 1.3, students revise their initial response to the Chapter 1 Question: *How small are the microorganisms that live on and in the human body?* Their revisions give teachers a glimpse into students' current understanding of the scale of microorganisms, as well as the ability to gauge if student understanding has improved since Lesson 1.1 (when they wrote their initial response). Criteria of what to look for in the written responses, as well as suggestions for how to tailor instruction accordingly, are provided in the "On-the-Fly Assessments" reference PDF.

- **Force and Motion** unit: In Lesson 2.5, students are presented with a Self-Assessment, which invites them to reflect on their progress in solving the overall problem of the unit. Their responses enable teachers to gain insight into students' thinking at this point in the unit, and to know where more attention to particular topics may be needed.
- **Earth's Changing Climate** unit: In Lesson 1.5, students are given the opportunity to model a claim for what is causing climate change, based on evidence they have encountered in the unit. The models students submit will help teachers gauge how individual students are building their understanding of the relationship between atmosphere and climate, as well as how they are modeling their ideas. Possible responses and how to interpret them for insight into student learning are provided.

### Finding additional evidence:

#### Unit level, refer to:

- 1 **Embedded Formative Assessments.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Embedded Formative Assessments."

## C Scoring guidance

Includes aligned rubrics and scoring guidelines that provide guidance for interpreting student performance along the three dimensions to support teachers in (a) planning instruction and (b) providing ongoing feedback to students.

Guidance on interpreting student performance along the three dimensions is included in all Amplify Science units. Categories of evaluation guidance found throughout the program include:

- **Assessment guides/rubrics:** Guidance is provided to gauge the level of student performance on the assessment task, with suggestions for student feedback and questioning strategies to advance learning, revise performance, or elicit and clarify student thinking. Assessment guides/rubrics are available as a digital resource in the Lesson Brief for the lesson in which the task occurs.
- **Possible student responses:** Possible student responses are provided to model how evidence of understanding, or partial understanding, may be demonstrated by the student for the specific task. Possible student responses are provided in the Possible Responses tab in the activity where there is an applicable notebook page. Possible student responses also appear in the Assessment Guide for the End-of-Unit Assessment (in Digital Resources).
- **Look for/Now what? notes:** Each On-the-Fly Assessment includes a two-part description of what evidence of understanding would look like for the task (Look for) and how instruction may be adjusted in response (Now what?). These are accessible by pressing the orange hummingbird icon in the activity in which they appear.
- **Assess understanding/Tailor instruction notes:** Each Critical Juncture Assessment includes a two-part description of how the expected level of student understanding may be demonstrated in the task (Assess understanding) and how instruction may be adjusted in response (Tailor instruction) at the class, group, and student level. These are accessible by pressing the orange hummingbird icon for the activity in which they appear.

### Evidence:

- **Populations and Resources** unit: In Lesson 2.5, students complete a Critical Juncture Assessment consisting of 12 multiple-choice questions and two written-response questions. The Critical Juncture Assessment provides formative information about students' progress in the unit and can be used to group students for the differentiated lesson that follows it. This offers an opportunity to provide more personalized learning experiences to students with different levels of content understanding. A group assignment recommendation will be made automatically, based on auto-scoring of the Critical Juncture Assessment multiple-choice questions. Reviewing students' responses to the two written response questions using the provided rubrics offers additional evidence of student understanding.

- **Chemical Reactions** unit: In Lesson 4.4, students complete an End-of-Unit Assessment, consisting of the same 12 multiple choice questions and 2 written-response questions as are in the Pre-Unit Assessment. The assessment indicates where student understanding is located along the levels of the Progress Build after instruction. The “End-of-Unit Assessment Scoring Guide and Answer Key” (located in the Digital Resources of Lesson 4.4) provides detailed information on the assessment design as well as on how to evaluate student performance on both the multiple-choice and written items. Rubrics and possible responses are provided for use in interpreting the written responses. When analyzed with the Pre-Unit Assessment and Critical Juncture Assessment, results from the End-of-Unit Assessment indicate students’ growth over the course of the unit.
- **Plate Motion** unit: In the third activity of Lesson 1.4, students demonstrate their understanding of how earthquake patterns are related to plate boundaries by creating a model depicting this relationship along the plate boundary between Africa and South America. The Possible Responses tab in the Instructional Guide provides an example of a proficient model. Furthermore, the teacher can use this opportunity as an On-the-Fly Assessment of students’ understanding of what plates are and that plates can move, and to that end the On-the-Fly reference information includes the guidance, “As you circulate the classroom, observe students’ models to see if students are drawing the plate boundary between South America and Africa along the line of earthquakes [...]. When students share their thinking, they should be using earthquakes as evidence of plate movement, and they should consider the pattern of earthquakes as evidence of where a plate boundary is. If students are challenged by the synthesis of unit content required to complete their models, you may wish to guide them through the process of building their models in smaller conceptual pieces. You may wish to provide this support to a small group of students, or take this scaffolded approach with the whole class.” Instructions on doing so follow, enabling teachers to not only gauge students’ learning, but to provide feedback and tailor instruction effectively, as well.

### Finding additional evidence:

#### Unit level, refer to:

- 1 **Assessment System.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Assessment System.”
- 2 **Embedded Formative Assessments.** Open any unit. Click “JUMP DOWN TO UNIT GUIDE” link, then click “Embedded Formative Assessments.”

#### Lesson level, refer to:

- 1 **“End-of-Unit Assessment Answer Key and Scoring Guide” PDF.** Open the last lesson of any core unit. Go to “Digital Resources” area on right side of the Lesson Brief. Click the *End-of-unit Assessment Answer Key and Scoring Guide* within the list of resources.
- 2 Explore the **Activities** in any lesson, and the associated Instructional Guide content. Also see “Possible Response” tab for the activity, where scoring guidance is provided if applicable.

## D Unbiased tasks/items

Assesses student proficiency using methods, vocabulary, representations, and examples that are accessible and unbiased for all students.

Amplify Science's multiple measure approach to assessment is designed to minimize bias by providing a wide variety of opportunities for students to demonstrate understanding—not just text, but also talk, diagramming, and modeling.

### Evidence

- **Natural Selection** unit: In Lesson 4.2, students demonstrate their knowledge of natural selection through a collaborative group discussion (Science Seminar) in which they discuss evidence to determine which claim best explains why the stickleback population has changed. The Science Seminar discussion provides an informal opportunity to gauge students' ability to use evidence to make arguments. It also provides the opportunity to assess their grasp of the content learned over the course of the unit. Furthermore, in the following lesson (Lesson 4.3), students get the opportunity to build on their experience by independently writing a convincing scientific argument that explains why the stickleback population has less armor and has become faster compared to the sticklebacks 13 generations ago. Two rubrics are provided for teachers to evaluate these Final Written Arguments. The first rubric may be used summatively to assess students' understanding of science concepts from the unit. The second rubric is designed to formatively assess the practice of constructing arguments (note: students' facility with this practice takes time to develop, and students will have opportunities to practice argumentation in each unit)
- **Thermal Energy** unit: In Lesson 1.1, students complete a Pre-Unit Assessment consisting of 16 multiple-choice questions and two written-response questions. The assessment is designed to be used formatively and provides insight into a student's understanding of the key concepts before encountering them in the unit.
- **Oceans, Atmosphere, and Climate** unit: In Lesson 2.4, students use the *Ocean, Atmosphere, and Climate* Modeling Tool to demonstrate how the ocean current that passes near the city of Christchurch, New Zealand, affects its air temperature. This modeling activity is a good opportunity to formatively assess individual student understanding of how ocean currents can affect both the ocean and air temperature of a location (i.e., level 2 of the Progress Build). It is also an opportunity to check on how students reflect on the crosscutting concept of Cause and Effect as it relates to what determines the air temperature of a location.

In addition to the multiple-measure approach, all assessments are carefully reviewed to improve accessibility and to eliminate bias. The review process is supported by psychometricians, assessment experts, science educators, literacy experts, and educators with deep experience in the grade level in which particular assessments occur.

As a part of this process to create unbiased assessments, language in assessment items is carefully chosen to be grade-level appropriate and to avoid the common pitfalls of assessment design, like false cognates and complex grammatical structure or tense. As an important element of construct validity, contexts used for assessment items and performance tasks are carefully chosen to avoid advantaging or disadvantaging students from different backgrounds—Amplify Science aims for student performance to be a function of the understanding and practices being learned and assessed, not the set of experiences they are familiar with.

### Finding additional evidence:

Unit level, refer to:

- 1 **Assessment System.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Assessment System."
- 2 **Embedded Formative Assessments.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Embedded Formative Assessments."

## Category III: Monitoring NGSS Student Progress (additional criteria for units only)

If you are evaluating a lesson, it is not necessary to evaluate criteria E–F. Please enter your rating for a lesson above (after D).

### Unit criteria

A unit or longer lesson designed for the NGSS will also include clear and compelling evidence of the following:

### Where to find evidence in Amplify Science

#### E Coherent assessment system

Includes pre-, formative, summative, and self-assessment measures that assess three-dimensional learning.

The assessment system for each Amplify Science unit is designed to provide teachers with actionable diagnostic information about student progress toward the learning goals for the unit. Assessment of unit learning goals is grounded in the unit's Progress Build, which describes how student understanding is likely to develop and deepen through engagement with the unit's learning experiences. The assessment system includes formal and informal opportunities for students to demonstrate understanding and for teachers to gather information throughout the unit — all while giving teachers flexibility in deciding what to score and what to simply review. Built largely around instructionally embedded performances, these opportunities encompass a range of modalities that, as a system, attend to research on effective assessment strategies and the *NRC Framework for K–12 Science Education*.

The variety of assessment options for grades 6–8 in Amplify Science include:

- **Pre-Unit Assessment** (formative): Combination of auto-scored multiple-choice questions and rubric-scored written responses.
- **On-the-Fly Assessments (OtFA)** (formative): 3–4 per chapter; each OtFA includes guidance on what to look for in student activity or work products, and offers suggestions on how to adjust instruction accordingly.
- **End-of-chapter scientific explanations** (formative): Three-dimensional performance tasks to support students' understanding of ideas encountered in each chapter.
- **Self-assessments** (formative): One per chapter; brief opportunities for students to reflect on their own learning, ask questions, and reveal ongoing thoughts about unit content.
- **Critical Juncture Assessment (CJ)** (formative): Occurring toward the midpoint of each unit, similar in format to the Pre-Unit and End-of-Unit assessments.
- **Science Seminar & Final Written Argument** (summative for unit concepts; formative for the practice of scientific argumentation): Culminating performance task for each unit, includes a rubric for assessing core unit concepts and a rubric for assessing students' developing facility with the practice of scientific argumentation.
- **End-of-Unit Assessment** (summative): Combination of auto-scored multiple-choice questions and rubric-scored written responses.
- **Benchmark Assessments**: Delivered three to four times per year in grades 3–8, benchmark assessments report on students' facility with each of the grade-level appropriate disciplinary core ideas, science and engineering practices, crosscutting concepts, and performance expectations of the NGSS.

## Evidence

- **Light Waves** unit: In Lesson 1.1, students complete a Pre-Unit Assessment consisting of 16 multiple-choice questions and two written-response questions. The assessment is designed to be used formatively and provides insight into a student's understanding of the key concepts before encountering them in the unit. Prior to instruction, students' understanding is not expected to reach any level of the Progress Build. In Lesson 3.4, students complete a Critical Juncture Assessment consisting of 12 multiple-choice questions and two written-response questions. The Critical Juncture Assessment provides formative information about students' progress in the unit, aligned to the Progress Build, and can be used to group students for the differentiated lesson that follows it. In Lesson 4.4, students complete an End-of-Unit Assessment, consisting of the same 16 multiple choice questions and two written-response questions as are in the Pre-Unit Assessment. This assessment indicates where student understanding is located along the levels of the Progress Build after instruction. The End-of-Unit Assessment also measures students' understanding of important supporting content not explicitly included in the Progress Build. When analyzed with the Pre-Unit Assessment and Critical Juncture Assessment, results from the End-of-Unit Assessment indicate students' growth over the course of the unit. In between the formal assessments, a range of assessment opportunities are embedded in instruction, including On-the-Fly Assessments in Lessons 1.2, 1.4, 3.2, and 4.4 (among others); Self-Assessments in Lessons 1.4, 2.5, 3.6, and 4.3; end-of-chapter written explanations in Lessons 1.4, 2.5, and 3.6; a final written argument in lesson 4.3; and more. Together, the assessments are a coherent system through which teachers gain actionable, timely, and relevant insight into their students' learning.

## Finding additional evidence:

### Unit level, refer to:

- 1 **Assessment System.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Assessment System."

## F Opportunity to learn

Provides multiple opportunities for students to demonstrate performance of practices connected with their understanding of disciplinary core ideas and crosscutting concepts and receive feedback.

Each unit also includes a range of assessments embedded in instruction. By leveraging the formative opportunities in the learning experiences that students are already engaged in, these assessments are designed to provide regular information to the teacher with minimal impact on instructional time. These embedded assessment opportunities are smaller in scale than the more formal assessments described above and often highlight individual concepts or practices. *On-the-Fly Assessments* (OtFAs) are designed to help a teacher make sense of student activity during a learning experience (e.g., student–student talk, writing, model construction) and provide evidence of how a student is coming to understand core concepts. Each OtFA provides a description of how a student might demonstrate understanding of a concept and/or practice through the activity (and, where appropriate, what evidence of common alternative conceptions would entail). Importantly, OtFAs also provide instructional suggestions for what to do in response to the assessment information, and, where possible, highlight existing resources and opportunities within the unit for additional practice with the relevant ideas.

Another set of tools to help illuminate student thinking and to support student metacognition are *Self-Assessments*. At the end of each chapter, students are given an opportunity to reflect on the unit's central problem by responding to the same set of prompts each time. The purpose of this consistency is to ensure that students' own progress is more visible to them. Reviewing students' responses provides a sense of what students believe about what they know. Looking at students' questions about what they are still wondering can also provide insight into what they are curious about or interested in learning, or what they might need additional support to learn.

## Evidence

- **Traits and Reproduction** unit: In Activity 3 of Lesson 1.4, students complete a visual model to demonstrate their understanding that connections between different kinds of protein molecules determine different traits for spider silk flexibility. The teacher uses this opportunity as an On-the-Fly Assessment of students' ability to model specific examples of how changing proteins can lead to different traits. Students have the opportunity to use the Modeling Tool to demonstrate understanding more throughout the unit, including in Lesson 2.4, when they use it to illustrate their ideas about the relationship between different gene versions and different proteins, and again in Lesson 3.3, when they use it to show how sexual reproduction can result in different combinations of gene versions.
- **Magnetic Fields** unit: In Activity 1 of Lesson 1.6, students construct visual models to show their ideas about magnetic field lines. The teacher uses this opportunity as an On-the-Fly Assessment of students' understanding of magnetic force and magnetic fields. Later in the lesson, students create a written explanation of how the magnetic field line data supports or refutes the claim that the launcher and spacecraft magnets were misaligned in a recent launch. Finally, to conclude the lesson and chapter, students complete a Self-Assessment. This quick but important activity asks students to reflect on what they do or do not yet understand about the core concepts from the unit.
- **Earth, Moon, and Sun** unit: Embedded On-the-Fly assessments can be seen in Lesson 1.2, when students explore the Earth, Moon, and Sun Simulation to gather evidence that will help answer the first Investigation Question; in Lesson 1.3, when students engage in a physical Moon Sphere Model to demonstrate understanding of the concepts of models and scale; and in Lesson 1.4, when students communicate their knowledge of why part of the Moon is dark by gathering and presenting evidence related to a new Investigation Question. These are just a few of the many opportunities students have to show their developing understanding of the unit's core concepts and facility with focal science and engineering practices.

## Finding additional evidence:

### Unit level, refer to:

- 1 **Embedded Formative Assessments.** Open any unit. Click "JUMP DOWN TO UNIT GUIDE" link, then click "Embedded Formative Assessments."

### Lesson level, refer to:

- 1 **Students are provided with self-assessment opportunities at the end of each chapter.** See the final activity in each chapter.

For more information on Amplify Science,  
visit **[amplify.com/science](https://amplify.com/science)**.

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