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Benchmark Code	Benchmark	**LESSONS WHERE STANDARD/BENCHMARK IS DIRECTLY ADDRESSED IN MAJOR TOOL (MOST IN-DEPTH COVERAGE LISTED FIRST)** (Include the student edition and teacher edition with the page numbers of lesson, a link to lesson, or other identifier for easy lookup by reviewers.)
PUBLISHER'S NOTE AND INSTRUCTIONS: Teacher logins can see both the teacher and student material. Therefore, a citation of "Unit X, Lesson Y, Activity Z" is good for **both** student material (lesson text, activity instructions) and teacher material.		
SC.6.N.1.1	Define a problem from the sixth-grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.	Every unit in Amplify Science is structured around conducting investigations as well as gathering and analyzing evidence from other sources to draw and defend conclusions about scientific principles as well as specific phenomena. For example, in the Magnetic Fields unit, students are investigating what could have caused a failure in the test of a model of an electromagnetic spacecraft launcher system. They then apply what they have learned to the design of electromagnetic launcher systems for roller coasters. ● In Lesson 2.2, students are investigating the question: How can magnets cause objects to have kinetic energy? In Activity 2 students use reference materials (a set of articles about kinetic and potential energy in extreme sports) to gather evidence about where kinetic energy comes from; then in Activity 3, students use physical materials (including magnets) to plan and build systems that can give an object kinetic energy. ● In Lesson 4.1, Activity 4, students evaluate evidence from a set of magnet experiments in order to determine whether or not variables were controlled. After identifying which variables were not controlled appropriately, students design their own improved experiments in

		Lesson 4.2, Activity 2. In Activity 3 and 4 they analyze and discuss the results. ● In Lesson 4.3, Activity 3, students engage in a discussion in which they defend their conclusions about the launcher designs. They then produce a written argument in Activity 4.
SC.6.N.1.2	Explain why scientific investigations should be replicable.	This standard is addressed in multiple units. For example: ● In the Force and Motion unit, Lesson 1.4, Activity 3, students conduct a hands-on investigation in which they conduct repeated trials in order to collect data on the relationship between force and velocity change. ● In the Phase Change Engineering Internship, Lesson 5, Activity titled "Introducing the Design Cycle" the teacher discusses the importance of iterative testing.
SC.6.N.1.3	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.	This standard is addressed in multiple units, in which students engage in different types of investigations and discuss the evidence gathered. For example: ● In the Magnetic Fields unit, Lesson 4.2, Activity 2, students design and conduct a controlled experiment, using the Magnetic Fields simulation, to investigate the factors affecting kinetic energy changes in a system of electromagnets. They then discuss the nature of experiments and the distinction between experiments and systematic observations. ● In the Chemical Reactions unit, Lesson 1.2, Activity 3, students conduct a systematic observation of different substances and their properties (click NEXT to view all parts of the activity). ● In the Force and Motion unit, Lesson 2.1, Activity 2, students conduct a controlled experiment to investigate the relationship between mass, force, and velocity change.
SC.6.N.1.4	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.	In every Amplify Science student, there are frequent opportunities for student-to-student talk as students share results of investigations and discuss possible explanations. For example: ● In the Magnetic Fields Unit, Lesson 3.1, Activity 2, students plan and conduct an investigation of the question, "What affects the amount of potential energy stored in the magnetic field when a magnet is moved against a magnetic force?" using the Magnetic Fields simulation. In

		Activity 3, the teacher leads a class discussion in which students share how they designed their experiments and the evidence they collected. ● In the Light Waves Unit, Lesson 3.1, Activity 2, students plan and conduct an investigation to gather evidence about whether light travels in a straight line. Students then discuss the evidence found (click NEXT to view all parts of the activity).
SC.6.N.1.5	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.	Students are exposed to many different examples of scientists using creativity in their work. For example: ● In Force and Motion, Lesson 2.2, Activity 2, students read an article, “Designing Wheelchairs”, which describes the creative processes used by an engineer who designs wheelchairs to be used by different kinds of athletes. ● In Chemical Reactions, Lesson 2.3, Activity 4, students read an article, “Meet a Scientist Who Preserves Artwork”, which describes the creative processes used by a chemist who works in art preservation. Students also think creatively themselves as they plan investigations and create explanations. For example: ● In the Magnetic Fields Unit, Lesson 3.1, Activity 2, students plan and conduct their own investigation of the question, “What affects the amount of potential energy stored in the magnetic field when a magnet is moved against a magnetic force?” using the Magnetic Fields simulation. ● In the Force and Motion Unit, Lesson 1.6, Activity 3, students use creativity as they produce explanations for two possible claims that could both fit the evidence students have about what could have caused an observed change in velocity.
SC.6.N.2.1	Distinguish science from other activities involving thought.	Amplify Science units provide students with a strong foundational understanding of how scientific knowledge is constructed and how this differs from everyday thinking processes. One illustration of this is the Argumentation Wall, which is introduced in Harnessing Human Energy, Lesson 1.2, in the Activity titled “Introducing Argumentation and the Reasoning Tool”. The wall contains visual representations of the goals and structure of scientific arguments, and is added to and referred to across the year. When the Argumentation Wall is introduced, there is explicit discussion of the differences between scientific knowledge and other kinds of knowledge.
SC.6.N.2.2	Explain that scientific knowledge is durable because it is open to change	Across multiple Amplify Science units, students encounter this concept both in their own work and in reading about scientists. For example:

	as new evidence or interpretations are encountered.	- In the Phase Change unit, Lesson 1.2, Activity 4, students read an article “Air Pressure and Boyle’s Law” that includes a description of how scientists’ knowledge that air is matter changed as technology improved and new evidence was available. - In the Force and Motion unit, students refine their claims about the causes of a space pod docking failure as they receive new evidence. For example, in Lesson 2.1, Activity 1, they receive new evidence and reflect on how this might prompt them to revise their claims. - In the Magnetic Fields unit, in Lesson 4.3, Activity 3, students participate in a Science Seminar discussion in which they present and discuss evidence. Students are encouraged to change their mind in the face of convincing counter evidence.
SC.6.N.2.3	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.	Across multiple Amplify Science units, students encounter profiles of scientists of a wide variety of ethnic and racial backgrounds, and of different ages and genders. The profiles highlight a variety of goals, interests and manners of investigating. For example: - In the Light Waves unit, Lesson 1.2, in the activity titled “Interview with a Spectroscopist”, students watch a video featuring a young, female African-American physicist who studies lasers. - In the Magnetic Fields unit, Lesson 1.2, Activity 6, students read an article, “Meet a Scientist Who Studied Magnets”, a profile of and African-American scientist born on a peanut farm in rural Alabama in 1909 who grew up to be one of the nation’s greatest experts on low-temperature magnetism. - In the Force and Motion unit, Lesson 2.2, Activity 2, students read an article, “Designing Wheelchairs”, which features an engineer who was disabled during his military service and now designs wheelchairs to be used by different kinds of athletes. - In Chemical Reactions, Lesson 2.3, Activity 4, students read an article about a female chemist, “Meet a Scientist Who Preserves Artwork”, who uses chemistry in art preservation. - In Chemical Reactions, Lesson 1.2, the Activity titled “Playing Using Chemistry to Keep Water Safe“, students view a video about a young biracial female chemist who works in water quality. - In the Force and Motion unit, Lesson 1.2, the activity titled “The Missing Seconds Video”, scientists and engineers presented in a fictional introductory video represent gender, age, and ethnic diversity. - In the Magnetic Fields unit, Lesson 1.2, the activity titled “Video:

		Troubleshooting a Magnetic Launcher", scientists and engineers presented in a fictional introductory video represent gender, age, and ethnic diversity.
SC.6.N.3.1	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.	Students are exposed to examples of theories and other forms of scientific knowledge across multiple units. For example: ● In the Chemical Reactions unit, Lesson 3.1, Activity 3, students read the article "What Happens When Fuels Burn?" which includes a discussion of the Law of Conservation of Matter. ● In the Chemical Reactions unit, Lesson 1.4, Activity 2, students read the article "Atomic Zoom-In" which introduces atomic theory.
SC.6.N.3.2	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.	This standard is addressed across multiple units. For example: ● In Magnetic Fields, Lesson 2.3, Activity 3, students discuss how the Law of Conservation of Energy applies to the magnetic systems they are investigating, and also discuss what a scientific law is and how it is different from a societal law (click NEXT to see part 4 of 4 of this activity, where this discussion takes place). In addition: ● In the Chemical Reactions unit, Lesson 3.1, Activity 3, students read the article "What Happens When Fuels Burn?" which includes a discussion of the Law of Conservation of Matter. ● In the Phase Change unit, Lesson 1.2, Activity 4, students read an article "Air Pressure and Boyle's Law" that includes a description of Boyle's law describing the relationship between pressure and volume of a gas.
SC.6.N.3.3	Give several examples of scientific laws.	Students are exposed to examples of scientific laws across multiple units. For example: ● In Magnetic Fields, Lesson 2.3, Activity 3, students discuss how the Law of Conservation of Energy applies to the magnetic systems they are investigating (click NEXT to see part 4 of 4 of this activity, where this discussion takes place). ● In the Chemical Reactions unit, Lesson 3.1, Activity 3, students read the article "What Happens When Fuels Burn?" which includes a discussion of the Law of Conservation of Matter. ● In the Phase Change unit, Lesson 1.2, Activity 4, students read an article "Air Pressure and Boyle's Law" that includes a description of

		Boyle's law describing the relationship between pressure and volume of a gas.
SC.6.N.3.4	Identify the role of models in the context of the sixth-grade science benchmarks.	Throughout the Amplify Science program, students experience the importance of a wide variety of models to scientific investigation and communication. For example: ● In the Magnetic Fields unit, students learn about how magnetic fields lines are used to model magnetic force fields, including in the article "Earth's Geomagnetism", read in Lesson 1.4, Activity 2. ● In the Phase Change Engineering Internship, students use a digital model to test and revise their designs for a portable baby incubator. The model is introduced in Lesson 1, the Activity titled "Exploring BabyWarmer" and the purpose of models in engineering is discussed. ● In the Chemical Reactions unit, students use a variety of models to represent substances at the atomic level and how those substances change during chemical reactions. These models include: physical tokens (as in Lesson 3.3., Activity 2), visual space-filling models (shown in the article, "Atomic Zoom-In, introduced in Lesson 1.4, Activity 2), and models that students draw to represent their explanations (as in Lesson 3.4, Activity 3). ● In the Thermal Energy unit, in Lesson 1.4, Activity 3, students create a visual model to show their ideas about the difference between warm and cold air.
SC.6.P.11.1	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.	This standard is addressed across multiple units in the Physical Science Course. For example: ● In the Harnessing Human Energy, Lesson 1.3, Activity 2, students collaborate to categorize a series of objects based on whether they see evidence of energy. The teacher introduces the term kinetic energy and potential energy and students learn that objects that are moving have kinetic energy and that objects that have the ability to make something move in the future have potential energy. ● In the Harnessing Human Energy, Lesson 2.2, Activity 2, students revisit an article, Energy Inventions, with a focus on where the objects in the article get their energy from. After analyzing information presented in this article, students figure out that energy can be converted from potential to kinetic energy. ● In the Harnessing Human Energy, Lesson 3.2, Activity 2, students engage in a hands-on activity during which they design an energy

		system that harnesses human kinetic energy and transforms it into another form of energy. Students create Energy Transfer Diagrams to describe how their systems work. ● In the Magnetic Fields unit, Lesson 2.2, Activity 2, students read articles about kinetic and potential energy in extreme sports. Students learn that kinetic energy can be converted into potential energy and vice versa. Students identify how potential energy is converted into kinetic energy for movement in a particular sport. ● In the Magnetic Fields unit, Lesson 2.2, Activity 3, students use hands on materials to create three energy systems where potential energy is converted into kinetic energy. Students identify when the system has more potential energy and when it has more kinetic energy. ● In Magnetic Fields, Lesson 2.3, Activity 3 (press NEXT to see part 4 of 4), students make an explicit connection between their investigation results and the law of conservation of energy.
SC.6.P.12.1	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.	This standard is addressed in the Force and Motion unit: ● In Lesson 1.6, Activity 4, Students measure and graph the time it takes a rolling ball to travel a certain distance. Students graph the results for a slow-rolling ball, a ball rolling at medium speed, and a fast-rolling ball. Students interpret and analyze the graphs to find the graphed line is steeper for faster moving objects.
SC.6.P.13.1	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.	This standard is addressed across multiple units in the Physical Science Course. For example: ● In the Force and Motion unit, Lesson 1.3, Activity 3, students use the Force and Motion simulation to investigate forces. Students run tests in the simulation to make objects start moving, stop moving, speed up and slow down. Students observe that a force is always required to change the velocity of an object. ● In the Magnetic Fields unit, Lesson 1.2, Activity 3 and Activity 4, students investigate forces acting at a distance using magnets and the Magnetic Fields simulation. Students gather evidence from both sources to discover that magnetic forces can attract or repel objects at a distance. ● In the Magnetic Fields unit, Lesson 1.5, Activity 5, students read the article Painting with Static Electricity. The article provides an opportunity for students to learn about electrical fields produced by charged objects and how electrical fields create forces that can act at a distance to move

		objects.
SC.6.P.13.2	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.	This standard is addressed in the Magnetic Fields unit: ● In Lesson 3.2, activity 4, Students read the article Escaping a Black Hole about the gravitational forces between objects. Students learn that a gravitational force is a pull that acts between all objects and the greater the mass of the objects the greater the force. Students also learn that the gravitational force between two objects depends on how far apart they are: the closer the two objects, the stronger the field between them.
SC.6.P.13.3	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.	This standard is addressed in the Force and Motion unit. For example: ● In Lesson 1.3, Activity 3, students use the Force and Motion simulation to investigate forces. Students run tests in the simulation to make objects start moving, stop moving, speed up and slow down. Students observe that a force is always required to change the velocity of an object. (Press NEXT to see all 4 parts of this activity; students are introduced to the idea of balanced and unbalanced forces in part 4 of 4) ● In Lesson 3.2, Activity 2, students investigate the forces in a collision by causing collisions between two balls. Students discover that in a collision the forces on each object are in opposite directions which cause the objects to change speed and/or change direction.
SC.7.N.1.1	Define a problem from the seventh-grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.	Every unit in Amplify Science is structured around conducting investigations as well as gathering and analyzing evidence from other sources to draw and defend conclusions about scientific principles as well as specific phenomena. For example, in the Light Waves unit, students are investigating the cause of the increased rate of skin cancer in Australia. ● In Lesson 2.1, Activity 2, students conduct an experiment to gather evidence about how different types of light affect materials differently. ● In Lesson 2.2, Activity 2, students use reference materials—an article titled “Harvesting Sunlight”—to get more evidence about different wavelengths of light. ● In Lesson 2.5, Activity 3, students analyze data about melanin levels in different populations and about global levels of UV light. ● In Lesson 2.5, Activity 4, students write an argument defending their conclusions about the causes of the increased rate of skin cancer in Australia.
SC.7.N.1.2	Differentiate replication (by others)	This standard is supported by students’ investigation in multiple units. For

	from repetition (multiple trials).	example: ● In the Phase Change Engineering Internship, Lesson 5, the activity titled "Testing Incubator Designs", students conduct multiple trials in their iterative testing process.
SC.7.N.1.3	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.	This standard is addressed in multiple units, in which students engage in different types of investigations and discuss the evidence gathered. For example: ● In Thermal Energy, Lesson 1.2, Activity 3, students conduct an experiment in which they compare effects in hot and cold water. ● In Light Waves, Lesson 1.2, Activity 3, students conduct an exploratory investigation in which they gather evidence that light carries energy.
SC.7.N.1.4	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.	This standard is addressed in multiple units in Amplify Science. For example, in the Magnetic Fields unit: ● In Lesson 1.3, Activity 2, students are introduced to the importance of isolating variables in an experiment. ● In Lesson 4.2, Activity 1, students plan experiments they will conduct using the Magnetic Fields simulation, and identify the test variables and outcome variables.
SC.7.N.1.5	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.	Throughout the physical science course, students experience and discuss numerous methods used in physical science to gather evidence in pursuit of scientific explanations. For example: ● In the Phase Change Unit, in Lesson 1.2 in the activity titled "Investigating Methane on Titan" students watch a short documentary video about two scientists who collaborate to investigate methane lakes on Titan, using both models, laboratory experiments and remote data collection methods. ● In the Light Waves Unit, Lesson 1.2, in the activity titled "Interview with a Spectroscopist", students watch a short documentary video about a scientist who conducts laboratory experiments using lasers. ● In Harnessing Human Energy unit, Lesson 1.4, Activity 3, students read an article, "Energy Inventions", about scientists and engineers who design energy solutions.
SC.7.N.1.6	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which	Every Amplify Science unit is structured around students generating empirical evidence and analyzing this evidence as well as other evidence in order to make explanations about scientific principles as well as specific phenomena.

	scientific explanations are based.	For example, in the Light Waves unit, students are investigating the natural phenomenon of the high rate of skin cancer in Australia. ● In Lesson 1.2, Activity 3, students gather empirical evidence that light carries energy. ● In Lesson 1.4, Activity 3, students analyze observations of world sunlight levels and compare them to skin cancer rates. ● In Lesson 1.4, Activity 4, students write an explanation of the phenomenon based on this evidence and observations.
SC.7.N.1.7	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.	In several Amplify Science units, students read examples of debates and confirmation in the science community. For example: ● In the Phase Change Unit, Lesson 1.2, Activity 4, students read about Robert Boyle and the debates around the discovery that air is matter. ● In the Light Waves Unit, Lesson 3.2, Activity 4, students read an article “What Animals See” that includes discussion about the uncertainties scientists have about animal vision. In addition, during Chapter Four of each Amplify Science unit, students engage in scientific debate around a question for which there is compelling evidence to support multiple competing claims, and in which students are supported to disagree productively. For example: ● In Thermal Energy, Chapter Four (e.g., Lesson 4.2, Activity 3) students engage in argumentation about the cause of a failed water pasteurization effort.
SC.7.N.2.1	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.	This standard is addressed in the Phase Change Unit, Lesson 1.2, Activity 4, in which students read about Robert Boyle and how scientific knowledge about the nature of air changed in light of new evidence.
SC.7.N.3.1	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.	Students are exposed to examples of scientific theories and laws across multiple units. For example: ● In the Chemical Reactions unit, Lesson 1.6, Activity 4, students are introduced to the term “atomic theory”. They also discuss the difference between a theory and a law, and consider other theories that they may be familiar with, such as the theory of plate tectonics and the theory of evolution. ● In the Chemical Reactions unit, Lesson 3.1, Activity 3, students read the article “What Happens When Fuels Burn?” which includes a discussion

		of the Law of Conservation of Matter. ● In the Phase Change unit, Lesson 1.2, Activity 4, students read an article “Air Pressure and Boyle’s Law” that includes a description of Boyle’s law describing the relationship between pressure and volume of a gas.
SC.7.N.3.2	Identify the benefits and limitations of the use of scientific models.	This standard is addressed in all Amplify Science units. For example: ● In the Chemical Reactions unit, Lesson 1.5, Activity 2, students discuss the role of models in chemistry. ● In the Thermal Energy unit, students investigate thermal energy transfer using a variety of models, including a digital simulation (e.g., Lesson 1.3, Activity 2), a physical model (Lesson 2.4, Activity 3), and a visual model (Lesson 2.5, Activity 3), recognizing differences between each model. ● In the Phase Change Unit, in Lesson 1.2 in the activity titled “Investigating Methane on Titan” students watch a short documentary video about scientists who use models on Earth to investigate methane lakes on Titan.
SC.7.P.10.1	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.	This standard is the focus of the Light Waves unit and is addressed in multiple lessons. For example: ● In lesson 2.2 activity 2, Students read the article “Harvesting Sunlight”, about how the sun emits all types of light, including infrared, visible and ultraviolet, but plants can only use certain types of visible light for photosynthesis; then in Lesson 2.3, Activity 1, they analyze a diagram and write an explanation of the difference between light from the sun and light from a grow bulb, in terms of wavelengths and spectrum. ● In lesson 2.4, Activity 1, students analyze a diagram showing the range of wavelengths emitted from the sun, considering which wavelengths are absorbed in the atmosphere. ● In Lesson 2.3, Activity 3, students use the Light Wave simulation to discover that different types of light have different wavelengths. ● In Lesson 2.4, Activity 2, students use the Light Wave simulation to collect, record and analyze data about the effects of different types of light on the genetic materials in cells. ● In Lesson 3.2, Activity 2, students read the article “What Eyes Can See”, which helps them make an explanation for why objects appear a certain color because they reflect or absorb different colors of light that make up white light.

SC.7.P.10.2	Observe and explain that light can be reflected, refracted, and/or absorbed.	This standard is addressed in the Light Waves unit: ● In Lesson 3.1, Activity 2, students use a laser pointer and different objects to investigate what can happen to light as it travels. Students discover that light can be reflected, transmitted or absorbed depending on the object it hits. ● In Lesson 3.1, Activity 3, students use the Light Waves simulation to test how different types of light behave when they hit glass and aluminum foil. Students discover that light can be reflected, transmitted or absorbed depending on the type of light and the material it hits. ● In Lesson 3.6, Activity 4, students read the article “Making Waves at Swim Practice”, about how waves travel different speeds depending on the material they are traveling through. Students learn that when waves change speed when traveling from one material to another the light wave refracts (bends).
SC.7.P.10.3	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.	This standard is addressed in the Light Waves unit: ● In Lesson 3.6, Activity 4, students read the article “Making Waves at Swim Practice”, about how waves travel different speeds depending on the material they are traveling through. Students learn that sounds waves travel more quickly through solids and liquids than through gases like the air, but that light waves travel most quickly through empty space, more slowly through gas and even more slowly through liquids.
SC.7.P.11.1	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.	This standard is addressed across multiple units in the Physical Science Course. For example: ● In the Phase Change unit, Lesson 2.1, Activity 2, students reread an article about how water changes phase in different situations. In Activity 3, students recreate the situations in the Phase Change simulation and discover that substances change phase when energy (heat) is added or removed from a substance. ● In the Phase Change unit, Lesson 2.2, in the activity called Playing Zooming in on Phase Change, students watch a video comparing the molecules that make up butter, a solid at room temperature, and oil, a liquid at room temperature. Students observe temperature increase as energy (heat) is transferred into the substances. The video and subsequent class discussion help students conclude that transferring energy (heat) into a substance increases the temperature of a substance and transferring energy (heat) out of a substance decreases the temperature of a substance.

		• In the Thermal Energy unit, Lesson 2.3, Activity 2, students investigate why the molecules that make up objects change speed (why objects change temperature). Using the Thermal Energy simulation, students test what happens when a warm object and is placed near a cooler object. Students observe that energy (heat) transfers from warmer to cooler objects causing both objects to change temperature. When energy (heat) is transferred out the object gets cooler, when energy (heat) is transferred in the object gets warmer. • In Lesson 2.3, Activity 3, students reread the Article How Air Conditioners Make Cities Hotter, about how air conditioners make the inside of building cooler by transferring energy (heat) to the outdoors, making it hotter. Students learn that energy (heat) transfers from warmer objects to colder objects because faster-moving molecules that make up warmer objects collide with the slower-moving molecules that make up cooler objects, making the slower-moving molecules speed up. This causes the warmer object to cool down and the cooler object to warm up.
SC.7.P.11.2	Investigate and describe the transformation of energy from one form to another.	This standard is addressed in the Harnessing Human Energy unit. • In Lesson 1.4, Activity 3, students engage in active reading of an article, Energy Inventions, an informational text about a series of innovative inventions that harness energy and transform it into a different type of energy that can be used to solve a real-world problem (such as the creation of the Little Sun Lamp, transforms solar energy into light energy for communities with limited resources). • In Lesson 2.1, Activity 3, students investigate in a digital simulation to gather evidence about where objects get their energy from. From this investigation, students discover that objects do not create their own energy; rather, they get energy from other objects that have energy. • In Lesson 3.1, Activity 3, students read an article, Capturing Human Energy, about innovative designs that transform human energy into other usable forms of energy. • In Lesson 3.2, Activity 2, students engage in a hands-on activity during which they design an energy system that harnesses human kinetic energy and transforms it into another form of energy. Students create Energy Transfer Diagrams to describe how their systems work.
SC.7.P.11.3	Cite evidence to explain that energy cannot be created nor destroyed,	This standard is addressed in multiple units. In the Harnessing Human Energy unit:

	only changed from one form to another.	● In Lesson 2.1, Activity 3, students investigate in a digital simulation to gather evidence about where objects get their energy from. From this investigation, students discover that objects do not create their own energy; rather, they get energy from other objects that have energy. (press NEXT to see part 2 of 3 of this activity). Students make an explicit connection between their investigations and the law of conservation of energy. ● In Lesson 2.2, Activity 2, students revisit an article, “Energy Inventions”, with a focus on where the objects in the article get their energy from. After analyzing information presented in this article, students figure out that energy can change from one form to another. In the Magnetic Fields unit: ● In Magnetic Fields, Lesson 2.1, Activities 2 and 3, students read, “The Potential for Speed” which describes ways that athletes transform elastic potential energy or gravitational potential energy into kinetic energy. ● In Magnetic Fields, Lesson 2.2, Activity 3, students gather evidence of the transformation of magnetic, gravitational, and elastic potential energy into kinetic energy through hands-on investigation. ● In Magnetic Fields, Lesson 2.3, Activity 3 (press NEXT to see part 4 of 4), students make an explicit connection between their investigation results and the law of conservation of energy.
SC.7.P.11.4	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.	This standard is addressed in the Thermal Energy unit: ● In Lesson 2.3, Activity 2, students investigate why the molecules that make up objects change speed (why objects change temperature). Using the Thermal Energy simulation, students test what happens when a warm object and is placed near a cooler object. Students learn that energy (heat) transfers from the warmer object to the cooler object. ● In Lesson 2.3, Activity 3, students reread the Article How Air Conditioners Make Cities Hotter, about how air conditioners make the inside of building cooler by transferring energy (heat) to the outdoors, making it hotter. Students learn that energy (heat) transfers from warmer objects to colder objects because faster-moving molecules that make up warmer objects collide with the slower-moving molecules that make up cooler objects, making the slower-moving molecules speed up. This transfer happens until the objects are the same temperature.
SC.8.N.1.1	Define a problem from the eighth-grade curriculum using appropriate	Every unit in Amplify Science is structured around conducting investigations as well as gathering and analyzing evidence from other sources to draw and defend

	reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.	conclusions about scientific principles as well as specific phenomena. For example, in the Chemical Reactions unit, students are investigating the source of a mysterious substance found in a town's well water. ● In Lesson 1.3, Activity 3, students make systematic observations of unknown substances. ● In Lesson 3.2, Activity 2, students conduct an experiment using the Chemical Reactions Simulation, in which they compare the effect of two different substances when mixed with 'oxygen. In Lesson 3.2, Activity 4, they discuss and defend their conclusions. ● In Lesson 3.2, Activity 3, students use reference materials, the article "What Happens When Fuels Burn?" to gather evidence to support claims.
SC.8.N.1.2	Design and conduct a study using repeated trials and replication.	This standard is addressed in multiple units. For example: ● In the Phase Change Engineering Internship, Lesson 5, the activity titled "Testing Incubator Designs", students design and conduct multiple trials in their iterative testing process.
SC.8.N.1.3	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.	In every unit in Amplify Science, students are supported in using the language of scientific argumentation. For example ● In the Harnessing Human Energy unit, Lesson 1.2, Activity 2, in the Activity students are introduced to the "Argumentation Wall". The wall contains visual representations of the goals and structure of scientific arguments, and is added to and referred to across the year. ● In every core unit, in Chapter 4, students participate in a Science Seminar in which they engage in oral and written argumentation. Students are provided with Argumentation Sentence Starters such as 'the evidence that supports my claim is…' (see Phase Change, Lesson 4.3, the activity titled "Introducing the Science Seminar").
SC.8.N.1.4	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.	Across Amplify Science, students are exposed to the idea that scientists make claims based on evidence and revise those claims when needed, in the face of new evidence. Students experience this both in their own scientific investigations and in reading about professional scientists. For example: ● In Harnessing Human Energy, Lesson 2.2, Activity 5, students read an article, "How We Store Energy" (press NEXT to see part 4 of 4 of the activity), that describes the challenges scientists have faced throughout history in devising methods of energy storage. In Lesson 2.3, Activity 1,

		students reflect on the article and the teacher introduces the idea that even inaccurate ideas are valuable if they lead to further investigations. ● In Phase Change, Lesson 2.3, Activity 2, students revise their claims about the phase change on Titan based on new evidence.
SC.8.N.1.5	Analyze the methods used to develop a scientific explanation as seen in different fields of science.	In every Amplify Science unit, students are exposed to scientists using different methods to develop scientific explanations, and also use different methods in their own investigations. For example: ● Students conduct a **systematic observation** of substances in Chemical Reactions, Lesson 1.2, Activity 3. ● Students conduct **controlled experiments** in Chemical Reactions, In Lesson 3.2, Activity 2, using the Chemical Reactions Simulation ● Students view a video how both **laboratory experiments and remote data collection** can be valuable in in the Phase Change unit, in Lesson 1.2 in the activity titled "Investigating Methane on Titan".
SC.8.N.1.6	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.	Every unit in Amplify Science is structured around a driving question which students answer by gathering evidence, using reasoning to construct arguments, and making explanations and models. As one example, in the Chemical Reactions unit, students are investigating the source of a mysterious substance in a town's well water. ● Students collect evidence from multiple sources, including text (Lesson 1.4, Activity 2), firsthand observations (Lesson 1.2, Activity 3), and simulation data (Lesson 2.1, Activity 3). ● Students create and revise models and written explanations based on this evidence (Lesson 1.6, Activity 3; Lesson 2.3, Activity 3 and 4; Lesson 3.4, Activity 3 and 4). ● In Lesson 3.4, Activity 4, the class reflects on what they have done and how that demonstrates what is involved in scientific investigations.
SC.8.N.2.1	Distinguish between scientific and pseudoscientific ideas.	Students are supported in their understanding of the distinction between scientific and pseudoscientific ideas through a continual emphasis on the nature of scientific knowledge as constructed based on empirical evidence and revised through the collaboration of the scientific community. For example, in the Harnessing Human Energy unit, Lesson 1.2, Activity 2, students are introduced to the Argumentation Wall. The wall contains visual representations of the goals and structure of scientific arguments, and is added to and referred to across the year. The teacher introduces the term pseudoscience and explains how students will learn a lot in this course about how scientific ideas are supported, which will

		help them distinguish between scientific ideas and pseudoscientific ideas.
SC.8.N.2.2	Discuss what characterizes science and its methods.	Students are supported in their understanding of what characterizes science and its methods through a continual emphasis on the nature of scientific knowledge as constructed based on empirical evidence and revised through the collaboration of the scientific community. For example: ● In the Magnetic Fields unit, Lesson 4.2, Activity 2, students discuss different investigation methods in science. ● In the Harnessing Human Energy unit, Lesson 1.2, in the Activity titled "Introducing Argumentation and the Reasoning Tool" students are introduced to the Argumentation Wall. The wall contains visual representations of the goals and structure of scientific arguments, and is added to and referred to across the year.
SC.8.N.3.1	Select models useful in relating the results of their own investigations.	In every Amplify science unit, students both use a variety of models and create or select their own models to explain the results of their investigations. For example: ● In the Chemical Reactions unit, Lesson 2.3, Activity 2, students use a physical model to evaluate different claims about which substances could have been involved in a chemical reaction. ● In the Phase Change unit, Lesson 3.3, Activity 3, students create a model to show their explanation, based on their investigations, of the phase change that happened in a lake on Titan.
SC.8.N.3.2	Explain why theories may be modified but are rarely discarded.	Students understanding of this idea is supported by discussions of how claims in science, including theories, are constructed and modified. For example: ● In the Phase Change unit, Lesson 1.2, Activity 4, students read an article "Air Pressure and Boyle's Law" that describes progress in scientists' understanding of the nature of air. See the Teacher Support tab, the note titled "Instructional Suggestion: Nature of Science: Discussing How Theories Change"
SC.8.N.4.1	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.	Students get experience with how science can be used in decision-making process in several units. For example: ● In Thermal Energy, Lesson 1.2, the activity titled "Video: A Tale of Two Heating Systems", students are introduced to a scenario in which a school principal must use scientific understanding to make a decision about a school heating system. ● In Chemical Reactions, Lesson 1.2, the activity titled "Playing Using

		Chemistry to Keep Water Safe", students view a short documentary about a chemist who works in water safety testing. ● In Chemical Reactions, Lesson 1.2, Activity 2, students are introduced to a scenario in which a chemist is helping the town of Westfield identify the source of a water contaminant.
SC.8.N.4.2	Explain how political, social, and economic concerns can affect science, and vice versa.	Students see how political, social, and economic concerns can affect science, and vice versa, across multiple units in the Physical Science Course. For example: ● In the Phase Change Engineering Internship, Lesson 1, in the activity titled "Introducing Futura" students are introduced to the idea that scientists and engineers are designing portable baby incubators to support low birthweight babies in rural and underdeveloped areas. ● In Chemical Reactions, Lesson 1.2, Activity 2, students are introduced to a scenario in which a chemist is helping the town of Westfield identify the source of a water contaminant.
SC.8.P.8.1	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.	This standard is addressed in the Phase Change unit: ● In Lesson 1.3, Activity 4, students use the Phase Change simulation to investigate how particles move in solids, liquids, and gases. Students discover that particles that make up gases move apart from each other, particles that make up liquids move around each other but not apart, and particles that make up solids move only in place.
SC.8.P.8.2	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.	This standard is addressed in the Phase Change unit: ● In Lesson 1.6 Activity 5, students read an article, Could This Cat Weigh More Than You? Mass and Weight, about the difference in the gravitational pull between objects with different masses. Students relate this to the weight of different objects on Earth compared with Titan, a moon of Saturn, with less mass than Earth.
SC.8.P.8.3	Explore and describe the densities of various materials through measurement of their masses and volumes.	This standard is addressed in the Phase Change unit: ● In Lesson 3.3, Activity 4, students measure the mass and volume of three different substances in order to understand the concept of density. Students learn that the density of a substance is dependent on the mass of each individual molecule and how tightly packed they are.
SC.8.P.8.4	Classify and compare substances on the basis of characteristic physical	This standard is addressed across multiple units in the Physical Science Course. For example:

	properties that can be demonstrated or measured for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.	- In the Magnetic Fields unit, Lesson 1.2, Activity 3, students explore the effect of magnets on different objects to discover that some materials are magnetic, affected by magnetic forces, and others are not. - In the Chemical Reactions unit, Lesson 1.4, Activity 2, students read the article Atomic Zoom-In: Comparing Substances at a Very Small Scale, about how atoms that make up substances lead to the different properties. They discover that it is the different combinations of atoms that lead substances to have different properties, such as smell, phase at room temperature, hardness, and melting point. - In the Chemical Reactions unit, Lesson 2.4, Activity 4, students read the article Why Is Seawater Salty? about the properties of seawater. Students learn that water is a unique and essential substance on Earth because of some of its properties. For example, water's boiling and melting points and density in different phases. Students also learn the many substance, such as salts, are soluble in water. Student learn that while pure water cannot conduct electricity, water with dissolved salts can. - In the Phase Change unit, Lesson 3.3, Activity 4, students measure the mass and volume of three different substances in order to understand the concept of density. Students learn that the density of a substance is dependent on the mass of each individual molecule and how tightly packed they are. Students discover that water is denser than oil which is denser than shaving cream. Students conclude that density is physical property unique to a particular substance.
SC.8.P.8.5	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.	This standard is addressed in the Chemical Reactions unit: - In Lesson 1.4, during the activity called Playing Everything Is Made of Atoms, students watch a video about the atoms. Students learn that atoms make up all living and nonliving things. - In Lesson 1.4, Activity 2, students read the article Atomic Zoom-In: Comparing Substances at a Very Small Scale, about how atoms that make up substances lead substances to have different properties. Students learn that atoms combine in different ways to form different compounds that make up all matter. They discover that it is the different combinations of atoms that lead substances to have different properties. - In Lesson 1.5, Activity 2, students use the Chemical Reactions simulation, to compare 3 different substances at the atomic scale. Student discover that different substances have atoms arranged in different groups which gives them their distinct properties.

		● In Lesson 1.6, Activity 4, students read the article Mapping the Elements, about composition and discovery of atoms. Students learn that atoms that make up elements make up all living and nonliving things and that there are only a finite number of elements that have been discovered.
SC.8.P.8.6	Recognize that elements are grouped in the periodic table according to similarities of their properties.	This standard is addressed in the Chemical Reactions unit: ● In Lesson 1.6, Activity 4, students read the article Mapping the Elements, about composition and discovery of atoms. Students learn that elements are ordered in the periodic table based on their atomic number and grouped according to similarities of their properties.
SC.8.P.8.7	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).	This standard is addressed in the Chemical Reactions unit: ● In Lesson 1.6, Activity 4, students read the article Mapping the Elements, about composition and discovery of atoms. Students learn that elements are made of only one type of atom and that atoms are made of smaller particles. The nucleus of an atom is made up of protons and neutrons and electrons surround the nucleus.
SC.8.P.8.8	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.	This standard is addressed in the Chemical Reactions unit: ● In Lesson 2.4, Activity 4, students read the article Why Is Seawater Salty? about the properties of seawater. Students read about the way compounds can be classified and the properties of different compounds. Students learn about three classifications of compounds, salts, acids and bases and the properties of each.
SC.8.P.8.9	Distinguish among mixtures (including solutions) and pure substances.	This standard is addressed in the Phase Change unit: ● In Lesson 3.4, Activity 4, students read the article This Is Not an Oxygen Tank: mixtures and substances which compares mixtures and pure substances. Students learn that air is a mixture of many different substances and that pure substances, like oxygen, are made of just one type of atom or group of atoms arranged in a particular way.
SC.8.P.9.1	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.	This standard is addressed across multiple units in the Physical Science Course. For example: ● In the Phase Change unit, Lesson 1.3, Activity 4, students use the Phase Change simulation to investigate what happens to molecules when substances change phase. Students conclude that the number of

		molecules do not change during physical changes. ● In the Chemical Reactions unit, Lesson 3.2, Activity 2 and 3 students use the Chemical Reactions simulation and read an article What Happens When Fuels Burn? to investigate what happens to molecules when a substances burns (a chemical change). Students consider a claim that the atom are destroyed and find evidence in the simulation and article to refute the claim. Student discover that atoms rearrange during a chemical reaction but no atoms are lost. ● In the Chemical Reactions unit, Lesson 3.3, Activity 2, students model a chemical change using colored tokens to represent atoms. Students use this model to consider where atoms found in the products come from. Students discover that atoms in the products must come from the reactants because atoms cannot be created from nowhere.
SC.8.P.9.2	Differentiate between physical changes and chemical changes.	This standard is addressed in the Chemical Reactions unit: ● In Lesson 2.5, Activity 4, students read the article Is It a Chemical Change or a Physical Change? about how to distinguish between chemical and physical changes. Students learn that in chemical changes the atoms that make up the substance rearrange to form new substances but in physical changes the substances stay the same but they change phase. Students use this information to categorize four changes as physical or chemical.
SC.8.P.9.3	Investigate and describe how temperature influences chemical changes.	This standard is addressed in the Chemical Reactions unit: ● In Lesson 2.3, Activity 5 students analyze a set of data to discover the effect of temperature on the rate of chemical reactions. Students conclude that reactions with warmer reactants happen faster.
LAFS.68.RST.1.1	Cite specific textual evidence to support analysis of science and technical texts.	This standard is addressed in every unit of the Physical Science Course. Students read articles multiple times, for different purposes, in order to gather textual evidence to support science ideas. For example: ● In Lesson 2.2, Activity 2 of the Force and Motion unit, students read the article, “Designing Wheelchairs.” Students are encouraged to actively read and analyze the text by making annotations, noting questions they have and connections they are making as they read. During Activity 3, students discuss their annotations with a partner, then with the whole class. The reading followed by a text-based discuss helps students to better understand important ideas about force, motion and velocity as they work together to analyze the text.

		• In Lesson 2.3, Activity 3 of the Thermal Energy unit, students re-read a section of the same article, "How Air Conditioners Make Cities Hotter" that they read during the previous lesson. The purpose of the re-reading they do in this lesson is to collect evidence from the article to support or refute two opposing claims about how molecules speed up when energy is introduced. Students then discuss the evidence they found and the claim that is supported (or refuted) based on evidence from the text.
LAFS.68.RST.1.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.	This standard is addressed in every unit of the Physical Science Course. Students read articles multiple times and apply the strategy of summarizing often. In addition, for every 'second read' students are asked questions that help them to summarize the important ideas from the text. For example: • In Lesson 2.2, Activity 2 of the Light Waves unit, students read the article "Harvesting Sunlight" and are introduced to the specific strategy of summarizing main ideas while reading. Students then read and apply this strategy, among others they have learned as part of the Active Reading approach. After reading, in Activity 3, students share their annotations (first with partners and with the whole class), including the summaries they made while reading. • In Lesson 1.5, Activity 3 of the Chemical Reactions unit, students re-read a section of the article, "Atomic Zoom-In" in order to better understand how the atomic arrangement of different molecules can result in very different properties. They highlight important information as they read, then respond to a question that helps them to use evidence from the text to summarize what they learned from reading. In addition, students then participate in a whole class discussion where they use information from the text to orally summarize important information from the text.
LAFS.68.RST.1.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	This standard is addressed in every unit of the Advanced Physical Science Course. For example: • In Lesson 3.2, Activity 2 of the Chemical Reactions unit, students use the Chemical Reactions simulation to test what happens to different substances when they burn; students view and analyze these interactions at the atomic level. In order to complete this activity, students must follow a multistep procedure that includes descriptions for what to do, and what data to observe. • In Lesson 3.2, Activity 2 of the Harnessing Human Energy unit, students work in small groups to design and create an energy system, using

		materials in the classroom. In order to do this, they must work together and follow a set of procedures, checking these procedures often throughout the activity to ensure that they have included all the required elements. ● In Lesson 5, the Activity titled “Testing Incubator Designs” of the Phase Change Engineering Internship unit, students must use a digital tool to design baby warmers that will keep a baby consistently warm. Throughout the lesson students must follow several sets of steps in order to first understand what is expected of them, then to effectively use the tool, and finally, to analyze data they gather from the tool. In order to complete the trials of the different materials used to make baby warmers, students must follow multistep directions.
LAFS.68.RST.2.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 68 texts and topics.	This standard is addressed in every unit of the Physical Science Course. For example: ● In Lesson 1.6, Activity 2 of the Magnetic Fields unit, students examine a series of visual representations that support an understanding of how magnets and magnetic fields work. Students must interpret symbols and utilize domain-specific words in order to understand and participate in this activity. ● In Lesson 4.1, Activities 3 and 4 of the Thermal Energy unit, students read, annotate and analyze evidence cards. Each card contains text, symbols, graphs and/or data tables. Students must carefully read all available information on these cards in order to make meaning from them. ● In Lesson 3.1, Activity 2 of the Phase Change unit, students read the article, “Liquid Oxygen” The article contains both traditional text as well as several diagrams that are essential for understanding the content in the article. In order to analyze these diagrams, students need to determine the meaning of the associated symbols and domain-specific vocabulary.
LAFS.68.RST.2.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.	This standard is addressed in multiple units of the Physical Science Course. For example: ● In the Chemical Reactions unit, Lesson 2.5, Activity 4 (see the Teacher Support tab, note titled “Instructional Suggestion: Literacy Note: Text Structure) students are introduced to the idea of different text structures and discuss the text structure that best applies to the “Is it a Physical Change or a Chemical Change” article.

		• In Lesson 1, Activity 2 for the Phase Change Engineering Internship unit, students learn what a dossier is (a term professionals use for a set of related documents) and learn that as chemical engineering interns, they too will be examining and adding to a dossier by writing a proposal based on the work they do. Throughout the unit, students read different portions of the dossier and encouraged to consider the formal tone as well as the structure and organization of the text.
LAFS.68.RST.2.6	Analyze the authors purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.	This standard is addressed in multiple units of the Physical Science Course. For example: • In Lesson 3.3, during the Activities titled introducing Quality of Evidence and Evaluating Ed-U-Swivel Evidence from the Harnessing Human Energy unit, students are asked to read and analyze a set of possible evidences, and sort it according to how reliable each source of evidence is. Each piece of evidence comes from a different source, and students evaluating the sources and make conclusions about the inherent biases of each before deciding which data they should rely upon to create arguments later in the lesson. • In Lesson 1, in the Activity titled “Introducing Futura” for the Phase Change Engineering Internship unit, the teacher explains the various roles students (and the teacher) will take on during the Engineering Internship. In each lesson that follows, students repeatedly read texts from different participants in the internship and consider the role each participant plays and how this affects the ways they should read associated texts that are provided in the unit.
LAFS.68.RST.3.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	This standard is addressed in every unit of the Physical Science Course, during standard reading lessons, as well as when students read evidence cards and participate in using a simulation that has textual elements such as symbols, graphs and standard text. For example: • In Lesson 4.2 of the Phase Change unit, students are asked to apply content knowledge about phase change to help explain why a liquid oxygen machine is not working. In Activity 2 they examine three claims about this problem, each of which is accompanied by a diagrammatic visual claim. Each visual claim is based on a diagram they encountered and analyzed when they read the article, “Liquid Oxygen” in the previous lesson. Students read and annotate the visual claim diagrams, and are then provided with evidence cards in Activity 3. Students read all sources of information and evidence (claims, visual claims, article and

		evidence cards) in order to make sense of the problem. ● In Lesson 4.1, Activities 2, 3 and 4 of the Magnetic Fields unit, students are introduced to and examine three designs for a faster roller coaster, along with experiments that support these designs. Students read and annotate all relevant documents (three roller coaster designs and accompanying experiments) all of which include complex diagrams and texts that students need to interpret. ● In Lesson 2.3, Activity 2 of the Force and Motion unit, students re-read the article "Designing Wheelchairs" in order to review and consider the concepts to mass, velocity and force as they related a real-life scenario: wheelchairs. They then apply this understanding in Activity 3, where they use the digital Modeling Tool to explain how mass, velocity and force can help explain how a spacecraft moved. The modeling tool offers a visual, graphic way of showing these concepts.
LAFS.68.RST.3.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	This standard is addressed in multiple units of the Physical Science Course. For example: ● In Lesson 4.1, Activity 2 of the Thermal Energy unit, students are introduced to a problem that they need analyze: after a disaster on an island, a company provided the residents with pasteurization kits, yet some residents still got sick. Were the kits faulty, or was something else at fault? Over the course of this and the following lesson (Lesson 4.2) students read, analyze and discuss evidence cards and other related documents in order to determine what happened; they must decide which facts and which opinions use, refute or ignore in order to make a strong argument about what happened on the island.
LAFS.68.RST.3.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	This standard is addressed in every unit of the Physical Science Course. For example: ● In Lesson 2.3, Activity 2 of the Light Waves unit, students re-read the article, "Harvesting Sunlight" to identify different kinds of light that affect plants. This information helps students to understand that there are different kinds of light, and that each kind of light can affect materials in different ways. Next, in Activity 3, students further develop this understanding by using the Light Waves simulation to create different kinds of light in the simulation and investigate their properties. ● In Lesson 1.5, Activity 2 of the Magnetic Fields unit, students re-read a section of the article, 'Earth's Geomagnetism" in order to find evidence about field lines and about how field lines can help to predict if two

		magnets will attract, repel or both. Next, in Activity 3, students continue this investigation and evidence collection using data from the Magnetic Fields simulation. ● In Lesson 3.2, Activity 2 of the Thermal Energy unit, students re-read a section of the article, "Thermal Energy is NOT Temperature," in order to review concepts about average kinetic energy and total kinetic energy. They then use this understanding to a hands-on modeling activity about the same concepts in Activity 3.
LAFS.68.RST.4.10	By the end of grade 8, read and comprehend science/technical texts in the grades 68 text complexity band independently and proficiently.	This standard is addressed in every unit of the Physical Science Course. Every unit has at least 2 embedded articles in them, and students read each article at least two times for different purposes. For example: ● In Lesson 1.4, Activity 2 in the Chemical Reactions unit, students read the article, "Atomic Zoom-In." In the following Lesson, during Activity 3, students re-read a section of the same article in order to focus on understanding the repeating nature of atom groups.
LAFS.68.WHST.1.1	Write arguments focused on discipline-specific content. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. Establish and maintain a formal style. Provide a concluding statement or section that follows from and supports the argument presented.	This standard is addressed in all units of the Physical Science Course. For example: ● In Lesson 4.3, Activity 4 in the Thermal Energy unit, students write arguments about whether the heating instructions for a pasteurization kit that was distributed to an island community after a disaster are actually able to pasteurize water. Students base their arguments on evidence about how the device, which uses concepts of heat (energy) transfer works. This argumentation writing activity is constructed so that students' arguments can contain content from the entire unit. ● During Lessons 4.1 (for example, Activity 3) and 4.2 (for example, Activity 3) of the Force and Motion unit, students consider evidence and claims about how to create a specific kind of crash in a movie, using miniature set pieces. In order to analyze the evidence, students use the content knowledge they have gained throughout the unit about force, mass and velocity. In Lesson 4.3, Activity 4 students write arguments to address the question, "What is the difference between Claire's test of the collision scene where Vehicle 2 fell off the cliff, and the film, Iceworld Revenge, where it did not?" Students base their arguments on the evidence the examined in the previous two lessons. This writing activity is constructed so that students' arguments can contain content from the entire unit.

LAFS.68.WHST.1.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. Use precise language and domain-specific vocabulary to inform about or explain the topic. Establish and maintain a formal style and objective tone. Provide a concluding statement or section that follows from and supports the information or explanation presented.	This standard is addressed in all units of the Physical Science Course. For example: ● In Lesson 4.3, Activity 2 in the Light Waves unit, students begin to prepare to write final arguments by first choosing a claim they want to support in writing. They then organize their thinking using a tool called the Reasoning Tool. Next, students further organize their thinking by examining what they written on the Reasoning Tool and deciding which evidence to include in their writing. All of these activities prepare students to develop a topic with relevant, well-chosen facts. In the instructions for writing their arguments, students are encouraged to directly use the information from each evidence card to support their writing, as they write their arguments in Activity 4. In addition, students are provided with supportive scaffolds such as the Scientific Argument Sentence Starters, which remind students ways to include transitions, clarify relationships among ideas, and maintain cohesion during their writing. ● In Lesson 7, during the activity titled, 'Introducing the Proposal" of the Phase Change Engineering Internship unit, students discuss the rubric that will use to design their proposals, so that they can observe and understand the tone and construction of the arguments they will be writing; the rubric also includes categories that describe the use of relevant, domain specific vocabulary that should be included. Next, students create draft outlines, which receive feedback about the content as well as overall writing and vocabulary use, and in Lesson 8 they revise their proposals based on this feedback. In addition, throughout Lessons 7, 8, and 9, students are reminded to establish and maintain a formal style and objective tone in their proposal writing.
LAFS.68.WHST.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	This standard is addressed in all units of the Physical Science Course. For example: ● In Lessons 7, 8, and 9 of the Phase Change Engineering Internship unit, students are introduced to the task of developing an Engineering Proposal that explains which baby warmer design is best for keeping a newborn baby consistently warm, based on criteria such as material type and cost. Students develop, revise and organize their written proposals during this series of lessons, and consider the style (through examination of a rubric, and after receiving feedback about their proposals) as well as audience (See for example: Lesson 7, Activity

		titled “Outlining Design Decisions”; Lesson 8, Activity titled “Revising Design Decisions”, in which students discuss a rubric for effective scientific communication; and Lesson 9, the Activity titled “Finalizing the Proposal”)
LAFS.68.WHST.2.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.	This standard is addressed in all units of the Physical Science Course. Most units in the Physical Science Course end with a 3-day Science Seminar Sequence. This sequence provides time for students to examine evidence about a novel scientific problem that requires them to use content from the rest of the unit. Students discuss their ideas about this problem in a discourse routine called the Science Seminar, then independently write final arguments based on the thinking they did during the sequence. For example: ● In Lesson 7, during the Activity titled, ‘Introducing the Proposal” of the Phase Change Engineering Internship unit, students review their role as engineering interns and consider the audience to whom they will be addressing their proposals -- their project director. They are introduced to the rubric that will be used to provide feedback about their proposals and, through this, consider the component parts, tone, audience and specific vocabulary needed to write an effective proposal. Next, students write draft proposals, which receive feedback, and in Lesson 8 students revise their proposals based on this feedback (see the Activity titled “Processing Outline Feedback”). ● In Lesson 4.3, Activity 2 of the Force and Motion unit, during which students begin to prepare to write their final arguments. They first choose a claim they want to support in their writing, then use a tool called the Reasoning Tool to consider, analyze, and organize their evidence. In Activity 3, students further organize their thinking by examining what they have done with the reasoning tool and deciding which evidence to include in their writing. All of these activities prepare students to write their arguments in Activity 4. In addition, as they write in Activity 4, students are provided with supportive scaffolds such as Scientific Argumentation Sentence Starters to support their use of appropriate language and tone.
LAFS.68.WHST.2.6	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.	This standard is addressed in all units of the Physical Science Course. For example: ● In Lesson 4.3, Activity 4 in the Thermal Energy Unit (see the Teacher Support note titled Instructional Suggestion: Literacy Note: Additional Modalities for Sharing Arguments) students are presented with

		presentation options for their final argument, including publishing to a class webpage or blog. ● In Lesson 3.4, Activity 3 in the Chemical Reactions unit, students create models to show what they think is happening at the atomic level, to the pipes and the water in the fictitious town (Westfield) that they have been studying. They add text to the model, describing what it is showing. In Activity 4, students use their models to help them publish an argument within the digital platform; the argument is in the form of a report, and explains to the people of Westfield what is happening to their pipes. ● In Lesson 9, across all Activities in the lesson for the Phase Change Engineering Internship unit, students create final, published reports describing the ideal baby warmer that they have been engineering in the unit. The report has several distinct sections and students work on each, while consulting a rubric that guides their work throughout.
LAFS.68.WHST.3.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	This standard is addressed in many units of the Physical Science Course. For example: ● In the Harnessing Human Energy unit, students are challenged to figure out how rescue workers who have to conduct rescues in areas that are far from an energy grid might have access to a sustainable supply of energy. They gather evidence about how this supply could be available over the course of many lessons; Particularly, in Lessons 2.1 and 2.2 students conduct experiments using the Harnessing Human Energy simulation and gather evidence from an article and from energy source cards. In Lesson 2.3 they write explanations about how rescue workers can best meet their energy needs.
LAFS.68.WHST.3.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.	This standard is addressed across the Physical Science Course. For example: ● In every unit, students can use the search function in the Amplify Library to search and find relevant content within articles. ● In Lesson 4.1 of the Magnetic Fields unit, students are asked to decide which one of three designs for a magnetically-driven roller coaster they think is the best, based on evidence. During this lesson (Activity 3) students examine and annotate these designs, and consider accompanying experiments in order to gather evidence for their eventual written arguments. In Lesson 4.2, Activity 2, they collect more evidence through use of the Magnetic Fields simulation. After discussing the evidence for and against each of the three designs with their class in Lesson 4.3, Activity 3, students write arguments that are supported

		through the evidence they've examined and collected during the prior three days. ● In Lesson 3.3, during the Activities titled introducing Quality of Evidence and Evaluating Ed-U-Swivel Evidence from the Harnessing Human Energy unit, students are asked to read and analyze a set of possible evidences, and sort it according to how reliable each source of evidence is. Each piece of evidence comes from a different source, and students evaluate the sources and make conclusions about the inherent biases of each before deciding which data they should rely upon to create arguments later in the lesson. Students use the evidence that they determined is from more quality/less biased sources to prepare for (Activity 3) and write (Activity 4) an argument.
LAFS.68.WHST.3.9	Draw evidence from informational texts to support analysis reflection, and research.	This standard is addressed in all units of the Physical Science Course. For example: ● In Lesson 2.3, Activity 3 of the Thermal Energy unit, students conduct a second read of part of the article "How Air Conditioners Make Cities Hotter." During this read, they collect and record evidence that, along with evidence they gathered from a simulation investigation in Activity 2, allows them determine which claim, out of two provided claims, is most strongly supported by evidence. ● In Lesson 2.3, Activity 2 of the Light Waves unit, students reread the article, "Harvesting Sunlight." After reading, students respond in writing to several questions that ask them to reflect upon and summarize important ideas from the article. Next, in Activity 3, students use this thinking to support an investigation they conduct in the Light Waves simulation. ● In all Science Seminar Sequences, which occur in all core units in the Physical Science Course, students spend either 1-2 days reading, analyzing and participating in research using evidence cards and other sources. Then, at the end of the sequence, students use evidence derived from these sources to support writing final arguments for the unit.
LAFS.68.WHST.4.10	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks,	This standard is addressed in all units of the Physical Science Course. Students write in virtually every lesson, for a wide variety of purposes. Some examples are: ● In Lesson 4.3, Activity 4 of the Force and Motion unit, students write final arguments to culminate their Science Seminar experience. These

	purposes, and audiences.	arguments contain content from the entire unit and serve as a culminating experience for the unit. ● In Lesson 3.6, Activity 3 of the Light Waves unit, students analyze evidence with support of the Reasoning Tool, then use this work to write short arguments in Activity 5, about why skin cancer rates are so high in Australia. ● In Lesson 1.6, Activity 3 of the Phase Change unit, students participate in a writing and discourse routine called Write and Share. In the routine, students are broken into small groups, and each group member receives a different but related prompt. Students write independently for a few minutes then share their written responses and discuss.
LAFS.8.SL.1.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others ideas and expressing their own clearly. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed. Pose questions that connect the ideas of several speakers and respond to others questions and comments with relevant evidence, observations, and ideas. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.	This standard is addressed in all units of the Physical Science Course. Students discuss their thinking in virtually every lesson, for a wide variety of purposes. Some examples are: ● In the Phase Change unit, students discuss every day, with small, medium and large groups. In Lesson 1.2, Activity 2, student pairs watch and discuss videos that introduce them to the concept of phase change. In Lesson 1.6, Activity 3, students participate in the small group discourse routine, Write and Share, where each student in a group receives a unique data source, write about it then share what they learned with their group so that all members can learn something new from the others. In Lesson 3.3, Activity 2, students again use the Write and Share discourse routine to share thinking about attraction between molecules and how this affects phase change. In Lesson 4.2 Student pairs discuss claims and evidence for the entire lesson, and in Lesson 4.3 students participate in a whole-class discussion called the Science Seminar where they work together to discuss claims and evidence about a unique problem where content from the unit is used to discuss and solve the problem.

LAFS.8.SL.1.2	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.	This standard is addressed across multiple units in the Physical Science Course. For example: ● In Lesson 3.3, Activity 2 of the Phase Change unit, students participate in the small group discourse routine, Write and Share. In this activity one student evaluates evidence offered from the Phase Change simulation, one student evaluates evidence from a video that depicts phase change in a substance, and another evaluates evidence from an article students read earlier in the unit. During the discussion, students share what they learned from each source, and discuss what kind of evidence each unique format has to offer. They use all three sources to answer questions from the unit. ● In Lesson 4.1 Activity 2, of the Chemical Reactions unit, students receive evidence from a variety of sources. They discuss and critique each source, evaluating them according to how carefully it was collected and how much detail was involved in describing the observations involved. In Lesson 4.2 students revisit this evidence and discuss its usefulness in supporting or refuting claims.
LAFS.8.SL.1.3	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.	This standard is addressed across multiple units in the Physical Science Course. Most units end with a curricular sequence called the Science Seminar Sequence. This 3-day series of lessons asks students to use content derived throughout the unit and apply it to understanding a new context. Students are presented with competing claims and evidence, then prepare for a whole-class discussion of this evidence. The following offer examples of students discussing claims and evidence and using reasoning: ● In Lesson 4.3, Activity 3 of Chemical Changes students, in a whole-class group format, discuss claims about chemical changes that may or may not have happened at the scene of a crime, and use evidence and reasoning to determine whether there is more convincing evidence to decide which of three suspects likely committed the crime, and which chemical reaction was involved in that crime. During the discussion, students evaluate which evidence is relevant and irrelevant to each claim and evaluate the soundness of the reasoning that each participant offers.
LAFS.8.SL.2.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid	This standard is addressed across multiple units in the Advanced Physical Science Course. Most units end with a curricular sequence called the Science Seminar Sequence, which asks students to apply what they have learned to a new context. Students are presented with competing claims and evidence, then

	reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.	prepare for a whole-class discussion of this evidence. The following offer examples of students coming prepared to discuss a specific, content-specific topic: ● In Lesson 4.3, in the Activity titled ‘Introducing the Science Seminar’ from the Phase Change unit, the class reviews the important social attributes needed to participate effectively in scientific argumentation. In Activity 3 students discuss claims about where in a liquid oxygen tank something went wrong to cause the machine to malfunction. Students use evidence that they have analyzed and discussed during the previous two lessons in order to hold this whole class discussion. ● In Lesson 4.3, in the Activity titled ‘Introducing the Science Seminar’ from the Chemical Changes unit, the class reviews the important social attributes needed to participate effectively in scientific argumentation. In Activity 3 students discuss claims about which of three suspects may have committed a crime, and which chemical reactions would have been involved for each suspect; during the whole-class discussion students use evidence that they have examined during the previous two lessons during the discussion
LAFS.8.SL.2.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.	This standard is addressed in all units of the Physical Science Course. For example: ● In Lesson 4.3, Activity 4 in the Thermal Energy Unit (see the Teacher Support note titled Instructional Suggestion: Literacy Note: Additional Modalities for Sharing Arguments) students are presented with presentation options for their final argument, including a multimedia presentation or video. ● In Lesson 4.3 of the Phase Change unit, students participate in a whole-class Science Seminar discussion. Much of the evidence under discussion comes from several diagrams that students have analyzed in previous lessons and, throughout the discussion in the Science Seminar students reference and discuss these diagrams. ● In Lesson 3.2, Activity 2 of Chemical Reactions, student pairs participate in an activity in which they collect data from the Chemical Reactions simulation. During this activity student pairs are directed to discuss their observations and the data they collect, and to then apply this information to claims they have been considering. In Activity 3 students reread a section of the article, “What Happens When Fuel Burns?”; following this, student pairs discuss what they learned from the reading, then in Activity 4 they discuss what they learned from both the simulation and the article

		with the entire class. ● In Lesson 1.5, Activities 1-4 of the Phase Change unit, students begin by re-reading a section of the article “Weird Water Events” that includes a diagram focused on freedom of movement for molecules at different phases and discuss what they learn with a peer and then with the entire class. They then re-read more of the article so that they can better understand phases and freedom of movement. After discussing with the whole class what they learned about this content from the two reading activities, students are introduced to and complete a digital model where they diagrammatically show their thinking about what happens at a molecular level when a popsicle melts; they use the information they gathered during the reading and discussion conducted in the previous activities to complete the model.
MAFS.6.SP.2.5	Summarize numerical data sets in relation to their context, such as by: Reporting the number of observations. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	This standard is addressed across multiple units in the Physical Science course. For example: ● In the Thermal Energy unit, students use the Thermal Energy digital simulation to examine the behavior of molecules in various samples of material when thermal energy is added or taken away and analyze data the set that results. For example, in Lesson 2.3, Activity 2, students use the sim to investigate what happens at the molecular level when two samples of material of different temperatures are combined. They analyze graphs of their resulting data sets--thermal energy over time and temperature over time--to notice the correlational pattern between molecular speed and thermal energy and to draw conclusions about why molecules change speed. ● In Lesson 2.5, Activity 3, of Light Waves, students investigate multiple data sets: a map that represents hours of bright sunlight per year on different parts of the globe, a map that represents amount of UV light on different parts of the globe, and a graph that shows melanin levels in populations of people living in Australia and Brazil. Students examine what these data sets show and use them to draw conclusions about why the skin cancer rate is higher in Australia than in Brazil.
MAFS.7.SP.2.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences	This standard is addressed in the Thermal Energy unit. In Lesson 1.4, Activity 2, students discuss the concept of an average as they define temperature (a measure of the average speed of the molecules of a thing). In an extended activity (see the Teacher Support tab in part 1 of 4 of the activity, the note titled:

	about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.	INSTRUCTIONAL SUGGESTION: Going Further: Mathematical Thinking), students are introduced to and use measure of center and variability (median, mode, and range) to describe the same data set.
MAFS.7.SP.3.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	This standard is addressed in the Light Waves unit. In Lesson 1.2, Activity 2 (see the Teacher Support tab, note titled “INSTRUCTIONAL SUGGESTION Going Further: Mathematical Thinking), students are prompted to think more about the chances of a person in Australia and a person in the US getting skin cancer. Students are introduced to data about the likelihood of each scenario (e.g., 2 out of every 3 people) and are supported to determine the probability of each event and to compare the two.
MAFS.8.F.2.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	This standard is addressed across multiple units in the Physical Science course. For example: ● In Lesson 3, in the activity titled “Revisiting the Temperature Plateau” of Phase Change Engineering Internship, students analyze two line graphs to understand what happens to energy and temperature when a phase change is occurring. Also in this activity (see the Teacher Support tab), students create a temperature versus time line graph and look for a temperature plateau during phase change of different materials. Students use this information to influence their designs for a baby incubator. ● In the Thermal Energy unit, students use the Thermal Energy digital simulation to examine the behavior of molecules in various samples of material when thermal energy is added or taken away and analyze line graphs that result. For example, in Lesson 2.3, Activity 2, students use the sim to investigate what happens at the molecular level when two samples of material of different temperatures are combined. They analyze line graphs that show thermal energy over time and temperature over time, noticing the correlational pattern between molecular speed and thermal energy. ● In Lesson 2.2, Activity 2 (see the Teacher Support tab) of Magnetic Fields, students calculate the kinetic energy of the spacecraft for each

		launch using the KE = ½ mv2 and a given mass. Students then use the Magnetic Fields Data Tool to input their values and create a graph to visually analyze the relationship between kinetic energy and speed.
MAFS.8.G.3.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	This standard is addressed in the Phase Change unit. In Lesson 3.3, Activity 4 (see the Teacher Support tab), students relate density to volume and practice using formulas to calculate volumes of cones, cylinders, and spheres as they solve a challenge: a space probe collects rock samples of varying shapes and sizes from an asteroid and needs to know the mass of each to understand how much mass total will be added to the space probe.
ELD.K12.ELL.SC.1	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	In every Amplify Science unit, students are supported in developing science vocabulary and scientific language structures in oral discourse and in writing. For example: ● In the Thermal Energy Unit, Lesson 2.1, Activity 3, students use a Word Relationships routine to consider how key vocabulary words relate to one another and to practice forming sentences with these key words. ● In the Magnetic Fields unit, Lesson 4.3, Activity 2, students' use Argumentation Sentence Starters to support their use of scientific language as they discuss claims and evidence about the best design for a roller coaster launcher. ● In the Phase Change Unit, Lesson 4.4, Activity 2, students use a Reasoning Tool graphic organizer as they learn to connect evidence to claims in a written scientific argument.
ELD.K12.ELL.SI.1	English language learners communicate for social and instructional purposes within the school setting.	Student-to-student talk and writing-to-learn are important aspects of the pedagogical approach throughout Amplify Science, and Amplify Science uses a set of research-based principles for supporting English language learners in their oral and written participation: ● Access and build on students' background knowledge. ● Capitalize on students' knowledge of language. ● Provide additional scaffolds for language. ● Provide explicit instruction about the language of science. ● Offer multiple entry points into science content. ● Provide multiple means of expressing science content knowledge. These principles are built into each unit. For example: ● In all units, students have opportunity to express background knowledge orally or in writing (see for example, Thermal Energy, Lesson 1.2, Activity 1, in which students agree or disagree with a set of statements

		to express their prior knowledge). ● In all core units, students use modeling tools to create visual representations of their explanations, providing English learners with an opportunity to express their understanding visually in addition to in writing (see for example, Phase Change, Lesson 1.6, Activity 4) ● Students are provided with scaffolds for oral and written language use, such as sentence starters (see for example, Force and Motion, Lesson 4.2, Activity 2): ● Teachers are provided with suggestions for how to group students in order to support English learners (see for example, Phase Change, Lesson 1.2, in the Differentiation Brief, section titled, “Specific Differentiation Strategies for English Learners”, note titled “Strategically choose partners for English learners.” ● Teachers are encouraged to capitalize on English learners’ language knowledge, for example by point out Spanish-English cognates (see for example, Harnessing Human Energy, Lesson 1.3, in the Differentiation Brief, section titled, “Specific Differentiation Strategies for English Learners”, note titled “Accessing cognates for Spanish-speaking students.”
MAFS.K12.MP.1.1	Make sense of problems and persevere in solving them.	Making sense of problems and persevering in solving them is a common characteristic of Amplify Science units. Each unit begins with a real-world problem that students address over the course of the unit, distilling patterns from data, synthesizing across a variety of evidence sources (e.g., text, tables, and graphs), and creating models to illustrate relationships between ideas. For example: ● In Force and Motion (see Lesson 1.2, the activity titled “The Missing Seconds Video”), students assume the role of student physicists working for the fictional Universal Space Agency. They are called upon to investigate why a space pod failed to dock at a space station. Students tackle this question one piece at a time, drawing on a range of data, including force, velocity, and mass of moving objects, to explain why the space pod collided with the space station and started moving in the opposite direction. ● In Harnessing Human Energy (see Lesson 1.1, the activity titled “Welcome to the Energy Research Lab”), students assume the role of student energy scientists. Students are actively considering, discussing, and reflecting as they work to understand the larger problem of finding a way for rescue workers to get energy to the batteries in their equipment

		during rescue missions. As they persevere in solving this problem, they strategically break it down into smaller parts, look for correspondences between and across quantitative data, and frequently use visual representations and models to investigate scientific ideas. ● In Chemical Reactions (see Lesson 1.2, the activity titled "Investigating a Mysterious Substance"), students take on the role of student chemists to solve multiple mysteries, including why a brown substance is coming out of the water pipes in a neighborhood that gets its water from a well. Students explain this problem by answering smaller questions one at a time. As they do so, they analyze data from text and from the Chemical Reactions sim, as well as chemical equations, to identify trends and draw conclusions about the basic principles of chemistry.
MAFS.K12.MP.2.1	Reason abstractly and quantitatively.	This standard is addressed across multiple units in the Physical Science course. For example: ● In Lesson 1.3, Activity 2 of Harnessing Human Energy (press NEXT to see part 3 of 3 of this activity, and see the Teacher Support tab, the note titled "Instructional Suggestion: Going Further: Mathematical Thinking), students introduced to the mathematical models used to describe the kinetic and potential energy of objects falling in Earth's gravitational field and are asked to calculate the potential energy of student on a skateboard at the top of a hill and the kinetic energy of that same student once the skateboard has rolled to the bottom of the hill. Students decontextualize the problem as they work through the equations and contextualize as they analyze what these values mean in relation to the problem at hand. ● In Lesson 3 of the Phase Change Engineering Internship, the activity titled "Investigating Plateaus in Baby Warmer," students collect data on two different types of materials for a baby incubator to investigate temperature plateaus. Students collect temperature data and then contextualize the data by discussing its meaning (e.g., the material with the longer plateau is transferring thermal energy to the baby at its plateau temperature for a longer period of time).
MAFS.K12.MP.3.1	Construct viable arguments and critique the reasoning of others.	This standard is addressed across multiple units in the Physical Science course. For example: ● In Lesson 1.6, Activity 2 of Magnetic Fields, students use data (field line models) to refute a claim that a misaligned launcher was the cause of a spacecraft traveling so much faster than expected.

		In Lesson 3.3, Activity 3 of Thermal Energy, students analyze evidence (e.g., temperature of water in two heating systems) and collect data by running a test in the Thermal Energy Sim. Students use this data to support a conclusion about which of two heating systems will warm a school more.
MAFS.K12.MP.4.1	Model with mathematics.	This standard is addressed across multiple units in the Physical Science course. For example: - In Lesson 2.2, Activity 2 (see the Teacher Support tab) of Magnetic Fields, students examine the relationship between speed and kinetic energy. They calculate the kinetic energy of a spacecraft for multiple launches. Students then use the Data Tool: Kinetic Energy vs. Speed to create a graph to visually analyze the relationship between kinetic energy and speed. - In Lesson 2.2, Activity 3 of Chemical Reactions, students use physical tokens to explain what occurs at the atomic level when a chemical reaction happens, demonstrating the concept of conservation of matter.
MAFS.K12.MP.5.1	Use appropriate tools strategically.	This standard is addressed across multiple units in the Physical Science course. For example: - In Lesson 3.1, Activity 2 of Magnetic Fields, students examine the relationship between the initial distance between magnets and the distance the magnet travels (Click NEXT to see part 3 of 3 of this activity, then see the Teacher Support tab). Students complete additional tests at different initial distances between magnets and then create a graph using the Data Tool: Force vs. Distance (See Teacher Support tab, in part 3 of 3, Going Further: Mathematical Thinking) that allows them to visualize the relationship between initial distance and distance travelled. - In Lesson 2.1, Activity 2, students use the Thermal Energy sim to to observe the kinetic energy of molecules for a specific purpose: to draw conclusions about what happens at a molecular scale when a material gets hotter.
MAFS.K12.MP.6.1	Attend to precision.	This standard is addressed across multiple units in the Physical Science course. For example: In Lesson 1.4, Activity 3 of Force and Motion, students engage in a firsthand investigation during which they use stronger and weaker forces to launch various objects and compare how different strength forces

		affect the velocities of identical objects. To complete this activity, students must attend precisely to the way they are launching objects, measuring distance, and recording their data. ● In Lesson 2.4, Activity 2 of Thermal Energy, students use the Thermal Energy sim to collect and analyze data about two samples before and after contact in order to discover that energy transfers until all the molecules are moving at about the same speed. To do so, students must closely observe the molecules of the two samples to characterize their behavior, and accurately record and attend to the patterns in the temperature data they collect.
MAFS.K12.MP.7.1	Look for and make use of structure.	This standard is addressed across multiple units in the Physical Science course. For example: ● In Lesson 1.5, Activity 3 of Magnetic Fields, students are tasked with determining how field lines look when magnets repel, attract, or both. They will use this structure to make field line models, which will serve as evidence in support of or against various claims about why a spacecraft was traveling so much faster than expected. ● In the Thermal Energy unit, students use the Thermal Energy digital simulation to examine the behavior of molecules in various samples of material when thermal energy is added or taken away and analyze line graphs that result. For example, in Lesson 2.3, Activity 2, students use the sim to investigate what happens at the molecular level when two samples of material of different temperatures are combined. They analyze line graphs that show thermal energy over time and temperature over time, noticing the correlational pattern between molecular speed and thermal energy. ● In Lesson 1.5, Activity 3 of Chemical Reactions, students read the "Atomic Zoom-In" article, gathering evidence about ethyl butyrate and isovaleric acid. This evidence helps students conclude that substances have different properties because of differences in the atoms or groups of atoms that repeat to make up each substance. Students use this structural understanding to explain how substances are different.
MAFS.K12.MP.8.1	Look for and express regularity in repeated reasoning.	This standard is addressed across multiple units in the Physical Science course. For example: ● In Lesson 1.4, Activity 3 of Force and Motion (see the Teacher Support tab), students collect quantitative data by measuring the time it takes for a jar band to travel 100 cm when propelled by a weak or strong force.

		They can describe the velocity by calculating the speed and indicating the direction of motion. Students gain an understanding of velocity and use quantitative data to determine the relationship between strength of force and size of velocity change. ● In Lesson 2.4, Activity 2 of Thermal Energy, students investigate in the digital sim to explain why energy transfer between two materials stops. Students recognize that as the total energy of one sample in the system decreases, the total energy of the second sample increases, and that the total energy of the system is the same for starting and final; it remains constant. In an extended activity (see the teacher support tab), students construct an equation for the total energy of a system and use the equation to solve for unknowns. ● In Lesson 2.2, Activity 3 of Phase Change, students use the Sim to observe how transfer of energy affects kinetic energy, temperature, and freedom of movement, identifying patterns in the associations between these variables that students can use to explain what occurs when a materials changes phase.