

Subject: Science
Grade Level: 6-8
Course Title: M/J Comprehensive Science 3
Course Code: (#2002100)
Submission Title: Amplify Science: Florida Edition - Comprehensive Science 3
Bid ID: 3347
Publisher: Amplify Education, Inc.
Publisher ID: 13-4125483

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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.8.E.5.1	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.	This standard is addressed in several units. For example: <ul style="list-style-type: none"> • In the Geology on Mars unit, Lesson 4.3, Activity 2, students are introduced to light-years, then calculate the time it would take to travel by spacecraft to other stars. • In the Earth, Moon, and Sun unit in Lesson 1.2, Activity 4. Students read "The Solar System is Huge", an article that describes objects in our solar system—how big they are, how far away they are, and what it would take for humans to visit them
SC.8.E.5.2	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.	This standard is addressed in the Geology on Mars unit, for example: <ul style="list-style-type: none"> • In Lesson 4.2, Activity 2, students analyze an image of the night sky to estimate the number of stars in the Milky Way, and in Activity 3, they analyze the Hubble Deep Field Image to estimate the number of galaxies in the Universe. • In Lesson 4.3, Activity 3, students critique a physical model of the Milky Way in which grains of salt represent stars.
SC.8.E.5.3	Distinguish the hierarchical	This standard is addressed in the Geology on Mars unit, for example:

	relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.	<ul style="list-style-type: none"> • In Lesson 1.1, Activity 2, students analyze data about objects in our Solar System. • In Lesson 4.3, Activity 2, students are introduced to light-years, then calculate the time it would take to travel by spacecraft to other stars. • In Lesson 4.2, Activity 3, they observe the Hubble Deep Field Image and learn that galaxies are composed of billions of stars.
SC.8.E.5.4	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.	This standard is addressed in the Earth, Moon, and Sun unit in Lesson 2.4, Activity 5. Students read the article "Gravity in the Solar System" which discusses how the force of gravity helped form the solar system and continues to hold the solar system together as objects travel in their orbits.
SC.8.E.5.5	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).	<p>This standard is addressed in the Geology on Mars unit, for example:</p> <ul style="list-style-type: none"> • In Lesson 4.1, Activity 3, students analyze a set of Star Cards and classify stars based on data about each star. • In Lesson 4.6, Activity 2, students analyze data about several stars in order to create scientific arguments about the stars' exoplanets. <p>(Note: the Star Cards are printed and included in the unit kit. They can also be viewed in the Resource: Print Materials: 8.5x11 document found with the unit overview. Stars include: Alpha Centauri A, 51-Pegasi, Nu2 Lupi, Rigel A, Zeta Pupis, TRAPPIST-1, Kepler 438, Barnard's Star, Aldebaran, Wolf 1061, EPIC 201367065. Data presented about each star includes color, temperature, diameter, luminosity, sunspots, solar ares, and prominences; distance from Earth; and known planets)</p>
SC.8.E.5.6	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.	<p>This standard is addressed in the Geology on Mars unit. For example:</p> <ul style="list-style-type: none"> • In Lesson 4.1, Activity 3, students analyze a set of Star Cards with data about solar properties. They identify commonalities across the stars in order to create a mental model of the properties that all or most stars have in common. • In Lesson 4.5, Activity 3, students create a physical model of stars with different temperature properties.
SC.8.E.5.7	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the	This standard is addressed in the Geology on Mars unit, Lesson 1.1, Activity 2. Students analyze data about objects in our Solar System using a set of Solar System cards (Note: the Solar System cards are printed and include in the unit kit. They can also be viewed in the Resource: Print Materials: 8.5x11 document found with the unit overview).

	Sun, speed, movement, temperature, and atmospheric conditions.	<p>The objects presented in the Solar System cards are:</p> <ul style="list-style-type: none"> • The sun • Planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Neptune, Uranus • Pluto (a dwarf planet) • Moons: Earth's Moon, Titan, Io, Europa • Rosetta's comet • 4 Vesta (an asteroid) <p>Data about each object presented on the card includes diameter, composition, surface temperature, surface gravity, movement, atmosphere and distance from the sun.</p>
SC.8.E.5.8	Compare various historical models of the Solar System, including geocentric and heliocentric.	This standard is addressed in the Earth, Moon, and Sun unit, Lesson 1.4, Activity 5. Students read "Cosmic Models" which describes how ideas about the Solar System have changed as people discovered new evidence.
SC.8.E.5.9	Explain the impact of objects in space on each other including: the Sun on the Earth including seasons and gravitational attraction the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.	<p>This standard is addressed throughout the Earth, Moon, and Sun unit. For example:</p> <ul style="list-style-type: none"> • In Lesson 2.2, Activity 2, students use a physical model to gather evidence about the cause of changing moon phases. • In Lesson 3.3, Activity 2, students gather evidence about the cause of lunar eclipses from a digital simulation. • In Lesson 2.6, Activity 4, students read "Tides and the Moon" about the cause of tides. • In Lesson 3.1, Activity 5 (press NEXT to see part 2 of 2 of this activity), students read "The Endless Summer of the Arctic Tern" about the causes of seasons. • In Lesson 2.4, Activity 5, students read the article "Gravity in the Solar System" which discusses how the force of gravity helped form the solar system and continues to hold the solar system together as objects travel in their orbits.
SC.8.E.5.10	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.	<p>This standard is addressed across several units. For example:</p> <ul style="list-style-type: none"> • In the Geology on Mars unit, Lesson 3.4, students watch a documentary video called "Rover on Mars" which describes a scientist's investigations that rely on technology. • In the Geology on Mars unit, Lesson 4.4, Activities 2 and 3, students read and discuss "Using Starlight to Investigate Exoplanets", which describes the use of technology to detect different types of light as evidence about stars and planets.

SC.8.E.5.11	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.	This standard is addressed in the Geology on Mars unit, Lesson 4.4, Activities 2 and 3. Students read and discuss “Using Starlight to Investigate Exoplanets”, which describes how scientists detect different types of light as a way to gather evidence about stars and planets.
SC.8.E.5.12	Summarize the effects of space exploration on the economy and culture of Florida.	This standard is addressed in the Geology on Mars unit, Lesson 2.3, Activity 4, when students read “How Space Flight Has Shaped Florida”.
SC.8.L.18.1	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll production of food release of oxygen.	The unit Matter and Energy in Ecosystems is focused on this concept. For example: <ul style="list-style-type: none"> • In Lesson 1.3, Activity 2, students read the article, “Sunlight and Life”, which looks at the effects of varying levels of sunlight on photosynthesis in three very different ecosystems: the Arctic, coral reefs, and tropical rain forests. • In Lesson 1.4, Activity 3, students gather evidence in the Matter and Energy in Ecosystems sim about how plants create energy storage molecules (i.e., glucose).
SC.8.L.18.2	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.	This standard is addressed in the Matter and Energy in Ecosystems unit. In Lesson 2.2, Activity 2, students observe and analyze cellular respiration in a digital simulation. In that same lesson, students create a model of the process of cellular respiration in living things.
SC.8.L.18.3	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.	This standard is addressed in the Matter and Energy in Ecosystems unit. For example: <ul style="list-style-type: none"> • In Lesson 1.5, Activity 3, students use the Matter and Energy in Ecosystems Simulation to investigate ways to affect the flow of matter in an ecosystem. • In Lesson 2.1, Activity 2, students complete a digital Sorting Tool activity to show their ideas about which parts of an ecosystem give off carbon dioxide and which do not. • In Lesson 3.1, Activity 3, students read the article “Carbon in the Global Ecosystem”, focused on the carbon cycle.
SC.8.L.18.4	Cite evidence that living systems	This standard is addressed in the Matter and Energy in Ecosystems unit. For

	follow the Laws of Conservation of Mass and Energy.	<p>example:</p> <ul style="list-style-type: none"> • In Lesson 1.3, Activity 3 (press NEXT to see part 2 of 2 of this activity) students discuss an article called “Sunlight and Life” and make an explicit connection between photosynthesis and the Law of Conservation of Energy. • In Lesson 3.1, Activity 3, students read about how carbon moves through the Earth system. In the next lesson (Lesson 3.2, Activity 3), students play the Carbon Game, simulating the movement of carbon through a closed ecosystem. From these activities, students construct an understanding that the total amount of carbon in a closed ecosystem does not change, and therefore, if the amount of carbon changes in abiotic matter, it must also change in biotic matter. They then learn about the Law of Conservation of Mass and discuss how they saw evidence of this in the Carbon Game.
SC.8.N.1.1	Define a problem from the eighth-grade curriculum using appropriate 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.	<p>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 Matter and Energy in Ecosystems unit, students are investigating why the closed ecosystem in a biodome collapsed.</p> <ul style="list-style-type: none"> • In Lesson 1.2, Activity 2, students use reference materials, the “Biodome Files”, to prepare for their investigations. • In Lesson 1.6, Activity 2, students analyze graphical data about biotic and abiotic factors in order to make an explanation. • In Lesson 3.3, Activity 2, students make a prediction about what happened to missing carbon in the biodome, and use the Matter and Energy simulation to make observations and gather evidence to test their prediction. • In Lesson 4.3, Activity 4, students write a scientific argument in which they defend their conclusions about how carbon moves in an ecosystem. <p>In the Chemical Reactions unit, students are investigating the source of a mysterious substance found in a town’s well water.</p> <ul style="list-style-type: none"> • 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

		<p>“What Happens When Fuels Burn?” to gather evidence to support claims.</p> <p>In the Geology on Mars unit, students are investigating what created a particular channel on the surface of Mars.</p> <ul style="list-style-type: none"> • In Lesson 1.1, Activities 2 and 4, students use reference materials, the Solar System Cards and Rocky Planet Cards, to support their understanding of the context of their investigation. • In Lesson 1.2, Activities 2 and 4, students make systematic observations and comparisons of surface features on Mars and Earth. • In Lesson 2.3, Activity 2, students plan, make predictions about, and conduct an experiment using a stream table to gather additional evidence. • In Lesson 3.4, Activity 2, students write a scientific argument, based on several types of evidence, in which they defend their conclusions about the process that formed the channel.
SC.8.N.1.2	Design and conduct a study using repeated trials and replication.	<p>This standard is addressed in multiple units. For example:</p> <ul style="list-style-type: none"> • In the Phase Change Engineering Internship, Day 5, the activity titled “Testing Incubator Designs”, students design and conduct multiple trials in their iterative testing process. • In the Geology on Mars unit, Lesson 2.2, Activity 3, the class conducts the same investigation on two stream tables and discusses the importance of conducting this investigation twice and the degree of variation that occurs even when the same procedures are followed.
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.	<p>In every unit in Amplify Science, students are supported in using the language of scientific argumentation. For example:</p> <ul style="list-style-type: none"> • 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 Matter and Energy in Ecosystems, Lesson 4.2, Activity 2 for an example). • 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” or Earth, Moon, and Sun, Lesson 4.2, Activity 2 for an example). • In the Geology on Mars unit, Lesson 1.3, in Activity 2 titled “Introducing

		Argumentation, 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.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.	<p>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.</p> <p>For example:</p> <ul style="list-style-type: none"> • In Earth, Moon, and Sun, Lesson 1.4, Activity 5, students read an article, “Cosmic Models” that describes several inaccurate hypotheses about the Solar System then led to further investigations. The teacher explicitly introduces the idea that these ideas were valuable even though they turned out to be inaccurate. • In Matter and Energy in Ecosystems, Lesson 1.6, Activity 4, students revise their models based on new evidence. • 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.	<p>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:</p> <ul style="list-style-type: none"> • Students view a video about scientists conducting a closed-system experiment in Matter and Energy in Ecosystems, Lesson 1.2, the activity titled “Introducing Biosphere 2” • 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”. • Students conduct systematic observations of a physical models in Earth, Moon, and Sun, Lesson 2.2, Activity 2, and of photographs in Geology on Mars Lesson 1.2, Activities 3 and 4.
SC.8.N.1.6	Understand that scientific investigations involve the collection of relevant empirical evidence, the	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 Matter and Energy

	<p>use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.</p>	<p>in Ecosystems unit, students are investigating the question of why the closed-ecosystem biodome failed.</p> <ul style="list-style-type: none"> • Students collect evidence from multiple sources, including text (Lesson 1.4, Activity 2), secondhand quantitative data (Lesson 1.6, Activity 2); simulation data (Lesson 2.3, Activity 3). • Students create and revise models and written explanations based on this evidence (Lesson 1.6, Activity 4; Lesson 2.3, Activity 5; Lesson 3.4, Activity 3 and 4). • Students use a graphic organizer called the Reasoning Tool to organize their evidence (Lesson 4.3, Activity 3) and then write an argument (Lesson 4.3, Activity 4) • In Lesson 3.4, the Activity titled “What’s New at Biosphere 2”, the class reflects on what they have done and how that demonstrates what is involved in scientific investigations. <p>In the Chemical Reactions unit, students are investigating the source of a mysterious substance in a town’s well water.</p> <ul style="list-style-type: none"> • 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. <p>In the Geology on Mars unit, students are investigating what created a particular channel on the surface of Mars.</p> <ul style="list-style-type: none"> • In Lesson 1.2, Activities 2 and 4, students make systematic observations and comparisons of surface features on Mars and Earth. • In Lesson 2.3, Activity 2, students plan, make predictions about, and conduct an experiment using a stream table to gather additional evidence. • In Lesson 3.3, Activity 2, students use a graphic organizer called the Reasoning Tool to organize their evidence • In Lesson 3.4, Activity 2, students write a scientific argument, based on several types of evidence, in which they defend their conclusions about the process that formed the channel. • In Lesson 3.4, Activity 3, the class reflects on what they have done and how that demonstrates what is involved in scientific investigations.
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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 Geology on Mars unit, Lesson 1.3, Activity 2, “Introduction to Argumentation”, 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: <ul style="list-style-type: none"> • In the Geology on Mars unit, Lesson 2.3, Activity 2, students discuss different investigation methods in science. • In the Geology on Mars unit, Lesson 1.3, Activity 2, “Introducing Argumentation”, 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: <ul style="list-style-type: none"> • In the Matter and Energy in Ecosystem unit, Lesson 3.4, Activity 3, students create a model to show their explanation, based on their investigations, of how carbon moves through the different parts of the biodome ecosystem. • 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. • In the Earth, Moon, and Sun unit, Lesson 3.3, Activity 4, students create a model to show their explanation, based on their investigations, of the cause of when and how lunar eclipses occur.

SC.8.N.3.2	Explain why theories may be modified but are rarely discarded.	<p>Students understanding of this idea is supported by discussions of how claims in science, including theories, are constructed and modified. For example:</p> <ul style="list-style-type: none"> • 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” • In Earth, Moon, and Sun, Lesson 1.4, Activity 5, students read an article, “Cosmic Models” that describes progress made at different points in the development of an accurate understanding of the Solar System.
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.	<p>Students get experience with how science can be used in decision-making process in several units. For example:</p> <ul style="list-style-type: none"> • 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.	<p>Students see how political, social, and economic concerns can affect science, and vice versa, across multiple units in the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • In Matter and Energy in Ecosystems, in Chapter 4, students investigate a problem related to how deforestation, while providing space for farmland, also potentially increases carbon dioxide in the atmosphere. (See Lesson 4.1, Activity 2, for the introduction to the problem) • In the Phase Change Engineering Internship, Day 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	<p>This standard is addressed in the Phase Change unit:</p> <ul style="list-style-type: none"> • 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,

	gases.	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.	<p>This standard is addressed in the Phase Change unit:</p> <ul style="list-style-type: none"> In Lesson 1.6, Activity 5, students read an article, “Could This Cat Weigh More Than You?” 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.	<p>This standard is addressed in the Phase Change unit:</p> <ul style="list-style-type: none"> 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 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.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> 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.	<p>This standard is addressed in the Chemical Reactions unit:</p> <ul style="list-style-type: none"> • 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.	<p>This standard is addressed in the Chemical Reactions unit:</p> <ul style="list-style-type: none"> • 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).	<p>This standard is addressed in the Chemical Reactions unit:</p> <ul style="list-style-type: none"> • 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.	<p>This standard is addressed in the Chemical Reactions unit:</p> <ul style="list-style-type: none"> • 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.	<p>This standard is addressed in the Phase Change unit:</p> <ul style="list-style-type: none"> In Lesson 3.4, Activity 4, students read the article “This Is Not an Oxygen Tank”, 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.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> 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.	<p>This standard is addressed in the Chemical Reactions unit:</p> <ul style="list-style-type: none"> 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	<p>This standard is addressed in the Chemical Reactions unit:</p> <ul style="list-style-type: none"> In Lesson 2.3, Activity 5 students analyze a set of data to discover the

	changes.	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.	<p>This standard is addressed in every unit of the Comprehensive Science 3 Course. Students read articles multiple times, for different purposes, in order to gather textual evidence to support science ideas. For example:</p> <ul style="list-style-type: none"> • In Lesson 1.3, Activity 2 of the Matter and Energy in Ecosystems unit, students read the article, "Sunlight and Life." 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 3.2, Activity 3 of the Phase Change unit, students re-read the same article they read during the previous lesson. Students use this reading to understand an important and specific aspect of the content -- why energy transfer does not always result in a phase change. The information they gather from the reading is paired with a hands-on activity they conducted prior to reading in Activity 2; students use both sources as they then use the Phase Change simulation in Activity 4 to better understand how molecular attraction affects whether or not a phase change occurs.
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.	<p>This standard is addressed in every unit of the Comprehensive Science 3 Course. Students read articles multiple times and for every 'second read' students are asked questions to summarize the important ideas from the text. For example:</p> <ul style="list-style-type: none"> • 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. • In Lesson 2.2, Activity 2 of the Geology on Mars unit, students re-read a section of the article, "Investigation Landforms on Venus" in order to

		<p>better understand how earth scientists use evidence from landforms to describe the history of a rocky planet, and how models can provide evidence about surface formations and geologic activity on a planet that is too far away to directly study. Students highlight and note important information as they read, then respond to questions that help 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.</p>
LAFS.68.RST.1.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	<p>This standard is addressed in every unit of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • In Lesson 5, Activities 1-4 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. • 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.
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.	<p>This standard is addressed in every unit of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • In Lesson 4.1, Activity 3 of the Matter and Energy in Ecosystems unit, students read and annotate evidence cards. Each card contains text and graphs. 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.	<p>This standard is addressed in multiple units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • 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 in 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.	<p>This standard is addressed in multiple units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • In Lesson 1.2, Activity 2, of the Matter and Energy in Ecosystems unit, students examine the “Biodome Files” -- a set of texts they will use throughout the unit to understand what happened to the (fictitious) ecosystem trapped inside a biodome. Students are encouraged in this lesson and throughout the unit to consider the authors’ purposes in creating the texts that make up these files. • In Lesson 1, in the Teacher-led 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 (several of whom are fake) and consider the role each participant plays and how this affects the ways they should read associated texts that are provided in the unit. • In Lesson 2.2, during Activity 2 of the Geology on Mars unit, students re-read a portion of the article “Investigating Landforms on Venus” which is about the work that one scientist does with models as part of his work studying Venus. Before reading the class discusses the scientist’s work and why and how he uses models as part of that work as well as why this article, written for this unit, is important for inclusion in the unit. As they read they continue to consider the purposes and usefulness of this work and connect this to other content in the unit; students spend time

		after reading considering these questions as well.
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).	<p>This standard is addressed in every unit of the Comprehensive Science 3 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:</p> <ul style="list-style-type: none"> • In Lesson 4.1, Activity 3 of the Matter and Energy in Ecosystems unit, students read and annotate a set of evidence cards. Each card has both text and a graph and students must incorporate an understanding of each element on the card to fully understand and interpret what the evidence is saying. • 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 3.3, Activities 2 of the Earth, Moon, and Sun unit, students gather evidence from the Earth, Moon, and Sun simulation about the conditions for an eclipse to happen. While conducting each trial on the simulation students need to read and understand the diagrams that are used, and they also need to be able to read and understand the data that is provided for each run of the simulation. Next, in Activity 3, students re-read the article, “An Ancient Machine for Predicting Eclipses” and continue to gather evidence about eclipses. Both sources provide evidence for students to use as they create models of eclipses in Activity 3.
LAFS.68.RST.3.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	<p>This standard is addressed in multiple units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • In Lesson 4.1, Activity 2 of the Chemical Reactions unit, students read and make annotations about possible evidence cards. Some cards have careful, detailed observations on them, while some have opinions and vague descriptions. Students read these cards then discuss them with a partner. Their goal is to discard evidence that is not strong, based on the

		observations that are offered.
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.	<p>This standard is addressed in every unit of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • In Lesson 3.3, Activities 2 of the Earth, Moon, and Sun unit, students gather evidence from the Earth, Moon, and Sun simulation about the conditions necessary for a lunar eclipse to happen. Next, in Activity 3, students re-read the article, “An Ancient Machine for Predicting Eclipses” and continue to gather evidence about eclipses, comparing and contrasting the evidence from each source. Both sources provide evidence for students to use as they create models of eclipses in Activity 4. • In Lesson 2.2, Activity 2, of the Geology on Mars unit, students re-read a portion of the article, “Investigating Landforms on Venus” in order to better understand how the scientist profiled in the article uses models to understand, and collect data about, landforms on Venus. In Activity 3 of the same lesson, students use this understanding to help them see the value in using models to understand landforms on Mars and Earth, and examine a hands-on model from which they then collect data.
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.	<p>This standard is addressed in every unit of the Comprehensive Science 3 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:</p> <ul style="list-style-type: none"> • 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. • In Lesson 1.4, Activity 2 in the Phase Change unit, students read one of four articles from a set called “Weird Water Events”. Students read about phase changes that happen to water on Earth, then discuss what they read with a partner who read the same article. In the following Lesson, during Activity 2, students re-read a section of the same article in order to share what they have learned about water phase changes on Earth with a group of students who read about a different event.
LAFS.68.WHST.1.1	Write arguments focused on discipline-specific content. Introduce claim(s) about a topic or issue, acknowledge and distinguish the	<p>This standard is addressed in all units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • In Lesson 4.3, Activity 4 in the Matter and Energy in Ecosystems unit, students write arguments to address the question Why does

	<p>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.</p>	<p>deforestation lead to increased carbon dioxide in the air? Students base their arguments on evidence about a specific site where deforestation occurred (the site is fictional but realistic). This writing activity is constructed so that students' arguments can contain content from the entire unit.</p> <ul style="list-style-type: none"> • In Lesson 4.3, Activity 4 in the Earth, Moon, and Sun unit, students write arguments to address the question, "During a year, will there be a lunar eclipse of the moon of Kepler-47c?" Kepler-47c is an actual planet that orbits two stars. Students write arguments based on evidence that they examine in the previous two lessons, as well as content knowledge they have gained throughout the unit; the writing activity is constructed so that students' arguments can contain content from the entire unit.
LAFS.68.WHST.1.2	<p>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</p>	<p>This standard is addressed in all units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • 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 the last 4 lessons of this unit, students are reminded to establish and maintain a formal style and objective tone in their proposal writing. • In Lesson 4.3, Activity 1 of the Earth, Moon, and Sun unit, students review what a convincing argument contains. In Activity 2 students prepare to write final unit arguments by completing the Reasoning Tool, a tool designed to support students in using evidence to support an argument. Students then review their work and choose the best evidence to use in their arguments during Activity 3. In Activity 4 the teacher reviews components of a strong scientific argument, then students write their final arguments in class.

	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.	
LAFS.68.WHST.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	<p>This standard is addressed in all units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • 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”) • In Lesson 3.4, Activity 2 of the Geology on Mars unit, students write arguments describing whether they think a channel found on Mars was made from volcanic activity or from running water. They organize their thinking prior to writing, by considering each piece of possible evidence they might use in a tool called the Reasoning Tool. Students are encouraged to consult the work they did with the Reasoning Tool to help them develop and organize their arguments, and are reminded about the style, task, purpose of this kind of writing before they begin.
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.	<p>This standard is addressed in all units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • In Lesson 7, during the Teacher-led 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

		<p>proposal. Next, students write draft proposals, which receive feedback, and in Lesson 9 students revise their proposals based on this feedback.</p> <ul style="list-style-type: none"> • Most units in the Comprehensive Science 3 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. • In Lesson 4.3, Activity 2 of the Earth, Moon, and Sun 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.	<p>This standard is addressed in all units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • In Lesson 4.3, Activity 4 in the Earth, Moon, and Sun 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.	<p>This standard is addressed in many units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> In Lesson 2.3, Activity 4 of the Phase Change unit, students write scientific arguments about what they believe happened to a lake on the moon, Titan: did the lake evaporate or freeze? Students use evidence from the reading and the investigations they have done in the previous lessons to complete their arguments.
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.	<p>This standard is addressed across the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> In every unit, students can use the search function in the Amplify Library to search and find relevant content within articles. The Chemical Reactions unit prioritizes a consideration of strong and weak evidence, based on how careful and detailed the observations were. In Lesson 4.1, Activity 2, students work together to consider which evidence is strongest and therefore most useful, based on this criterion. After discarding observations that did not meet this standard, students further discuss the remaining evidence in Lesson 4.2 and 4.3, then write arguments based on the evidence in Lesson 4.3, Activity 4.
LAFS.68.WHST.3.9	Draw evidence from informational texts to support analysis reflection, and research.	<p>This standard is addressed in all units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> In all Science Seminar Sequences, which occur in most units in the Comprehensive Science 3 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. In Lesson 1.1, Activity 3 of the Geology on Mars unit, students examine cards that provide information about the different parts of each system (atmosphere, hydrosphere, biosphere, geosphere) that makes up the rocky planets in our solar system (Mars, Earth, Venus, Mercury). Students draw information and evidence from these cards and record this information in writing, then share what they learn with their peers.
LAFS.68.WHST.4.10	Write routinely over extended time frames (time for reflection and	This standard is addressed in all units of the Comprehensive Science 3 Course. Students write in virtually every lesson, for a wide variety of purposes. Some

	revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	<p>examples are:</p> <ul style="list-style-type: none"> • In Lesson 4.3, Activity 4 of the Matter and Energy in Ecosystems unit, students write final arguments to culminate their Science Seminar experience. These arguments contain content from the entire unit and serve as a culminating experience for the unit. • 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. • In Lesson 2.2, Activity 3 of the Geology on Mars unit, students record observations of a hands-on model of stream tables.
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.	<p>This standard is addressed in all units of the Comprehensive Science 3 Course. Students discuss their thinking in virtually every lesson, for a wide variety of purposes. Some examples are:</p> <ul style="list-style-type: none"> • 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. • In the Geology on Mars unit, students discuss every day, with small, medium and large groups. In Lesson 1.1, Activity 4, students discuss in partners comparing one sphere (atmosphere, geosphere, biosphere or hydrosphere) for the four rocky planets of our solar system, then return to small groups to discuss what they learn. In Lesson 1.2 students work in pairs to examine what they can find out about the surface of Mars by exploring Google Mars, then share their findings with the entire class. In Lesson 1.3 student pairs work together to examine and make sense of

		evidence about a mysterious object found on Mars, then discuss their findings with the class.
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.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • 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 3, 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.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 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:</p> <ul style="list-style-type: none"> • In Lesson 4.3, Activity 3 of Chemical Reactions, 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. • In Lesson 4.2, Activity 3 of the Earth, Moon, and Sun unit, students participate in a whole-class discussion of what might be causing different

		<p>surface features on Venus. Students use evidence they have examined in the previous lesson during the discussion, and discuss which evidence supports each proffered claim. During the discussion students provide reasoning to support their thinking.</p>
LAFS.8.SL.2.4	<p>Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.</p>	<p>This standard is addressed across multiple units in the Comprehensive Science 3 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 prepare for a whole-class discussion of this evidence. The following offer examples of students coming prepared to discuss a specific, content-specific topic:</p> <ul style="list-style-type: none"> • 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 In Chemical Reactions unit, the class reviews the important social attributes needed to participate effectively in scientific argumentation. In Activity 2 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	<p>Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.</p>	<p>This standard is addressed in all units of the Comprehensive Science 3 Course. For example:</p> <ul style="list-style-type: none"> • 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

		<p>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.</p> <ul style="list-style-type: none"> • 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.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.	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.
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.	<p>In every Amplify Science unit, students are supported in developing science vocabulary and scientific language structures in oral discourse and in writing. For example:</p> <ul style="list-style-type: none"> • In the Matter and Energy in Ecosystems Unit, Lesson 2.3, Activity 4, students use a Word Relationships routine to consider how key

		<p>vocabulary words relate to one another and to practice forming sentences with these key words.</p> <ul style="list-style-type: none"> • 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. • In the Earth, Moon, and Sun unit, Lesson 4.2, Activity 2, students' use Argumentation Sentence Starters to support their use of scientific language as they discuss claims and evidence about whether lunar eclipses are likely in a binary star system
ELD.K12.ELL.SI.1	English language learners communicate for social and instructional purposes within the school setting.	<p>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:</p> <ul style="list-style-type: none"> • 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. <p>These principles are built into each unit. For example:</p> <ul style="list-style-type: none"> • Students are provided with scaffolds for oral and written language use, such as sentence starters (see for example, Matter and Energy in Ecosystems, Lesson 4.3, Activity 4 or Geology on Mars, Lesson 4.6, Activity 3) • 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 or Earth, Moon, and Sun, Lesson 2.4, Activity 4) • 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."
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

		<p>data, synthesizing across a variety of evidence sources (e.g., text, tables, and graphs), and creating models to illustrate relationships between ideas. For example:</p> <ul style="list-style-type: none"> • In Chemical Reactions (see Lesson 1.2, Activity 2), 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. • In Geology on Mars (see Lesson 1.1, the activity titled “Introducing the Student Planetary Geologist Role”), students take on the role of student planetary geologists working to investigate the planet Mars, students search for evidence of past liquid water on the surface to determine habitability of Mars. Students explain this problem by answering smaller questions one at a time. Students compare a channel on Mars to analogous structures on Earth’s surface and use physical models to gather evidence and evaluate whether it supports the claim that flowing liquid water formed the channel.
MAFS.K12.MP.2.1	Reason abstractly and quantitatively.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 course. For example:</p> <ul style="list-style-type: none"> • In Lesson 1.6, Activity 4 of the Matter and Energy in Ecosystems unit, students create a model (using a digital modeling tool) to reason about the relationship between quantities of carbon dioxide, glucose, and photosynthesis in an ecosystem using symbols. Also in this lesson (Activity 2), students analyze graphs to determine how the amounts of sunlight, water, and carbon dioxide has changed in an ecosystem over time. • 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.	Construct viable arguments and	This standard is addressed across multiple units in the Comprehensive Science

1	critique the reasoning of others.	<p>3 course. For example:</p> <ul style="list-style-type: none"> • In Lesson 1.6, Activity 3 of the Matter and Energy in Ecosystems unit, students evaluate a claim using graphical evidence that represents how the amounts of sunlight, water, and carbon dioxide has changed in an ecosystem over time. • In Geology on Mars (see Lesson 3.3, Activity 2 for example), students evaluate evidence and generate arguments about whether flowing water caused a channel to form on Mars. In doing so, students reason inductively about data and make plausible arguments by taking into account the context from which the data arose.
MAFS.K12.MP.4. 1	Model with mathematics.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 course. For example:</p> <ul style="list-style-type: none"> • In Lesson 1.6, Activity 4 of the Matter and Energy in Ecosystems unit, students use a digital modeling tool to show decreasing in carbon dioxide and decrease in energy storage molecules, using a symbol that represent a decreasing quantity. In Lesson 3.3, Activity 2, of that same unit, students use the digital Sim to analyze (using a graph) what happens to the quantity of carbon in an ecosystem when all decomposers die. • 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.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 course. For example:</p> <ul style="list-style-type: none"> • In Lesson 3.3, Activity 2, of the Matter and Energy in Ecosystems unit, students use the digital Sim to strategically alter an ecosystem to observe the effects of those changes on the abiotic parts of that ecosystem. Students use a graph to analyze what happens to the quantity of carbon in an ecosystem when all decomposers die. • In Lesson 1.2, Activity 2 of Geology on Mars, students use an interactive digital tool, Google Mars, to explore the surface of Mars and identify landforms using elevation data that could be evidence that water once flowed on the planet.
MAFS.K12.MP.6. 1	Attend to precision.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 course. For example:</p> <ul style="list-style-type: none"> • In Lesson 1.6, Activity 4 of the Matter and Energy in Ecosystems unit,

		<p>students use a digital modeling tool to show decreasing in carbon dioxide and decrease in energy storage molecules, using a symbol that represents a decreasing quantity.</p> <ul style="list-style-type: none"> • In Lesson 2.3, Activity 2 of Earth, Moon, and Sun, students make models of the moon at different times of month, attending to precision as they consider how much of the moon is visible from different locations.
MAFS.K12.MP.7.1	Look for and make use of structure.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 course. For example:</p> <ul style="list-style-type: none"> • 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. • In Lesson 2.3, Activity 3 of Earth, Moon, and Sun (see the Teacher Support tab), students use the equation for surface area ($SA = 4\pi r^2$) to determine the surface area of the moon. Students use the structure of this equation to determine the total surface area of the moon that is illuminated at different positions on Earth at a particular time.
MAFS.K12.MP.8.1	Look for and express regularity in repeated reasoning.	<p>This standard is addressed across multiple units in the Comprehensive Science 3 course. For example:</p> <ul style="list-style-type: none"> • In Lesson 1.5, Activity 3 (press NEXT to see part 2 of 2 and see the Teacher Support tab, the note titled “Instructional Suggestion: Going Further: Mathematical Thinking) of the Matter and Energy in Ecosystems unit, students make quantitative comparisons for the changes they make in the Matter and Energy in Ecosystems sim by calculating the total amount of glucose produced during the observed amount of time units before and after they make a change to the ecosystem. Students also write an equation for the amount of glucose produced as a function of time and use the function to calculate the total amount of glucose produced for any amount of time. • 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.

