SAUSD 8th Grade Physical Science Curriculum 2014-2015

Unit 1 • Structure and Properties of Matter

**For additional details, see NGSS and full curriculum map*

Big Idea	Atomic and molecular interactions can explain the properties of matter that we see and feel.		
Essential Questions Time Frame 10 Weeks	1. What are the physical characteristics and chemical properties of pure substances? 2. What happens at the molecular level in each state of matter and when matter changes between states? 3. How can particles combine to produce a substance with different properties?		
Common Core Language Standards	**L.8.1.** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking **L.8.2**. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing **L.8.3.** Use knowledge of language and its conventions when writing, speaking, reading, or listening **L.8.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 8 reading and content, choosing flexibly from a range of strategies **L.8.6.** Acquire and use accurately grade-appropriate general academic and domain- specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression		
ELD Standards	NGSS Performance Task	NGSS Clarification Statement	Lab Activities
Part IC-9: Express information and ideas in formal oral presentations on academic topics **Part IC-10:** Write literary and informational texts to present, describe, and explain ideas and information, using appropriate technology **Part IC-11:** Justify opinions or persuade others by making connections and distinctions between ideas and texts and articulating sufficient, detailed, and relevant textual evidence or background knowledge, using appropriate register.	**MS-PS1-1.** Develop models to describe the atomic composition of simple molecules and extended structures. **MS-PS1-3.** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. **MS-PS1-4.** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	**MS-PS1-1** Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms. [***Assessment Boundary****: Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete description of all individual atoms in a complex molecule or extended structure is not required.*] **MS-PS1-3.** Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.] [*Assessment Boundary: Assessment is limited to qualitative information.*] **MS-PS1-4.** Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawing and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.]	• Construct a physical model of simple molecules such as ammonia or methanol. • Write an essay that describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. • Plan and do an investigation that uses physical characteristics and chemical properties to identify an unknown substance. • FOSS Chemical Interactions Kit

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Unit 2 • Chemical Reactions **For additional details, see NGSS and full curriculum map*

Big Idea	Chemical reactions involve regrouping of atoms to form new substances.		
Essential Questions Time Frame 5 Weeks	1. What happens to atoms during chemical reactions? 2. How can you tell if a chemical reaction has taken place?		
Common Core Language Standards	**L.8.1.** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking **L.8.2.** Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing **L.8.3.** Use knowledge of language and its conventions when writing, speaking, reading, or listening **L.8.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 8 reading and content, choosing flexibly from a range of strategies **L.8.6.** Acquire and use accurately grade-appropriate general academic and domain- specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression		
ELD Standards	NGSS Performance Task	NGSS Clarification Statement	Lab Activities
Part IC-9: Express information and ideas in formal oral presentations on academic topics **Part IC-10:** Write literary and informational texts to present, describe, and explain ideas and information, using appropriate technology **Part IC-11:** Justify opinions or persuade others by making connections and distinctions between ideas and texts and articulating sufficient, detailed, and relevant textual evidence or background knowledge, using appropriate register.	**MS-PS1-2.** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **MS-PS1-5.** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. **MS-PS1-6.** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.*	**MS-PS1-2.** Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride. [***Assessment boundary**: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.*] **MS-PS1-5.** Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms that represent atoms. [***Assessment Boundary**: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.*] **MS-PS1-6.** Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could involve chemical reactions such as dissolving ammonium chloride or calcium chloride. [***Assessment Boundary**: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.*]	• Develop a model to describe how the total number of atoms does not change in a chemical reaction. • Plan and do an investigation to determine if a chemical reaction has occurred in common substances (ie melting ice, burning sugar, mixing zinc with HCl) • FOSS Chemical Interactions Kit

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Unit 3 • Energy CCSS Unit of Study Roller Coaster **For additional details, see NGSS and full curriculum map*

Big Idea	Energy can be transferred from one object or system to another.
Essential Questions Time Frame 3 Weeks	1. How does the transfer of energy from one object or system to another affect the interactions of those objects or systems? 2. What is the difference between potential and kinetic energy? 3. What is the relationship between kinetic energy and mass; and between kinetic energy and speed?
Common Core Language Standards	**L.8.1.** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking **L.8.2.** Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing **L.8.3.** Use knowledge of language and its conventions when writing, speaking, reading, or listening **L.8.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 8 reading and content, choosing flexibly from a range of strategies **L.8.6.** Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression

ELD Standards	NGSS Performance Task	NGSS Clarification Statement	Lab Activities
Part IC-9: Express information and ideas in formal oral presentations on academic topics **Part IC-10:** Write literary and informational texts to present, describe, and explain ideas and information, using appropriate technology **Part IC-11:** Justify opinions or persuade others by making connections and distinctions between ideas and texts and articulating sufficient, detailed, and relevant textual evidence or background knowledge, using appropriate register	**MS-PS3-1.** Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. **MS-PS3-2.** Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	**MS-PS3-1.** Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a wiffle ball versus a tennis ball. **MS-PS3-2.** Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Examples of models could include representations, diagrams, pictures, and written descriptions of systems.[***Assessment*** *is limited to two objects and electric, magnetic, and gravitational interactions.*]	• Design and build a Roller Coaster and be able to explain the role of gravity and where kinetic and potential energy reach maximum and minimum values (engineering) • Develop a model that demonstrates energy transfer from one object to another during collision • Plan and do an investigation that demonstrates the relationships between kinetic energy and mass; and kinetic energy and speed and do an investigation to determine the relationships among the energy transferred, type of matter, mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

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Unit 4 • Forces and Interactions

**For additional details, see NGSS and full curriculum map*

Big Idea	The physical interactions between objects and within systems of objects can be explained and predicted.
Essential Questions Time Frame 10 Weeks	1. Why do some objects keep moving? Why do some objects fall to the ground? 2. Why are some materials attracted to each other and other materials not?
Common Core Language Standards	**L.8.1.** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking **L.8.2.** Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing **L.8.3.** Use knowledge of language and its conventions when writing, speaking, reading, or listening **L.8.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 8 reading and content, choosing flexibly from a range of strategies **L.8.6.** Acquire and use accurately grade-appropriate general academic and domain- specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression

ELD Standards	NGSS Performance Task	NGSS Clarification Statement	Lab Activities
Part IC-9: Express information and ideas in formal oral presentations on academic topics **Part IC-10:** Write literary and informational texts to present, describe, and explain ideas and information, using appropriate technology **Part IC-11:** Justify opinions or persuade others by making connections and distinctions between ideas and texts and articulating sufficient, detailed, and relevant textual evidence or background knowledge, using appropriate register	**MS-PS2-1.** Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.* **MS-PS2-2.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **MS-PS2-3.** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-4.** Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. **MS-PS2-5.** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces	**MS-PS2-1.** Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle. [***Assessment Boundary**: Assessment is limited to vertical or horizontal interactions in one dimension.*] **MS-PS2-2.** Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units. [***Assessment Boundary**: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.*] **MS-PS2-3.** Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor. [***Assessment Boundary**: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.*] **MS-PS2-4.** Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system. [***Assessment Boundary**: Assessment does not include Newton's Law of Gravitation or Kepler's Laws.*] **MS-PS2-5.** Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically-charged pith balls. Examples of investigations could include first-hand experiences or simulations. [***Assessment Boundary**: Assessment is limited to electric and magnetic fields, and limited to qualitative evidence for the existence of fields.*]	• Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. • Make a poster or brochure that explains why we should wear seatbelts. • Plan and conduct an investigation to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. • FOSS Force and Motion Kit

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Unit 5 • Space Systems: Earth's Place in the Universe

**For additional details, see NGSS and full curriculum map*

Big Idea	The Earth' motion can explain seasons and eclipses. Gravity is the key force involved in the motions within galaxies and the solar system.		
Essential Questions Time Frame 3 Weeks	1. What is the Earth's place in relation to the solar system, Milky Way galaxy and universe? 2. How can one use models to explain the cyclic nature of tides, seasons and eclipses? 3. How has technology allowed us to explore objects in our solar system and obtain data that support theories that explain the formation and evolution of the universe?		
Common Core Language Standards	**L.8.1.** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking **L.8.2.** Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing **L.8.3.** Use knowledge of language and its conventions when writing, speaking, reading, or listening **L.8.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 8 reading and content, choosing flexibly from a range of strategies **L.8.6.** Acquire and use accurately grade-appropriate general academic and domain- specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression		
ELD Standards	NGSS Performance Task	NGSS Clarification Statement	Lab Activities
Part IC-9: Express information and ideas in formal oral presentations on academic topics **Part IC-10:** Write literary and informational texts to present, describe, and explain ideas and information, using appropriate technology **Part IC-11:** Justify opinions or persuade others by making connections and distinctions between ideas and texts and articulating sufficient, detailed, and relevant textual evidence or background knowledge, using appropriate register	**MS-ESS1-1.** Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. **MS-ESS1-2.** Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. **MS-ESS1-3.** Analyze and interpret data to determine scale properties of objects in the solar system. *These standards are included until CSTs are eliminated from science testing.	**MS-ESS1-1.** Examples of models can be physical, graphical, or conceptual **MS-ESS1-2.** Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students' school or state). [***Assessment Boundary**: Assessment does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.*] **MS-ESS1-3.** Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models. [***Assessment Boundary**: Assessment does not include recalling facts about properties of the planets and other solar system bodies.*]	• Design a model that demonstrates the relationship between the Earth-sun-moon and how this relationship affects eclipses, lunar phases and seasons. • Demonstrate how gravity affects motion and explain how gravity plays a major role in the motions of objects in the solar system and galaxies

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Unit 6 • Waves and Electromagnetic Radiation

**For additional details, see NGSS and full curriculum map*

Big Idea	Waves have characteristic properties.		
Essential Questions Time Frame 3 Weeks	1. What are the characteristic properties and behaviors of waves when they interact with matter? 2. What is the relationship between a wave's amplitude and the amount of energy transferred? 3. How can waves be used to send digital information?		
Common Core Language Standards	**L.8.1.** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking **L.8.2.** Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing **L.8.3.** Use knowledge of language and its conventions when writing, speaking, reading, or listening **L.8.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 8 reading and content, choosing flexibly from a range of strategies **L.8.6.** Acquire and use accurately grade-appropriate general academic and domain- specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression		
ELD Standards	NGSS Performance Task	NGSS Clarification Statement	Lab Activities
Part IC-9: Express information and ideas in formal oral presentations on academic topics **Part IC-10:** Write literary and informational texts to present, describe, and explain ideas and information, using appropriate technology **Part IC-11:** Justify opinions or persuade others by making connections and distinctions between ideas and texts and articulating sufficient, detailed, and relevant textual evidence or background knowledge, using appropriate register	**MS-PS4-1.** Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. **MS-PS4-2.** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. **MS-PS4-3.** Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	**MS-PS4-1.** Emphasis is on describing waves with both qualitative and quantitative thinking. [***Assessment Boundary**: Assessment does not include electromagnetic waves and is limited to standard repeating waves.*] **MS-PS4-2.** Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions. [***Assessment Boundary**: Assessment is limited to qualitative applications pertaining to light and mechanical waves.*] **MS-PS4-3.** Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in wifi devices, and conversion of stored binary patterns to make sound or text on a computer screen. [***Assessment Boundary:** Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.*]	• Design a model (conceptual or physical) that explains the relationship between wave amplitude and energy transferred. • Make a poster or brochure that describes how waves are used to send digital information.

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Unit 7 • HIV Prevention Education

**For additional details, see NGSS and full curriculum map*

Big Idea	It's your responsibility to keep yourself safe from contracting HIV.	
Essential Questions Time Frame 2Weeks	1. What are the causes and consequences of HIV and other Sexually Transmitted Infections (STIs)? 2. What strategies can be used to resist pressures to use drugs or participate in risky behaviors?	
Common Core Language Standards	**L.8.1.** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking **L.8.2.** Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing **L.8.3.** Use knowledge of language and its conventions when writing, speaking, reading, or listening **L.8.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 8 reading and content, choosing flexibly from a range of strategies **L.8.6.** Acquire and use accurately grade-appropriate general academic and domain- specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression	
ELD Standards	California ED CODE	Lab Activities
Part IC-9: Express information and ideas in formal oral presentations on academic topics **Part IC-10:** Write literary and informational texts to present, describe, and explain ideas and information, using appropriate technology **Part IC-11:** Justify opinions or persuade others by making connections and distinctions between ideas and texts and articulating sufficient, detailed, and relevant textual evidence or background knowledge, using appropriate register	**51934(a)** A school district shall ensure that all pupils in grades 7 to 12, inclusive, receive HIV/AIDS prevention education from instructors trained in the appropriate courses. Each pupil shall receive this instruction at least once in junior high school. Shall include the following: **(1)** Information on the nature of HIV/AIDS and its effects on the human body. **(2)** Information on the manner in which HIV is and is not transmitted, including information on activities that present the highest risk of HIV infection. Discussion of methods to reduce the risk of HIV infection. This instruction shall emphasize that sexual abstinence, monogamy, the avoidance of multiple sexual partners, and abstinence from intravenous drug use are the most effective means for HIV/AIDS prevention, but shall also include statistics based upon the latest medical information citing the success and failure rates of condoms and other contraceptives in preventing sexually transmitted HIV infection, as well as information on other methods that may reduce the risk of HIV transmission from intravenous drug use. **(4)** Discussion of the public health issues associated with HIV/AIDS. **(5)** Information on local resources for HIV testing and medical care. **(6)** Development of refusal skills to assist pupils in overcoming peer pressure and using effective decision making skills to avoid high- risk activities. **(3)** Discussion about societal views on HIV/AIDS, including stereotypes and myths regarding persons with HIV/AIDS. This instruction shall emphasize compassion for persons living with HIV/AIDS.	• Role play for refusing to participate in risky behavior. • Make a poster or brochure that describes causes and consequences of HIV and ways to protect oneself from HIV. • Red Cross - Positive Prevention Level A