

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



Integrated Science 8

Board Approval Date:	Course Length: 3 Trimesters
Grading: A-F	Credits: N/A
Proposed Grade Level(s): 8	Subject Area: Science Elective Area (if applicable):
Prerequisite(s): Eighth grade standing	Corequisite(s): N/A
CTE Sector/Pathway: N/A	
Intent to Pursue 'A-G' College Prep Status: No	
A-G Course Identifier: N/A	
Graduation Requirement: No	
Course Intent: Program (if applicable): N/A	

COURSE DESCRIPTION:

This is the last of three courses in the preferred integrated model for science instruction in grades six through eight. In this course, students will have the opportunity to engage in real-world phenomena, ask questions, and seek answers to those questions without regard to disciplinary boundaries. Each unit in this course opens with an integrated phenomena that unites all the interdisciplinary sub-units to address a real-world event through an anchoring phenomena. Each anchoring phenomena is explored in more detail through investigative phenomena. The investigative opportunities provide the schema for students to develop an understanding of the disciplinary core ideas, science and engineering principles, and cross-cutting concepts. As a result, students are able to build a deeper, personal connection to the idea or concept being explored.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Forces	<p>How is an object’s position determined?</p> <p>What is an object’s average velocity?</p> <p>What would the velocity be if an object just moved in a circle every few seconds, returning to its same starting position each time?</p> <p>What is a force?</p> <p>If wind causes air to push on a sail attached to a boat, what force does the sailboat exert even though it’s moving?</p> <p>When wind blows a sail, moving a sailboat that was previously at rest, are the forces balanced or unbalanced?</p> <p>What is friction?</p>	<p>*KWL on anchoring phenomena</p> <p>*Observing phenomena activity</p> <p>*Investigation: Modeling relative motion and reference frames</p> <p>*Investigation: Demonstrating velocity</p> <p>*Investigation: Investigating acceleration</p> <p>*Making sense of phenomena questions</p> <p>*Investigation: Defining and modeling force</p> <p>*Investigation: Applying Newton’s Third Law</p> <p>*Investigation: Solving a problem in a zipline system</p> <p>*Investigation: Understanding net force</p> <p>*Investigation: Applying Newton’s First and Second Laws</p> <p>*Investigation: Planning an investigation of force and mass</p>	<p>*Performance assessment: As the newest engineering for a go-cart company, students will analyze the current go-carts for their safety and fun factor.</p>
2. Mechanical Waves	<p>What is a mechanical wave?</p> <p>What kinds of waves occur in water?</p> <p>What is moving through an ocean to the shore?</p> <p>What is a surface wave?</p> <p>How do objects floating on the water move with surface waves?</p> <p>How is a wave’s frequency determined?</p> <p>How does the frequency of a surface wave impact how quickly an object floating</p>	<p>*KWL on anchoring phenomena</p> <p>*Observing phenomena activity</p> <p>*Investigation: Defining waves</p> <p>*Investigation: Identifying waves</p> <p>*Investigation: Creating wave dances</p> <p>*Making sense of phenomena questions</p> <p>*Investigation: Playing “Simon Says” with waves</p> <p>*Investigation: Measuring</p>	<p>*Performance assessment: Students will design a solution to support a restaurant owner who is concerned about waves crashing on the cliff below his restaurant.</p>

	<p>on the surface reaches the shore? How would wave amplitude impact the movement of a raft floating on wavy water? How would wavelength and frequency affect the raft? What is wave energy? Where does the energy in the ocean's surface waves come from? How do water waves change when they move from deep to shallow water?</p>	<p>wave properties *Investigation: Analyzing wave amplitude and energy *Investigation: Modeling waves in different media *Investigation: Modeling refraction by marching *Simulation: Wave on a string</p>	
<p>3. The Earth-Sun-Moon System</p>	<p>What causes the appearance of the sun rising and setting each day? Why does the amount of sunlight reaching one location on Earth vary seasonally? Does any of the light reaching Earth come from the moon? How is it that we can predict what parts of celestial objects will be hit by sunlight? What causes a solar eclipse? How can a small object block light from a large object? What is the relationship between the green light phenomena and an eclipse?</p>	<p>*KWL on anchoring phenomena *Observing phenomena activity *Investigation: Modeling Earth's rotation *Investigation: Modeling how constellations appear from Earth *Investigation: Modeling how Polaris appears from Earth *Making sense of phenomena questions *Investigation: Modeling the seasons *Investigation: Measuring energy on Earth's surface *Investigation: Explaining the seasons *Investigation: Modeling the moon's motion *Investigation: Modeling the moon's phases *Investigation: Modeling the lit half of the moon *Investigation: Predicting moon phases *Investigation: Modeling an eclipse *Investigation: Modeling the</p>	<p>*Performance assessment: Students will develop a presentation to educate adult-learners about the Earth-sun-moon system.</p>

		<p>moon's orbital plane</p> <ul style="list-style-type: none"> *Investigation: Developing and testing an eclipse model *Investigation: Investigating apparent size of moon and sun 	
4. Light Waves	<p>What is a light ray?</p> <p>What is refraction?</p> <p>What happens to light when it passes through a new medium?</p> <p>How is sunlight refracted in the atmosphere?</p> <p>How does wavelength vary in visible light?</p> <p>What color light does the sun emit?</p> <p>How does a prism spread out the different colors of white light?</p> <p>What type of light is scattered most by nitrogen in the atmosphere?</p> <p>What does the sun appear especially red and yellow during a sunset?</p>	<ul style="list-style-type: none"> *KWL on anchoring phenomena *Observing phenomena activity *Investigation: Discovering a phenomena *Investigation: Modeling light rays and vision *Investigation: Investigating properties of light *Making sense of phenomena questions *Investigation: Developing a model of color *Investigation: Making a rainbow *Simulation: Color Vision 	<p>*Performance assessment: Students will create a light art piece that demonstrates the many amazing properties of light.</p>
5. Noncontact Forces	<p>What are gravitational forces?</p> <p>How is gravity different on Earth and in space?</p> <p>How do spacecraft's orbit the Earth?</p> <p>Why do astronauts look like they are weightless in spacecraft's?</p> <p>How could a power tool work without being plugged into something?</p> <p>What could be the course of power for a power tool not plugged into something?</p> <p>How does the motor of a power drill work?</p>	<ul style="list-style-type: none"> *KWL on anchoring phenomena *Observing phenomena activity *Investigation: Observing falling objects *Investigation: Investigating gravitational force *Investigation: Modeling gravitational fields *Making sense of phenomena questions *Investigation: Investigating static electricity *Investigation: Modeling electric fields *Investigation: Modeling electric currents and circuits *Investigation: Modeling magnetic fields 	<p>*Performance assessment: Students will analyze a drone's motor and explain how it works.</p>

		<ul style="list-style-type: none"> *Investigation: Testing an electromagnet *Investigation: Building a motor *Investigation: Understanding generators 	
6. The Solar System	<p>What two factors influence the strength of a gravitational force? How does gravity contribute to Earth orbiting the sun? Why doesn't Earth fall toward the sun until they collide? Which is the largest terrestrial planet? How is the gravitational force of Earth different than that of Mercury? Would it be any different to drop a power tool while orbiting Mercury rather than on the surface of Mercury? How might Jupiter's radiation affect a power tool? How could you describe the gravitational force of Jupiter?</p>	<ul style="list-style-type: none"> *KWL on anchoring phenomena *Observing phenomena activity *Investigation: Scaling the Earth-sun-moon system *Investigation: Walking the planets *Simulation: Gravity and orbits *Investigation: Designing a space mission *Investigation: Classifying planets *Investigation: Gathering planet data 	<p>*Engineering challenge: Students will design a landing vehicle for an astronaut to land on Mars. *Performance assessment: Students will analyze and interpret data to determine the appropriate classification of a recently discovered celestial body.</p>
7. The Solar System and Beyond	<p>How was gravity involved in the formation of the solar system? What explains why a moon would orbit a planet? Why aren't there objects being pulled into the planets frequently? What is the distance of the closest celestial object to Earth? How close are we to other stars? What fills that space</p>	<ul style="list-style-type: none"> *KWL on anchor phenomena *Observing phenomena activity *Investigation: Modeling gravitational force *Investigation: Evaluating models of solar system formation *Making sense of phenomena *Simulation: Gravity force lab *Investigation: The distance between celestial bodies *Investigation: Mass, 	<p>*Engineering challenge: Students will design a device to help protect the director's camera as it travels into space. *Performance assessment: As a science consultant to a director, students will clarify misconceptions about gravity, critique the current script and provide a new storyline idea.</p>

	<p>between Earth and stars? How likely is it that Earth would crash into a large object that would have a big impact on the Earth?</p>	<p>distance, and gravity in the universe</p>	
<p>8. The History of Life on Earth</p>	<p>When did early Earth's constant bombardment by objects from space stop, and why? How do scientists know that a huge object hit Earth at the time of dinosaurs? What is a mass extinction event? What do scientists think caused the mass extinction of dinosaurs?</p>	<p>*KWL on anchor phenomena *Observing phenomena activity *Investigation: Modeling rock strata *Investigation: Creating a fossil timeline *Investigation: Understanding absolute dating *Making sense of phenomena *Investigation: Interpreting fossils *Investigation: Finding patterns in fossil data</p>	<p>*Engineering challenge: Students will design, test and evaluate a fossil extraction toolset. *Performance assessment: Students will analyze a fossil dig site data to recreate a three-dimensional model of the fossil site.</p>
<p>9. The Evolution of Life</p>	<p>What is Darwin's Theory of Natural Selection? How is the Theory of Natural Selection different than evolution? How is the Theory of Natural Selection related to adaptations? How can natural selection lead to traits that increase survival? How could the ability to run faster to catch more prey impact an animal's ability to survive? How are genes related to traits? What is an allele? What is a mutation and how can it affect traits? What might happen if a mutation caused a cheetah to have bigger leg muscles? What is a species?</p>	<p>*KWL on anchor phenomena * Observing phenomena activity *Investigation: Modeling natural selection *Investigation: Understanding variation in natural selection *Making sense of phenomena *Investigation: Graphing trait changes over time *Investigation: Exploring environmental changes *Investigation: Understanding sexual selection *Investigation: Modeling genes and mutations *Investigation: Understanding mutations *Investigation: Tracking mutations *Investigation: Comparing organisms *Investigation: Finding patterns in development</p>	<p>*Performance assessment: As an evolutionary biologist, students will identify the closest living relative to the whale using available data sets to create an evidence-supported argument.</p>

<p>9. Kinetic and Potential Energy</p>	<p>What is energy and how does food give energy to a living thing? How is energy related to matter? What are the two forms of energy? What kind of energy is present in a cheetah that is moving very fast? What is the relationship between kinetic energy and mass? What is the relationship between kinetic energy and speed? What kind of potential energy is in food? How is the energy in food released? How do cheetahs, and other living things, use the energy in food?</p>	<p>*KWL on anchoring phenomena *Observing phenomena activity *Investigation: Discovering potential energy and kinetic energy *Investigation: Demonstrating energy transformations *Investigation: Relative kinetic energy to mass and speed *Investigation: Testing model wrecking balls *Investigation: Graphing kinetic energy relationships *Investigation: Building a virtual skate park *Investigation: Modeling changes in potential energy *Investigation: Modeling forms of potential energy</p>	<p>*Engineering challenge: Students will design simple instruments as part of a community service project. *Performance assessment: Students will review a “Rube Goldberg” machine and construct arguments regarding energy transformations and provide explanations on the relationship between kinetic energy and mass throughout the machine.</p>
<p>11. Human Impacts on Evolution</p>	<p>What is the difference between natural and artificial selection? How can artificial selection be used to save animals that are not domesticated and live in the wild? What is the difference between changing populations with genetic engineering and changing them with artificial selection? How can genetic engineering be used to save animals that are not domesticated and live in the wild? How is the human population changing? How does human population growth impact fossil fuel use? How does fossil fuel impact</p>	<p>*KWL on anchoring phenomena *Observing phenomena activity *Investigation: Comparing natural and artificial selection *Investigation: Researching artificial selection *Making sense of phenomena *Investigation: Researching genetically modified organisms *Investigation: Modeling resource use *Investigation: Understanding environmental impacts on evolution</p>	<p>*Engineering challenge: Students will design a solution for a local environmental problem using second hand materials. *Performance assessment: As members of a bioethics committee, students will debate the topic of how we should be dealing with rapid environmental changes caused by humans.</p>

	<p>climate change? What is the influence of climate change on polar bears? How does the rate of change in the environment caused by human activities affect organisms' ability to evolve in response?</p>		
12. Thermal Energy	<p>What is the relationship between ice, liquid water, and water vapor? What is required in order to turn ice into water? What is the energy source that is heating the climate and melting ice in polar bears' habitat? Why is thermal energy important for melting solid ice in liquid water? Is direct sunlight the only way to add energy to solid ice? What is another way related to global warming that energy from sunlight could end up contributing to ice melting at the polar caps?</p>	<p>*KWL on anchoring phenomena *Observing phenomena activity *Investigation: Identifying thermal relationships *Investigation: Planning and conducting heat experiments *Investigation: Modeling heat transfer *Making sense of phenomena questions *Investigation: Investigating thermal conductivity *Investigation: Understanding heat capacity *Investigation: Tracking temperature during changes of state</p>	<p>*Performance assessment: Students will design, construct and test a thermos that can be used in the desert.</p>

ESSENTIAL STANDARDS:

MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. (ELA/Literacy CCSS: RST.6-8.1, RST.6-8.7, 6.EE.B.6)

MS-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (ELA/Literacy CCSS: RST.6-8.1, WHST.6-8.8)

MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. (Math CCSS: MP.4, 6.RP.A.1, 6.SP.B.5, 7.RP.A.2)

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. (ELA/Literacy CCSS: SL.8.5 and Math CCSS: MP.4, 6.RP.A.1, 7.RP.A.2)

MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. (ELA/Literacy CCSS: RST.6-8.1, WHST.6-8.1, WHST.6-8.9 and Math CCSS: 6.RP.A.1, 7.RP.A.2, 6.EE.B.6, 7.EE.B.4)

MS-PS2-1. Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.* (ELA/Literacy CCSS: RST.6-8.1, RST.6-8.3, WHST.6-8.7 and Math CCSS: MP.2, 6.NS.C.5, 6.EE.A.2, 7.EE.B.3, 7.EE.B.4)

MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. (ELA/Literacy CCSS: RST.6-8.1 and Math CCSS: MP.2)

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. (ELA/Literacy CCSS: WHST.6-8.1)

MS-PS 3-1. 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. (ELA/Literacy CCSS: RST.6-8.1, RST.6-8.7 and Math CCSS: MP.2, 6.RP.A.1, 6.RP.A.2, 7.RP.A.2, 8.EE.A.1, 8.EE.A.2, 8.F.A.3)

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. (ELA/Literacy CCSS: SI.8.5)

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):

Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.

<http://www.corestandards.org/ELA-Literacy/RST/6-8/>

Link to Framework (if applicable):

Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which reviews and recommends textbooks and other instructional materials to be adopted by the SBE.

<https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter5.pdf>

Link to Subject Area Content Standards (if applicable):

Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.

Link to Program Content Area Standards (if applicable):

Program Content Area Standards applies to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

Board Approved	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
Yes		<i>Bring Science Alive! 8th Grade Integrated</i>	Martin, S., L. Blumenthal, S. Duren, R.	TCI		

			Mikulec, L. Prescott, M. Wetterschneider			
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Other Resource Materials

Supplemental Materials

Board approved supplemental materials (Including but not limited to: Film Clips, Digital Resources, Supplemental texts, DVDs, programs).

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