

SCIENCE K-12 CAPE MAY COUNTY NEW JERSEY (2010)

OBJECTIVE CODE			UNIT CONTENT & PACING	UNIT ESSENTIAL QUESTIONS	UNIT ENDURING UNDERSTANDING WHAT STUDENTS SHOULD KNOW AND BE ABLE TO DO	DIFFERENTIATED ACTIVITIES Tier 1, 2, 3	BENCHMARK ASSESSMENTS
Grade	Standard	Strand					
7-8	5.1 (Vocabulary)	A1	Understanding Scientific Explanation (<i>all year</i>)	What are the core scientific principles that represent the conceptual basis of model-building and facilitate the generation of new and productive questions?	Demonstrate understanding and use of interrelationships among central scientific concepts to revise explanations and to consider alternative explanations.	View 5.1 A1 Differentiated Activity	Science Fair/ Experimental Design Project
		A2		How results of observations and measurements can be used to build conceptual- based models and to search for core explanations?	Use mathematical, physical and computational tools to build conceptual-based models and to pose theories.	Make observations about a box containing an unknown object(s). Use your observations to infer what is inside the box. Discuss your theories with other students.	Performance tasks and scoring rubrics listed by grade level and subject http://pals.sri.com/tasks/tasks5-8.html
7-8	5.1	A3	Understanding Scientific Explanation (<i>all year</i>)	How can predictions and explanations be revised based on systematic observations, accurate measurements and structured data/evidence?	Use scientific principles and models to frame and synthesize scientific arguments and pose theories.	<p>Measure the height of a burning birthday candle every two minutes. Use the data to create a line plot. Use line plot to predict the height of a candle after burning for 5 minutes. Test the prediction.</p> <p>Predict the number of drops of water that will fit on a penny. Test your prediction with a medicine dropper. Find the mean for the class data. Come up with question that can be tested about drops of water on a penny (which holds more heads or tails, new or old penny, etc.) Collect data to answer your question.</p>	Science Fair/ Experimental Design Project Performance tasks and scoring rubrics listed by grade level and subject http://pals.sri.com/tasks/tasks5-8.html

7-8	5.1	B1	Generate Scientific Evidence through Active Investigations <i>(all year)</i>	How is evidence generated and evaluated?	Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.	Equipment Survey- applications Various Labs Make a boat out of a piece of aluminum foil. Test how many pennies the boat can hold before sinking. Modify your design so it can hold more pennies. Test your design against those made by other students.	Science Fair/ Experimental Design Project Performance tasks and scoring rubrics listed by grade level and subject http://pals.sri.com/tasks/tasks5-8.html
		B2		How can mathematics and technology be used to gather, analyze, and communicate results?	Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.		
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7-8	5.1	B3	Generate Scientific Evidence through Active Investigations <i>(all year)</i>	How is collected evidence used to construct and defend arguments?	Use qualitative and quantitative evidence to develop observation based arguments.	Various Lab Activities & Lab Reports	Science Fair/ Experimental Design Project Performance tasks and scoring rubrics listed by grade level and subject http://pals.sri.com/tasks/tasks5-8.html
		B4		How is scientific reasoning used to support scientific conclusions?	Use quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.	Construct tables and graphs	

7-8	5.1	D1	Participate Productively in Science <i>(all year)</i>	What are the social interactions that should occur in the science classroom?	Engage in multiple forms of discussion in order to process, make sense of, and learn from others ideas, observations and experiences.	Paired discussions, group work, debates, role plays, Presentations	Science Fair/ Experimental Design Project Performance tasks and scoring rubrics listed by grade level and subject http://pals.sri.com/tasks/tasks5-8.html
		D2		How can students collaborate in a science classroom?	Engage in productive scientific discussion processes during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and model-building.	Participate in an on-line collaborative project CIESE On-Line Collaborative Projects Students work in teams to find a way to save a gummy worm from “drowning.” Save Fred Activity Review another student’s science project or lab report. Question the student and give constructive criticism. Use the constructive criticism of your own work to improve it.	

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7-8	5.1	D3	Participate Productively in Science <i>(all year)</i>	What are the instruments of measurement that can be used to safely gather accurate information for making scientific comparisons of objects and events?	Demonstrate how to safely use tools, instruments and supplies.	Lab Activities using tools Online- virtual dissections Care for a living organism: plant, terrarium, aquarium, etc.	Science Fair/ Experimental Design Project Performance tasks and scoring rubrics listed by grade level and subject http://pals.sri.com/tasks/tasks5-8.html
		D4		How can organisms be treated humanely, responsibly and ethically?	Handle and treat organisms humanely, responsibly and ethically.		

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7-8	5.2 (Vocabulary)	A1 A2 A3 A4 A5	Properties of Matter	<p>What are the parts that make up matter?</p> <p>What are all substances made of?</p> <p>How can energy alter the behavior of molecules in the different phases of matter?</p> <p>What do scientists consider when organizing the elements on the periodic table?</p> <p>How do the physical and chemical</p>	<p>Explain that all matter is made up of atoms, and give examples of common elements.</p> <p>Analyze and explain the implications of the statement, "all substances are composed of elements."</p> <p>Use the kinetic molecular model to predict how solids, liquids and gases would behave under various physical circumstances such as heating and cooling.</p> <p>Predict the physical and chemical properties of elements based on their position on the periodic table.</p> <p>Identify unknown substances based on</p>	<p>Write a "Wanted" poster for an element describing its properties</p> <p>Use indicators to measure pH, measure pH or acid base combo</p> <p>Separate a mixture using the properties of the substances</p> <p>Organize a periodic table of elements by arranging the elements into groups based on their properties</p> <p>View 5.2 A4 Differentiated Activity</p> <p>http://chemcool.com/</p>	<p>Create Atomic Cookies</p> <p>Separate Mixtures & Explain</p> <p>Building/ drawing molecules</p> <p>Determine the pH for common household liquids</p> <p>http://pals.sri.com/tasks/tasks5-8.html</p>

Differentiated activities are suggestions for teachers. See the hyperlinked, bolded activity for a suggestion on tiered lessons. Click on grade 7-8 for hyperlinked vocabulary.

		A6	properties of products in a chemical reaction, differ from the reactants involved?	data regarding their physical and chemical properties.	Rader's Chem4kids	
		A7	What properties do scientists consider when classifying a substance as a metal or non-metal?	Determine whether a substance is a metal or non metal through student designed investigations.	ProtonDon	
			What indicators can be used to identify an unknown compound as an acid?	Determine the relative acidity and relativity of common acids, such as vinegar or cream of tartar, through a variety of student designed investigations	Science Education at Jefferson Labs	
					Build Atoms Yourself	
					Interactive Periodic Table	

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7-8	5.2	B1	Changes in Matter	What is the law of mass conservation?	Explain, using an understanding of the concept of chemical changes, why the mass of reactants and the mass of products remain the same.	View 5.2 B Differentiated Activity	Make homemade ice cream and explain how it was formed scientifically
		B2		In a chemical reaction, how and why are the products different than the reactants?	Compare and contrast the physical properties of reactants with products after a chemical reaction such as those that occur during photosynthesis and cellular respiration.	Balance Chemical Equations using manipulatives Describe a chemical reaction, measure the mass of products and reactants Design an experiment to test if a variable (temp, size, etc.) affects the rate at which an effervescent tablet dissolves	Potato and hydrogen peroxide explanations Identification of various scenarios as chemical or physical reactions http://pals.sri.com/tasks/tasks5-8.html
						Classic Chembalancer	

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7-8	5.2	C1	Forms of Energy	What is Earth's primary source of energy and what does it provide?	Structure evidence to explain the relatively high frequency of tornadoes in "Tornado Alley."	Put wax on rods of different at different , melt drops of wax of rods, wax at different distances	Design and build a solar cooker
		C2		What are the ways light and thermal energy travel from place to place?	Model a current technology used to capture solar energy for the purpose of converting it to electrical energy.		Illustrate energy chains for various activities http://pals.sri.com/tasks/tasks5-8.html
7-8	5.2	D1	Energy Transfer & Conservation	How is energy transferred from one system to another while the quantity of energy before transfer equals the quantity of energy after the transfer?	Relate the kinetic and potential energies of a roller coaster at various points of its path.	Test pendulum, determine which variables (length, mass, etc) affect the period of swing	Build ,test & explain a functional roller coaster or amusement park ride
		D2		How do the nuclear reactions from the sun affect the energy flow on Earth?	Describe the flow of energy from the sun to the fuel tank of an automobile.	Draw and describe an energy chain (pole vaulter, flashlight, toaster, etc.) Build and test levers using a meter stick and a fulcrum, measure the mechanical advantage EdHeads Compound Machine Amusement Park Physics Simulation – Energy Skate Park Power Play EdHeads Simple Machines	Draw and describe an energy chain http://pals.sri.com/tasks/tasks5-8.html
7-8	5.2	E1	Forces & Motion	How is the speed of an object calculated and how does it affect the motion of an object?	Calculate the speed of an object when given distance and time.	Describe an example of Newton's Laws in your own life	Apply Newton's Three Laws to real-life situations
		E2		What are Newton's Three Laws of Motion?	Compare the motion of an object acted on by balanced forces with the motion of an object acted on by unbalanced forces in given specific scenario.	Bowling using ramp, golf ball Drop different nails down tube into Styrofoam, measure how deep they penetrate Read and interpret distance vs. time graphs Egg drop survive drop	Read and interpret distance vs. time graphs Tell a story illustrating Newton's Three Laws http://pals.sri.com/tasks/tasks5-8.html

						<p>Make a boat out of aluminum foil, test how much weight it can hold</p> <p>Build and test paper airplanes</p> <p>Use toy cars, measure time, distance, calculate speed, test varying slopes and cars</p> <p>Exploratorium – Sports Physics</p> <p>EdHeads Crash Scene Investigation</p>	
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7-8	5.3 (Vocabulary)	A1 A2	Organization and Development	<p>What are the functions of cells in a multicellular organism?</p> <p>How do cells reproduce?</p>	<p>Compare the benefits and limitations of existing as a single-celled organism and as a multicellular organism.</p> <p>Explain how single-celled organism and multicellular organisms reproduce.</p>	<p>View 5.3 A1/A2 Differentiated Activity</p> <p>Describe the parts and functions of a cell, write an analogy of the cell compared to a city or factory</p> <p>Use a microscope to view and draw prepared slides</p> <p>Create a wet mount slide</p> <p>WWW Virtual Library: Microscopy Image Libraries</p>	<p>Edible Cell/ Clay models</p> <p>Performance assessment to act out the cell parts & functions</p> <p>Flip books/ Comic strips for Mitosis</p> <p>Using virtual images identify the parts of cells</p> <p>http://pals.sri.com/tasks/tasks5-8.html</p>

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						<p>Molecular Expressions Virtual Microscopy</p> <p>Discovery Education Virtual Electron Microscope</p> <p>Beyond Books Cell: Down to Basics</p> <p>Cells Alive Website</p> <p>Online Onion Root Tip Mitosis Lab</p>	
7-8	5.3	B1 B2	Matter & Energy Transformations	<p>Where do cells get food to function?</p> <p>How do animals, including humans meet their energy needs?</p>	<p>Relate the energy and nutritional needs of organisms in a variety of life stages and situations, including stages of development and periods of maintenance.</p> <p>Analyze the components of a consumer's diet and trace them back to plants and plant products.</p>	<p>View 5.3 B Differentiated Activity</p> <p>Measure the calories in food (marshmallow, cereal, etc.) by burning the food, heating water, and calculating the calories of energy released</p>	<p>Verbally use the vocabulary to explain processes</p> <p>Construct and use the calorimeter</p> <p>http://pals.sri.com/tasks/tasks5-8.html</p>
7-8	5.3	C1	Interdependence	How can a change on one species impact the rest of the ecosystem?	<p>Model the effect of positive and negative changes in population size on symbiotic pairing such as: producer/consumer, predator/prey, parasite/host, scavenger prey, decomposer/prey.</p>	<p>Use a simulation or role play to demonstrate how limiting factors (food, shelter, etc) and interactions (predator/prey) affect an ecosystem</p> <p>Investigate how camouflage can help a species by coloring paper butterflies, hiding them around the room, and testing which can be found.</p> <p>Write a report about white tailed deer overpopulation in New Jersey. Describe what caused the problem, the consequences, and suggest a solution.</p> <p>Complete a research project on invasive species</p>	<p>Create a graphic organizer to demonstrate the interrelationships of species/ impact of removing a species</p> <p>Horseshoe Crab and shorebird projects</p> <p>Introduced vs. Indigenous Species reports</p> <p>http://pals.sri.com/tasks/tasks5-8.html</p>

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						National Invasive Species Information Center Nowhere to Hide Camouflage Simulation	
7-8	5.3	D1 D2 D3	Heredity and Reproduction	What evidence do you have that proves genetic traits are inherited from your parents? a) How can the recombining of parental genes result in variation of traits among offspring? b) How is it possible for siblings from the same parents to have different genetic traits? What factors can influence an organism's characteristics?	Defend the principle that, through reproduction, genetic traits are passed from one generation to the next, using evidence collected from observations of inherited traits. Explain the source of variation among siblings. Describe the environmental conditions or factors that may lead to a change in a cell's genetic information or to an organism's development, and how these changes are passed on.	Use coin flips to determine the inherited traits of a simulated organism Draw Punnet squares showing the possible outcomes of a cross Build a model of DNA 23 and Me Genetics Testing for Health Nova Online Create a DNA Fingerprint Virtual Fruit Fly Genetics Lab	Analyze Karyotype Mr. Potato head projects Analyze personal phenotypes vs. genotypes Dragon Genetics http://pals.sri.com/tasks/tasks5-8.html
7-8	5.3	E1 E2	Evolution & Diversity	a) What factors play a role in a species chance of survival? b) How can an environmental change lead to changes in characteristics amongst a species of organisms? What anatomical evidence supports the theory evolution?	Organize and present evidence to show how the extinction of a species is related to an inability to adapt to changing environmental conditions using quantitative and qualitative data. Compare the anatomical structures of a species with fossil records to derive a line of decent.	Research an endangered species IUCN Red List of Threatened Species PBS Evolution in Action Simulation Interactive Tree of Life Bio-Alive	Adaptations vs. Mutations Activiites (ie. Forks, Starburst Survivor, bird beaks) Behavioral or structural adaptations- identifications Create their own animal with special adaptations for an environment http://pals.sri.com/tasks/tasks5-8.html

		A3		What two factors contribute to the amount of gravitational pull one object exerts on another?	Predict how gravitational forces between two bodies would differ for bodies of different masses or bodies that are different distances apart.	Model the motion of the sun, earth, and moon using a flashlight and some volunteers	http://pals.sri.com/tasks/tasks5-8.html
		A4		How does the predictable motion of objects such as comets, planets and moons allow scientists to predict their position in the solar system?	Analyze data regarding the motion of comets, planets and moons to find general patterns of orbital motion.	Make a scale model of the solar system that accurately models both the sizes and distances of the planets Astronomy Picture of the Day Space Mysteries	
7-8	5.4	B1	History of Earth	How has life on Earth changed over time?	Correlate the evolution of organisms and the environmental conditions on Earth as they changed throughout geologic time.	Create a timeline of important geologic events on a long strip of adding machine paper	Identify characteristics of general time period
		B2		How do fossils show the evidence of how life and environmental conditions have changed?	Evaluate the appropriateness of increasing the human population in a region based on catastrophic events.		Chronologically place important developments of geologic time http://pals.sri.com/tasks/tasks5-8.html

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7-8	5.4	C1	Properties of Earth Materials	What is the composition of soil and how does it change through each layer?	Determine the chemical properties of soil.	Compare topsoil and subsoil, measure their composition	What is the problem in the garden? Activity
		C2		What are the physical and chemical changes that take place on Earth's materials through weathering and erosion?	Explain how the chemical and physical mechanisms are responsible for creating a variety of landforms.	Make a model river Model wave erosion Identify the properties of rocks and minerals (hardness, density, etc.)	Stations & identifications for the types of weathering http://pals.sri.com/tasks/tasks5-8.html

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7-8	5.4	C3	Properties of Earth's Materials	What is the content of Earth's atmosphere at different levels?	Model the vertical structure of the atmosphere using information from active and passive remote-sensing (e.g., satellites, balloons, and/or ground-based sensors) in the analysis.	Identify the levels of Earth's Atmosphere and provide a characteristic for each layer	Match the layers of the atmosphere with characteristics
7-8	5.4	D1 D2	Tectonics	What are the Earth's layers? What are the major geological events that result from the motion of the plates?	Model the interactions between the layers of Earth. Present evidence to support the arguments for the theory of plate motion.	Compare the structure of the Earth to a model (egg, apple, etc.) Build and test a structure that can withstand an earthquake Triangulate an earthquake epicenter using the arrival times of seismic waves Model seismic waves with a slinky Use clay to model geologic forces and faults IRIS Seismic Monitor National Geographic Forces of Nature	Diagram or construct the layers of Earth Assess a model to determine if it is realistic with the Earth's model Spaghetti Earthquake web quest http://pals.sri.com/tasks/tasks5-8.html

7-8	5.4	D3	Tectonics	How can scientists use Earth's magnetic fields for navigation?	Explain why geomagnetic north and geographic north are at different locations.	Construct a model of the sea floor and the geomagnetic north and south	Model and explain magnetic reversals
7-8	5.4	E1	Energy in Earth Systems	How is the sun's energy responsible for: plant growth, ocean currents, wind circulation, and the water cycle?	Explain how energy from the sun is transformed and transferred in global wind circulation, and the water cycle.	Model ocean temperature and density currents using water and food coloring Demonstrate the water cycle	Interpretation of the water cycle Use appropriate vocabulary
7-8	5.4	F1 F2 F3	Climate & Weather	How do patterns of movement in the atmosphere influence our local weather? What role do oceans and landmasses have on local and global climate? How does the water cycle influence weather and climate?	Determine the origin of local weather by exploring national and international maps. Explain the mechanisms that cause varying daily temperature ranges in a coastal community and in a community located in the interior of the country. Create a model of the hydrologic cycle that focuses on the transfer of water in and out of the atmosphere. Apply the model to different climates throughout the world.	Track a hurricane Research and present a weekly weather forecast, test its accuracy Smog City 2 Interactive Weather Maker Edheads Weather National Geographic Forces of Nature	Model heating of land vs. water and explain results Locate global winds Weather map and predictions http://pals.sri.com/tasks/tasks5-8.html
7-8	5.4	G1 G2	Biochemical Cycles	How does the energy in Earth's oceans affect global climate systems? a) What positive and negative effects can humans have on their immediate environment? b) What is the scientific cause and effect of an environmental issue in your community? c) What is the scientific cause and effect of a global environmental issue?	Represent and explain, using sea surface temperature and maps, how ocean currents impact the climate of coastal communities. Investigate a local or global environmental issue by defining the problem, researching possible causative factors, understanding the underlying science, and evaluating the benefits and risks of alternative solutions.	Make a colored map of ocean temperatures around the world, determine their effects on global climate Measure the temperature changes of water and soil as they are heated and cooled. Investigate local environmental issues. Discuss with a guest speaker from the local, county, or state level. For example: Watershed Ambassadors, local environmental commission, Steve Serwatka New Jersey Nature, Americorps, etc. Write a report about a controversial environmental issue,	Identify and address an environmental concern Community Clean-ups http://pals.sri.com/tasks/tasks5-8.html

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						make the case for both sides, then give your own opinion	
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