

FOLSOM-CORDOVA UNIFIED SCHOOL DISTRICT

GENERAL PHYSICAL SCIENCE

DATE: April, 2008

SCHOOL: Middle Schools

COURSE TITLE: General Science

SUBJECT AREA: Science

PROPOSED GRADE LEVEL(s): Eighth Grade

COURSE LENGTH: One Year

GRADING: A-F

NUMBER OF CREDITS: NA

PREREQUISITES: Eighth Grade Standing

COURSE DESCRIPTION:

The Eighth Grade Middle School Science program emphasizes individual and active learning. This approach focuses on how a learner fits new information into his or her existing bank of knowledge and attitudes so new concepts will be constructed. Students understand the nature of science both as a way of thinking about the world and as a process. An integration of science, technology, and society will be emphasized to extend the study of science into the student's own home and neighborhood. This program reflects the current state science standards for Eighth grade. Science can be organized in many ways; those presented here should be regarded as only some of the ways the concepts of science may be integrated into a curriculum that spans scientific disciplines. Each grade level includes investigation and experimentation as it relates each of the subject area/standards covered. The subject areas covered as follows:

- **Motion**
- **Forces**
- **Structure of Matter**
- **Earth in the Solar System**
- **Reactions**
- **Chemistry of Living Systems**
- **Periodic Table**
- **Density and Buoyancy**
- **Investigations and Experimentation**

GENERAL GOALS/PURPOSES:

Science is an active enterprise, made so by our human capacity to think. Scientific knowledge grows as scientists think about the natural world, act on that knowledge in planned ways, and then develop thoughtful explanations of the results. The knowledge of science is its content. There is continual dynamic interaction between the content of science and the thinking processes that characterize the scientific enterprise. The content of science consists of a highly structured, complex set of facts, hypotheses, and theories in a context where many observations have meaning. Theory development is progressive; theory suggests further observations that often make possible further elaboration and testing of the theory.

Scientists use their senses and extensions of their senses to see, touch, and otherwise view the world, observing its characteristics and behaviors as objectively as possible. Scientists describe and picture what they observe in various ways, thus communicating their ideas to others so that they can exchange views and interpretations and pass along information. They test what they know against what they do not yet know, comparing features and

behaviors for similarities and differences. Scientists organize their understandings, ordering and categorizing them into broader, more general groupings and classifications. They study the interactions among objects and describe the events, relating factors that reveal deeper insights into causes and effects. Scientists hypothesize and predict what will happen based on accumulated knowledge and on the events they expect to take place, inferring something that they have not seen because it has not yet happened or because it cannot be observed directly. And as knowledge grows through the use of these scientific thinking processes, scientists develop expertise, applying both knowledge and processes for useful purposes, to make still further extensions of the explanatory power of theory and to perceive fresh possibilities.

STUDENT READING COMPONENT:

The goal of reading in science is to blend scientific knowledge and process with reading strategies to create scientifically literate students.

The reading strategies emphasize upcoming key concepts in order to guide and ensure comprehension of the material.

Methods to be used may include, but are not limited to, guided reading, supplemental reading worksheets, vocabulary building activities, oral reading, and periodic comprehension checks.

STUDENT WRITING COMPONENT:

Students will be expected and encouraged to express themselves in complete sentences, with correct capitalization and punctuation, and correct spelling. While students will be expected to meet these standards to the best of their ability, they will be evaluated primarily on the content and quality of their work.

STUDENT ORAL COMPONENT:

Students will be engaged in meaningful science programs that stretch their content of understanding and their abilities to communicate their reasoning and problem solving through various methods such as team reporting and oral presentations.

DETAILED UNITS OF INSTRUCTION:

The following time line for instruction is a guide only. As the students become actively involved in exploring science concepts and processes that are part of each unit, the time line will be adjusted to allow for student-initiated learning activities and projects. In these cases, subsequent units may be shortened. While all standards will be covered, timelines are flexible.

Differentiation of units of instruction is delineated in the standards.

Motion (4 weeks)

California science standards:

- The velocity of an object is the rate of change of its position. As a basis for understanding this concept, students know:
 - Position is defined relative to some choice of standard reference point and a set of reference directions.
 - Average speed is the total distance traveled divided by the total time elapsed. The speed of an object along the path traveled can vary.
 - How to solve problems involving distance, time, and average speed.
 - To describe the velocity of an object one must specify both direction and speed.
 - Changes in velocity can be changes in speed, direction, or both.
 - How to interpret graphs of position versus time and speed versus time for motion in a single direction.

Vocabulary from California science standards: reference point, speed, average speed, velocity, motion.

Correlates to Prentice Hall California Physical Science chapters 9, 12, 13, 14, 15

Forces (5 weeks)

California science standards:

- Unbalanced forces cause changes in velocity. As a basis for understanding this concept, students know:
 - A force has both direction and magnitude.
 - When an object is subject to two or more forces at once, the effect is the cumulative effect of all the forces.
 - When the forces on an object are balanced, the motion of the object does not change.
 - How to identify separately two or more forces acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction.
 - When the forces on an object are unbalanced the object will change its motion (that is, it will speed up, slow down, or change direction).
 - The greater the mass of an object the more force is needed to achieve the same change in motion.
 - The role of gravity in forming and maintaining planets, stars and the solar system.

Vocabulary from California science standards: force, unbalanced forces, balanced forces, static object, gravity, elastic force, tension, compression, friction

Correlates to Prentice Hall California Physical Science chapters 9, 10, 11, 12, 13, 14, 15

Structure of Matter (7 weeks)

California science standards:

- Elements have distinct properties and atomic structure. All matter is comprised of one or more of over 100 elements. As a basis for understanding this concept, students know:
 - The structure of the atom and how it is composed of protons, neutrons and electrons.
 - Compounds are formed by combining two or more different elements. Compounds have properties that are different from the constituent elements.
 - Atoms and molecules form solids by building up repeating patterns such as the crystal structure of NaCl or long chain polymers.
 - The states (solid, liquid, gas) of matter depend on molecular motion.
 - In solids the atoms are closely locked in position and can only vibrate, in liquids the atoms and molecules are more loosely connected and can collide with and move past one another, while in gases the atoms or molecules are free to move independently, colliding frequently.
 - How to use the periodic table to identify elements in simple compounds

Vocabulary from California science standards: matter, element, atom, proton, neutron, electron, compound, properties (chemical and physical), molecule, solid, liquid, gas, molecular motion, periodic table.

Correlates to Prentice Hall California Physical Science chapters 2, 3, 4, 5, 6, 8

Earth in the Solar System (Earth Science) (4 weeks)

California science standards:

- The structure and composition of the universe can be learned from the study of stars and galaxies, and their evolution. As a basis for understanding this concept, students know:
 - Galaxies are clusters of billions of stars, and may have different shapes.
 - The sun is one of many stars in our own Milky Way galaxy. Stars may differ in size, temperature, and color.
 - How to use astronomical units and light years as measures of distance between the sun, stars, and Earth.

- Stars are the source of light for all bright objects in outer space. The moon and planets shine by reflected sunlight, not by their own light.
- The appearance, general composition, relative position, size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.

Vocabulary from California science standards: galaxy, star planet, moon, asteroid, comet.

Correlates to Prentice Hall California Physical Science chapters 12, 13, 14, 15

Reactions (7 weeks)

California science standards:

- Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept, students know:
 - Reactant atoms and molecules interact to form products with different chemical properties.
 - The idea of atoms explains the conservation of matter: in chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.
 - Chemical reactions usually liberate heat or absorb heat.
 - Physical processes include freezing and boiling, in which a material changes form with no chemical reaction.
 - How to determine whether a solution is acidic, basic or neutral.

Vocabulary from California science standards: reactant, product, conservation of matter, chemical reaction, physical process, acid, base, neutral.

Correlates to Prentice Hall California Physical Science chapters 2, 3, 6, 7, 8

Chemistry of Living Systems (Life Science) (2 weeks)

California science standards:

- Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept, students know:
 - Carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms.
 - Living organisms are made of molecules largely consisting of carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur.
 - Living organisms have many different kinds of molecules including small ones such as water and salt, and very large ones such as carbohydrates, fats, proteins and DNA.

Vocabulary from California science standards: carbon, living organism, carbohydrate, fat, protein, DNA.

Correlates to Prentice Hall California Physical Science chapters 4, 8, 14.

Periodic Table (5 weeks)

California science standards:

- The organization of the Periodic Table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept, students know:
 - How to identify regions corresponding to metals, nonmetals and inert gases.
 - Elements are defined by the number of protons in the nucleus, which is called the atomic number. Different isotopes of an element have a different number of neutrons in the nucleus.
 - Substances can be classified by their properties, including melting temperature, density, hardness, heat, and electrical conductivity.

Vocabulary from California science standards: regions, periods, families, metals, nonmetals, inert gases, isotopes, nucleus, melting temperature, density, hardness, heat and electrical conductivity.

Correlates to Prentice Hall California Physical Science chapters 2, 3, 4, 5, 13

Unit 8 - Density and Buoyancy (2 weeks)

California science standards:

- All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept, students know:
 - Density is mass per unit volume.
 - How to calculate the density of substances (regular and irregular solids, and liquids) from measurements of mass and volume.
 - The buoyant force on an object in a fluid is an upward force equal to the weight of the fluid it has displaced.
 - How to predict whether an object will float or sink.

Vocabulary from California science standards: mass, volume, density, buoyant force, displacement.

Correlates to Prentice Hall California Physical Science chapters 1, 3, 11

Investigation and Experimentation

This standard is introduced is embedded in the curriculum throughout the year.

California science standards:

- Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content the other three strands, students should develop their own questions and perform investigations. Students will:
 - Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
 - Utilize a variety of print and electronic resources (including the World Wide Web) to collect information as evidence as part of a research project.
 - Communicate the logical connection among hypothesis, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
 - Construct scale models, maps and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).
 - Communicate the steps and results from an investigation in written reports and verbal presentations.

This standard shall be met by incorporating activities into lessons throughout the seventh grade science program.

(This standard is found throughout the text and ancillary materials.)

THIS COURSE WILL PREPARE STUDENTS FOR THE CAHSEE AND/OR THE FCUSD EXIT EXAMS:

Science

LAB FEE IF REQUIRED:

None

SUBJECT AREA CONTENT STANDARDS TO BE ADDRESSED:

See Detailed Units for Instruction for Seventh Grade Science Standards.

DISTRICT ESLR's TO BE ADDRESSED:

Students will be:

Self-Directed Learners: This course prepares students to be self-directed learners as they pursue mastering major concepts in investigation and experimentation, cell biology, genetics, evolution, earth sciences, structure, function, and physical principals in living systems.

Effective Communications: This course prepare students to be effective communicators as they complete the writing and oral components of this class.

Quality Producers/Performers: This course prepares students to be quality producers and performers by initiating projects, setting quality standards, and adapting to changing conditions.

Constructive Thinkers: This course prepares students to be constructive thinkers with lab assignments that require them to synthesize, apply, and analyze information, applying the concepts to other situations.

Collaborative Workers: Lab activities and other projects are done in cooperative groups. Students need to be collaborative workers in order to complete these tasks efficiently.

Responsible Citizens: This course will help prepare students to be responsible citizens by using life science knowledge and scientific inquiry skills to make informed decisions about issues related to life science and biotechnology.

APPENDIX I

Assessment Resources in Prentice Hall California Science

1. Progress Monitoring Assessments:
 - Diagnostic tests
 - Reading checkpoints
 - Caption Questions
 - Section Assessments

2. Summative Assessments:
 - Chapter tests
 - Unit Assessments
 - Benchmark tests
 - Midyear exam
 - End-of-year (Outcome) exam

3. Online Self-Assessment Tools for students
 - Chapter review
 - Active Art
 - Success Tracker

4. ExamView® Test Bank